Land & Resource Management Plan for the Mt. Baker-Snoqualmie NF

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Record of Decision

United States
Department of
Agriculture

Summary

Forest
Service

Pacific
Northwest
Region

Final Environmental Impact Statement

Land and Resource Management Plan

Mt. Baker-Snoqualmie National Forest

Dear Reader,

You have received the "Summary Packet" of information for the Mt. Baker-Snoqualmie National Forest, Land and Resource Management Plan (the Forest Plan). This packet includes the 72-page Summary of the Final Environmental Impact Statement, the Record of Decision, and a set of maps for eight alternatives and various forest resources.

The Summary (with glossary) provides a concise version of the 750-page Final Environmental Impact Statement. The Record of Decision, signed by Regional Forester John F. Butruille, explains the actual decision made for management of the Mt. Baker-Snoqualmie National Forest, plus the rationale for that decision. These two documents, plus the maps, will provide you with the basic information needed to understand the final decision.

These documents were sent either at your request, or because you commented on the Draft Environmental Impact Statement and Proposed Forest Plan.

If, after reviewing the "Summary Packet" and maps, you are interested in the detailed information contained in the complete set of documents, there are several options available to you.

The complete set of documents includes:

- the 750-page Final Environmental Impact Statement;
- two volumes of appendices, totaling 1,800 pages;
- and the 550-page Land and Resource Management Plan.

You may check out a complete set of documents from most Puget Sound area university, public, and community libraries. Two week "loaner" copies are also available from all Mt. Baker-Snoqualmie National Forest offices. You may also request a full set of documents from the Mt. Baker-Snoqualmie National Forest Supervisor's Office. The office is currently located in downtown Seattle, but will be relocating to Mountlake Terrace later this summer.

Mt. Baker-Snoqualmie National Forest - Supervisor's Office
1022 First Avenue
Seattle, WA 98104 Phone 442-5400

New Address, Late Summer 1990: 21905 - 64th Avenue West
Mountlake Terrace, WA 98043

SUMMARY

Final Environmental Impact Statement
Land and Resource Management Plan
Mt. Baker-Snoqualmie National Forest

PART 1 - INTRODUCTION

This Final Environmental Impact Statement (FEIS) discusses the alternative strategies for future management of the land and resources of the Mt. Baker-Snoqualmie National Forest. The preferred alternative is developed into the accompanying Land and Resource Management Plan (the Forest Plan). The Record of Decision describes the decision to implement the Forest Plan and the rationale for that decision. While the Forest Plan will guide the management of the Forest for the next 10 to 15 years, the analysis covers a planning horizon of 150 years to evaluate and display the long-term effects of current actions.

The Draft Environmental Impact Statement (DEIS) and Proposed Land and Resource Management Plan were released for public review and comment in December, 1987. This FEIS and Forest Plan were developed in response to those comments and incorporates many suggestions made by the public and other agencies. Changes that were made between the DEIS and FEIS are described throughout the document and highlighted at the beginning of each chapter.

This is a general summary of the entire FEIS. It emphasizes the issues and concerns raised by the public, other agencies, and Forest Service personnel regarding management of the Mt. Baker-Snoqualmie National Forest. This summary is arranged in a slightly different order to facilitate understanding by the general reader. **Part 1** includes a brief discussion of the public responses to DEIS, the changes made between the DEIS and FEIS, the purpose and need for the proposed action, and a description of the affected environment. In **Part 2**, the major issues, concerns, and opportunities (ICO's) are presented.

Part 3 includes descriptions of eight alternatives; a goal statement is given for each and the "design criteria" that were used to develop each alternative are described. **Part 4** is a condensed version of Chapter IV of the FEIS: the environmental consequences of implementing the alternatives.

Public Response to the DEIS

On December 30, 1987 the DEIS and Proposed Forest Plan were released to the public. Copies were distributed to government agencies, libraries in the greater Puget Sound area, and interested members of the public. A "Public Summary" package, which included alternative and resource maps, was sent to several thousand individuals. Public open houses were held in 11 cities in the Puget Sound area; news releases inviting the public to attend were printed and circulated in area newspapers.

The Forest received nearly 12,000 responses to the DEIS during the 115 day review period. The most popular form used to comment was a response form (prepared by a public interest group) (67%), followed by personal letters and cards (30%), and other form letters (2%). Most replies came from the

five-county area of influence for the Forest; refer to the vicinity map, Figure S-1. Nearly half of the responses came from the Seattle-Tacoma-Everett metropolitan area.

The Interdisciplinary Planning Team read and considered every response. A detailed content analysis process was used for coding and analyzing the input received. This allowed the team to report what the public said, in their words. The results of this analysis were very useful in moving from a draft to final plan; most of the changes between the DEIS and FEIS are in response to public comment. A summary of the complete analysis of comments, plus the Forest Service responses to substantive comments can be found in Appendix J, FEIS.

Three alternatives generated the most comment: support for the Public Land Users Society (PLUS) Alternative (as outlined in their input); support for Alternative G, as presented in the DEIS but with the addition of Backcountry areas and more trails; and opposition to Alternative H, the Forest Service preferred alternative in the DEIS.

The comments on issues within the 12,000 responses were numerous and varied. Over 68,000 individual comments related to recreation and trails opportunities and uses. An additional 15,000 comments focused on timber; 14,000 on the northern spotted owl and other wildlife; and 4,000 related to old growth. Other issues generating considerable response included: roads, wild and scenic rivers, roadless areas, the cumulative effects of management activities, water quality and fisheries, jobs, log exports, and wide variety of technical planning process comments.

There were only two areas of general consensus: recreation (of all types) is a vitally important function of the Mt. Baker-Snoqualmie. Secondly, more trails are needed; opinion varied on who should use those trails. Strongly-voiced opinions on all sides of these issues were stated.

Changes Between Draft and Final

The tremendous public response to the DEIS provided the Forest with a wealth of suggestions for improvements about how to provide more benefits to the public. These ranged from broad conceptual approaches to specific technical changes.

Beginning with the DEIS Preferred Alternative (H), Alternative J was developed to respond to public comments and new information. This is the preferred alternative in the FEIS; it is described below, in Part 3.

A new alternative is included in the FEIS; Alternative I was developed to respond to the goals put forth in the PLUS response. Alternative G has been modified, to better reflect the comments received; it is Alternative G-Modified in the FEIS. Several alternatives included in the DEIS are not displayed in the FEIS, as they received little support in comments and are not needed to provide a full range of alternatives for analysis.

The issues, concerns, and opportunities were refocused, to reflect public comment. Wild and Scenic Rivers is now a major ICO, based on the comments.

New timber yield tables and technical corrections were made to the FORPLAN computer model in response to public comments.

The management requirements (MR's) were revisited. Spotted Owl Habitat Areas changed to meet the Record of Decision for the Final Supplement to the EIS for an Amendment to the Pacific Northwest Regional Guide. MR's for mountain goats were enlarged, and deer and elk MR's were dropped to meet regional direction. An analysis of the condition of the Forest's watersheds was conducted; this formed the basis for a method to meet water quality and riparian area MR's. The procedure was developed in response to public comments.

The wild and scenic river eligibility process was redefined, also in response to public input. A committee was formed for this task, and it included representatives from several groups and Washington State agencies.

Proposed vegetative management in the Mt. Baker-Snoqualmie National Forest FEIS and Forest Plan is consistent with the FEIS for Managing Competing and Unwanted Vegetation, Pacific Northwest Region (released in December, 1988).

Finally, some data have been updated (such as the acres of timber harvested) since the DEIS was issued, new fisheries values were calculated, more discussion has been added to the diversity of plant and animal communities sections, and errors and omissions have been corrected.

Purpose and Need

The purpose of the Forest Plan is to direct all natural resource management activities on the Mt. Baker-Snoqualmie National Forest. The preferred alternative is the basis for the Forest Plan document. Preparation of the Land and Resource Management Plan is required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA), plus the associated Planning Regulations (36 CFR 219).

The preparation of an environmental impact statement disclosing a preferred alternative and a broad range of additional alternatives is required by the National Environmental Policy Act of 1969 (NEPA) and its implementing regulations (40 CFR 1500), and the implementing regulations of NFMA. For purpose of disclosure under NEPA, this FEIS and the accompanying Forest Plan are treated as combined documents.

The Planning Period

The Forest Plan period is ten to fifteen years. Throughout this document, projections beyond that time are provided for informational purposes. The Forest Service is required to revise the plan within 15 years of its adoption.

Current Management Situation

The Mt. Baker-Snoqualmie National Forest is currently managed under several different plans. Examples of these include Timber Management Plans, District Multiple Use Plans, and the Glacier Peak Wilderness Management Plan. The Forest Plan supersedes or incorporates all previous land and resource management plans; the Alpine Lakes Land Area Management Plan and the Skagit Wild and Scenic River Management Plan will be incorporated into the Plan. Upon implementation, all Forest management activities will comply with the Forest Plan. Appropriated budgets may alter the schedule of activities.

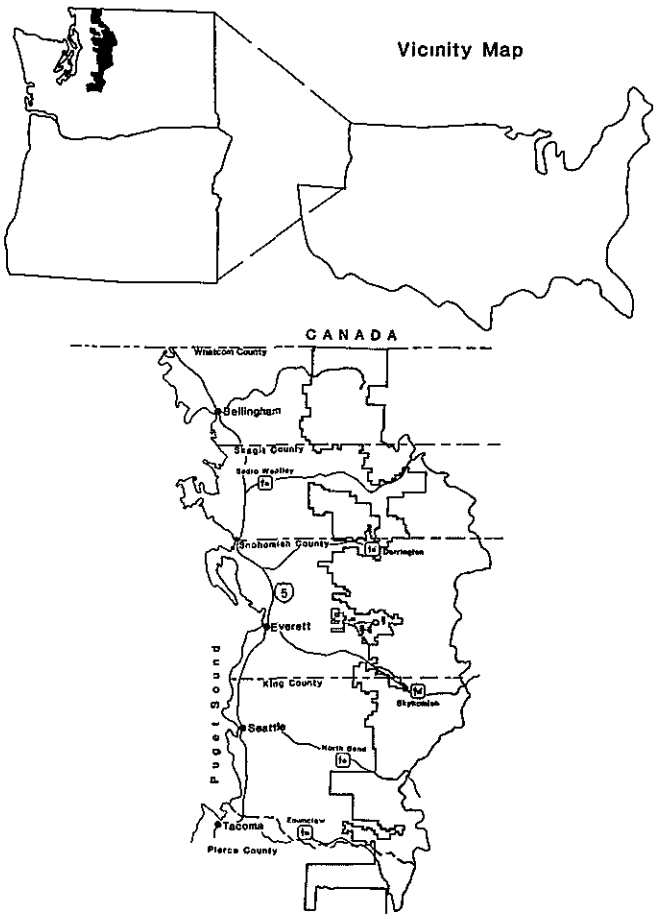
The Affected Environment

The 1.7 million acre Mt. Baker-Snoqualmie National Forest serves a large and diverse population. The Forest is located in some of the nation's most beautiful country - the Cascade Mountains - in northwest Washington state. The Forest contains lush, forested valleys; steep and rugged mountain peaks; glaciers; and numerous high-elevation lakes. The diversity of both the physical and social settings contributes to the complexity of issues facing Forest managers. The Forest includes land from the Canadian border south to the northern boundary of Mt. Rainier National Park, 130 miles, and is adjacent to North Cascades National Park, Wenatchee National Forest, and Mt. Rainier National Park.

The five-county area that includes the Forest has a population of more than 2.5 million persons, over 56 percent of the total State population. Most of these 2.5 million people live in the greater Seattle-Everett-Tacoma metropolitan area, only 40 to 70 miles west of the forest boundary. Just north of the Forest is the Vancouver, B.C., Canada metropolitan area, with a population of 3.0 million people. The Puget Sound economy is quite diverse, although the aerospace industry is still a major employer. The forest products industry has experienced major changes over the last decade; wood products manufacturing outputs have been up the last three years, but with 25 percent fewer employees.

The Mt. Baker-Snoqualmie National Forest contains a wide variety of landforms and natural resources that provide a wide range of goods, services, and opportunities for use. The upper reaches of seven major river systems are located on the Forest. Approximately 1,500 stream miles and over 12,000 lake acres provide both seasonal and year-round spawning and rearing habitat for anadromous and resident fish. The existing annual value of anadromous and resident fish produced on the Mt. Baker-Snoqualmie is estimated at $23 million. Nineteen of the 88 hydrological watersheds on the Forest are currently in an unacceptable condition, due to a combination of moderate to heavy amounts of timber harvesting and road construction plus the presence of unstable soils, steep slopes, and periodic major floods and debris torrents.

Figure S-1



There are 18 municipal watersheds on the Forest serving a population of over 1.4 million. Water from only one of those watersheds requires treatment other than disinfectant, attesting to the high quality of the surface water.

The great diversity of plant and tree communities of the Forest provides a variety of habitats for a wide variety of wildlife species. Four federally-listed threatened and endangered species may occur on the Forest: the bald eagle, American peregrine falcon, grizzly bear, and the gray wolf. Several hundred bald eagles winter on the Forest. A decision on federal Threatened and Endangered listing for the spotted owl, a bird that lives primarily in dense, mature and old growth forests, is expected in 1990.

Fifteen American Indian tribes in the Puget Sound area use the land and resources of the Mt. Baker-Snoqualmie for religious and cultural practices. A 1981 inventory identified important use sites and areas. The Forest possesses some of the few remaining areas with the necessary purity, privacy, and isolation.

The Forest is rich in recreation opportunities and receives over five million recreation visits annually. Dispersed day-use recreation is a major use and occurs throughout the forest. Developed uses occur at seven alpine ski areas, campgrounds, and picnic areas. There are 1,384 miles of system trails on the Forest; 40% are located in wilderness. Ninety-six miles of the Pacific Crest National Scenic Trail are located within the Forest boundary. The Forest has enough roaded recreation lands to meet existing and projected demand, but it cannot meet current or future demand for unroaded, nonwilderness recreation without crowding and loss of solitude.

Nearly 42 percent (722,000 acres) of the Forest is designated wilderness. Wilderness received 455,000 recreation visitor days in 1988. Additional Congressionally designated areas include: the Skagit Wild and Scenic River System (a total of 58.5 miles of recreational river and 100 miles of scenic river); the Mt. Baker National Recreation Area (8,700 acres); and the multiple use Alpine Lakes Management Unit (148,000 acres).

There are 402,930 acres of roadless areas on the Forest; about 40 percent of these acres are tentatively suitable for timber production.

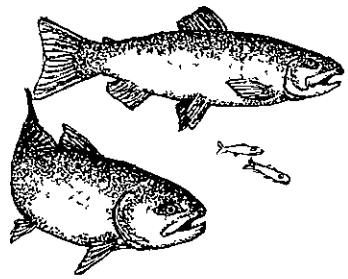
Forest-wide, approximately 160,000 acres of forest land are not suitable for timber production because of problems in replanting the land if the trees were cut. Many of these acres occur at higher elevations. Additional acres - over 95,000 - cannot be considered for potential timber cutting because of highly unstable soils. About 597,000 acres, or 35 percent, of the Forest have been identified as tentatively suitable for timber production. Nearly half of this acreage is currently forested with old growth trees. Almost 60% of the tentatively suitable old growth is in areas that are unroaded and undeveloped.

Between 1975 and 1988, an annual average of 250 million board feet of timber were sold from the dense forests of hemlock, cedar, and Douglas-fir. Changes in the land base as a result of wilderness designation, allocations for wildlife habitat protection, and other resource objectives have affected the amount of timber that can be sold from the Forest in the future.

Three existing Research Natural Areas (RNA) on the Forest are set aside as examples of typical or unique natural ecosystems. There are five potential RNA's, three located within wilderness.

About 9 percent of the Forest acres have moderate to high potential for copper, gold, molybdenum, silver, lead, zinc, chromium, nickel, and olivine. Currently, only olivine is commercially produced. The Forest has about 1,230,500 acres of land that are prospectively valuable for oil, gas, and geothermal resources.

There are 2,829 miles of system roads on the Forest; 52% are accessible only by high-clearance vehicles.



PART 2 - PUBLIC ISSUES AND MANAGEMENT CONCERNS

An extensive and continuing process has been used to identify the issues, concerns, and opportunities (ICO's). The Forest has involved the public throughout the planning process, including various State, county, and other Federal agencies, Indian Tribes, and three public liaison groups.

Several changes have been made to the ICO's since the DEIS was released, reflecting public comment and changing public interests and concerns. Several issues have been refocused (with slight changes in their title) to better reflect recent public response. The transportation issue and wood residue management opportunity have been incorporated as facets of other major ICO's. Wild and Scenic Rivers is now addressed as a major issue; it had been a facet of the recreation ICO.

The issues drive the planning process and play a key part in the development of alternatives. The issues are an expression of the wants and preferences of the various publics with respect to Mt. Baker-Snoqualmie National Forest resources. The issues are also an indication of areas of conflict and of the public's view of the need for a change in management direction.

The nine major issues, concerns, and opportunities are summarized below. The following list shows the indicators used in evaluating how responsive each alternative is to the issues; responsiveness is reported in Table S-4.

Issue, Concern, Opportunity Indicator of Response	Unit of Measure
Development versus Nondevelopment of the Forest	
Existing Roadless Areas Allocated to Nondevelopment	% Acres, M Acres
Roadless Areas Assigned to Roaded Mgt. Prescription But Not Developed in Next 15 Years	M Acres
Timber Supply	
Timber Harvest Level	MMCF/MMBF
Long-Term Sustained Yield Capacity	MMCF
Lands Suitable for Timber Production	M Acres
Employment: Jobs Supported by the Alternatives	M Jobs
Payments to Counties	MM Dollars
Old Growth Ecosystems and Fish/Wildlife/Plant Diversity	
Total Old Growth Remaining, End of Decades 1, 5	M Acres
Old Growth Remaining on Suitable Acres, Decades 1, 5	M Acres
Anadromous Fish Production	Pounds Per Year
Low-Elevation Old Growth Habitat for Wildlife	M Acres Under 3000'
Suitable Winter Range for Deer and Elk, Decade 1	M Acres
American Indian Religious and Cultural Use	
Inventoried Use Areas with High/Moderate Protection	% of Inventoried Ac.
Recreation Opportunities	
Demand Satisfied for Wilderness, Primitive, Semi-Primitive Nonmotorized Recreation, Decades 1 and 5	% of Capacity
Roads Open to Public Use, Passenger Car	Miles
Trail Construction, Reconstruction, Decade 1	Miles

Lands Managed for High Visual Quality Levels	M Acres Retention, Partial Retention
Wild and Scenic Rivers	
Rivers Recommended for Designation as Wild and Scenic	No. Rivers, Miles
Management of Municipal Watersheds	
Timber Harvest Level	MMCF (MMBF)
Effects of Timber Management and Related Activities	
Timber Harvest Level	MMCF (MMBF)
Old Growth Remaining on Suitable Acres, Decades 1, 5	M Acres
Annual Road Construction, Decade 1	Miles
Sediment Produced from All Sources, Annually, Decade 1	M Tons
Adjacent and Intermingled Lands	
Timber Harvest Level	MMCF (MMBF)

Development versus Nondevelopment of the Forest

How should the released, roadless areas be allocated and how will the resources be managed?

At what rate should the Forest Service enter those roadless areas that are allocated for development?

The allocation and management of 402,930 acres of unroaded area (23% of the net Forest acres) remains a highly controversial issue. This issue has been retitled, to better reflect public comments received on the DEIS.

These roadless lands were inventoried in RARE II; they were released from wilderness consideration by the 1984 Washington State Wilderness Act. Many comments on the DEIS focused less on the RARE II remnants and more on the general issue of whether the remaining unroaded and undeveloped lands on the Forest should be managed for commodity production/roaded recreation or remain undeveloped. This key issue encompasses facets of nearly all the other ICO's.

Some elected officials, environmental groups, many hikers, some Indian Tribes, and wildlife organizations want the unroaded areas to remain undeveloped and unroaded. Key concerns are protection of wildlife habitat, old growth, and other resource values. Maintain the option of future consideration for wilderness was also mentioned. A number of individuals and groups support a proposal for Backcountry Areas, roughly corresponding to five roadless areas.

Other individuals, plus timber and mining companies, trade organizations, and energy-related industries feel that the 1984 Wilderness Act "released" these lands for multiple uses. They are concerned that nondevelopment will limit the amount of timber and minerals available for use, affect the local and regional economy, and lead to future wilderness designation. Many people feel there is a need for more motorized access to the roadless areas, to encourage recreation. The commercial forest land within the roadless areas has been used to calculate the annual potential yield in the 1963 Timber Management Plans, as amended. However, this timber was not available for harvest from 1972 through 1984, resulting in a long-term concentration of timber harvesting on about one-half the land base. Approximately 155,700 acres, or 39 percent, of the unroaded areas are tentatively suitable for timber production.

Timber Supply

What is the capability and suitability of the Mt. Baker-Snoqualmie National Forest to produce timber?

What should the timber harvest level be considering all resources on the forest and their relationship to social, economic, and environmental factors including local, regional, and national demands?

A major public issue and management concern is the timber supply on the Mt. Baker-Snoqualmie National Forest. This issue has also been retitled since the DEIS, to better reflect public comments. The issue now includes facets of the wood residue opportunity.

Support for maintaining or increasing the timber supply comes from timber industry (management and employees), some community leaders, businesses dependent on the timber industry, and economic development agencies. Many individuals want the timber supply to be maintained, primarily to protect jobs. Environmentalists, some recreation users, wildlife and some hunting interests, fishing organizations, Indian tribes, some community leaders, and State wildlife agencies strongly support restricting or reducing the timber harvest, especially in low-elevation old growth. A number of people feel the loss of mill jobs is due to factors other than timber supply.

The timber industry is a small but still important part of the overall Puget Sound economy; 4% of the wage and salary jobs in two counties are based on lumber and wood manufacturing. The Forest currently supplies about 17% of the logs consumed in the Puget Sound area; a number of mills are dependent on National Forest logs.

The annual potential yield under the 1963 Plans (as amended) is 203.8 million board feet (MMBF). Over the period 1979 to 1988, the average timber volume sold was 235.8 MMBF and harvested was 229.6 MMBF, which is within the average annual potential yield for the decade: 229.7 MMBF. The timber supply potential on the Forest is considerably less than what past timber sale programs have indicated.

Approximately 597,000, or 35 percent, of the net Forest acres are considered to be tentatively suitable for timber production; about half of the tentatively suitable acres contain old-growth forest.

Old Growth Ecosystems and Fish, Wildlife, and Plant Diversity

What management direction is needed and where should action be taken that will maintain and/or enhance old growth and diversity to meet multiple use objectives?

The title of this ICO has been adjusted, in response to public comment. Old growth is a major issue on the Mt. Baker-Snoqualmie National Forest. Its value in providing biological diversity, wildlife and fisheries habitat (including habitat for the northern spotted owl), recreation, aesthetics, water quality, as well as industrial raw material is widely recognized by the public and the scientific community.

Environmental groups, wildlife societies and organizations, many individuals, Indian Tribes, and State wildlife agencies want the remaining old-growth forests protected. Old growth is important to American Indians for religious and cultural purposes.

Timber company representatives, industry trade associations, some State and local agencies, and many individuals feel these resources are an important contribution to timber production and maintaining local economies. Some feel that converting these stands into second growth timber is important for increasing long-term forest productivity.

There are approximately 643,500 acres of old growth within the Forest; 232,500 acres (36%) are located in wilderness and are not available for harvest.

A related public issue and management concern is the maintenance and/or enhancement of plant, wildlife and fish diversity within the objectives of multiple use management. There is increasing recognition within the scientific community that ecosystem diversity is important; this issue also received considerable public comment. Many respondents to the DEIS felt national forest management should focus on wildlife. State Department of Wildlife officials, hunters, and recreationists are concerned about the population and habitat needs of big game animals, such as deer, elk, and mountain goats.

Indian tribes, sport and commercial fishing interests, and state and federal fishery agencies are increasingly concerned about the effects of water quality on the anadromous fish resource. The cumulative effects of management activities on fish/fish habitat was raised as a major concern by individuals, Indian Tribes, and State agencies.

American Indian Religious and Cultural Use

What policy and management direction is needed to comply with the Native American Religious Freedom Act and various treaties?

How can Inventoried religious and cultural use areas be protected within the objectives of multiple use management?

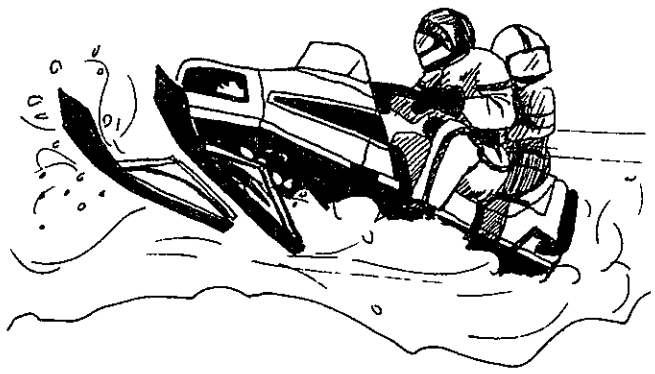
The 15 American Indian tribes who currently use the Mt. Baker-Snoqualmie for religious and cultural uses continue to challenge Forest management activities, primarily proposed road construction, timber harvest, and small hydroelectric power projects, that potentially threaten their religious use sites and areas.

The Tribes also have a significant interest and concern for protection and enhancement of the anadromous fisheries resource. Fishing has been, for many, a traditional and principle means of income. They are strongly opposed to any management activities that might adversely affect anadromous fish habitat.

In the 1981 inventory of religious use, practices, and localities, over 300 cultural use areas and sites were identified (totaling about 450,000 acres - 34% inside wilderness). Some sites cover less than one acre; larger areas average 3,000 to 15,000 acres. There are five broad categories of use areas: cedar sites, ceremonial flora, spirit sites, legendary sites, and cemeteries and archaeological sites. There is a wide variation in compatibility between types of management activities and categories of religious, ceremonial, and cultural use.

Since the completion of the 1981 inventory, the Forest has initiated a consultation process with the Tribes. When proposed projects fall within an inventoried use-areas, the proposed activity is reviewed in detail with representatives of the Tribe(s) which may be affected. As more management activities are proposed, there is the potential for increased conflict.

Individuals and Tribal representatives feel that the draft Forest Plan standards and guidelines and the inventory process were not adequate to protect Religious Freedom Act rights. Others, including some timber industry representatives, feel protection of religious and cultural use areas will constrain timber availability.



Recreation Opportunities

To what extent can the Mt. Baker-Snoqualmie National Forest provide recreation opportunities and how should they be managed?

How many miles of trails should be provided and in what locations?

Public comment on the DEIS reconfirmed that recreation use - of all types - is a major public issue on the Mt. Baker-Snoqualmie. Opinion is divided on what types of recreation opportunities should be provided.

Many groups and individuals - including hikers, horse users, some off-road vehicle users, naturalists, wildlife advocates, and environmentalists - want to preserve opportunities for unroaded dispersed recreation outside of wilderness. They prefer more remote, natural appearing recreation settings. National Forest lands are the major supplier of non-motorized dispersed

recreation in the Puget Sound area. Many other recreationists spoke to the need for better recreation access for young families and the elderly, more ORV areas, more snowmobile opportunities, and more campgrounds.

A large majority of people commenting on the DEIS favor more trails. There was support from environmentalists and many recreation/commodity groups for the "Trails 2000" proposal, developed by one environmental organization. ORV and horse users want more trails open for their use. Many hikers feel that trails should be closed to motorized use. Conflicts between recreation and other Forest resources were frequently mentioned. Some users dislike the expanding road system needed for timber harvest, while others feel roads are important for their activities and access.

Many recreation attractions and opportunities on the Mt. Baker-Snoqualmie are found within eight wildernesses. A concern is the level of management required to accommodate the high recreation demand within these areas, while protecting the wilderness resource. Some recreation and environmental groups, who strongly supported wilderness status for favorite areas, now find themselves debating the need for management actions in those areas, including limiting use. Facets of this issue include: the need for new or relocated trails to disperse recreation use in heavily-used areas; and whether roads that access popular wilderness attractions should be kept open to the public.

Wild and Scenic Rivers

How should the potential wild and scenic rivers of the Forest be managed and their values protected?

Wild and Scenic Rivers has been identified as a separate major issue, due to public response on the DEIS. There is one designated Wild and Scenic River on the Forest, the Skagit (designated in 1978). The Wild and Scenic Rivers Act established criteria for the addition of other rivers to the National System. The National Park Service (formally Heritage Conservation and Recreation Service) conducted an inventory of potential rivers; portions of the 16 rivers on that inventory are within the Forest boundary.

Portions of the Skykomish River system have been designated by the State of Washington as a Scenic River. This designation applies only to city, county, and State lands. A 1988 Washington State Scenic River Assessment identified 3 rivers on the Forest which possess values that would make them suitable additions to the Washington State Scenic River System (the Carbon, Nooksack, and Stillaguamish Rivers).

There was considerable public comment on the DEIS eligibility study, plus support for many more miles of wild and scenic rivers than recommended for study in the DEIS. There was also vocal opposition to more designation.

Between draft and final plans, eligibility criteria were re-evaluated and the list of eligible rivers adjusted. A total of 51 rivers were identified and studied for their eligibility and 47 of these were determined to be eligible. There was considerable public and agency involvement in this process. A suitability study for the 47 eligible rivers was also completed, again in response to public comment on the draft.

Wild and scenic river legislation has been considered but no action taken. Public concern on all sides is high. The portions of seven major river systems that lie within the Mt. Baker-Snoqualmie contain sections with unparalleled anadromous fisheries values. There are also high recreational and scenic values.

Management of Municipal Watersheds

What activities should be permitted within municipal watersheds?

What measures should be taken that will maintain or enhance water quality?

The title of this major ICO has been changed, to better reflect emerging issues. Maintenance of high water quality is a facet of the issue; it is also addressed on the Effects of Timber Management and Related Activities ICO. Changes in City of Seattle policies for the management of the Cedar River watershed may necessitate renegotiation of the existing, 1962 Cooperative Agreement. Under the 1989 Secondary Use Policies for the Cedar River, the City will set aside 50 percent of its lands in a reserve precluding timber harvest. The policies also call for acquiring 4-6,000 acres of old growth (currently national forest lands) to be maintained as old-growth habitat.

Maintaining high quality water remains as an objective of many individuals, sports and recreation organizations, municipalities, Indian Tribes, and State and federal agencies. These interests believe that timber harvest, road construction, mining, and some recreation activities are detrimental to water quality and support action to limit or prohibit development in the watersheds. Many also support maintenance of old growth habitat in the Cedar River watershed. Municipalities are concerned that increased access and recreation use will result in the need to install filtration facilities to assure potable water to the consumer.

Timber, energy, mining industries, plus a number of hunters feel that development can occur and any adverse impacts to water supply and quality can be mitigated. They believe that limiting or prohibiting activities unduly restricts the industry's ability to maintain or increase supplies of timber, electric power, and minerals. Hunters feel that big game populations could actually be enhanced with controlled hunts in the watersheds.

A significant portion of the watersheds supplying the cities of Seattle, Bellingham, Everett, and Tacoma is located on the Mt. Baker-Snoqualmie. Water is also provided for a number of smaller municipalities, ski areas, and other recreation sites. About 128,000 acres of national forest land supply municipal water to 1.4 million people. Water quality is high; only one municipality filters water, others use a disinfectant.

Currently, a wide range of activities occur within the municipal watersheds. Some watersheds have not been accessed by roads and remain primarily in a natural condition. Other watersheds have been developed, with extensive timber harvesting and road construction. Recreation is permitted or encouraged in some watersheds; in others, poor access and municipal opposition has limited recreation opportunities.

Effects of Timber Management and Related Activities

What management direction is needed for timber harvest and road construction activities to benefit or maintain the quality of other resources?

The effects of timber harvest and road construction, especially the cumulative effects of these activities, are of great concern to federal agencies, environmentalists, Indian Tribes, State Fish and Wildlife agencies and individuals. The effects of management activities on water quality, fish and fish habitat is of greatest concern, and this interest has increased since the DEIS was released. Other resources affected by timber harvest and road construction are wildlife, scenery, and dispersed unroaded recreation.

The timber industry, miners, and many individuals feel that the effects of these activities can be mitigated, and that not enough national forest land is open to full commodity production (and recreation use).

Management for the commercial production of timber includes a number of activities: road construction and/or reconstruction, preparation of the land for planting seedlings, possible thinning, et cetera. These activities have direct and indirect effects on other resources, including: fish and wildlife habitat, soil, water, and American Indian religious and cultural use. Recreation opportunities are changed, and the visual condition of the Forest changes. The visual impact of clear-cutting and loss of habitat for some wildlife species is a major concern. Changes in vegetation and the effects on diversity and sensitive plants have also been identified as concerns by some people commenting on the DEIS.

Adjacent and Intermingled Lands

How should National Forest lands adjacent to lands of non-federal owners be managed?

What management activities should be conducted on National Forest lands that are located near private developments?

The land ownership pattern within and adjacent to the National Forest boundary and the management of intermingled Federal and Private lands remains a major issue and concern.

A few environmental groups are actively proposing legislative land exchanges that would exchange high-elevation, low timber site class private lands for low elevation, high-site federal lands. Some major industrial timber land owners support these types of exchanges. Independent mill operators and loggers who depend on National Forest timber and some public interest groups strongly oppose such exchanges, as the exchanges would further reduce timber supplies available to them. Some people commenting on the DEIS urged the Forest Service to retain all mineral rights in any exchange.

Environmentalists, State Fish and Wildlife agencies, Indian Tribes and some sporting groups believe that management activities, such as timber harvest,

should be delayed or deferred on National Forest lands to mitigate the cumulative effects of large-scale timber harvest on private lands that are intermingled with Federal lands. Independent mill operators and loggers are opposed to any delays or deferrals that would reduce timber supplies available to them.

In many areas of checkerboard ownership, adjacent land owners have completely removed the old-growth timber (in approximately 640 acre blocks), leaving the timber present on National Forest land more vulnerable to wind-throw. Removing these blocks of old growth has also had the effect of reducing the amount of habitat available for wildlife species dependent on old-growth habitat. In areas of intermingled lands, management of National Forest land affects adjacent lands of non-Federal landowners, and activities on non-Federal lands affect management of National Forest land.

Urban growth is steadily moving east toward the Forest boundary. Forest lands, regardless of ownership, are affected by this growth. Resources such as wildlife, water, and air do not recognize ownership boundaries, but they are directly impacted as shopping centers, subdivisions, and residences - plus an increased network of roads - spread closer to the Forest boundary.

PART 3 - THE ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Eight alternatives were developed in detail. The alternatives, including the proposed action (the Preferred Alternative) are based on the identified issues, concerns, and opportunities, the "drivers" of the planning process. Each alternative is designed to achieve specific goals and objectives. Each is a unique combination of land uses, forest management activities, and schedules designed to address, mitigate, or resolve the planning questions discussed above. A wide range of alternatives was developed to test for the combinations of goals and objectives that best maximize net public benefits while responding effectively to the ICO's. With one exception (the No Change Alternative), a computerized model (FORPLAN) was used to ascertain the potential outputs and effects of each alternative.

Each alternative, except Alternative NC (No Change), falls within the scope of the Mt. Baker-Snoqualmie Standards and Guidelines. These standards and guidelines were prepared to meet laws, regulations, and policy requirements; to direct management activities in meeting goals; to respond to the issues and concerns; and to mitigate potential adverse effects on a Forest-wide basis. Refer to the Forest Plan document and FEIS, Appendix D.

Each alternative, except Alternative NC, includes the management requirements (MR's) (36 CFR 219) pertaining to timber, fish and wildlife, soil and water, land productivity, and riparian areas. The management requirements are discussed in detail in FEIS, Appendix H.

Alternative J is the Preferred Alternative; it was selected by the Regional Forester as the alternative which best maximizes the net public benefits while responding effectively to all the issues.

The Alternatives - Items Treated the Same in All Alternatives

A number of resource management programs are treated the same in all the alternatives:

- Alpine Lakes Management Plan (1981) and the Skagit Wild and Scenic River Plan (1984) are incorporated in all alternatives except Alternative NC.
- The Mt. Baker National Recreation Area (1984) is the same in all;
- The three existing Research Natural Areas are retained in all alternatives;
- The foreground of Mather Memorial Parkway is managed to retain its scenic quality in all alternatives;
- The management requirements (MR's) necessary to integrate requirements of law and regulation are incorporated in all alternatives except Alternative NC;
- The rights established by the various Indian treaties are retained in all alternatives, as is the consultation process for any proposed projects within inventoried religious and cultural use areas;
- The acres of designated wilderness are the same. Acres assigned to classes of the Wilderness Recreation Opportunity Spectrum (WROS) vary by alternative; there are no WROS classes in Alternative NC;
- Even-aged management and regeneration harvest through clearcutting are assumed in estimating timber outputs in all alternatives. However, the use of other systems is not precluded (refer to Appendix F in the DEIS Appendices for more information);
- All alternatives would make full use of vegetation management techniques including herbicides and fire. In 1988, the Pacific Northwest Region, USDA Forest Service completed a final EIS on managing competing and unwanted vegetation (USDA 1988b). That final EIS, the Mediated Agreement, and accompanying implementation direction is incorporated by reference into this FEIS. It will guide vegetation management activities as the Forest Plan is implemented.
- All existing utility corridors, electronic sites, and administrative sites are retained in all alternatives.

ALTERNATIVE NC (NO CHANGE)

The No Change Alternative has been developed in response to decisions made regarding appeal number 1588, brought by the Northwest Forest Resource Council on May 19, 1986. The appeal centered on a decision by the Regional Forester to "require inclusion of minimum management requirements (MR's) in the Current Direction Alternative for each Forest Plan." The substance of the appeal was that a "true no-action alternative representing current management plans" was not included in Forest Plan EIS's.

The No Change Alternative is designed to continue the level of goods and services as set out in plans formulated and approved prior to the passage of the National Forest Management Act, specifically the 1963 Timber Management Plans. This alternative does not comply with all provisions of NFMA and the regulations promulgated by the Secretary of Agriculture to implement NFMA (it does not incorporate management requirements, including those designed to maintain viable plant and animal populations). The alternative could not be implemented or used in future management of the Forest under the Forest Plan without Congressional and/or Secretary of Agriculture action to change the law or regulations.

Design Criteria for Alternative NC (No Change):

Timber: the 1963 Timber Management Plans are the basis for the alternative.

Roads: the Naches Pass road would not be constructed.

Roadless Areas: an estimated 60% of the roadless areas would remain undeveloped; this estimate is based on the acres of commercial forest land assumed to be in the roadless areas.

Visual Resource: same as "Items Treated the Same in All Alternatives."

Wild and Scenic Rivers: no provision for study or protection of potential rivers is included in the TM Plans.

Research Natural Areas: no potential areas recommended.

Spotted Owls: no provisions made to protect old-growth habitat for wildlife.

Big Game Habitat: no provisions made for protection of big game habitat.

Cavity Excavators: no provisions made for protection of habitat.

Anadromous/Resident Fish: no provisions made for protection of fish habitat.

Municipal Watersheds: all are managed under current agreements, memoranda of understanding.

ALTERNATIVE A (NO ACTION)

Alternative A was developed to continue management direction as set out in plans formulated and approved prior to the passage of the National Forest Management Act. The alternative incorporates the requirements of the National Forest Management Act of 1976 (36 CFR 219.12 through 219.27). The goal of Alternative A is to provide maximum timber outputs while maintaining or exceeding existing recreation, wildlife, fisheries, and visual resource outputs. The plans approved prior to NFMA, plus current laws, regulations, and directions - including MR's - were used to assign management direction to different parts of the Forest. This is the No Action Alternative required by the Council on Environmental Quality Regulations for implementing the National Environmental Policy Act (NEPA).

Design Criteria for Alternative A (No Action):

Timber: an exception to "Items Treated the Same in All Alternatives", in FORPLAN, Alternative A was run with an objective of maximize timber volume for the first five decades, then was rerun to maximize PNV for 15 decades with the same timber outputs as in Decades 1-5. This resulted in some timber prescriptions having less than maximum economic efficiency. Approximately 70 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed for timber production. In the first two decades, approximately 26 miles of arterial and collector roads would be built. During that same period, about 330 miles of local roads would be constructed. The Naches Pass road would not be constructed.

Roadless Areas: would be managed under the direction contained in the Ranger District Multiple Use Plans; approximately 73 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: same as "Items Treated the Same in All Alternatives."

Wild and Scenic Rivers: 15 of the 16 rivers included in the National Park Service Nation-wide Inventory are recommended for designation as part of the National Wild and Scenic River System. Jim Creek is excluded as not eligible. These 15 rivers include a total of 287 miles - 215 within the forest boundary.

Research Natural Areas: no potential areas recommended.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 36,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: habitat is provided for viable populations at the MR levels; additional habitat for some species in wilderness, RNA, and areas not suited for timber production.

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at 40% of their potential population levels.

Anadromous/Resident Fish: current populations are maintained through habitat maintenance or improvement at the MR level (low investment).

Municipal Watersheds: are managed under current agreements, memoranda of understanding.

ALTERNATIVE B (RPA)

The goal of Alternative B is to simultaneously produce high levels of timber, anadromous fish, commonly hunted species of big game, and dispersed unroaded recreation, as specified in the 1980 RPA Program.

Design Criteria for Alternative B (RPA):

Timber: is produced at the highest level possible, while meeting the other goals of the alternative. Approximately 64 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed for timber production. In the first two decades, approximately 28 miles of arterial and collector roads would be built. During that same period, about 280 miles of local roads would be constructed. The option to construct Naches Pass road is retained.

Roadless Areas: all roadless area acres that are tentatively suitable for timber production are available for assignment to a timber harvest prescription, unless needed to meet MR's. Approximately 79 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: same as "Items Treated the Same in All Alternatives."

Wild and Scenic Rivers: high timber goal precludes recommending any eligible rivers for Wild and Scenic designation.

Research Natural Areas: no potential areas recommended.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 79,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: alternative designed to increase population levels over time. Acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotation, sale design, smaller clearcuts, etc., provide an optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on land suitable for timber production, habitat is provided to maintain cavity excavators at the MR level - 20% of their potential population levels.

Anadromous/Resident Fish: anadromous fish production is increased through habitat improvements at a high investment level.

Municipal Watersheds: Cedar River - contains 2 SOHA's, retain NF lands, timber production on suitable lands, maintain old-growth habitat; Green River - high level of timber production, essentially closed to public recreation; Sultan River - retain NF lands, full multiple use; Others - managed for a full range of outputs, timber production on suitable lands.

ALTERNATIVE C

The goal of Alternative C is to emphasize primitive and semi-primitive nonmotorized recreation (accomplished through retention of existing roadless areas and, over time, reversion of some roaded areas to unroaded condition); protect scenery, fish, and wildlife habitat; and protect sites and areas important to American Indians for religious and cultural use.

Design Criteria for Alternative C:

Timber: no production goals set; suitable acres and harvest level will be the lowest of all alternatives considered in detail. Approximately 43 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: roads to be closed include approximately 300 miles of existing arterial and collector roads. In the first two decades, about 15 miles of arterial and collector roads would be built, and about 180 miles of local roads would be constructed. Construction of the the Naches Pass road is precluded by management of surrounding lands for unroaded dispersed recreation.

Roadless Areas: nearly all (96%) of the roadless area acres are retained in an unroaded condition at the end of the fifth decade.

Visual Resource: high to moderately-high protection of the foreground and middleground of all inventoried primary and secondary viewsheds.

Wild and Scenic Rivers: all 47 rivers determined to be eligible for Wild and Scenic River designation are recommended for designation as part of the National Wild and Scenic River System. The total mileage of rivers included is 606, of which 446 miles are within the national forest boundary.

Research Natural Areas: five potential RNA's are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

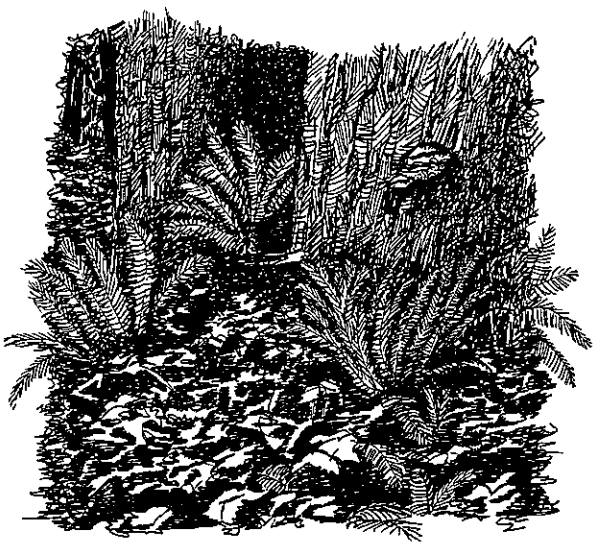
Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 36,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: some acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotations, sale design, smaller clearcuts etc. provide optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat provided to maintain cavity excavators at 60% of their potential population levels.

Anadromous/Resident Fish: anadromous and resident fish production is increased through habitat improvements at a high investment level.

Municipal Watersheds: Cedar River - contains 2 SOHA's, with stipulation that habitat be maintained as old growth when lands exchanged to City of Seattle; Green River - current direction (timber production, dispersed recreation permitted); Sultan River - closed watershed, exchange NF lands; Others - no timber harvest, limited recreation use.



ALTERNATIVE G-MODIFIED

The goal of Alternative G-Modified is to emphasize maintenance of natural ecosystems and diversity of native plants and animals, emphasize providing uses not found on private lands, and produce timber in a way that is consistent with the other goals and is non-damaging to soils.

Design Criteria for Alternative G-Modified:

Timber: timber production will occur on currently accessed sites first. Maintenance or development of old growth, especially at lower elevations, is emphasized. Approximately 41 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: roads to be closed include approximately 65 miles of existing arterial and collector roads. In the first two decades, approximately 13 miles of arterial and collector roads would be built, and about 145 miles of local roads would be constructed. Construction of the Naches Pass road is precluded by management of surrounding lands for undeveloped recreation.

Roadless Areas: approximately 93% of the roadless area acres are retained in an unroaded condition at the end of the fifth decade.

Visual Resource: the foreground of selected corridors is protected, including the upper end of Mt. Baker Highway, portions of the Cascade River and North

Fork of the Cascade, portions of the Mt. Loop Highway, the upper Sauk, lower Sultan, and Mather Memorial Parkway. Integral vistas within and from Class I airsheds and other wildernesses (not yet designated Class I) are protected.

Wild and Scenic Rivers: all 47 rivers determined to be eligible for Wild and Scenic River designation are recommended for designation as part of the National Wild and Scenic River System. The total mileage of rivers include is 796, of which 446 miles are within the national forest boundary.

Research Natural Areas: five potential RNA's are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Special Areas: special interest areas are recommended for designation at Twin Sisters, Monte Cristo, Baker Lake, Naches Pass, and along the Mather Memorial Parkway.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide **with additional habitat areas** being protected to meet the objectives of the alternative. Approximately 113,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: habitat provided for viable populations at the MR levels; some additional habitat for some species in wilderness, RNA.

Cavity Excavators: on lands suitable for timber production, habitat is provided for cavity excavators at the MR level - 20% of potential population levels.

Anadromous/Resident Fish: anadromous and resident fish production is increased through habitat improvements at a high investment level.

Municipal Watersheds: Cedar River - managed to retain old-growth habitat with stipulation that it be maintained when lands exchanged to City of Seattle; Green River - current direction (timber production, dispersed recreation permitted); Sultan River - current situation (exchange NF lands, moderate timber harvest, restricted recreation use); Others - managed for a full range of outputs, timber production on suitable lands.

ALTERNATIVE H

The goal of Alternative H is to provide an increased emphasis on unroaded recreation; protection of scenic values in the foreground and middleground of heavily traveled highway corridors; increasing big game populations; plus emphasis on timber production on tentatively suitable acres not assigned to other objectives.

Design Criteria for Alternative H:

Timber: about 60 per cent of the tentatively suitable acres are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed. About 20 miles of existing roads, located in areas assigned to unroaded dispersed recreation, will be closed. In the first two decades, approximately 11 miles of arterial and collector roads would be built. During that same period, about 250 miles of local roads would be constructed. The option to construct the Naches Pass road is retained.

Roadless Areas: areas with a high percentage of tentatively suitable lands are available for timber production emphasis, except where they also have a combination of high values for unroaded dispersed recreation, big game winter range enhancement opportunities, and are inventoried American Indian religious sites. Approximately 82 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: the foreground and middleground seen areas of heavily traveled highway corridors are managed for scenic quality (meet inventoried visual quality levels): I-90, U.S. 2, Mather Memorial Parkway, and Mountain Loop, Mt. Baker, and Baker Lake Highways.

Wild and Scenic Rivers: the five rivers determined in the DEIS to be eligible for Wild and Scenic River designation are recommended for designation - North Fork Nooksack, North Fork Skykomish, South Fork Skykomish, Tye, and Middle Fork Snoqualmie Rivers, a total of 154 miles, of which 71 miles are within the national forest boundary.

Research Natural Areas: five potential are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

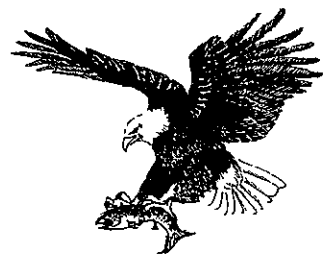
Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 61,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: some acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotations, sale design, smaller clearcuts etc. provide optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at 40% of potential population levels.

Anadromous/Resident Fish: anadromous fish production is increased through habitat improvements at a high investment level.

Municipal Watersheds: Cedar River - current direction (exchange NF lands to City of Seattle, no old-growth habitat maintained); Green River - current direction (timber production, dispersed recreation permitted); Sultan River - current situation (exchange NF lands, moderate timber harvest, restricted recreation use); Others - manage for a full range of outputs, timber production on suitable lands.



ALTERNATIVE I

The goal of Alternative I is to emphasize those resources with an established price in the market place: timber production, anadromous fish, developed recreation, and minerals. Emphasis is also placed on enhancement of big game wildlife and fish habitat, and developing/maintaining an extensive trail system to accommodate a wide variety of users on a year-round basis. Other resources are managed at levels that do not reduce the outputs from the market resources.

Design Criteria for Alternative I:

Timber: timber production is emphasized. Approximately 65 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed, to meet timber production goals. In the first two decades, approximately 34 miles of arterial and collector roads would be built. During that same period, about 290 miles of local roads would be constructed. The option to construct the Naches Pass road is retained.

Roadless Areas: all roadless area acres that are tentatively suitable for timber production are available for assignment to a timber harvest prescription, unless needed to meet MR's. Approximately 78 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual: the foreground of heavily-traveled highways are managed for scenic quality (I-90, U.S. 2, Mather Memorial Parkway, and Mountain Loop, Mt. Baker, and Baker Lake Highways).

Wild and Scenic Rivers: high timber goal precludes recommending any eligible rivers for Wild and Scenic River designation.

Research Natural Areas: no potential areas are recommended for designation.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. About 93,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: alternative designed to increase population levels over time. Acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotation, sale design, smaller clearcuts, etc., provide an optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at the MR level - 20% of potential population levels.

Anadromous/Resident Fish: anadromous fish populations are increased through habitat improvements at a high investment level.

Municipal Watersheds: Cedar River - contains 2 SOHA's, retain NF lands, timber production on suitable lands, maintain old-growth habitat; Green River - high level of timber production, essentially closed to public recreation; Sultan

River - retain NF lands, full multiple use; Others - managed for a full range of outputs, timber production on suitable lands.

ALTERNATIVE J (PREFERRED)

This is the Preferred Alternative. It is a new alternative and was not displayed in the DEIS. Beginning with the draft EIS Preferred Alternative (H), Alternative J was developed to respond to public comment and new information. Differences between the draft and this Preferred Alternative include: a considerable increase in trail mileage; an increase in the number of rivers recommended for addition to the National Wild and Scenic Rivers System; allocation of three Special Areas (Botanic, Scenic, and Recreation/Education); an increased emphasis on unroaded recreation; and greater protection of scenic values within travel corridors. Timber production is emphasized on suitable acres assigned to a timber harvest prescription. Other resources will be managed at levels commensurate with the objectives of the alternative.

Design Criteria for Alternative J (Preferred):

Timber: about 58 per cent of the tentatively suitable acres are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed. Roads to be closed include about 25 miles of existing roads, located in areas assigned to unroaded dispersed recreation. In the first two decades, approximately 15 miles of arterial and collector roads would be built, and about 240 miles of local roads would be constructed. The option to construct the Naches Pass road is retained.

Roadless Areas: areas with a high percentage of tentatively suitable lands are available for timber production emphasis, except where they also have a combination of high values for unroaded dispersed recreation, big game winter range enhancement opportunities, and are inventoried American Indian religious sites. Approximately 86 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: the foreground and middleground seen areas of heavily traveled highway corridors are managed for scenic quality (meet inventoried visual quality levels): I-90, U.S. 2, Mather Memorial Parkway, and Mountain Loop, Mt. Baker, Baker Lake Highways, Cascade River road, and Crystal Mountain Highway.

Wild and Scenic Rivers: 30 of the 47 rivers determined to be eligible for Wild and Scenic River designation are recommended for inclusion in the National Wild and Scenic Rivers System. A total of 452 miles are recommended, with 276 of those miles located within the national forest boundary. This recommendation is a preliminary administrative recommendation that will receive further review and possible modification by the Chief of the Forest Service, Secretary of Agriculture, and the President of the United States. The Congress has reserved the authority to make final decisions on designation of rivers as part of the National Wild and Scenic Rivers System.

Research Natural Areas: five potential RNA's are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Special Areas: special interest areas are recommended for designation at Mather Memorial Parkway, Heather Meadows, and Sulphur Creek.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 54,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: some acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotations, sale design, smaller clearcuts etc. provide optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at 40% of potential population levels.

Anadromous/Resident Fish: anadromous and resident fish production is increased through habitat improvements at a high investment level.

Municipal Watersheds: Cedar River - initiate negotiations on a new Cooperative Agreement to reestablish goals and management for the watershed; until then, do not enter into land exchanges affecting National Forest lands; Green River - current direction (timber production, dispersed recreation permitted); Sultan River - current situation (exchange NF lands, moderate timber harvest, restricted recreation use); Others - manage for a full range of outputs, timber production on suitable lands.

The Management Areas

To complement the description of alternatives, Table S-1 presents the acres assigned to each management area, by alternative. Management areas (MA's) are areas of the Forest to which a set of management practices, standards, and guidelines apply. (Alternative NC is not shown; it is based on the 1963 Timber Management Plans and has no management areas.) Multiple use will continue to be the overall goal of the Mt. Baker-Snoqualmie; one or more uses may be emphasized in a management area, but many uses are compatible and will occur in every MA.

Management areas are identified by a number or number/letter, plus a short, descriptive title. The letters are various "intensities" of a broader management area. Some MA's have only one intensity. The MA's are described on the alternative maps accompanying this package of documents. The standards and guidelines that apply to each MA are discussed in detail in the Forest Plan (for Alternative J (Preferred)) and in FEIS, Appendix D. The maps show the on-the-ground location of the management areas for each alternative.

Table S-1 is a useful summary, but some items should be noted. The alternatives are presented in descending order of acres suitable for timber harvest, an indicator of the level of vegetative management. Many of the outputs and effects discussed later in this Summary are either directly or inversely correlated to the amount of vegetative management in the alternatives. This order of presentation facilitates quicker and easier comparisons among the alternatives.

Acres are assigned to management areas to meet the overall goals and objectives of each alternative, in response to the issues. Simply comparing the number of acres in each management area does not give the full picture of an alternative. Where compatible uses occur on the same area, the acres have been assigned and mapped to the set of management practices, standards, and guidelines that cover management for both uses. Example, an area assigned to nonmotorized dispersed recreation (MA 1A, 1B) may also be capable of providing old-growth wildlife habitat (MA 11). In this case, the MA mapped would be 1A or 1B, not 11 because old-growth habitat has been "overridden" by an MA that is more restrictive: roads cannot be built in 1A/1B; they may be constructed outside the core area in MA 11 (if habitat objectives can be met).

Note that the acres for the wildlife management requirements (MR's) vary among the alternatives. This is primarily due to "overrides." For example, Alternative C shows the fewest acres assigned to MA 11 Old Growth, yet C has a goal of emphasizing wildlife. Old-growth habitat is protected at a high level in Alternative C but many acres of old growth habitat are located within MA's 1A or 1B, which provide for both wildlife habitat and nonmotorized recreation. The designated old growth acres are still "there", but they are mapped as 1A or 1B, and are listed in Table S-1 as 1A or 1B.

Table S-1

Acreages in Management Areas by Alternative 1/

Management Area	A (No Action)	I	B (RPA)	H	J (Preferred)	C	C-Modified
Lands Suitable for Timber Production	412,508	386,512	380,448	358,754	346,411	256,206	247,091
1 Dispersed Recreation							
1A Primitive	0	0	0	4,561	45,278	16,914	6,793
1B Semi-Prim Nonmotorized	0	0	134,585	248,479	225,104	387 168	369,889
1C Semi-Prim Motorized	0	143,102	5,123	2,501	2,981	0	3,608
1D Roaded Natural Rec	0	5,307	20,159	12,852	14,926	15,699	0
1E General Dispersed Rec	344,304 2/	0	0	0	0	0	0
1F 1926 Mt Baker Rec	7 991 3/	0	0	0	0	0	0
Subtotal	352,294	148,409	159,867	268,393	288,289	419,781	380,290
2 Scenic Viewshed							
2A Foreground	3 321	29,223	4,015	24,581	23,406	65,721	9,486
2B Middleground	0	0	0	81,573	95,795	57,500	0
Subtotal	3,321	29,223	4,015	106,154	119,201	123,221	9,486
3 Developed Recreation							
3A Public Sector Sites	1,813	1,809	1,764	1 810	1,819	1,761	2,273
3B Potential Rec Sites	0	0	0	0	0	0	0
3C Winter Sports Resorts	4 618	5,904	5,214	5,692	6,041	5,290	4,865
3D Private Sector Sites	556	555	541	555	558	540	557
Subtotal	6,986	8,268	7,519	8,057	8,418	7,591	7,695
4 Mt Baker Natl Rec Area	8,740	8,740	8,740	8,740	8,740	8 740	8,740
5 Recommended Wild & Scenic R	24,506	0	0	8,794	20,865	29,617	20,234
6 Skagit Wild & Scenic River	17,037	17,037	17,037	17,037	17,037	17,037	17,037
7 Amer Indian Relg/Cult Use 4/	0	0	0	0	0	0	0
8 Special Areas 5/	0	0	663	0	6,321	809	22,006
10 Wilderness							
10A Transition	12,067	21 878	14,402	7,982	15,078	7,032	7,644
10B Trailed	44 356	49 628	39,786	46,734	49,015	45,700	52,669
10C General Trailless	585,326	643 495	543,881	437,931	457,000	272,679	444,688
10D Dedicated Trailless	80,000	0	121,409	219,292	191,606	386 992	207,930
10E Special Area	0	6,715	2,238	9,777	9,017	9,313	8,785
Subtotal	721 716	721,716	721 716	721 716	721,716	721 716	721 716
11 Old Growth Habitat	36 247	93,037	79,328	60,977	54,191	36 072	112 987
12 Mature & Old Growth Habitat	14,074	27 691	23,344	19,185	19,282	13,071	10,648
13 Watershed, Wildlife, & Fisheries Emphasis in Riparian Areas 6/	52,436	46,772	41 288	49,872	47 048	23 219	31 857
14 Deer and Elk Winter Range	0	106,632	158,824	34,239	33,587	39,057	26,622
15 Mountain Goat Habitat							
15A Mgt Requirements	9 217	24,291	19,370	15,742	17,110	9 742	6 311
15B Habitat Improvement	0	0	20,158	0	0	3,040	0
Subtotal	9 217	24,291	39,528	15,742	17,110	12,782	6,311
16 Threatened & Endangered Species 7/							
16A Northern Bald Eagle	2,808	2,808	2 808	2,808	2 808	2,808	2,808

Management Area	A (No Action)	I	B (RPA)	H	J (Preferred)	C	G-Modified
17 Timber Management Emphasis	321,470	273,572	235,711	198 559	166,611	89,267	201,023
18 Research Natural Areas 8/	2,364	2,364	2,364	5,233	5,233	5,233	5,233
19 Mtn Hemlock Zone	0	48,803	62,333	31,812	31,965	16,039	22,761
20 Cedar R Municipal Watershed							
20A Current Direction, Exchange NF Lands to City	13,398	11,804	0	12,517	0	0	0
20B Exchange NF Lands, City Maintains Old Growth	0	0	0	0	0	12,214	6,212
20C Retain NF Land, Maintain Old Growth Habitat	0	0	13,297	0		0	0
20D Negotiate New Coop Agreement	0	0	0	0	11,724	0	0
21 Green River Municipal Watershed							
21A Current Direction, Tmbr Harvest, Disp Rec OK	9,799	24,546	0	24,914	24,935	23,931	12,846
21B Timber Harvest OK, Most Public Rec. Prohibited	0	0	23 839	0	0	0	0
22 Sultan River Municipal Watershed							
22A Closed Except Protect Water & Hydropower Production, Exchange NF Lands	0	0	0	0	0	8,935	0
22B Current Situation, Exch NF Lands Moderate Timber Harvest, Restricted Rec	4,646	8,772	0	8,393	8,399	0	5,633
22C Retain NF Lands, Full Multiple Use	0	0	9,260	0	0	0	0
23 Other Municipal Watersheds							
23A Tmbr Harvest, Mod Rec	14,081	19,682	16,124	19,315	13,138	0	9,315
23B No Harvest, Limited Rec	0	0	0	0	0	21,068	0
25 Special Uses - Utilities							
25A Utility Corridors 9/	[1500]	[1500]	[1500]	[1500]	[1500]	[1500]	[1500]
25B Electronic Sites	1,014	1,014	1,014	1,014	1,014	1,014	1,014
26 Administrative Sites	143	143	143	143	143	143	143
27 Alpine Lakes Mgt Area 10/	106,950	97,981	94,606	99 647	95,305	89,991	79,466

1/ Total acres in each alt vary due to rounding MA 9 not used, MA 24 Min Mgt not assigned in any alternative

2/ Applies only to Alt A, includes mostly unroaded, but some roaded recreation, from exisitng Multiple Use Plans

3/ Parcels of the 1926 area that remain outside of wilderness and the Mt Baker NRA are included here

4/ Acres are protected, at varying levels, in the alternatives, but not shown to protect confidential nature

5/ Includes Cultural-Historic, Geologic, Biologic, Botanic, and Scenic Special Areas

6/ Many acres of riparian zone fall within other MA's and are protected through those management prescritptions

7/ Management Areas 16B Grizzly Bear, 16C American Peregrin Falcon and 16D Gray Wolf have no acres assigned at this time, because no specific habitat has been identified or evaluated

8/ Acres of existing or proposed RNA located within wilderness are included in MA 10, not here

9/ These acres overlap other MA's

10/ Includes acres within the congressionally designated Alpine Lakes Management Unit that are not otherwise assigned to other, compatible management areas (Compatible MA's include 5, 11, 12, 14, 15, and 16)

PART 4 - COMPARISON OF ALTERNATIVES

The following figures show how the alternatives compare to each other in just a few of the Forest activities or resource outputs. The graphs tie to the detailed output tables in the next section (where other outputs are displayed). Again, the alternatives are arranged in order of decreasing acres of land suitable for timber production. Alternative NC (No Change) was not modeled in FORPLAN, therefore not all outputs for this alternative can be reasonably estimated. Refer to the text and footnotes for each figure.

Figure S-2 shows average annual timber sale program quantity (TSPQ) for Decade 1 (in million board feet). TSPQ includes live (green) wood, plus salvage, fuelwood, and other non-industrial wood. Figure S-3 shows the acres of final timber harvest, each decade, for Decades 1, 2, and 5. Refer to Table S-2 for more comparisons.

Figure S-2

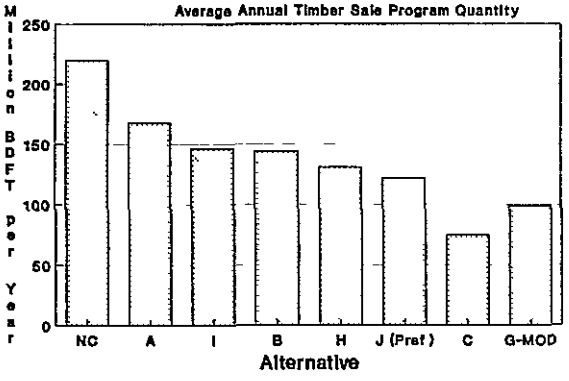


Figure S-3

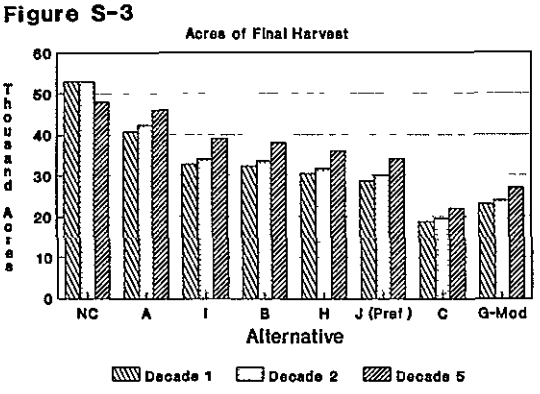


Figure S-4 shows the total amount of old-growth forest remaining, which includes old growth located in wilderness and other no-harvest areas. The starting point is the beginning of plan implementation. The figures then show acres remaining at the end of Decades 1, 2, and 5.

Figure S-4

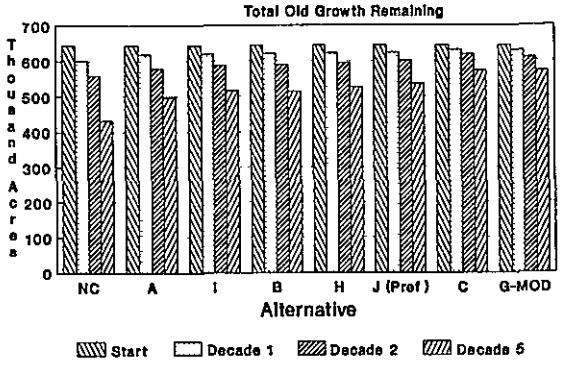


Figure S-5 shows total road construction, in miles per year. Most of the miles are local (timber purchaser) roads. Refer to Table S-2. In all alternatives, all arterial/collector road construction, but not all local road construction, will be completed by Decade 3. In Alternative C, about 300 miles of arterial and collector roads are closed starting in Decade 1; about 65 miles are closed

in Alternative G; 20 miles closed in Alternative H; and about 25 miles closed in Alternative J (Preferred).

Figure S-6 shows the disposition of the 402,930 acres of roadless areas: the percent remaining undeveloped at the end of Decades 1, 2, and 5. No data can reasonably be estimated for Alternative NC. In the first 10 to 15 years, from 1% to 7% would be developed, depending on the alternative. The acres shown for Alternative A are an estimate.

Figure S-5

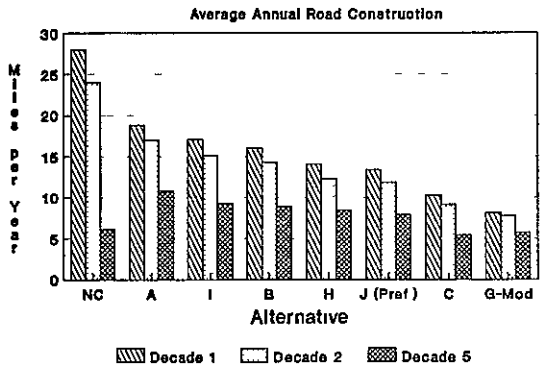
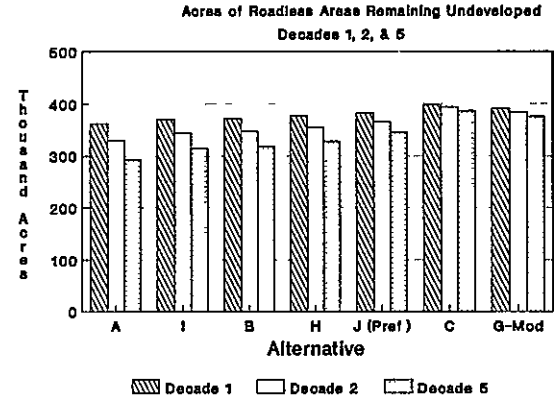


Figure S-6



Does not apply to NC Alt

Figures S-7 and S-8 show the acres of dispersed recreation by ROS classes. Alternative NC is estimated to be similar to Alternative A. The term "reached by Decade 4" is used because, as an alternative is implemented, land allocated to MA's, and standards and guidelines applied, the recreation setting will slowly change toward the desired future condition. The figures show the expected ROS acres after four decades of implementing each alternative. While no alternative can meet future demand for unroaded dispersed recreation,

Figure S-7

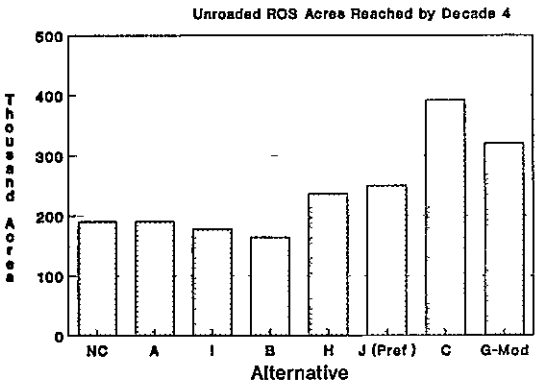
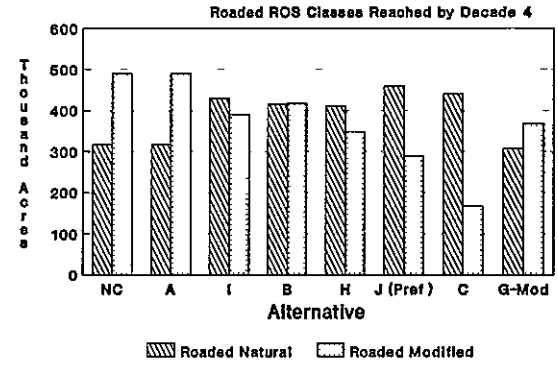


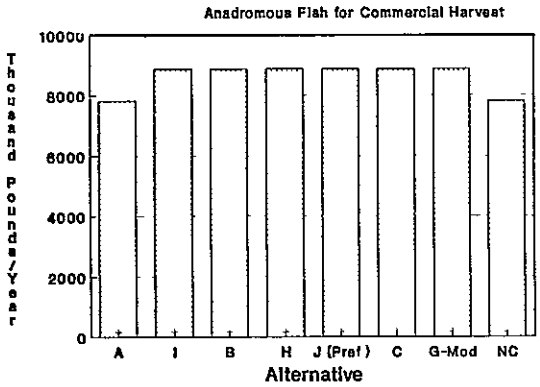
Figure S-8



Alternatives C and G-Modified come the closest. Alternative B cannot meet the RPA target for dispersed recreation. Looking at Figure S-8, the alternatives with more timber harvest activities and associated road construction (NC, A, and I) provide the most roaded dispersed recreation; however, much of this recreation will occur in landscapes that have been heavily altered.

Figure S-9 shows the pounds of anadromous fish available for commercial harvest. The differences between alternatives are a function of investments in habitat improvements: a higher level of investment and more restoration/ enhancement results in more available fish. Alternative NC is similar to A. While not shown in this figure, resident fish habitat is also improved/enhanced in Alternatives C, G-Modified, and J (Preferred).

Figure S-9



Quantitative Outputs and Effects of the Alternatives

Tables S-2 and S-2a show some of the key outputs and effects of the eight alternatives. Again, the alternatives are displayed in descending order of acres suitable for timber harvest, an indicator of the level of vegetative management. Many outputs and effects are either directly or inversely correlated to this order.

Alternative NC (No Change) is based on the 1963 Timber Management Plans (as amended), which were not integrated resource plans and consequently did not address all resource uses and outputs. Data for Alternative NC is presented where it can be reasonably estimated, or where information was addressed in the 1963 Plans. Alternative NC was not modeled in FORPLAN, therefore, economic measures comparable with the other alternatives were not determined.

While the alternatives and the decision apply only for the life of this Forest Plan - 10 to 15 years - outputs and effects for Decades 2 and 5 are included to show some long-term trends of implementation.

Both allowable sale quantity and timber sale program quantity are shown; the footnotes explain the difference in these two terms. Allowable sale quantity (ASQ) is shown in board feet per year only for the first decade. ASQ and timber sale program quantity, by alternative, are shown in cubic feet per year for all time periods.

Generally, as suitable acres increase, the amount of harvest increases, as does road construction, and environmental effects, such as sediment index.
For the recreation and wilderness resource, the most useful way to compare the alternatives is to first look at current use and capacity, and then compare how well each alternative is able to provide for future demand, which is expressed as a range.

For this Forest, capacity means practical, or realistic, capacity not the theoretical maximum. 1/ It was assumed that projected recreation use will not exceed capacity for any particular activity. It is expected that use will be limited by a combination of direct management actions by the Forest Service (such as permits, area closures) and by the users themselves: when use of a site or area approaches capacity, people will substitute other activities (such as nordic skiing when alpine ski areas are full), or shift their activities to other lands, if they cannot satisfy their expected recreation experience on the Forest.

For non-wilderness unroaded dispersed recreation, current use already exceeds practical capacity. In total recreation use, current capacity far exceeds use (primarily due to the large reserve of developed capacity in ski areas, campgrounds, and in roaded dispersed recreation). However, by the fifth decade, all alternatives will fall short of meeting the range of total recreation demand.

Most of the miles of new trail construction, in all alternatives, are outside wilderness.

Note footnote number 8/ when comparing acres of old growth, by alternative. The "starting point" total acres of old growth, including acres within wilderness, is 643,538 acres. The acres within wilderness (232,500) remain constant in all alternatives over time. Proposed timber harvest will occur only on those old growth acres that are suitable for timber production and are assigned to a management prescription that includes timber harvest.

The pounds of anadromous fish available for commercial harvest are a direct function of the investment level for fish habitat improvement. MR's for water quality and riparian areas will also benefit this resource.

Population estimates for the spotted owl exceed the MR level in all alternatives, except Alternative NC, for all time periods. However, wildlife populations that primarily use mature and old-growth habitats (northern spotted owl, pine marten, pileated woodpecker) will decrease over time, in all alternatives, primarily due to harvest of mature and old-growth timber stands.

Winter range habitat capability for deer and elk increases from the current situation (which supports 9,140 deer and 470 elk) through the first decade, a result of increased forage from timber harvest activities. Habitat capability declines in Decade 2, as winter thermal cover becomes limiting. By Decade 5, habitat capability again increases, due to habitat improvements implemented in the first decade.

The text discussing Table S-2a, "Percentage of Inventoried American Indian Religious and Cultural Use Areas Assigned to MA's Providing High and Moderate Levels of Protection" follows all of the S-2 tables.

1/ Theoretical capacity is an estimate of the maximum use of the Forest, assuming all facilities are 100% full, all days of the maximum use season. Practical capacity recognizes physical and social limitations, such as low mid-week use and periods of unfavorable weather, when use declines.

Table S-2
Quantitative Resource Outputs, Inputs, Effects

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No Act)	I	B (RPA)	H	J (Preferred)	C	G-Mod
Lands Tentatively Suitable for Timber Production	Acres	NA	597,199	597,294	597,307	597,293	597,280	597,303	597,284
Lands Suitable for Timber Production	Acres	546,500	412,508	386,512	380,448	358,754	346,411	256,206	247,091
Allowable Sale Quant. 2/									
Decade 1	MMBF Per Year	204	149	129	127	116	108	66	87
Allowable Sale Quant. 2/									
Decade 1	MMCF	41 7	31.0	26 6	26 3	24.1	22.4	13.8	18.3
Decade 2	Per	41 7	36.7	30 0	29.6	27.5	25.7	16.3	20.7
Decade 5	Year	41 7	39.0	33.7	32.3	31.3	29.7	19.8	22.2
Timber Sale Program Quantity 3/									
Decade 1	MMCF	45.0	35 0	30.1	29.8	27 3	25.5	15.8	20.4
Decade 2	Per	44.5	40 8	33.3	32.9	30 6	28.5	18.2	23.0
Decade 5	Year	42.5	41 5	35.8	35.4	33.3	31 6	21 0	23.6
Arterial and Collector Road Construction									
Decade 1	Miles	8.2	1 4	1.8	1.5	0.6	0.8	0 7	0.6
Decade 2	Per	6.7	1 2	1.6	1.3	0.5	0.7	0 8	0.7
Decade 5	Year	0.0	0 0	0.0	0.0	0 0	0.0	0 0	0.0
Timber Purchaser (Local) Road Const./Recon.									
Decade 1 Const.		20.4	17 4	15.3	14.6	13 5	12.6	9.6	7 5
Reconstruct.	Miles	72.0	73 2	63.0	61.7	56 6	52.8	34.3	40.2
Decade 2 Const.	Per	17.8	15.8	13.6	13.0	11.8	11.1	8 3	7.0
Reconstruct.	Year	72.0	81 9	67.4	66 2	61.1	57 1	37 6	44.1
Decade 5 Const.		6.1	10 8	9 3	8.9	8 4	7 9	5 4	5.7
Reconstruct.		72.0	81 1	69.9	68.8	64.7	61.2	40 9	45.5
Sediment Index									
Decade 1	M Tons	Simi-	102 9	96.7	95.7	91 3	88.5	67 6	66.8
Decade 2	Per	lar to	102 6	96.5	95.4	91.0	88.2	67 5	67.1
Decade 5	Year	Alt. A	100 4	94.6	93.3	88.9	86.2	65.4	65.3

1/ The TM Plans upon which the No Change Alternative is based were developed in 1963 The outputs and effects are generated from previous inventories All other alt. outputs and effects were calculated using updated inventories and yield tables and the latest method of calculating timber harvest levels. For Alt NC, tentatively suitable lands were not determined and standard plus special commercial forest land is shown as lands suitable for timber production

2/ ASQ Quantity of timber that may be sold, from suitable land. Includes only chargeable, live (green) not salvage, fuelwood or other non-industrial wood Potential yield from the TM Plan is shown for Alternative NC

3/ Includes ASQ, nonchargeable mortality volume, volume not meeting utilization standards, and volume used for other than board products from lands suitable for timber production, and volume from unsuitable lands. Includes PY and all other volume for NC

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No Act.)	I	B (RPA)	H	J (Preferred)	C	G-Mod
Non-Wilderness Disp Rec. Use									
Roaded 4/									
Current Use (1989)	1,000	Similar	2,102	2,102	2,102	2,102	2,102	2,102	2,102
Current Capacity (1989)	RVD's	to Alt A	3,199	3,199	3,199	3,199	3,199	3,199	3,199
Future Capacity	Per Yr								
Decade 1		Similar	3,343	3,339	3,317	3,322	3,277	3,130	3,223
Decade 2		to	4,097	4,093	4,068	3,818	3,730	3,374	3,474
Decade 5		Alt. A	4,902	5,069	5,043	4,516	3,991	3,599	3,710
Future Demand									
Decade 1		Similar	----------1,854 to 2,266----------						
Decade 2		to	----------2,837 to 3,467----------						
Decade 5		Alt. A	----------4,817 to 5,887----------						
Non-Wilderness Disp Rec Use									
Unroaded 5/									
Current Use (1989)	1,000	Similar to	297	297	297	297	297	297	297
Current Capacity (1989)	RVD's	to	223	223	223	223	223	223	223
Future Capacity	Per Yr.	Alt. A							
Decade 1		Similar	201	208	200	205	208	222	218
Decade 2		to	164	182	157	174	182	220	210
Decade 5		Alt A	115	149	102	134	149	218	201
Future Demand									
Decade 1		Similar	----------225 to 293----------						
Decade 2		to	----------328 to 492----------						
Decade 5		Alt. A	----------713 to 890----------						
Wilderness Recreation									
Current Use (1989)	1,000	Similar	459	459	459	459	459	459	459
Current Capacity (1989)	RVD's	to	500	500	500	500	500	500	500
Future Capacity	Per Yr.	Alt A	500	675	511	422	539	375	440
Future Demand									
Decade 1		Similar	----------388 to 456----------						
Decade 2		to	----------565 to 673----------						
Decade 5		Alt. A	----------921 to 1,107----------						
Total Recreation Use 6/									
Current Use	1,000	Similar	5,182	5,182	5,182	5,182	5,182	5,182	5,182
Current Capacity	RVD's	to	8,966	8,966	8,966	8,966	8,966	8,966	8,966
Future Capacity	Per Yr	Alt A							
Decade 1		Similar	9,426	9,820	9,410	9,547	9,622	9,109	9,245
Decade 2		to	10,553	11,228	10,438	10,512	10,549	9,851	9,808
Decade 5		Alt A	12,359	13,491	12,318	12,310	11,917	11,214	10,995
Future Demand									
Decade 1		Similar	----------5,301 to 6,479----------						
Decade 2		to	----------7,636 to 9,334----------						
Decade 5		Alt. A	----------13,169 to 16,095----------						

4/ Includes RN, RM, and Rural ROS classes.
5/ Includes P, SPNM, and SPM ROS classes
6/ Includes Developed, Roaded & Unroaded Dispersed, and Wilderness Recreation totals Wildlife Fish User Days are included

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No Act.)	I	B (RPA)	H	J (Preferred)	C	G-Mod.
Developed Rec Site Construct./Reconstruction									
Dec. 1	PAOT	Similar	10/800	130/220	10/400	130/220	130/220	10/800	0/0
Dec 2	Per Yr.	to	50/850	200/100	0/400	100/900	100/900	100/900	0/0
Dec. 5		Alt. A	50/900	200/1200	0/400	100/1000	100/1000	100/1000	0/0
Trail Construction/ Reconstruction									
Dec. 1	Miles	Similar	7/6	35/12	5/7	9/12	22/49	9/8	35/12
Dec. 2	Per Yr	to	7/6	0/12	5/7	9/12	0/2	9/8	0/12
Dec. 5		Alt A	0/5	0/5	0/5	1/5	1/5	0/5	0/5
Roadless Areas 7/ Assigned Roaded Mgt. Prescript But Not Developed For Next 15 Years	Acres	NA	70,215	98,181	87,955	61,598	61,482	23,101	18,368
Roadless Areas 7/ Assigned to Unroaded Management Prescriptions	Acres	NA	280,334	256,397	266,623	305,068	309,214	375,800	368,445
Rivers Recommended for W & S River Designation	No. of Rivers	0	15	0	0	5	30	47	47
	Miles	0	287	0	0	154	452	606	796
Non-Wilderness Old Growth Not Suited for Timber Production 8/	Acres	NA	247,869	253,378	253,212	265,260	270,221	307,793	330,346
Non-Wilderness Old Growth Suited and Allocated to Timber Harvest Prescription	Start	NA	163,169	157,660	157,826	145,778	140,817	103,245	80,692
	End Dec 1	NA	137,131	134,385	134,897	125,105	121,939	91,396	66,491
	End Dec. 2	NA	97,723	102,244	103,339	96,335	96,634	77,180	47,228
	End Dec. 5	NA	16,156	29,834	27,308	28,326	32,373	33,134	7,824
Anadromous Fish Commercial Harvest									
Decade 1	1,000	Similar	7809	8874	8874	8874	8874	8874	8874
Decade 2	Lbs/Yr	to	7809	9000	9000	9000	9000	9000	9000
Decade 5		Alt. A	7809	10,000	10,000	10,000	10,000	10,000	10,000

7/ RARE II roadless areas released by the 1984 Washington Wilderness Act.

8/ There are 232,500 acres of old growth in wilderness in all alternatives. In all alternatives, there are 134,400 non-wilderness acres that are not suited for timber production due to potential irretrievable or irreversible resource damage The remaining acres in this line vary, based on the objective of the alternative. Total old growth on the Forest, starting point = 643,538 acres

Table S-2

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No. Act.)	I	B (RPA)	H	J (Preferred)	C	G-Mod.
Northern Spotted Owl									
Decade 1	Habitat	108 9/	108	108	108	111	111	115	115
Decade 2	Capability	91	97	98	98	101	103	110	110
Decade 5	for Pairs	54	76	76	76	80	82	99	98
Roosevelt Elk Winter Range									
Decade 1	Habitat	Similar 9/	780	780	770	770	770	750	740
Decade 2	Capability	to	720	700	690	700	690	670	660
Decade 5	for Indiv.	Alt A	790	740	730	740	710	650	640
Black-tailed Deer Winter Range									
Decade 1	Habitat	Similar 9/	16,520	15,350	15,300	15,250	15,160	14,870	14,610
Decade 2	Capability	to	14,400	13,510	13,410	13,450	13,390	12,950	12,680
Decade 5	for Indiv.	Alt A	15,740	14,300	13,970	14,190	13,580	12,410	12,110
Mountain Goat									
Decade 1	Habitat	Similar 9/	1430	1440	1450	1440	1450	1450	1450
Decade 2	Capability	to	1400	1440	1440	1440	1440	1450	1450
Decade 5	for Indiv.	Alt A	1330	1400	1410	1410	1420	1450	1440
Total Budget									
Decade 1	Million	NA	20.0	18.4	18.7	18.3	18.0	15.4	15.7
Decade 2	Dollars	NA	21 0	18 9	18 9	18.5	19.3	15.7	16.6
Decade 5	Per Yr.	NA	18.3	16.8	16 8	16.7	15.9	13.3	14.0
Returns to Treasury									
Decade 1	Million	35.9	21 4	19 8	19.4	18.1	16.8	9.3	14.3
Decade 2	Dollars	36.6	34.9	28.1	27.7	25.6	23.9	14.4	19.6
Decade 5	Per Yr.	24.0	46.2	40 3	40.2	38.9	37.7	26.2	24 2
Payments to Counties									
Decade 1	Million	NA	5.9	5.4	5.3	4.9	4.9	2.6	3.8
Decade 2	Dollars	NA	9.2	7.4	7.3	6.8	6.3	3.9	5.1
Decade 5	Per Yr	NA	11.9	10.4	10.3	10.0	9.6	6.7	6.2
Jobs Supported by the Alts.	Thousands of Jobs								
Decade 1	Per Year	NA	29.3	29 1	29.1	28.9	28.8	28.0	28.4

9/ Populations would be expected to decline at a rate faster than Alternative A because no specific provision is made in Alt. NC to maintain viable populations and more of the old growth is suitable for timber harvest and will be fragmented.

Table S-2a

Percentage of Inventoried Acres of American Indian Religious and Cultural Use Sites Assigned to Management Areas Providing High and Moderate Levels of Protection

Type of Site	Alternatives													
	NC 1/ (No Change)		A (No Action)		I		B (RPA)		H		J (Preferred)		C		G-Modified	
	High	Mod	High	Mod	High	Mod.	High	Mod.	High	Mod	High	Mod	High	Mod.	High	Mod.
Spirit Quest	NA		37	3	44	2	44	6	41	15	48	11	40	26	43	22
Legend Site	NA		16	2	30	2	28	16	25	26	40	17	23	45	18	47
Cedar Areas	NA		22	1	28	1	28	5	27	8	27	8	23	27	29	25
Ceremonial Flora	NA		52	1	56	1	57	6	54	16	56	15	58	24	55	26

1/ The 1963 TM Plans, upon which Alternative NC is based, were not integrated resource plans, and consequently did not address all resource uses and outputs. The missing information in this table cannot be reasonably estimated because, except for cemeteries, the percentages were developed by overlaying inventoried areas with MA's; no MA's were assigned in Alternative NC.

Table S-2a shows, by alternative, an estimated percentage of the inventoried American Indian religious and cultural use sites assigned to management areas that generally preclude or limit ground-disturbing activities.

The percents given should be viewed as only an approximation as some use sites and areas were not identified in the Inventory, but were included in a larger "buffer" area by tribal respondents. Therefore, the actual degree of protection in each alternative can only be estimated.

In the table, the difference between "high" and "moderate" is derived from the expected frequency of human encounters. There is no timber harvest or road construction under either high or moderate protection. All cemeteries have high protection. The actual protection of all sites will be determined using Forest-wide Standards and Guidelines (Forest Plan, Chapter 4) and consultation with appropriate tribes. To protect the confidential nature of the inventory, use sites and areas are not reported in Table S-1 nor are they mapped.

Economic Tradeoffs Among Alternatives

Present net value (PNV) is an estimate of the potential economic effectiveness of managing the Forest. PNV is defined as the discounted dollar value of all benefits of an alternative, less the discounted costs of management and investments needed to implement the alternative. Discounting is a way of combining current and future values to show them in today's terms. The values used in this plan are expressed in terms of 1982 dollars, with a discount rate of 4%. This concept is discussed in detail in Appendix B of the FEIS.

Table S-3 compares PNV and the benefits and costs among alternatives for major resource groups. An exact relationship between the dollar benefits associated with a particular priced output and the resource costs should not be assumed. For example, some recreation and wildlife benefits are joint outputs of timber management. The dollar values assigned are discussed in Appendix B.

Table S-3 indicates that almost all of the variation in PNV, discounted costs, and discounted benefits is due to the variation in timber outputs of the alternatives. With some minor exceptions, as timber outputs decline, so do discounted costs and benefits.

Discounted costs and benefits for recreation change very little from one alternative to another. This is partly due to the fact that current recreation use is very close to capacity on the Forest for most types of recreation, except roaded dispersed. There is little opportunity to significantly increase the recreation supply in wilderness, primitive, semi-primitive nonmotorized, or semi-primitive motorized outside of wilderness. Although there is some variation between alternatives in these dispersed recreation capacities, it is a very small percentage of the current capacity and affects discounted recreation benefits only about 6% between the alternatives. Discounted recreation benefits exceed discounted timber benefits in all alternatives, though actual cash flow or returns to the Treasury are much lower than for timber.

Alternative C has the lowest discounted recreation benefits of all the alternatives but the highest levels of primitive and semi-primitive nonmotorized recreation capacity. Although primitive and semi-primitive

nonmotorized recreation use has a higher value per Recreation Visitor Day (RVD) than motorized use, it has a lower RVD per acre coefficient (the number of people who do or can recreate on an acre). The result is that on a per-acre basis, motorized use is more valuable than nonmotorized use.

The alternatives in Table S-3 are displayed in order of highest to lowest PNV.

Table S-3
Present Net Values and Discounted Benefits and Costs by Resource Group

Alternatives	PNV	Discounted Benefits			Discounted Costs			
		Timber	Recreation	Other	Timber	Roads	Recreation	Other
	Millions of Dollars							
B (RPA)	2343 2	1384 3	1904 2	146 2	746.8	147 2	34 8	162 7
I	2342.9	1400 0	1892 1	146.2	754 1	146.9	35.2	159 2
A (No Act)	2283.5	1643 5	1880 0	33.7	916 2	165.1	34.8	157 6
H	2260.0	1288.6	1856.5	146.2	693.3	144.2	34.7	159 2
J (Pref)	2258 8	1204.8	1892.1	146.2	650.3	136.2	35.2	162.7
G-Mod.	1997 0	940.8	1805.4	78 9	523 1	110.9	34.9	159 2
C	1970.9	760 5	1788 5	146.2	420 5	106 8	34 2	162.7
NC (No Change)	NA	NA	NA	NA	NA	NA	NA	NA

Major Tradeoffs Among Alternatives

Table S-4 presents tradeoffs among economic benefits of the alternatives and their response to the major issues and concerns, as measured by quantitative indicators (listed in the ICO section of the Summary). Across the top of the table are the quantitative measures selected to indicate responsiveness to an ICO. To provide a partial framework for assessing these tradeoffs, the long-term resource demands or needs of the Nation, region, and local economic area are briefly summarized.

National, Regional, and Local Overview

National (RPA) planning estimates that total national demands will rise for all outputs of the National Forest. At the same time, there is a strong demand to protect and enhance the quality of the environment. Many people view the production of goods and services from the National Forests as competing with protection and enhancement of a quality environment.

Demands and prices for commodity products are generally determined in regional and national markets. The nation benefits most when supplies are provided from the most efficient sources of production.

The Mt. Baker-Snoqualmie National Forest is an efficient supplier of timber products. The 1980 RPA program assigned approximately 2.5 percent of the total projected timber outputs for the National Forest System in 1990 to the Mt. Baker-Snoqualmie National Forest. The Forests' share of the projected Regional outputs in 1990 is approximately 6 percent. The Mt. Baker-Snoqualmie produces about 15 percent of the logs consumed in the Puget Sound area; forest industry and other private owners are the major producers of logs consumed in the area. Nearly all (97%) of the logs produced on the Forest are processed in the local economic area (Larsen and others 1983). The resulting products are consumed primarily in the Western U.S. market.

Demands on the Forest for outdoor recreation uses are more localized than the regional and national demands for timber. Most of the Forest recreation users reside in the major population centers along the Interstate 5 highway corridor.

Recreation use and the demand for recreation of many types is growing, and at a rate faster than the population growth of the Puget Sound area. Total recreation use increased approximately 40 percent on the Forest in the 10 year period from 1975-1984. In a similar time period, the population of the five county area of the Forest increased approximately 20 percent. The fastest growing segment of the recreation spectrum is wilderness use: + 145 percent, compared to an increase of 65 percent in developed recreation use. Wilderness use represents approximately 4.5 percent of the total recreation use on the Forest for the period 1975 to 1984.

The Mt. Baker-Snoqualmie National Forest is a major supplier of National Forest wilderness in the Pacific Northwest and the nation. The Forest contains 16 percent of the National Forest wilderness in the Pacific Northwest Region and 2.2 percent of the total National Forest wilderness system. Available data collected in the late 1970's and early 1980's indicates that 82-94 percent of wilderness use on the Forest originated from Washington State, and 49-65 percent of the users are from the Puget Sound area. Several of the Forest wildernesses are among the most heavily used in the nation.

Salmon, by a large margin, is the most valuable fish or wildlife species, as measured by the market value of the harvest. An estimated 50 percent of the harvest of naturally produced (as opposed to hatchery produced) salmon for the Puget Sound area are produced from Mt. Baker-Snoqualmie National Forest water systems.

The Forest has extremely low capability to produce economically efficient forage for commercial grazing of domestic livestock.

How the Alternatives Respond to Major Issues, National Concerns. With the discussion above to set the stage, Table S-4 and the text that follows show the major differences among the alternatives. In this table, the alternatives are displayed in order of highest PNV to lowest. The main reason that alternatives differ is that each alternative is designed to respond to major ICO's in a different way. Note: two issues - Management of Municipal Watersheds and Adjacent and Intermingled Lands - are not listed separately in the table, but their indicators are included in other ICO's. When an indicator is used to measure responsiveness for more than one ICO, such as timber harvest level, the indicator is displayed only once. See page S-6 for the full list of indicators.

Table S-4
Response, By Alternative, to Major Issues and National Concerns

	National Concerns			Development Vs. Nondevelopment Issue 1/			Timber Supply Issue					
	Average Per Year for Decades 1/5											
	Present Net Value	Net Receipts	Noncash Benefits	Existing Roadless Areas Allocated to Nondevelopment		Roadless Areas Assigned to a Roaded Mgt Prescription But Not Devel in Next 15 Yrs.	Decade 1 - Average Annual Timber Sale Program Quantity (TSPQ)		Long Term Sustained Yield Capacity	Lands Suitable for Timber Product	Employment: Jobs Supported By the Alts	Payments to County
Alternatives	...Millions of Dollars...			% Total Acres	M Acres	M Acres	MMCF	(MMBF)	MMCF	M Acres	M Jobs	MM Dollars
I	2342.9	5 8/25.6	61 3/85 5	64	256 4	98 2	30.1	(146)	34.0	386	29.1	5 4
B (RPA)	2343.2	5 3/24 8	61.0/86.8	66	266 6	88 0	29.8	(144)	33 4	380	29.1	5.3
H	2260.0	4.8/24.1	60 5/83 8	76	305.0	61 6	27 3	(131)	31 8	359	28 9	4.9
J (Pref.)	2258.8	3.4/23.1	61 2/85 5	77	309 0	61 5	25 5	(122)	30.4	346	28.8	4.6
A (No Act)	2283.5	6 5/29.6	60 9/85 2	70	280 3	2/ 70.2	35.0	(168)	38.6	412	29.3	5 9
G-Modified	1997.0	2.4/11.0	60.6/80.2	91	368 4	18 4	20.4	(99)	23 6	247	28.4	3.8
C	1970 9	-2.1/14.1	60 7/78 8	93	375.8	23 1	15 8	(75)	19.9	256	28.0	2.6
NC 3/	N/A	N/A	N/A	NA	NA	NA	45.0	(220)	N/A	547	30.1	9 5

1/ Roadless Areas refer to the 402,930 acres of remaining RARE II parcels.

2/ This is an approximate figure. Alternative A is unique because an unspecified amount of development is permitted in the Upper Forest Resource Zone. See description of Management Area 1E

3/ The TM Plans upon which Alternative NC is based were developed in 1963; they are not integrated resource plans, and consequently did not address all resource uses and outputs Missing data in this table (NA) cannot be reasonably estimated, since the TM plans were based on yield tables and resource relationships which do not reflect the latest scientific techniques and information, do not reflect standards in the NFMA regulations, or are otherwise inappropriate

Table S-4
Response, By Alternative, to Major Issues and National Concerns

	Old Growth Ecosystems and Fish, Wildlife, & Plant Diversity Issue					American Indian Religious & Cultural Use Issue	
	Total Old Growth Remaining End of Decade 1/5	Old Growth Remaining on Suitable Acres End of Decade 1/5	Anadromous Fish Production Decade 1	"Effective" Areas Decade 1/5 Habitat for Old Growth Low Elevation Species 4/	Decade 1 Winter Range for Deer & Elk 5/	Inventoried Acres Afforded High/Moderate Protection 6/	
Alternatives	M Acres	M Acres	Thousand Lbs. Fish Per Year	M Acres	M Acres	High Percent	Moderate Percent
I	620 / 516	134 / 30	8,874	308/242	225	43	2
B (RPA)	621 / 513	135 / 27	8,874	309/239	253	43	7
H	623 / 526	125 / 28	8,874	309/246	257	40	17
J (Pref)	625 / 535	122 / 32	8,874	310/250	280	47	11
A (No Act)	618 / 497	137 / 16	7,809	306/220	113	36	3
G-Modified	629 / 571	66 / 8	8,874	313/275	113	42	23
C	632 / 573	91 / 33	8,874	315/275	281	37	27
NC 7/	601 / 432	190 / 21	7,809	N/A	N/A	N/A	N/A

4/ Includes wilderness and non-wilderness acres of old growth located below 3,000 feet elevation Indicator species for mature and old-growth habitats are Northern spotted owl, pileated woodpecker, and pine marten.

5/ Acres given include deer and elk winter range, management areas with compatible goals and which will incorporate winter range standards and guidelines, and some mountain goat habitat

6/ Protection is afforded by those management areas that preclude or limit ground disturbing activities. Differences between "high" and "moderate" derived from expected frequency of human encounters. See Table II-9o.

7/ No management areas assigned in Alternative NC and the above information cannot be reasonably estimated. The TM Plans, upon which the No Change Alternative is based, were developed in 1963.

Table S-4
Response by Alternative, to Major Issues and National Concerns

	Recreation Opportunities Issue						Wild & Scenic Rivers Issue		*Effects of Timber Management & Related Activities Issue*	
	Demand Satisfied in Wilderness, Primitive, & Semi-Primitive Nonmotorized		Roads Open to Public Use, Passenger Car	Trail Construction/ Reconstruction	Lands Managed for High Visual Quality Level		Recommended for Designation as Wild and Scenic River		Decade 1 *Annual Road* Construction	Sediment Produced Annually, Decade 1 7/
					Meeting VQO of					
Alternatives	Decade 1 Percent	Decade 5 Percent	Decade 1 Miles	Decade 1 Constr./Reconst. Miles	Retention M Acres	Partial Retention M Acres	No Rivers	Total Miles	Miles	M Tons
I	94	45	1032	350 / 120	208	311	0	0	17	97
B (RPA)	76	34	1033	50 / 70	287	285	0	0	16	96
H	67	31	1039	90 / 120	407	181	5	154	14	91
J (Pref)	79	38	1039	220 / 493	395	204	30	452	13	89
A (No Act)	75	34	1039	70 / 60	120	342	15	287	19	103
G-Modified	70	35	933	350 / 120	573	56	47	796	8	67
C	64	33	1017	90 / 80	619	148	47	606	10	67
NC	N/A		Similar to A	Similar to A	N/A	N/A	0	0	28	125

7/ From all sources, including timber harvest, new road construction, old roads, and background (which includes sediment from previously disturbed ground and natural sedimentation).

Economic Benefit and Issue Response Tradeoffs Among Alternatives

The alternatives were designed to respond to specific major issues, or a combination of issues. In responding to one set of issues, some potential benefits or responses to other issues may be limited or "traded off." In Table S-4, the alternatives are displayed in order of highest PNV to lowest. Most of the indicators of response follow a specific pattern as PNV declines. The indicators of response are grouped into those patterns in the display below. A detailed discussion of why these changes occur in each alternative can be found in Chapter II of the FEIS.

Indicators That Decline As PNV Declines:

- Net Receipts
- Non-cash Benefits (slightly) in 5th Decade
- Timber Sale Program Quantity, Long-Term Sustained Yield, Suitable Lands
- Jobs (slightly), Payments to Counties
- Old Growth on Suitable Lands

Indicators That Remain More-or-Less Stable Among Alternatives As PNV Declines:

- Non-cash Benefits in 1st Decade

- Demand Satisfied for Wilderness, Primitive, Semi-Primitive Nonmotorized Recreation

Indicators That Rise As PNV Declines:

- Visual Quality, Retention Acres
- Habitat for Low-elevation Old-Growth Wildlife Species, 1st Decade
- Habitat for Low-elevation Old-Growth Wildlife Species, 5th Decade
- Old Growth Remaining on All Lands in 5th Decade
- Existing Roadless Areas Allocated to Nondevelopment
- Religious and Cultural Use Areas Afforded High/Moderate Protection

Indicators That Vary Irregularly As PNV Declines:

- Visual Quality, Partial Retention Acres
- Acres of Deer and Elk Winter Range in 1st Decade
- Anadromous Fish Production (in pounds)
- Old Growth Remaining on All Lands in 1st Decade

PART 5 - ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

In the following section, only the significant direct and indirect effects of implementing the alternatives are summarized. Brief narratives show how the acre assignments, outputs, and schedules of each alternative will affect the physical, biological, social, and economic environment. Refer to Chapter IV of the DEIS for more detail.

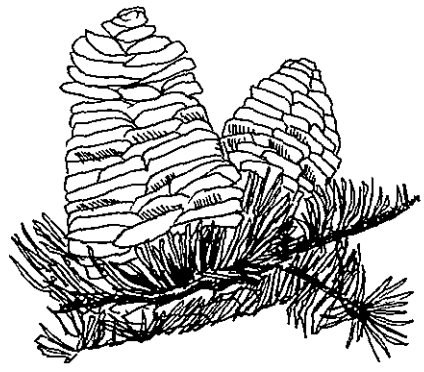
The Effects On Soils. In all alternatives, except Alternative NC (which has a high level), there will be moderate to moderately-high levels of "background" or existing erosion and sedimentation of streams. Some of this is natural, a result of unstable soils and steep terrain, and some results from old timber harvest areas and existing roads.

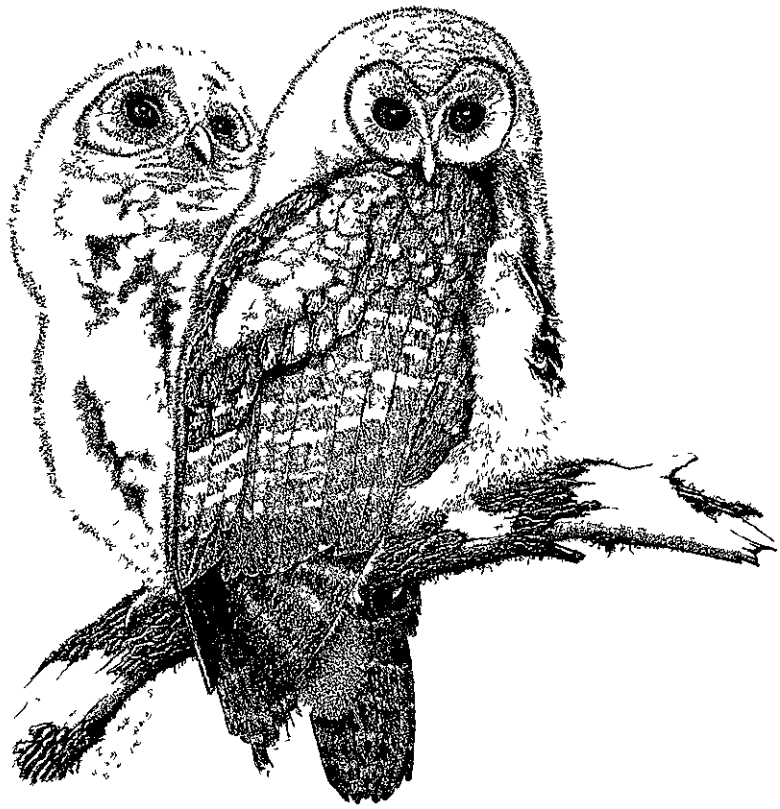
Implementing Alternative NC would result in the most erosion from timber harvest and roads during the 1st Decade; there would be moderately high erosion in Alternatives A, I, B, H, and J (Preferred). Alternatives C and G-Modified will result in considerably less erosion. Refer to the sediment index in Table S-2 for the effects on the Forest aquatic systems. There is limited broadcast burning in all alternatives; the least in Alternatives G-Modified and C.

The Effects On Water. In all alternatives, the Washington State Water Quality Regulations (designed to protect fish and water for domestic use) will be met, through the application of site-specific, Best Management Practices (see Appendix I, FEIS). Meeting water quality and riparian management requirements in all alternatives, except NC, will allow watersheds in an unacceptable condition to recover. Mitigation measures will result in a reduction in stream sediment, in all alternatives, from a current level of 125,000 tons per year in Alternative NC. Total sediment produced is the lowest in Alternatives C and G-Modified; Alternative J (Preferred) is second lowest.

The Effects On Vegetation and Plant Diversity. Diversity is primarily affected by timber harvest and road construction. In Decade 1, timber harvest in all alternatives will occur almost exclusively in old-growth forest. As old growth is removed, significant changes occur in the ecosystems. Over time, there is a decrease in acres of old-growth age classes and an increase in younger trees. However, this will also result in an increase in timber growth rate in the regenerated stands.

Alternatives G-Modified and C have fewer suitable acres and assign more acres of old growth to non-development. Alternative A (NC would be similar) has the highest suitable acres and harvests old growth at the fastest rate, followed by Alternatives I and then B. Both of these alternatives retain some old growth for deer and elk winter thermal cover. Alternatives H and J (Preferred) have moderately high acres of suitable land, and harvest at a moderate rate. Refer to Table S-2 for changes in acres of old growth, by alternative.





The Effects On Wildlife. Changes in wildlife habitats lead to a shift in the distribution and levels of wildlife habitats and populations. The most significant effects on wildlife are those resulting from timber harvest activities, road construction, and road use. However, MR's for viable populations of all species are met in all alternatives except Alternative NC; in that alternative no specific provisions are included to maintain viable wildlife populations. Federal Threatened and Endangered species are protected in all alternatives.

All alternatives reduce old-growth wildlife habitat. Population estimates for the spotted owl exceed the MR level in all alternatives, except Alternative NC, for all time periods. However, wildlife populations that primarily use mature and old-growth habitats (northern spotted owl, pine marten, pileated woodpecker) will decrease over time, in all alternatives, primarily due to harvest of mature and old-growth timber stands. They decrease the fastest in Alternatives NC, A, I, and B.

Winter range habitat capability for deer and elk increases from the current situation through Decade 1, especially in Alternatives NC and A, a result of increased forage from timber harvest activities. Habitat capability declines in Decade 2, as winter thermal cover becomes limiting. By Decade 5, habitat capability again increases in Alternatives NC, A, I, B, I and slightly in J (Preferred), due to habitat improvements implemented in the first decade.

The Effects On Fish. The major effect of all alternatives on fish is a change in habitat condition. Viable populations of fish are maintained on the Forest in all alternatives (viable defined as the current or existing levels of fish production). The amount of fish habitat capability to support and maintain

fish populations above the viability level varies by alternative, primarily in response to effects of forest management on key, in-channel and upslope conditions within stream systems, plus the emphasis on fish habitat restoration and improvement capital investment activities. Alternative A provides MR levels for anadromous fish. Alternatives I, B, and H provide high levels of capital investments for restoration/enhancement for anadromous fish habitat. Alternatives J (Preferred), G-Modified, and C provide high levels for both anadromous and resident fish.

The Effects On The Human Community. None of the alternatives will affect population in the five-county area. Only minimal effects to lifestyle would be noticed, and then, primarily among groups or individuals who work in forest products, who live near the Forest boundary, or who use the Forest for recreation, cutting firewood, or gathering forest products such as mushrooms or berries.

Implementation of any alternative will, at the most, decrease the total area employment/income by four-tenths to six-tenths of one percent. With or without implementation of the Forest Plan, traditional lifestyles in the smaller, rural communities will be challenged by new, more urban values and lifestyles. However, towns such as Darrington that are further from the urban areas, will experience change more slowly.

The Effects On American Indian Religious and Cultural Uses. In all alternatives, the consultation process will be continued for any proposed ground-disturbing project located in an inventoried site or area. Also, all cemetery sites will have high protection.

Refer to Table S-2a for the amount of protection afforded religious and cultural use areas. Alternative NC would have the greatest impact on religious and cultural use areas, because of high levels of timber harvest, road construction, and other development activities. Alternative G-Modified and C would have the least impact, with Alternatives A, B, H, I, and J (Preferred) resulting in intermediate levels of impacts.

The Effects On Archaeological and Historic Properties. Any ground disturbing activity, such as timber harvest or road building, has the potential to affect archaeological and historic properties. In all alternatives, ground-disturbing activities will include a professionally supervised inventory, evaluation, and mitigation, in compliance with the National Historic Preservation Act.

Implementation of Alternatives NC or A will result in the greatest loss of historic and cultural resources, due to the high level of timber production and road construction, plus high mitigation costs. Alternatives I, B, H, and J (Preferred) have moderate levels of impact. Alternatives C and G-Modified will result in the least amount of ground disturbance and the fewest losses.

The Effects On Scenery. Generally, alternatives that emphasize commodity production will, in the long term, result in a lower visual quality level and a more visually altered landscape than alternatives with a non-market emphasis. The foreground of Mather Memorial Parkway will be protected in all alternatives. In Alternatives J (Preferred) and G-Modified, the Mather Parkway is allocated to MA 8, Special Area; no scheduled timber harvest is allowed and scenery is emphasized.

Alternatives NC, A, and B will have the greatest effect on scenery. Visual quality will deteriorate over time for almost all the lands accessible by roads in these alternatives. Alternative I protects the foreground of selected, heavily traveled highways. In Alternative G-Modified, scenic quality would be reduced moderately in several significant viewsheds (as no middleground MA 2B is allocated), but would remain high in unroaded areas.

Alternatives C, H, and J (Preferred) protect both the foreground and middleground of selected major highway corridors; J (Preferred) manages for a high level of visual quality in additional viewsheds. Within these viewsheds, scenic quality will be retained at it's current level or improve gradually. Outside of the designated viewsheds and unroaded areas, scenic quality will decrease moderately.

The Effects On Recreation. Opportunities for various types of recreation vary among the alternatives. The supply of campgrounds is adequate to meet present demand; future demand can be met with a slight expansion of facilities. Expansion is planned, in varying degrees, in all alternatives except Alternatives B and G-Modified, which provide no further developed site construction.

The Forest will continue to be a supplier of dispersed motorized and a primary supplier of dispersed nonmotorized recreation for the Puget Sound area. All alternatives easily meet projected future demand for roaded motorized dispersed use; Alternatives NC, A, B, I and H provide the most. The major effect of alternatives with high, new road construction will be modification of the overall recreation setting. A shift will take place from the Semi-Primitive ROS classes, to Roaded Natural and Roaded Modified settings.

In all alternatives, under Regional and Forest standards of resource degradation, the Forest will not meet current or projected demand for non-wilderness, unroaded dispersed recreation. The deficit will be largest in those alternatives assigning the most unroaded acres to development. Alternatives A, B, and I develop 30%, 34%, and 36% of the roadless areas, respectively. Alternatives C and G-Modified develop the least acres of unroaded land and include large amounts of trail construction. I and J (Preferred) also include large increases in new trail construction.

While the demand already exceeds supply for Semi-Primitive Motorized, unroaded ORV opportunities, there is currently very little land suitable for this experience. This situation will not improve in any alternative, as most trails on the Forest are not suitable for ORV use due to terrain, unstable soils, and heavy precipitation.

The Effects On Wilderness. The total acres of wilderness are the same in all alternatives, but assignment of acres to different intensities of Wilderness Recreation Opportunity Spectrum (WROS) will vary the social and physical settings within the wilderness. Alternatives B, I, and J (Preferred) assign more acres to the Transition WROS class (over the current situation) and will generally provide for increased wilderness use. The average number of visitors per acre will be higher, resulting in degradation of naturalness and loss of solitude. All other alternatives reduce the amount of Transition, and offer a more natural setting with less social interaction. Alternative NC has no provision for management under the WROS system, therefore acres could not be reasonably estimated.

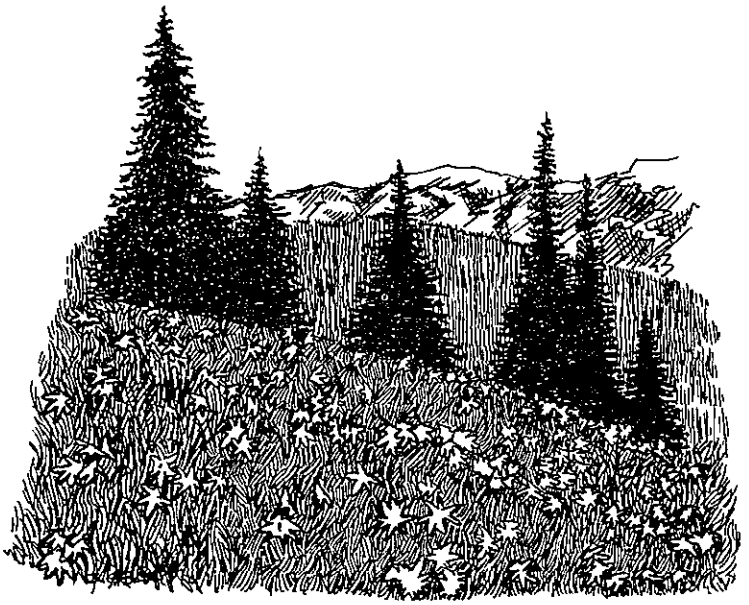
Easier road access in Alternatives NC, A, B, I, and H will likely result in more visitors, based on past experience, and will result in greater impact on the social and environmental features of wilderness. Alternatives C and G-Modified provide the fewest miles of new road construction, and close miles of existing roads, resulting in fewer impacts.

If more acres are available for primitive and semi-primitive dispersed recreation outside of wilderness, there is more opportunity to mitigate impacts on wilderness by offering alternative recreation sites. Alternatives NC, A, B, I and H will have the greatest potential effect on the wilderness, through elimination of alternate sites for primitive and semi-primitive nonmotorized recreation. Alternatives C and G-Modified will retain the most undeveloped area. Only Alternative C will increase acreage in primitive and semi-primitive ROS classes over the current situation.

The Effects On The Roadless Areas. A maximum of 36% of the total roadless area acres could be developed in any alternative, due to the lack of resource capability, the presence of wildlife habitat needed to meet the MR level for the Forest (except in Alternative NC), and because of the steep, high-elevation terrain of most of the areas. Only 39% of the roadless acres are tentatively suitable for timber production.

During the first decade, from 1 to 9 percent of the roadless areas will be developed in any alternative. The amount of proposed development cannot be estimated for Alternative NC; however, it is unlikely - based on the existing vegetation - that more than 50% of the total roadless areas would be developed in the foreseeable future.

Although additional wilderness is not being considered in this plan, areas left roadless now would maintain that option for the future. All alternatives foreclose that option to varying degrees. Alternatives NC, A, B, and I develop the most acres; Alternatives C, and G-Modified would assign the most acres to non-development, maintaining future wilderness consideration.



The Effects On Recommended Wild and Scenic Rivers. There were 795.9 miles of rivers and streams in 47 segments studied for possible inclusion in the National Wild and Scenic River System. The direct effect of implementing any of the alternatives will be a decision to recommend (or not recommend) designation of a river for inclusion in the National System. If a river is recommended, then management will be oriented toward protecting the features of the river system which would be important under the National Wild and Scenic River Act. No activities would be allowed which could preclude future designation. Management will protect all eligible rivers until Congress acts on the Forest's recommendation.

The number of rivers recommended for Wild and Scenic River designation range from none in Alternatives NC, B, and I, to all 47 rivers in Alternatives C and G-Modified. Alternative A recommends 15 rivers and J (Preferred) has 30 rivers recommended for inclusion.

The Effects On Air Quality. Implementation of any of the alternatives should not significantly impact air quality in the Forest area. Residue burning in all alternatives should drop to 20 percent of the acres harvested by 1990. Also, the amount of residue will decrease over time, as more logging is done in second growth timber, which contains less cull or unusable material than does old growth. Visibility in the Class I areas (two wildernesses) should continue to be good, with only brief periods of haze, often from urban pollutants or from activities off the Forest.

The Effects On Minerals. Mining operations may significantly impact soil, water, vegetative cover, plant diversity, wildlife, fish and recreation activities. On the Mt. Baker-Snoqualmie National Forest, such operations have occurred on a small scale and are very localized. However, mineral extraction could increase if market conditions become more favorable.

Implementation of some alternatives could make mineral access very difficult, due to acre assignments to management areas that restrict or prohibit various types of mineral activity. Access is a major consideration in determining whether commercial extraction is feasible. Alternatives NC and A are the least restrictive, with high miles of new road construction and only 13 percent (Alternative A - NC would be similar) of the Forest "withdrawn" or highly restricted for mineral activity. Alternatives B, I, H, and J (Preferred) withdraw or restrict a moderate amount of acres. Alternatives G C and G-Modified are most restrictive, two due to management of most of the roadless areas for non-development.

Relationship Between Short-Term Uses of The Environment and Maintenance and Enhancement of Long-Term Productivity

The relationship between short-term uses of the environment and the maintenance and/or enhancement of long-term productivity is complex. Short-term uses refer to those that would occur within the life of this plan, generally 10 years or less, but a maximum of 15 years. Long-term productivity refers to the capability of the land and water to produce a continuous supply of resources and values for future generations. Soil and water are the primary factors of productivity and represent the measurement of the relationship between short-term use and long-term productivity.

Some short-term uses can be detrimental to long-term productivity, particularly if effective mitigation measures are not implemented. Surface mining can leave an area with greatly diminished productivity for growing vegetation if the top soil is removed and not replaced. This adverse effect can be mitigated effectively by requiring stock piling and spreading of topsoil. Introduction of sediments into a stream on a continuous basis could adversely effect the future long-term productivity of that stream for production of fish. This potential adverse effect can be effectively mitigated by elimination of sediment sources or trapping sediment before it reaches the stream by maintaining vegetation along stream banks.

Some short-term uses also have the potential to increase long-term productivity. Harvest of old-growth timber stands and establishment of young faster growing stands increases the long-term productivity of the land to produce wood fiber. The current productivity of the Mt. Baker-Snoqualmie National Forest in terms of net timber growth is approximately 34 cubic feet per acre per year (1976 Timber Inventory). Harvest of these old growth stands can increases average annual growth on the Forest up to 90 cubic feet per acre per year.

The Multiple-Use Sustained-Yield (MUSY) Act of 1960, one of the principal laws relating to the Forest Service activities, requires the management of the various resources in such a manner that the productivity of the land will not be impaired. This law along with Forest Service Policy that was in effect prior to the MUSY Act have provided the basic frame work for development of management activities that are centered around maintaining the long-term productivity of the National Forests.

Many of the mitigation measures described in detail in Chapter II, Mitigation Incorporated in Alternatives, are designed specifically to maintain or enhance long-term productivity as short-term uses (projects) are designed and implemented. In all resource ares, long-term productivity of soil and water will be maintained or enhanced as a result of implementing the alternatives.

Implementation of the Forest Plan, which accompanies this FEIS, includes a monitoring plan. This monitoring plan will provide the data necessary to determine if the prescribed mitigation measures are effective in maintaining long-term productivity.

Irreversible or Irretrievable Commitment of Resources

An "irreversible commitment of resources" results from decisions to use or modify resources or environmental components of the Forest that cannot be renewed, or are renewable only over long periods of time. Examples are: old growth, soil productivity, minerals, cultural resources, scenery, and roadless areas. Once these resources are used or modified, they are irreversibly lost.

Soil productivity can be irreversibly lost or reduced by dedicated uses of the land. Examples of these uses would be arterial and collector roads, administrative sites, and developed recreation sites. Soil erosion, as a result of management activities, is an irretrievable loss because once the soil particles are removed from the site and deposited into a stream or river, they are no longer available. Accelerated erosion rates can reduce soil productivity and also reduce the water-holding capacity of the soil.

Removal of mineral or energy resources is an irreversible commitment of resources. The removal and utilization of rock resources for road construction would be an example of a common use on the Forest.

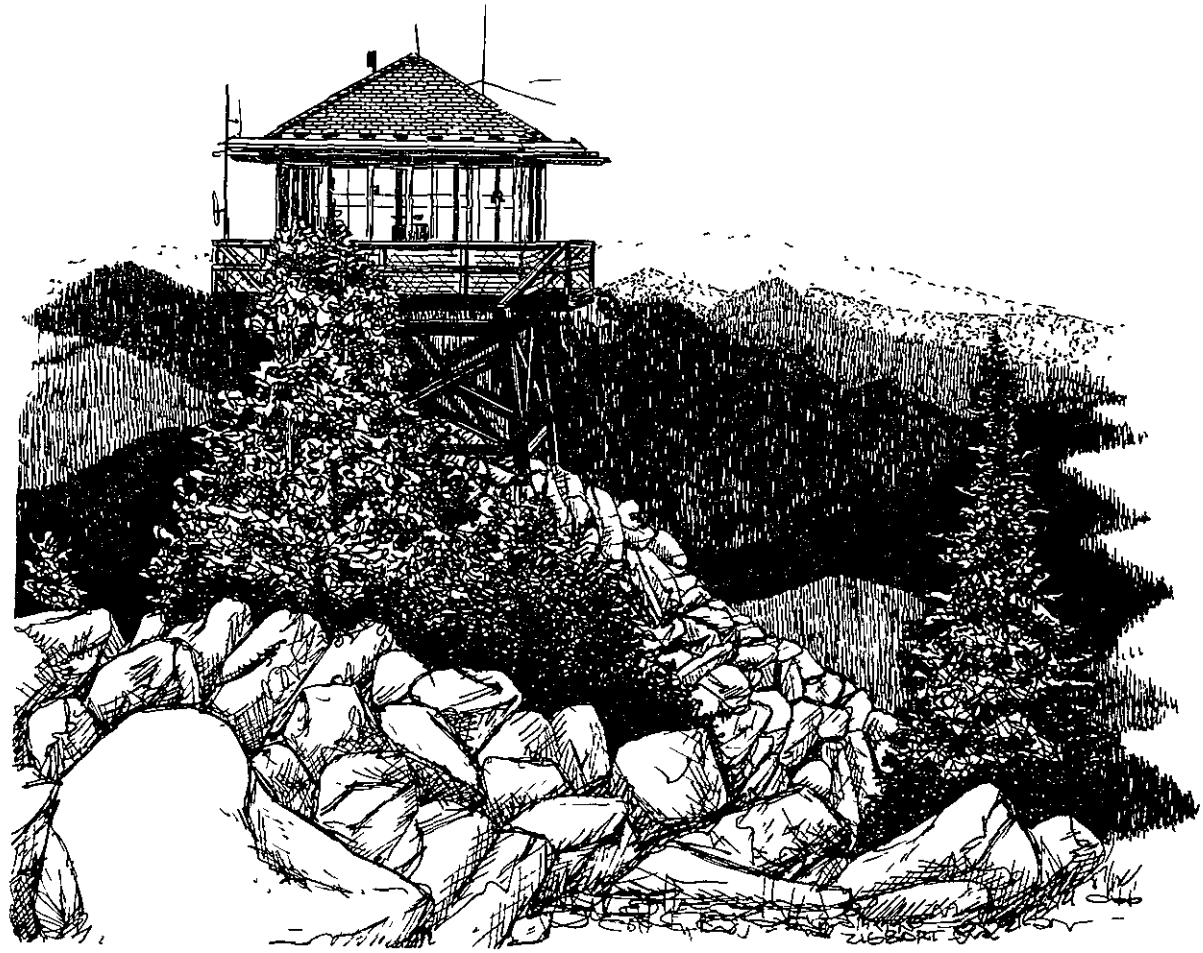
Reductions in habitat capability for old-growth-dependent species due to timber harvesting involve an irreversible and irretrievable commitment of resources.

The development of roadless areas would mean an irreversible loss of the characteristics which qualify these areas for Wildernesses or Roadless Areas. Development could also mean an irreversible loss of natural scenery and, in some cases, old-growth habitat.

Archaeological resources may be damaged by ground-disturbing activities; Irreversible information loss can result. Even when mitigation occurs prior to the activity, future study with more advanced techniques is precluded.

For American Indian religious use, land development removes the spiritual influence on the environment; this irreversibly removes the opportunity to conduct religious activities.

An "irretrievable commitment of resources" refers to a resource that is lost because of land use decisions or designations and/or scheduling decisions. These are opportunities foregone for the period of time that the resource cannot be used. Timber stands in management areas where timber harvest is not permitted represent an irretrievable loss of growth increases that could be made if the stands were being actively managed for timber production. Although the lost growth is irretrievable, the decision is not irreversible, since the stands could be managed at a later date in the future.



Probable Adverse Environmental Effects That Cannot Be Avoided

Implementation of Alternative J (Preferred) will result in some adverse environmental effects that cannot be avoided. The identification of an "adverse effect" is somewhat subjective, depending upon an individual's point of view. There are some effects considered to be adverse, by general agreement. The following effects are associated with implementation of Alternative J (Preferred). Although many of these effects can be reduced through the use of mitigation measures, they cannot be completely eliminated.

Timber harvest and associated road construction will result in adverse effects on scenery, water quality, soils, American Indian religious and cultural use areas, and dispersed recreation use in a non-motorized environmental setting.

Harvest of old-growth timber stands will reduce the amount of habitat available for old-growth dependent species and reduce their populations.

Ground-disturbing management activities and facilities management will probably result in inadvertent destruction or displacement of archeological and historical resources. Even when mitigation occurs, future study and interpretation are precluded.

Any mineral extraction activities that occur will result in destruction of vegetation, production of sediments, and effects on scenery.

Development and use of recreation facilities will result in compaction of soil, loss of vegetation, water pollution, dislocation of wildlife and disturbance of their habitat, noise and dust production in small areas, and localized air pollution from campfire smoke and vehicle exhaust.

Air quality will be degraded on a localized and short-term basis from prescribed fire and activities that generate dust from unpaved roads.

Any of the proposed small hydroelectric projects that reach the construction stage will result in adverse impacts on soil, water, and vegetation to some degree. These would generally be on a localized area. Construction techniques and mitigation measures can minimize most impacts and limit them to the construction effects on the visual resource. Some projects will also have long-term impacts on wildlife, American Indian religious and cultural use (effects on purity of streams), and recreation.

Development, especially timber harvest and hydroelectric projects, will create features and habitats out-of-keeping with traditional Indian religious use, and will reduce the availability of some plant materials, such as cedar.

Environmental Conditions Unchanged by Alternatives

Some environmental conditions and resource uses are essentially unchanged by any of the alternatives. These are resources which are often protected by law and are managed consistently in all alternatives. They include:

The wilderness acres are unchanged in any of the alternatives (refer to Chapter II, Alternatives Considered but Eliminated for Detailed Study). The acres

assigned to each wilderness ROS class vary between alternatives, but total wilderness acreage does not.

Management of the Skagit Wild and Scenic River is unchanged across all alternatives. The existing management plan for this river system (which is incorporated into this Forest Plan) will provide the same set of environmental conditions in each alternative (refer to Chapter II, Alternatives Considered but Eliminated from Detailed Study).

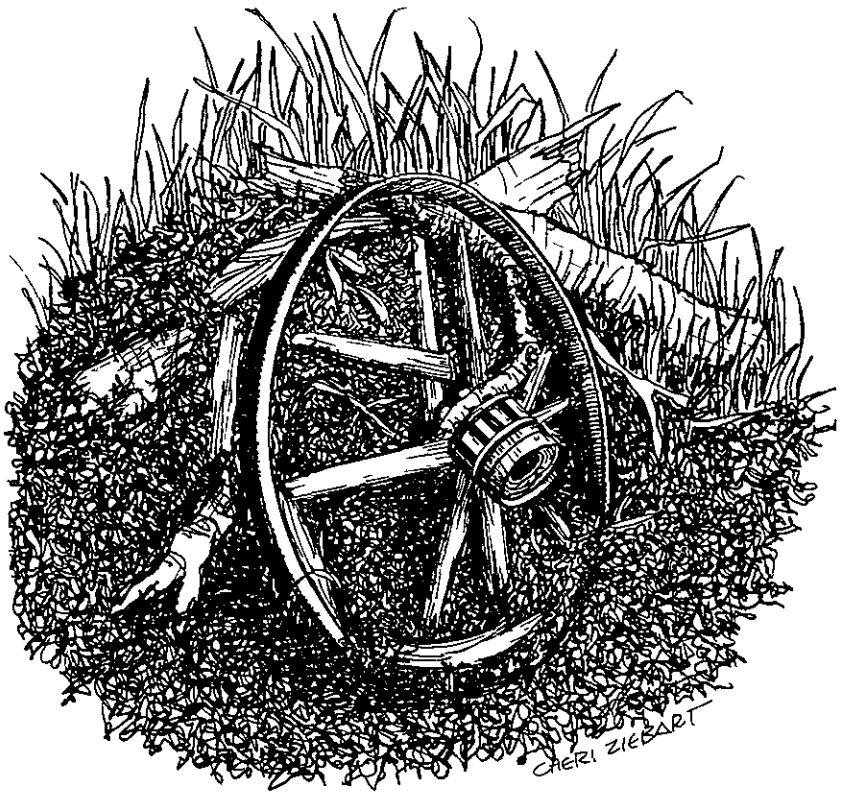
The basic land allocations established through implementation of the Alpine Lakes Area Land Management Plan (1981) are the same in all alternatives (refer to Chapter II, Alternatives Considered But Eliminated from Detailed Study).

The Mt. Baker National Recreation Area, size and management, is unchanged in any of the alternatives.

Management of the North Fork Nooksack, Lake Twenty-two, and Long Creek Research Natural Areas will remain the same in all alternatives. Although the alternatives recommend different numbers of new research natural areas for designation, the existing ones remain unchanged.

None of the alternatives result in any environmental consequences on prime farmlands, prime rangelands, or prime forestlands. None of these prime lands would be converted to other uses as a result of the implementation of any of the alternatives.

None of the alternatives results in any change in Indian Treaty Rights.



Abbreviations and Glossary for the Summary

ASQ - Annual Allowable Sale Quantity

BMP - Best Management Practices

CF - Cubic Foot

CFR - Code of Federal Regulations

DBH - Diameter at Breast Height

DEIS - Draft Environmental Impact Statement

FEIS - Final Environmental Impact Statement

FS - Forest Service

FSH - Forest Service Handbook

FSM - Forest Service Manual

FWS - Fish and Wildlife Service, U S. Department of the Interior

LAC - Limits of Acceptable Change

LTSYC - Long-Term Sustained Yield Capacity

MBS - Mt. Baker-Snoqualmie National Forest

MBF - Thousand Board Feet

MMBF - Million Board Feet

MCF - Thousand Cubic Feet

MMCF - Million Cubic Feet

MR - Management Requirement

NEPA - National Environmental Policy Act

NFMA - National Forest Management Act

PAOT - Persons-At-One-Time

ORV - Off-Road Vehicle

PNV - Present Net Value

RARE II - Roadless Area Review and Evaluation

RNA - Research Natural Area

ROS - Recreation Opportunity Spectrum

RPA - Forest and Rangeland Renewable Resources Planning Act
RVD - Recreation Visitor Day

SFEIS - Final Supplemental to the Environmental Impact Statement for an Amendment to the Pacific Northwest Regional Guide - Spotted Owl Guidelines, 1986

SOHA - Spotted Owl Habitat Area

TSPQ - Timber Sale Program Quantity

USDA - United States Department of Agriculture

USDI - United States Department of Interior

USFWS - United States Fish and Wildlife Service

WFUD - Wildlife Fish User Day

WROS - Wilderness Recreation Opportunity Spectrum

Glossary

Activity - Actions, measures, or treatments that are undertaken that directly or indirectly produce, enhance, or maintain forest and rangeland outputs or achieve administrative or environmental quality objectives. An activity can generate multiple outputs. Forest Service activity definitions, codes, and units of measure are contained in the Management Information Handbook (FSM 1309.11).

Allowable Sale Quantity (ASQ) - The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the plan. This quantity is usually expressed on an annual basis as the "Average Annual Allowable Sale Quantity." For timber resource planning purposes, the allowable sale quantity applies to each decade over the planning horizon and includes only chargeable volume. Consistent with the definition of timber production, fuelwood and other non-industrial wood shall not be included in the allowable sale quantity.

Alternative - One of several policies, plans, or projects proposed for decision making.

Amenity - An object, feature, quality, or experience that gives pleasure or is pleasing to the mind or senses. Amenity value is typically used in land use planning to describe those resource properties for which market values (or proxy values) are not or cannot be established (such as clean air and water, scenic quality, etc.).

Anadromous Fish - Those species of fish that mature in the sea and migrate into streams to spawn. Salmon, steelhead, and shad are examples.

Arterial Roads - See "Road, Arterial."

Best Management Practices (BMP's) - A practice or combination of practices that is determined by a State (or designated area-wide planning agency) after

problem assessment, examination of alternative practices, and appropriate public participation, to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals (Federal Register, Volume 40, No. 230 dated 11/28/75).

Big Game - Those species of large mammals normally managed for sport hunting. Big Game Summer Range - A range, usually at higher elevation, used by deer and elk during the summer. Summer ranges are usually much more extensive than winter ranges.

Big Game Winter Range - A range, usually at lower elevation, used by migratory deer and elk during the winter months; usually more clearly defined and smaller than summer ranges.

Board Foot - The amount of timber equivalent to a piece of wood one foot square and one inch thick, being the unit in board foot measure

Broadcast Burn - Allowing a prescribed fire to burn over a designated area within well-defined boundaries for reduction of fuel hazard or as a silvicultural treatment, or both.

Capability - The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at given levels of management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology, as well as on the application of management practices, such as silviculture or protection from fire, insects, and disease.

Carrying Capacity - 1) The number of organisms of a given species and quality that can survive in, without causing deterioration of, a given ecosystem through the least favorable environmental conditions that occur within a stated interval of time 2) In recreation management, the level of recreational use that a site can provide without deterioration of the quality of the recreation experience of the resource.

Cavity Excavators - The hollow excavated in trees by birds or other natural phenomena; used for roosting and reproduction by many birds and mammals.

Cedar - Areas that have been sources of various cedar products, or are at least identified as significant stands of cedar. Cedar is used in everything from smokehouse construction to spirit dancer costumes to basketry and other utilitarian items. Of all forest products it may be the most significant to the Indians of today, although it cannot survive without a total appropriate environment, most of which was used by the Indians in the past.

Cemeteries & Archaeological Sites - Villages, camps, and burial areas (not in most instances known to be cemeteries). Other sites are ethnographically and/or historically known cemeteries. Some are maintained and still used, others are not.

Ceremonial Flora - Locations known to contain certain plants that have ritual or healing properties. Some areas so designated are large and may contain several such plant species, others are small and may possess only a few. Often

areas containing specific flora are considered as ceremonially, ritually, and/or religiously powerful.

Chargeable Volume - All volume that is included in the growth and yield projections for the selected management prescriptions used to arrive at the allowable sale quantity, based on Regional utilization standards.

Code of Federal Regulations (CFR) - A codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government.

Collector Roads - See "Road, Collector."

Commodity - A transportable resource product with commercial value; all resource products that are articles of commerce.

Concern - A point, matter, or question raised by management and/or the public that must be addressed in the planning process.

Congressionally Classified and Designated Areas - Areas that require congressional enactment for their establishment, such as National Wilderness Areas, National Wild and Scenic Rivers, and National Recreation Areas.

Constraint - A confinement or restriction on the range of permissible choices.

Cubic Foot - A unit of quantity for lumber or timber equal to a cube 1x1x1 foot.

Cumulative Effects or Impacts - The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7 - these regulations use effects and impacts synonymously.)

DBH (d.b.h.) - Diameter at breast height, measured at 4 feet 6 inches from the ground.

Demand - The amount of an output that users are willing to take at a specified price, time period, and condition of sale.

Developed Recreation - Recreation that requires facilities that, in turn, result in concentrated use of an area. Examples of recreation areas are campgrounds and ski areas; facilities might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings.

Dispersed Recreation - A general term referring to recreation use outside a developed recreation site, such as scenic driving, hiking, fishing, cross-country skiing, horseback riding, snow mobiling, hunting, backpacking, and recreation in primitive environments.

Diversity - The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan. See also "Edge," "Horizontal Diversity," and "Vertical Diversity."

Douglas-fir Type - An association of tree species in which Douglas-fir is recognized as one of the principal seral species.

Draft Environmental Impact Statement (DEIS) - The draft statement of environmental effects which is required for major federal actions under Section 102 of the National Environmental Policy Act, and released to the public and other agencies for comment and review.

Ecosystem - An interacting system of organisms considered together with their environment; for example, marsh, watershed, and lake ecosystems.

Effects - Environmental consequences as a result of a proposed action. Included are direct effects, which are caused by the action and occur at the same time and place, and indirect effects, which are caused by the action and occur later in time and/or further removed in distance, but which are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air, water, and/or other natural systems, including ecosystems.

> Effects and impacts as used in this statement/plan are synonymous. Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic quality, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effects will be beneficial (40 CFR 1508.8).

Endangered Species - Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the Endangered Species Act of 1973, as amended.

Environmental Analysis - A process associated with the preparation of an environmental assessment or environmental impact statement. An analysis of alternative actions and their predictable short- and long-term environmental effects, including physical, biological, social, and economic.

Erosion - 1) The wearing away of the land surface by running water, wind, ice, or other geologic agents, including such processes as gravitation creep; or 2) detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

Even-Aged Management - The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of stands of varying ages (tree sizes) throughout the forest area. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands. (36 CFR 219.3)

Final Environmental Impact Statement (FEIS) - The final version of the statement of environmental effects required for major federal actions under section 102 of the National Environmental Policy Act. A revision of the draft

environmental impact statement to include public and agency responses to the draft.

Fisheries Habitats - Streams, lakes, and reservoirs that support fish populations.

Foreground - A term used in visual management to describe the portions of a view between the observer and up to 1/4 to 1/2 mile distant. The stand of trees immediately adjacent to a high-value scenic area, recreation facility, or forest highway. See "Background," "Middleground."

Forest or Forest Land - 1) Forest is used in the text as a proper noun to substitute for Mt. Baker-Snoqualmie National Forest. 2) See "Timber Resource Land Suitability Classification."

Forest Service Handbook (FSH) - For Forest Service use, directives that provide detailed instructions on how to proceed with a specialized phase of a program or activity.

Forest Service Manual (FSM) - A system of manuals which provides direction for Forest Service activities.

FORPLAN - Acronym for Forest Planning Model. A linear programming system used for developing and analyzing forest planning activities. Can be used to simulate management practices while at the same time optimizing for any given desired objective. As a manageable representation of reality, it can be used to manipulate information and look at alternative approaches to management, calculating tradeoffs and opportunity costs. See Appendix B for more detail.

Goal - A concise statement that describes a desired condition to be achieved sometime in the future. It is normally expressed in broad, general terms with no specific completion date. Goal statements form the principal basis from which objectives are developed

Guideline - An indication or outline of policy or conduct that is not a mandatory requirement (as opposed to a standard, which is mandatory).

Habitat Capability - The estimated ability of an area, given existing or predicted habitat conditions, to support a wildlife, fish or plant population. Measured in terms of potential population numbers

Hydrology - The scientific study of the properties, distribution, and effects of water in the atmosphere, on the earth's surface, and in soil and rocks.

Indicator Species - Species identified in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish including those that are socially or economically important. See Management Indicator Species.

Interdisciplinary Team (ID Team) - A group of individuals with different training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately assess the situation.

Intermingled Ownerships - Lands within the National Forest boundaries or surrounded by National Forest lands owned by private interests or other

government agencies. Because of early land grants, these lands frequently are in a checkerboard ownership pattern.

Irretrievable - Applies to losses of production, harvest, or use of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sports site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

Irreversible - Applies primarily to the use of non-renewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity, that are renewable only over long time periods. Irreversible also includes loss of future options.

Issue - A point, matter, or question of public discussion or interest to be addressed or decided through the planning process.

Legendary - Locations that may have, or may have had, spiritual significance. They appear also to be areas which are significant to the cosmology of the Indian groups in the project area. They are significant in mythology having to do with the origin and development of the area and of the people of that area.

Long-Term Sustained-Yield Capacity (LTSYC) - The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified management intensity consistent with multiple-use objectives.

Management Area - An area or non-contiguous areas of the Forest assigned to a specific management strategy (the management strategy then becomes the management prescription for the area(s)).

Management Direction - A statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them.

Management Indicator Species (MIS) - A species selected because its welfare is presumed to be an indicator of the welfare of other species using the same habitat. A species whose condition can be used to assess the impacts of management actions on a particular area. See "Indicator Species."

Management Intensity - A management practice or combination of management practices and associated costs designed to obtain different levels of goods and services.

Management Requirement (MR) - Minimum standards for resource protection, vegetation manipulation, silvicultural practices, even-aged management, riparian areas, soil and water diversity, to be met in accomplishing National Forest System goals and objectives.

Market Resources - Products derived from renewable and nonrenewable resources that have a well-established market value for example, forage, timber, water, and minerals.

MBF - One thousand board feet. Lumber or timber measurement term.

MCF - One thousand cubic feet. Lumber or timber measurement term.

Middleground - The visible terrain beyond the foreground where individual trees are still visible, but do not stand out distinctly from the stand. See "Foreground" and "Background."

Minerals - Common - mineral deposits which do not possess distinct, special economic value, such as common varieties of sand, stone, gravel, pumice, pumicite and cinders. They may have value for use in trade, manufacturing, science, or in the mechanical or ornamental arts.

> **Leasable** - federally owned minerals which are disposed of under the Mineral Leasing Act of 1920, as amended. These include coal, oil, gas, phosphate, sodium, potassium, oil shale, and in some states sulphur and geothermal steam.
>
> **Locatable** - federally owned minerals which can be located and patented under the 1892 Mining Law, as amended. In general, the locatable minerals are those hardrock minerals which are mined and processed for the recovery of metals. They also may include certain nonmetallic minerals and uncommon varieties of mineral materials, such as valuable and distinctive deposits of limestone or silica.

Mitigation - Avoiding or minimizing impacts by limiting the degree or magnitude of the action and its implementation, rectifying the impact by repairing, rehabilitating, or restoring the effected environment; reducing or eliminating the impact by preservation and maintenance operations during the life of the action.

MMBF - Million board feet. Lumber or timber measurement term.

MMCF - Million cubic feet. Lumber or timber measurement term.

Monitoring - A process to collect significant data from defined sources to identify departures or deviations from expected plan outputs.

Multiple Use - The management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some lands will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

Municipal Supply Watershed - A watershed that provides water for human consumption, where Forest Service management could have a significant effect upon the quality of water at the intake point, and that provides water used by a community, or any other public water system that regularly serves at least 25 individuals at least 60 days out of the year or that provides at least 15 service connections. In addition to cities, this includes campgrounds, residential developments, and restaurants.

National Environmental Policy Act (NEPA) of 1969 - An act to declare a National policy which will encourage productive and enjoyable harmony between humankind

and the environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, to enrich the understanding of the ecological systems and natural resources important to the Nation, and to establish a Council on Environmental Quality. (The Principal Laws Relating to Forest Service Activities, Agriculture Handbook No. 453, USDA, Forest Service, 359 pp.)

National Forest Management Act (NFMA) of 1976 - A law passed as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring the preparation of Regional Guides and Forest Plans and the preparation of regulations to guide that development.

Net Public Benefits - An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs), whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index. The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield.

Noncash Benefits - These are benefits or values that people derive from the good or service being provided, but where there is no market in which to exchange that good or service for cash, i.e. the person benefitting does not pay any of the actual value received.

Nonchargeable Volume - All volume that is not included in the growth and yield projections for the selected management prescriptions used to arrive at the allowable sale quantity. (FSH 2409.13)

Non-declining Flow - Where the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade, and this planned sale and harvest for any decade is not greater than the long-term sustained yield capacity.

Non-market - Products derived from National Forest resources that do not have a well-established market value for example, recreation, wilderness, wildlife.

Objective - A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals.

Off-Road Vehicle (ORV) - Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain. The term excludes any registered motorboat, any military, fire, emergency, or law enforcement vehicle when used for emergency purposes, and any vehicle whose use is expressly authorized by the respective agency head under a permit, lease, license, or contract. (Executive Order 11644)

Old-Growth Stand - Any stand of trees 10 acres or greater generally containing the following characteristics: 1) stands contain mature and overmature trees in the overstory and are well into the mature growth stage; 2) stands will usually contain a multi-layered canopy and trees of several age classes; 3) standing dead trees and down material are present; and 4) evidence of human

activity may be present, but does not significantly alter the other characteristics and would be a subordinate factor in a description of such a stand.

Output - The goods, end products, or services that are purchased, consumed, or used directly by people. Goods, services, products, and concerns produced by activities that are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. A broad term for describing any result, product, or service that a process or activity actually produces.

Persons-At-One-Time (PAOT) - The number of people in an area or using a facility at the same time. May be used as "maximum PAOT" to indicate the capacity of an area or facility to support peak usage within established user density standards and without degradation to biophysical resources.

Potential Yield - Sustainable output of wood fiber available after the yield foregone for the management opportunities of other resources has been deducted from the biological potential.

Present Net Value (PNV) - The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area. (36 CFR 219.3)

Primary Cavity Excavators - Wildlife species that excavate cavities in wood, for food and shelter. Example: woodpeckers.

Public Issue - A subject or question of widespread public interest relating to management of National Forest System. (36 CFR 219.3)

Record of Decision - A document separate from but associated with an Environmental Impact Statement which states the decision, identifies all alternatives, specifying which were environmentally preferable, and states whether all practicable means to avoid environmental harm from the alternative have been adopted, and if not, why not.

Recreation Capacity - The number of people that can take advantage of the supply of a recreation opportunity during an established use period without substantially diminishing the quality of the recreation experience or the biophysical resources.

Recreation Opportunity Spectrum (ROS) - A conceptual framework for defining types of recreation opportunities, physical settings, and experiences a visitor can expect. It is an inventory system and a management tool. There are six ROS classes. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs, based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use. Five of the 6 classes are (urban not included here):

1. Primitive--Area is characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.

2. Semi-primitive nonmotorized--Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum onsite controls and restrictions may be present, but would be subtle. Motorized recreation use is not permitted.

3. Semi-primitive Motorized--Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum onsite controls and restrictions may be present, but would be subtle. Motorized recreation use of local primitive or collector roads with predominantly natural surface and trails suitable for motor bikes is permitted.

4. Roaded Natural--Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.

5. Rural--Area is characterized by a natural environment that has been substantially modified by development of structures, vegetative manipulation, or pastoral agricultural development. Resource modification and utilization practices may be used to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate user densities are present away from developed sites. Facilities for intensified motorized use and parking are available.

Recreation Visitor Day (RVD) - A measure of recreation use. Twelve visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons.

Regeneration - The actual seedling and saplings existing in a stand; or the act of establishing young trees naturally or artificially.

Regeneration Cutting (Harvest) - Any removal of trees intended to assist regeneration already present or to make regeneration possible.

Region - An area covered by a Regional Guide. See FSM 1221.3 for organizational definitions.

Regional Forester - The Forest Service official responsible for administering a single Region.

Regional Guide - The guide developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended. It guides all

natural resource management activities, and establishes management standards and guidelines for the National Forest System lands within a given Region. It also disaggregates the assigned Regional RPA objectives to the Forests within that Region.

Research Natural Area (RNA) - In USDA Forest Service usage, RNAs are areas designated to ensure representative samples of as many of the major naturally-occurring plant communities as possible. An area established specifically to preserve a representative sample of an ecological community, primarily for scientific and educational purposes.

Riparian Area - A geographically delineated area with distinctive resource values and characteristics that is comprised of aquatic and riparian ecosystems. This includes floodplains, wetlands, and all areas within a horizontal distance of approximately 100 feet from the normal line of high water of a perennial stream channel or from the shoreline of other bodies of water.

Road: Arterial - A road that serves a large land area and usually connects with a public highway or other arterial road to form an integrated network of primary travel routes. The location and standard are often determined by a demand for maximum mobility and travel efficiency rather than specific resource-management service. They are usually developed and operated for long-term land and resource management purposes and constant service.

Collector - A road that serves a smaller land area than an arterial road and is usually connected to an arterial road or public highway. They collect traffic from local roads or terminal facilities. The location and standard are influenced by both long-term multi-resource service needs, as well as travel efficiency. Collector roads may be operated for either constant or intermittent service, depending on land use and resource management objectives for the area served by the facility (FSM 7700).

Local - A road that connects terminal facilities with a collector road, arterial road, or public highway. The location and standard are usually determined by that required to serve a specific resource activity, rather than travel efficiency. Local roads may be developed and operated for either long- or short-term service.

Roaded Natural (RN) - See "Recreation Opportunity Spectrum."
Roaded Modified (RM) - " " " "

Roadless Area Review and Evaluation (RARE II) - A comprehensive process directed by the Secretary of Agriculture to identify roadless and undeveloped land areas in the National Forest system and to determine their uses for either wilderness or other resource management and development and to determine areas that would require further planning to make such a decision.

Roadless Areas - These lands, inventoried in the Roadless Areas Review and Evaluation (RARE II), were not designated wilderness by the Washington State Wilderness Act of 1984. See "Released Roadless," and Unroaded."

RPA - The Forest and Rangeland Renewable Resources Planning Act of 1974. Also refers to the National Assessment and Recommended Program developed to fulfill the requirements of the act. The most recent recommended program was completed in 1985.

Second Growth - Forest growth that has come up naturally after some drastic interference (for example, wholesale cutting, serious fire, or insect attack) with the previous forest growth.

Sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface.

Semi-primitive Motorized ROS Class - See "Recreation Opportunity Spectrum."
Semi-primitive Nonmotorized ROS Class - See "Recreation Opportunity Spectrum."

Sensitive Species - Plant or animal species which are susceptible or vulnerable to activity impacts or habitat alterations. Those species that have appeared in the Federal Register as proposed for classification and are under consideration for official listing as endangered or threatened species, that are on an official State list, or that are recognized by the Regional Forester as needing special management to prevent their being placed on Federal or State lists.

SOHA (Spotted Owl Habitat Area) - A habitat area designated to support one pair of owls. See the Final SEIS for the Pacific Northwest Regional Guide.

Standard - A statement which describes a condition when a job is done properly. Standards show how well something should be done, rather than what should be done.

Suitable Forest Land - Land to be managed for timber production on a regulated basis. See Timber Resource Land Suitability Classification.

Thermal Cover - Cover used by animals to lessen the effects of weather; for elk, a stand of coniferous trees 40 feet or more tall with an average crown closure of 70 percent or more.

Threatened Species - Those plant or animal species likely to become endangered species throughout all or a significant portion of their range within the foreseeable future.

Timber Resource Land Suitability Classification - National Forest System lands are classified according to the following definitions:

1. **Non-forest** - Land that has never supported forests and land formerly forested where use for timber production is precluded by development or other uses.

2. **Forest** - Land at least 10-percent stocked (based on crown cover) by forest trees of any size, or formerly having had such tree cover and not currently developed for non-forest use.

3. **Unsuitable Forest Land (Not Suited)** - Forest land that is not managed for timber production because (a) the land has been withdrawn by Congress, the Secretary, or the Chief; (b) the land is not producing or capable of producing crops of industrial wood; (c) technology is not available to prevent irreversible damage to soils, productivity, or watershed conditions; (d) there is no reasonable assurance that lands can be adequately restocked within 5 years after final harvest,

based on existing technology and knowledge, as reflected in current research and experience, (e) there is at present, a lack of adequate information to responses to timber management activities; or (f) timber management is inconsistent with or not cost efficient (not appropriate) in meeting the management requirements and multiple-use objectives specified in a Forest Plan land management alternative.

4. **Tentatively Suitable Forest Land** - Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary, or the Chief; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils, productivity, or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

5. **Suitable** - Tentatively suitable forest land identified as appropriate for timber production in a Forest Plan land management alternative.

6. **Commercial Forest (CFL)** - Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary of Agriculture, or the Chief of the Forest Service; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; and (c) where existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvesting.

Timber Production - The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use other than for fuelwood.

Timber Sale Program Quantity (TSPQ) - The volume of timber planned for sale during the first decade of the planning horizon. It includes the allowable sale quantity (chargeable volume) and any additional material (nonchargeable volume) planned for sale. The timber sale program quantity is usually expressed as an annual average for the first decade.

Unroaded - 1) RARE II roadless areas released by the Washington State Wilderness Act of 1984 from being considered for designation as wilderness during development of the initial Forest Plan; 2) In the Forest's FORPLAN Model, an analysis area identifier which includes roadless areas defined in "1" above in addition to other unroaded areas in the Forest containing tentatively suitable forest land; 3) A term used to equal the sum of recreation use or carrying capacity from the primitive, semi-primitive nonmotorized, and semi-primitive motorized recreation opportunity spectrum areas outside wilderness.

Viable Population - The number of individuals of a species required to ensure the long-term existence of the species in natural, self-sustaining populations adequately distributed throughout their region.

Viewshed - (Sometimes termed "Viewshed Corridor" or "Visual Corridor") Viewsheds are the "seen" landscape visible to most Forest visitors from roads, trails, rivers, and recreation areas. Most are corridors, one-quarter to two miles wide. Viewsheds viewed from primary travel routes and use areas are "Sensitivity Level 1." Viewsheds viewed from secondary travel routes and use areas are "Sensitivity Level 2."

Visual Quality Levels (VQL) - An inventoried measure of acceptable levels of modification of the visual resource. VQL's are used in Forest planning as an indicator of social (visual) acceptability and as an input for management decisions. VQL's become Visual Quality Objectives in the approved Forest Land Management Plan.

1. **Preservation**--Allows ecological changes only
2. **Retention**--*Human activities are not evident to the casual Forest visitor.*
3. **Partial Retention**--Human activity may be evident, but must remain subordinate to the characteristic landscape.
4. **Modification**--Human activity may dominate the characteristic landscape, but must, at the same time, follow naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.
5. **Maximum Modification**--Human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

Wilderness - Areas designated by congressional action under the 1964 Wilderness Act Wilderness is defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature, with the imprint of human activity substantially *unnoticeable, have outstanding opportunities for solitude or for a primitive* and confined type of recreation; include at least 5,000 acres or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition, and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest.

Wild and Scenic Rivers - Those rivers or sections of rivers designated as such by congressional action under the 1968 Wild and Scenic Rivers Act, as supplemented and amended, or those sections of rivers designated as wild, scenic, or recreational by an act of the Legislature of the State or States through which they flow. Wild and Scenic Rivers may be classified and administered under one or more of the following categories:

1. Wild River Areas--Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

2. Scenic River Areas--Those rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

3. Recreational River Areas--Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development

along their shorelines, and that may have undergone some impoundment or diversion in the past.

Wilderness Recreation Opportunity Spectrum - See "Recreation Opportunity Spectrum." Wilderness ROS and their standards apply to all designated wilderness on the Forest. For specific direction regarding Alpine Lakes, consult the Alpine Lakes Area Land Management Plan. Within each WROS Class there are Limits of Acceptable Change (LAC). LAC is a maximum limit of change allowed. Managers try to achieve the best conditions possible rather than allowing conditions to deteriorate until the threshold is reached. See "Limits of Acceptable Change."

1. Transition - This trailed class includes system trails that have a travelway worn to mineral soil over long distances, and is characterized by having a large proportion of day-users, often mixed in with overnight and long distance travelers. This area is usually adjacent to trailheads and extends into the wilderness a distance that is typically traveled in one day by a hiker. This class includes areas accessed by trail, around lakes, or other attractions used by people or pack stock, within the day-use influence area. The class extends at least 500 feet on either side of a trail; it may be wider around lakes or heavily used areas. The length of this trail class will be established for each trail depending on ease of travel, distance from trailhead outside wilderness, and destination attractions inside wilderness. Length will generally be 3 to 5 miles inside the wilderness boundary If the day-use activity occurs entirely outside wilderness, the trail will have no Transition Class.

2. Trailed - This class includes all managed system trails. It extends beyond the Transition Class. This class extends at least 500 feet on either side of the trail but may be wider around lakes or heavily used areas.

3. General Trailless - This class includes areas not falling into the other classes. It attracts very low use because of a relative lack of trails or destination spots. The area is unmodified; user-made trails are not encouraged, but they may exist. If obvious user-made trails become well established, or are causing resource damage, consideration will be given to their reconstruction in order to protect the wilderness resource from further damage. Reclassification from general trailess to railed requires a supplement of the Forest Plan, which shall include full public involvement. This class is available for new trail construction or relocation of existing trails to protect resources or meet objectives by dispersing use. If this should occur, the trail will only be constructed to no higher than "more difficult or "most difficult" standards.

4. Dedicated Trailless - This class is managed forever trailless; user-made trails are not permitted. It may include popular attractions accessed only by cross-country travel. Human impact and influence is, by design, minimal; therefore user restrictions may be necessary to insure that trailless experiences remain. Dedicated Trailless areas should be of a size that will allow for a meaningful experience and can be reasonably protected for the experiences and remoteness identified. Generally the class is at least 1,000 acres in

size and contain whole drainages or basins out of sight and sound of trails or areas outside the wilderness.

5. Special Areas - The intent of this class is to provide for significant changes in standards or other management guidelines for unique areas. Areas that qualify for Special Area designation include congressionally acknowledged areas, areas of significant cultural or historic value, areas with special considerations, and areas with limited management options to deal with unique situations. Areas do not qualify for this class for administrative convenience in dealing with overuse. The class is rare and will not exist in many wildernesses.

Wildlife Fish User Day (WFUD) - One WFUD consists of 12 hours of recreation that is the result of fish or wildlife, such as hunting, fishing, birdwatching, etc.

Wood Residue - The residual wood remaining as a result of timber cutting, other vegetation disturbing activity, storms, fire, or other natural event. It includes any unutilized woody material. See "Slash" and "Residue Utilization."

Yield Tables - Tables that estimate the level of outputs that would result from implementing a particular activity. Usually referred to in conjunction with FORPLAN input or output. Yield tables can be developed for timber volumes, range production, soil and water outputs, and other resources.

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**Pacific
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Region**

June 1990

Final Environmental Impact Statement

Land and Resource Management Plan

Mt. Baker-Snoqualmie National Forest

FINAL ENVIRONMENTAL IMPACT STATEMENT

Mt. Baker-Snoqualmie National Forest
Land and Resource Management Plan

Whatcom, Skagit, Snohomish, King, and Pierce Counties, Washington

Lead Agency: USDA - Forest Service

Responsible Official: John F. Butruille
Regional Forester
Pacific Northwest Region
USDA Forest Service
P.O. Box 3623
Portland, Oregon 97208-3623

For Further Information: Robert Dunblazier
Planning Staff Officer
Mt. Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, Washington 98104
(206) 442-4888

Abstract: This final Environmental Impact Statement describes and analyzes eight alternatives for managing 1,724,229 aces of land administered by the Mt. Baker-Snoqualmie National Forest. Public comment on the Draft Environmental Impact Statement resulted in modification of Alternative G and formation of two new alternatives: I and J. Draft EIS Alternatives D, E, E-Departure, F, and H-Departure were dropped because of lack of public support in response to the DEIS; they were not needed to provide a full range of alternatives. Each of the alternatives responds differently to the major issues and concerns identified. **Alternative NC (No Change)** continues management of the Forest under existing plans, including the 1963 Timber Management Plans (as amended) without compliance with all the provisions of the National Forest Management Act of 1976 (NFMA) implementing regulations. **Alternative A (No Action)** continues the management of the Forest under current plans, policies, and direction, updated to comply with new legislation, including NFMA. **Alternative B (RPA)** responds to the 1980 Resource Planning Act Program. **Alternative C** emphasizes primitive/semi-primitive dispersed recreation, scenery, fish and wildlife. **Alternative G-Modified**, developed to be responsive to the goals and objectives of the Conservation Liaison Group, emphasizes natural ecosystems, diversity of native plants and animals, providing uses not found on private land, an extensive trails system, and timber production consistent with other goals. **Alternative H** emphasizes unroaded recreation, scenic values, wildlife, and timber production. **Alternative I**, developed to be responsive to the goals and objectives of the Public Land Users' Society, emphasizes marketable resources (timber, developed recreation, minerals), enhancement of big game habitat, and an extensive trails system. **Alternative J** is the Forest Service preferred alternative, and was developed in response to public comments received on the draft EIS. The goal is similar to Alternative H, but the

Preferred Alternative provides a considerable increase in trail mileage, an increase in the number of rivers recommended for addition to the National Wild and Scenic River System, three Special Areas, increased emphasis on unroaded recreation, greater protection of scenic values on travel corridors, and timber production on suitable acres assigned to a harvest prescription. Other resources are managed at levels commensurate with the objectives of the alternative.

This document presents the results of an environmental analysis of alternative ways of managing the Mt. Baker-Snoqualmie National Forest for the next 10 to 15 years. Long-term estimates of Forest resources and environmental conditions are considered; however, the alternative adopted as the basis for the Forest Plan would apply for 15 years or less.

The Forest Land and Resource Management Plan outlines the treatment of issues and concerns, analyzes the current management situation, and sets forth the proposed standards and guidelines for managing the Mt. Baker-Snoqualmie National Forest under Alternative J.

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SUMMARY

Final Environmental Impact Statement
Land and Resource Management Plan
Mt. Baker-Snoqualmie National Forest

PART 1 - INTRODUCTION

This Final Environmental Impact Statement (FEIS) discusses the alternative strategies for future management of the land and resources of the Mt. Baker-Snoqualmie National Forest. The preferred alternative is developed into the accompanying Land and Resource Management Plan (the Forest Plan). The Record of Decision describes the decision to implement the Forest Plan and the rationale for that decision. While the Forest Plan will guide the management of the Forest for the next 10 to 15 years, the analysis covers a planning horizon of 150 years to evaluate and display the long-term effects of current actions.

The Draft Environmental Impact Statement (DEIS) and Proposed Land and Resource Management Plan were released for public review and comment in December, 1987. This FEIS and Forest Plan were developed in response to those comments and incorporates many suggestions made by the public and other agencies. Changes that were made between the DEIS and FEIS are described throughout the document and highlighted at the beginning of each chapter.

This is a general summary of the entire FEIS. It emphasizes the issues and concerns raised by the public, other agencies, and Forest Service personnel regarding management of the Mt. Baker-Snoqualmie National Forest. This summary is arranged in a slightly different order to facilitate understanding by the general reader. **Part 1** includes a brief discussion of the public responses to DEIS, the changes made between the DEIS and FEIS, the purpose and need for the proposed action, and a description of the affected environment. In **Part 2**, the major issues, concerns, and opportunities (ICO's) are presented.

Part 3 includes descriptions of eight alternatives; a goal statement is given for each and the "design criteria" that were used to develop each alternative are described. **Part 4** is a condensed version of Chapter IV of the FEIS: the environmental consequences of implementing the alternatives.

Public Response to the DEIS

On December 30, 1987 the DEIS and Proposed Forest Plan were released to the public. Copies were distributed to government agencies, libraries in the greater Puget Sound area, and interested members of the public. A "Public Summary" package, which included alternative and resource maps, was sent to several thousand individuals. Public open houses were held in 11 cities in the Puget Sound area; news releases inviting the public to attend were printed and circulated in area newspapers.

The Forest received nearly 12,000 responses to the DEIS during the 115 day review period. The most popular form used to comment was a response form (prepared by a public interest group) (67%), followed by personal letters and cards (30%), and other form letters (2%). Most replies came from the five-county area of influence for the Forest; refer to the vicinity map, Figure S-1. Nearly half of the responses came from the Seattle-Tacoma-Everett metropolitan area.

The Interdisciplinary Planning Team read and considered every response. A detailed content analysis process was used for coding and analyzing the input received. This allowed the team to report what the public said, in their words. The results of this analysis were very useful in moving from a draft to final plan; most of the changes between the DEIS and FEIS are in response to public comment. A summary of the complete analysis of comments, plus the Forest Service responses to substantive comments can be found in Appendix J, FEIS.

Three alternatives generated the most comment: support for the Public Land Users Society (PLUS) Alternative (as outlined in their input); support for Alternative G, as presented in the DEIS but with the addition of Backcountry areas and more trails; and opposition to Alternative H, the Forest Service preferred alternative in the DEIS.

The comments on issues within the 12,000 responses were numerous and varied. Over 68,000 individual comments related to recreation and trails opportunities and uses. An additional 15,000 comments focused on timber; 14,000 on the northern spotted owl and other wildlife; and 4,000 related to old growth. Other issues generating considerable response included: roads, wild and scenic rivers, roadless areas, the cumulative effects of management activities, water quality and fisheries, jobs, log exports, and wide variety of technical planning process comments.

There were only two areas of general consensus: recreation (of all types) is a vitally important function of the Mt. Baker-Snoqualmie. Secondly, more trails are needed; opinion varied on who should use those trails. Strongly-voiced opinions on all sides of these issues were stated.

Changes Between Draft and Final

The tremendous public response to the DEIS provided the Forest with a wealth of suggestions for improvements about how to provide more benefits to the public. These ranged from broad conceptual approaches to specific technical changes.

Beginning with the DEIS Preferred Alternative (H), Alternative J was developed to respond to public comments and new information. This is the preferred alternative in the FEIS; it is described below, in Part 3.

A new alternative is included in the FEIS; Alternative I was developed to respond to the goals put forth in the PLUS response. Alternative G has been modified, to better reflect the comments received; it is Alternative G-Modified in the FEIS. Several alternatives included in the DEIS are not displayed in the FEIS, as they received little support in comments and are not needed to provide a full range of alternatives for analysis.

The issues, concerns, and opportunities were refocused, to reflect public comment. Wild and Scenic Rivers is now a major ICO, based on the comments.

New timber yield tables and technical corrections were made to the FORPLAN computer model in response to public comments.

The management requirements (MR's) were revisited. Spotted Owl Habitat Areas changed to meet the Record of Decision for the Final Supplement to the EIS for an Amendment to the Pacific Northwest Regional Guide. MR's for mountain goats were enlarged, and deer and elk MR's were dropped to meet regional direction. An analysis of the condition of the Forest's watersheds was conducted; this

formed the basis for a method to meet water quality and riparian area MR's. The procedure was developed in response to public comments.

The wild and scenic river eligibility process was redefined, also in response to public input. A committee was formed for this task, and it included representatives from several groups and Washington State agencies.

Proposed vegetative management in the Mt. Baker-Snoqualmie National Forest FEIS and Forest Plan is consistent with the FEIS for Managing Competing and Unwanted Vegetation, Pacific Northwest Region (released in December, 1988).

Finally, some data have been updated (such as the acres of timber harvested) since the DEIS was issued, new fisheries values were calculated, more discussion has been added to the diversity of plant and animal communities sections, and errors and omissions have been corrected.

Purpose and Need

The purpose of the Forest Plan is to direct all natural resource management activities on the Mt. Baker-Snoqualmie National Forest. The preferred alternative is the basis for the Forest Plan document. Preparation of the Land and Resource Management Plan is required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA), plus the associated Planning Regulations (36 CFR 219).

The preparation of an environmental impact statement disclosing a preferred alternative and a broad range of additional alternatives is required by the National Environmental Policy Act of 1969 (NEPA) and its implementing regulations (40 CFR 1500), and the implementing regulations of NFMA. For purpose of disclosure under NEPA, this FEIS and the accompanying Forest Plan are treated as combined documents.

The Planning Period

The Forest Plan period is ten to fifteen years. Throughout this document, projections beyond that time are provided for informational purposes. The Forest Service is required to revise the plan within 15 years of its adoption.

Current Management Situation

The Mt. Baker-Snoqualmie National Forest is currently managed under several different plans. Examples of these include Timber Management Plans, District Multiple Use Plans, and the Glacier Peak Wilderness Management Plan. The Forest Plan supersedes or incorporates all previous land and resource management plans; the Alpine Lakes Area Management Plan and the Skagit Wild and Scenic River Management Plan will be incorporated into the Plan. Upon implementation, all Forest management activities will comply with the Forest Plan. Appropriated budgets may alter the schedule of activities.

The Affected Environment

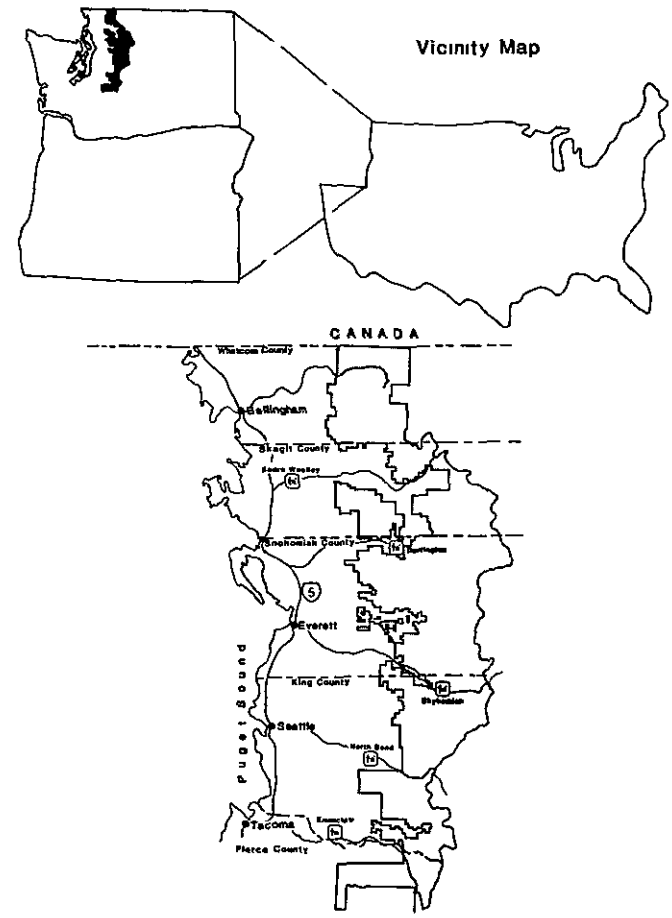
The 1.7 million acre Mt. Baker-Snoqualmie National Forest serves a large and diverse population. The Forest is located in some of the nation's most beautiful country - the Cascade Mountains - in northwest Washington state. The Forest contains lush, forested valleys; steep and rugged mountain peaks; glaciers; and numerous high-elevation lakes. The diversity of both the

physical and social settings contributes to the complexity of issues facing Forest managers. The Forest includes land from the Canadian border south to the northern boundary of Mt. Rainier National Park, 130 miles, and is adjacent to North Cascades National Park, Wenatchee National Forest, and Mt. Rainier National Park.

The five-county area that includes the Forest has a population of more than 2.5 million persons, over 56 percent of the total State population. Most of these 2.5 million people live in the greater Seattle-Everett-Tacoma metropolitan area, only 40 to 70 miles west of the forest boundary. Just north of the Forest is the Vancouver, B.C., Canada metropolitan area, with a population of 3.0 million people. The Puget Sound economy is quite diverse, although the aerospace industry is still a major employer. The forest products industry has experienced major changes over the last decade; wood products manufacturing outputs have been up the last three years, but with 25 percent fewer employees.

The Mt. Baker-Snoqualmie National Forest contains a wide variety of land forms and natural resources that provide a wide range of goods, services, and opportunities for use. The upper reaches of seven major river systems are located on the Forest. Approximately 1,500 stream miles and over 12,000 lake acres provide both seasonal and year-round spawning and rearing habitat for

Figure S-1



anadromous and resident fish. The existing annual value of anadromous and resident fish produced on the Mt. Baker-Snoqualmie is estimated at $23 million. Nineteen of the 88 hydrological watersheds on the Forest are currently in an unacceptable condition, due to a combination of moderate to heavy amounts of timber harvesting and road construction plus the presence of unstable soils, steep slopes, and periodic major floods and debris torrents.

There are 18 municipal watersheds on the Forest serving a population of over 1.4 million. Water from only one of those watersheds requires treatment other than disinfectant, attesting to the high quality of the surface water.

The great diversity of plant and tree communities of the Forest provides a variety of habitats for a wide variety of wildlife species. Four federally-listed threatened and endangered species may occur on the Forest: the bald eagle, American peregrine falcon, grizzly bear, and the gray wolf. Several hundred bald eagles winter on the Forest. A decision on federal Threatened and Endangered listing for the spotted owl, a bird that lives primarily in dense, mature and old growth forests, is expected in 1990.

Fifteen American Indian tribes in the Puget Sound area use the land and resources of the Mt. Baker-Snoqualmie for religious and cultural practices. A 1981 inventory identified important use sites and areas. The Forest possesses some of the few remaining areas with the necessary purity, privacy, and isolation.

The Forest is rich in recreation opportunities and receives over five million recreation visits annually. Dispersed day-use recreation is a major use and occurs throughout the forest. Developed uses occur at seven alpine ski areas, campgrounds, and picnic areas. There are 1,384 miles of system trails on the Forest; 40% are located in wilderness. Ninety-six miles of the Pacific Crest National Scenic Trail are located within the Forest boundary. The Forest has enough roaded recreation lands to meet existing and projected demand, but it cannot meet current or future demand for unroaded, nonwilderness recreation without crowding and loss of solitude.

Nearly 42 percent (722,000 acres) of the Forest is designated wilderness. Wilderness received 455,000 recreation visitor days in 1988. Additional Congressionally designated areas include: the Skagit Wild and Scenic River System (a total of 58.5 miles of recreational river and 100 miles of scenic river); the Mt. Baker National Recreation Area (8,700 acres); and the multiple use Alpine Lakes management unit (148,000 acres).

There are 402,930 acres of roadless areas on the Forest; about 40 percent of these acres are tentatively suitable for timber production.

Forest-wide, approximately 160,000 acres of forest land are not suitable for timber production because of problems in replanting the land if the trees were cut. Many of these acres occur at higher elevations. Additional acres - over 95,000 - cannot be considered for potential timber cutting because of highly unstable soils. About 597,000 acres, or 35 percent, of the Forest have been identified as tentatively suitable for timber production. Nearly half of this acreage is currently forested with old growth trees. Almost 60% of the tentatively suitable old growth is in areas that are unroaded and undeveloped.

Between 1979 and 1988, an annual average of 250 million board feet of timber were sold from the dense forests of hemlock, cedar, and Douglas-fir. Changes in the land base as a result of wilderness designation, allocations for

wildlife habitat protection, and other resource objectives have affected the amount of timber that can be sold from the Forest in the future.

Three existing Research Natural Areas (RNA) on the Forest are set aside as examples of typical or unique natural ecosystems. There are five potential RNA's, three located within wilderness.

About 9 percent of the Forest acres have moderate to high potential for copper, gold, molybdenum, silver, lead, zinc, chromium, nickel, and olivine. Currently, only olivine is commercially produced. The Forest has about 1,230,500 acres of land that are prospectively valuable for oil, gas, and geothermal resources.

There are 2,829 miles of system roads on the Forest; 52% are accessible only by high-clearance vehicles.

PART 2 - PUBLIC ISSUES AND MANAGEMENT CONCERNS

An extensive and continuing process has been used to identify the issues, concerns, and opportunities (ICO's). The Forest has involved the public throughout the planning process, including various State, county, and other Federal agencies, Indian Tribes, and three public liaison groups.

Several changes have been made to the ICO's since the DEIS was released, reflecting public comment and changing public interests and concerns. Several issues have been refocused (with slight changes in their title) to better reflect recent public response. The transportation issue and wood residue management opportunity have been incorporated as facets of other major ICO's. Wild and Scenic Rivers is now addressed as a major issue; it had been a facet of the recreation ICO.

The issues drive the planning process and play a key part in the development of alternatives. The issues are an expression of the wants and preferences of the various publics with respect to Mt. Baker-Snoqualmie National Forest resources. The issues are also an indication of areas of conflict and of the public's view of the need for a change in management direction.

The nine major issues, concerns, and opportunities are summarized below. The following list shows the indicators used in evaluating how responsive each alternative is to the issues; responsiveness is reported in Table S-4.

Issue, Concern, Opportunity Indicator of Response	Unit of Measure
Development versus Nondevelopment of the Forest	
Existing Roadless Areas Allocated to Nondevelopment	% Acres, M Acres
Roadless Areas Assigned to Roaded Mgt. Prescription But Not Developed in Next 15 Years	M Acres
Timber Supply	
Timber Harvest Level	MMCF/MMBF
Long-Term Sustained Yield Capacity	MMCF
Lands Suitable for Timber Production	M Acres
Employment: Jobs Supported by the Alternatives	M Jobs
Payments to Counties	MM Dollars
Old Growth Ecosystems and Fish/Wildlife/Plant Diversity	
Total Old Growth Remaining, End of Decades 1, 5	M Acres

Old Growth Remaining on Suitable Acres, Decades 1, 5	M Acres
Anadromous Fish Production	Pounds Per Year
Low-Elevation Old Growth Habitat for Wildlife	M Acres Under 3000'
Suitable Winter Range for Deer and Elk, Decade 1	M Acres
American Indian Religious and Cultural Use	
Inventoried Use Areas with High/Moderate Protection	% of Inventoried Ac.
Recreation Opportunities	
Demand Satisfied for Wilderness, Primitive, Semi-Primitive Nonmotorized Recreation, Decades 1 and 5	% of Capacity
Roads Open to Public Use, Passenger Car	Miles
Trail Construction, Reconstruction, Decade 1	Miles
Lands Managed for High Visual Quality Levels	*M Acres Retention, Partial Retention*
Wild and Scenic Rivers	
Rivers Recommended for Designation as Wild and Scenic	No. Rivers, Miles
Management of Municipal Watersheds	
Timber Harvest Level	MMCF (MMBF)
Effects of Timber Management and Related Activities	
Timber Harvest Level	MMCF (MMBF)
Old Growth Remaining on Suitable Acres, Decades 1, 5	M Acres
Annual Road Construction, Decade 1	Miles
Sediment Produced from All Sources, Annually, Decade 1	M Tons
Adjacent and Intermingled Lands	
Timber Harvest Level	MMCF (MMBF)

Development versus Nondevelopment of the Forest

How should the released, roadless areas be allocated and how will the resources be managed?

At what rate should the Forest Service enter those roadless areas that are allocated for development?

The allocation and management of 402,930 acres of unroaded area (23% of the net Forest acres) remains a highly controversial issue. This issue has been retitled, to better reflect public comments received on the DEIS.

These roadless lands were inventoried in RARE II; they were released from wilderness consideration by the 1984 Washington State Wilderness Act. Many comments on the DEIS focused less on the RARE II remnants and more on the general issue of whether the remaining unroaded and undeveloped lands on the Forest should be managed for commodity production/roaded recreation or remain undeveloped. This key issue encompasses facets of nearly all the other ICO's.

Some elected officials, environmental groups, many hikers, some Indian Tribes, and wildlife organizations want the unroaded areas to remain undeveloped and unroaded. Key concerns are protection of wildlife habitat, old growth, and other resource values. Maintain the option of future consideration for wilderness was also mentioned. A number of individuals and groups support a proposal for Backcountry Areas, roughly corresponding to five roadless areas.

Other individuals, plus timber and mining companies, trade organizations, and energy-related industries feel that the 1984 Wilderness Act "released" these lands for multiple uses. They are concerned that nondevelopment will limit the amount of timber and minerals available for use, affect the local and regional economy, and lead to future wilderness designation. Many people feel there is

a need for more motorized access to the roadless areas, to encourage recreation. The commercial forest land within the roadless areas has been used to calculate the annual potential yield in the 1963 Timber Management Plans, as amended. However, this timber was not available for harvest from 1972 through 1984, resulting in a long-term concentration of timber harvesting on about one-half the land base. Approximately 164,500 acres, or 40 percent, of the unroaded areas are tentatively suitable for timber production.

Timber Supply

What is the capability and suitability of the Mt. Baker-Snoqualmie National Forest to produce timber?

What should the timber harvest level be considering all resources on the forest and their relationship to social, economic, and environmental factors including local, regional, and national demands?

A major public issue and management concern is the timber supply on the Mt. Baker-Snoqualmie National Forest. This issue has also been retitled since the DEIS, to better reflect public comments. The issue now includes facets of the wood residue opportunity.

Support for maintaining or increasing the timber supply comes from timber industry (management and employees), some community leaders, businesses dependent on the timber industry, and economic development agencies. Many individuals want the timber supply to be maintained, primarily to protect jobs. Environmentalists, some recreation users, wildlife and some hunting interests, fishing organizations, Indian tribes, some community leaders, and State Wildlife agencies strongly support restricting or reducing the timber harvest, especially in low-elevation old growth. A number of people feel the loss of mill jobs is due to factors other than timber supply.

The timber industry is a small but still important part of the overall Puget Sound economy; 4% of the wage and salary jobs in two counties are based on lumber and wood manufacturing. The Forest currently supplies about 17% of the logs consumed in the Puget Sound area; a number of mills are dependent on National Forest logs.

The annual potential yield under the 1963 Plans (as amended) is 203.8 million board feet (MMBF). Over the period 1979 to 1988, the average timber volume sold was 235.8 MMBF and harvested was 229.6 MMBF, which is within the average annual potential yield for the decade: 229.7 MMBF. The timber supply potential on the Forest is considerably less than what past timber sale programs have indicated.

Approximately 597,000, or 35 percent, of the net Forest acres are considered to be tentatively suitable for timber production; about half of the tentatively suitable acres contain old-growth forest.

Old Growth Ecosystems and Fish, Wildlife, and Plant Diversity

What management direction is needed and where should action be taken that will maintain and/or enhance old growth and diversity to meet multiple use objectives?

The title of this ICO has been adjusted, in response to public comment. Old growth is a major issue on the Mt. Baker-Snoqualmie National Forest. Its value in providing biological diversity, wildlife and fisheries habitat (including habitat for the northern spotted owl), recreation, aesthetics, water quality, as well as industrial raw material is widely recognized by the public and the scientific community.

Environmental groups, wildlife societies and organizations, many individuals, Indian Tribes, and State wildlife agencies want the remaining old-growth forests protected. Old growth is important to American Indians for religious and cultural purposes.

Timber company representatives, industry trade associations, some State and local agencies, and many individuals feel these resources are an important contribution to timber production and maintaining local economies. Some feel that converting these stands into second growth timber is important for increasing long-term forest productivity.

There are approximately 643,500 acres of old growth within the Forest; 232,500 acres (36%) are located in wilderness and are not available for harvest.

A related public issue and management concern is the maintenance and/or enhancement of plant, wildlife and fish diversity within the objectives of multiple use management. There is increasing recognition within the scientific community that ecosystem diversity is important; this issue also received considerable public comment. Many respondents to the DEIS felt national forest management should focus on wildlife. State Department of Wildlife officials, hunters, and recreationists are concerned about the population and habitat needs of big game animals, such as deer, elk, and mountain goats.

Indian tribes, sport and commercial fishing interests, and state and federal fishery agencies are increasingly concerned about the effects of water quality on the anadromous fish resource. The cumulative effects of management activities on fish/fish habitat was raised as a major concern by individuals, Indian Tribes, and State agencies.

American Indian Religious and Cultural Use

What policy and management direction is needed to comply with the Native American Religious Freedom Act and various treaties?

How can Inventoried religious and cultural use areas be protected within the objectives of multiple use management?

The 15 American Indian tribes who currently use the Mt. Baker-Snoqualmie for religious and cultural uses continue to challenge Forest management activities, primarily proposed road construction, timber harvest, and small hydroelectric power projects, that potentially threaten their religious use sites and areas. The Tribes also have a significant interest and concern for protection and enhancement of the anadromous fisheries resource. Fishing has been, for many, a traditional and principle means of income. They are strongly opposed to any management activities that might adversely affect anadromous fish habitat.

In the 1981 inventory of religious use, practices, and localities, over 300 cultural use areas and sites were identified (totaling about 450,000 acres - 34% inside wilderness). Some sites cover less than one acre; larger areas

average 3,000 to 15,000 acres. There are five broad categories of use areas: cedar sites, ceremonial flora, spirit sites, legendary sites, and cemeteries and archaeological sites. There is a wide variation in compatibility between types of management activities and categories of religious, ceremonial, and cultural use.

Since the completion of the 1981 inventory, the Forest has initiated a consultation process with the Tribes. When proposed projects fall within an inventoried use-areas, the proposed activity is reviewed in detail with representatives of the Tribe(s) which may be affected. As more management activities are proposed, there is the potential for increased conflict.

Individuals and Tribal representatives feel that the draft Forest Plan standards and guidelines and the inventory process were not adequate to protect Religious Freedom Act rights. Others, including some timber industry representatives, feel protection of religious and cultural use areas will constrain timber availability.

Recreation Opportunities

To what extent can the Mt. Baker-Snoqualmie National Forest provide recreation opportunities and how should they be managed?

How many miles of trails should be provided and in what locations?

Public comment on the DEIS reconfirmed that recreation use - of all types - is a major public issue on the Mt. Baker-Snoqualmie. Opinion is divided on what types of recreation opportunities should be provided.

Many groups and individuals - including hikers, horse users, some off-road vehicle users, naturalists, wildlife advocates, and environmentalists - want to preserve opportunities for unroaded dispersed recreation outside of wilderness. They prefer more remote, natural appearing recreation settings. National Forest lands are the major supplier of non-motorized dispersed recreation in the Puget Sound area. Many other recreationists spoke to the need for better recreation access for young families and the elderly, more ORV areas, more snowmobile opportunities, and more campgrounds.

A large majority of people commenting on the DEIS favor more trails. There was support from environmentalists and many recreation/commodity groups for the "Trails 2000" proposal, developed by one environmental organization. ORV and horse users want more trails open for their use. Many hikers feel that trails should be closed to motorized use. Conflicts between recreation and other Forest resources were frequently mentioned. Some users dislike the expanding road system needed for timber harvest, while others feel roads are important for their activities and access.

Many recreation attractions and opportunities on the Mt. Baker-Snoqualmie are found within eight wildernesses. A concern is the level of management required to accommodate the high recreation demand within these areas, while protecting the wilderness resource. Some recreation and environmental groups, who strongly supported wilderness status for favorite areas, now find themselves debating the need for management actions in those areas, including limiting use. Facets of this issue include: the need for new or relocated trails to disperse recreation use in heavily-used areas; and whether roads that access popular wilderness attractions should be kept open to the public.

Wild and Scenic Rivers

How should the potential wild and scenic rivers of the Forest be managed and their values protected?

Wild and Scenic Rivers has been identified as a separate major issue, due to public response on the DEIS. There is one designated Wild and Scenic River on the Forest, the Skagit (designated in 1978). The Wild and Scenic Rivers Act established criteria for the addition of other rivers to the National System. The National Park Service (formally Heritage Conservation and Recreation Service) conducted an inventory of potential rivers; portions of the 16 rivers on that inventory are within the Forest boundary.

Portions of the Skykomish River system have been designated by the State of Washington as a Scenic River. This designation applies only to city, county, and State lands. A 1988 Washington State Scenic River Assessment identified 3 rivers on the Forest which possess values that would make them suitable additions to the Washington State Scenic River System (the Carbon, Nooksack, and Stillaguamish Rivers).

There was considerable public comment on the DEIS eligibility study, plus support for many more miles of wild and scenic rivers than recommended for study in the DEIS. There was also vocal opposition to more designation.

Between draft and final plans, eligibility criteria were re-evaluated and the list of eligible rivers adjusted. A total of 51 rivers were identified and studied for their eligibility and 47 of these were determined to be eligible. There was considerable public and agency involvement in this process. A suitability study for the 47 eligible rivers was also completed, again in response to public comment on the draft.

Wild and scenic river legislation has been considered but no action taken. Public concern on all sides is high. The portions of seven major river systems that lie within the Mt. Baker-Snoqualmie contain sections with unparalleled anadromous fisheries values. There are also high recreational and scenic values.

Management of Municipal Watersheds

What activities should be permitted within municipal watersheds?

What measures should be taken that will maintain or enhance water quality?

The title of this major ICO has been changed, to better reflect emerging issues. Maintenance of high water quality is a facet of the issue; it is also addressed on the Effects of Timber Management and Related Activities ICO. Changes in City of Seattle policies for the management of the Cedar River watershed may necessitate renegotiation of the existing, 1962 Cooperative Agreement. Under the 1989 Secondary Use Policies for the Cedar River, the City will set aside 50 percent of its lands in a reserve precluding timber harvest. The policies also call for acquiring 4-6,000 acres of old growth (currently national forest lands) to be maintained as old-growth habitat.

Maintaining high quality water remains as an objective of many individuals, sports and recreation organizations, municipalities, Indian Tribes, and State and federal agencies. These interests believe that timber harvest, road

construction, mining, and some recreation activities are detrimental to water quality and support action to limit or prohibit development in the watersheds. Many also support maintenance of old growth habitat in the Cedar River watershed. Municipalities are concerned that increased access and recreation use will result in the need to install filtration facilities to assure potable water to the consumer.

Timber, energy, mining industries, plus a number of hunters feel that development can occur and any adverse impacts to water supply and quality can be mitigated. They believe that limiting or prohibiting activities unduly restricts the industry's ability to maintain or increase supplies of timber, electric power, and minerals. Hunters feel that big game populations could actually be enhanced with controlled hunts in the watersheds.

A significant portion of the watersheds supplying the cities of Seattle, Bellingham, Everett, and Tacoma is located on the Mt. Baker-Snoqualmie. Water is also provided for a number of smaller municipalities, ski areas, and other recreation sites. About 128,000 acres of national forest land supply municipal water to 1.4 million people. Water quality is high; only one municipality filters water, others use a disinfectant.

Currently, a wide range of activities occur within the municipal watersheds. Some watersheds have not been accessed by roads and remain primarily in a natural condition. Other watersheds have been developed, with extensive timber harvesting and road construction. Recreation is permitted or encouraged in some watersheds; in others, poor access and municipal opposition has limited recreation opportunities.

Effects of Timber Management and Related Activities

What management direction is needed for timber harvest and road construction activities to benefit or maintain the quality of other resources?

The effects of timber harvest and road construction, especially the cumulative effects of these activities, are of great concern to federal agencies, environmentalists, Indian Tribes, State Fish and Wildlife agencies and individuals. The effects of management activities on water quality, fish and fish habitat of of greatest concern, and this interest has increased since the DEIS was released. Other resources affected by timber harvest and road construction are wildlife, scenery, and dispersed unroaded recreation.

The timber industry, miners, and many individuals feel that the effects of these activities can be mitigated, and that not enough national forest land is open to full commodity production (and recreation use).

Management for the commercial production of timber includes a number of activities: road construction and/or reconstruction, preparation of the land for planting seedlings, possible thinning, et cetera. These activities have direct and indirect effects on other resources, including· fish and wildlife habitat, soil, water, and American Indian religious and cultural use. Recreation opportunities are changed, and the visual condition of the Forest changes. The visual impact of clear-cutting and loss of habitat for some wildlife species is a major concern. Changes in vegetation and the effects on diversity and sensitive plants have also been identified as concerns by some people commenting on the DEIS.

Adjacent and Intermingled Lands

How should National Forest lands adjacent to lands of non-federal owners be managed?

What management activities should be conducted on National Forest lands that are located near private developments?

The land ownership pattern within and adjacent to the National Forest boundary and the management of intermingled Federal and Private lands remains a major issue and concern.

A few environmental groups are actively proposing legislative land exchanges that would exchange high-elevation, low timber site class private lands for low elevation, high-site federal lands. Some major industrial timber land owners support these types of exchanges. Independent mill operators and loggers who depend on National Forest timber and some public interest groups strongly oppose such exchanges, as the exchanges would further reduce timber supplies available to them. Some people commenting on the DEIS urged the Forest Service to retain all mineral rights in any exchange.

Environmentalists, State Fish and Wildlife agencies, Indian Tribes and some sporting groups believe that management activities, such as timber harvest, should be delayed or deferred on National Forest lands to mitigate the cumulative effects of large-scale timber harvest on private lands that are intermingled with Federal lands. Independent mill operators and loggers are opposed to any delays or deferrals that would reduce timber supplies available to them.

In many areas of checkerboard ownership, adjacent land owners have completely removed the old-growth timber (in approximately 640 acre blocks), leaving the timber present on National Forest land more vulnerable to wind-throw. Removing these blocks of old growth has also had the effect of reducing the amount of habitat available for wildlife species dependent on old-growth habitat. In areas of intermingled lands, management of National Forest land affects adjacent lands of non-Federal landowners, and activities on non-Federal lands affect management of National Forest land.

Urban growth is steadily moving east toward the Forest boundary. Forest lands, regardless of ownership, are affected by this growth. Resources such as wildlife, water, and air do not recognize ownership boundaries, but they are directly impacted as shopping centers, subdivisions, and residences - plus an increased network of roads - spread closer to the Forest boundary.

PART 3 - THE ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Eight alternatives were developed in detail. The alternatives, including the proposed action (the Preferred Alternative) are based on the identified issues, concerns, and opportunities, the "drivers" of the planning process. Each alternative is designed to achieve specific goals and objectives. Each is a unique combination of land uses, forest management activities, and schedules designed to address, mitigate, or resolve the planning questions discussed above. A wide range of alternatives was developed to test for the combinations of goals and objectives that best maximize net public benefits while responding effectively to the ICO's. With one exception (the No Change Alternative), a

computerized model (FORPLAN) was used to ascertain the potential outputs and effects of each alternative.

Each alternative, except Alternative NC (No Change), falls within the scope of the Mt. Baker-Snoqualmie Standards and Guidelines. These standards and guidelines were prepared to meet laws, regulations, and policy requirements; to direct management activities in meeting goals; to respond to the issues and concerns; and to mitigate potential adverse effects on a Forest-wide basis. Refer to the Forest Plan document and FEIS, Appendix D.

Each alternative, except Alternative NC, includes the management requirements (MR's) (36 CFR 219) pertaining to timber, fish and wildlife, soil and water, land productivity, and riparian areas. The management requirements are discussed in detail in FEIS, Appendix H.

Alternative J is the Preferred Alternative; it was selected by the Regional Forester as the alternative which best maximizes the net public benefits while responding effectively to all the issues.

The Alternatives – Items Treated the Same in All Alternatives

A number of resource management programs are treated the same in all the alternatives:

- Alpine Lakes Management Plan (1981) and the Skagit Wild and Scenic River Plan (1984) are incorporated in all alternatives except Alternative NC.
- The Mt. Baker National Recreation Area (1984) is the same in all;
- The three existing Research Natural Areas are retained in all alternatives;
- The foreground of Mather Memorial Parkway is managed to retain its scenic quality in all alternatives;
- The management requirements (MR's) necessary to integrate requirements of law and regulation are incorporated in all alternatives except Alternative NC;
- The rights established by the various Indian treaties are retained in all alternatives, as is the consultation process for any proposed projects within inventoried religious and cultural use areas;
- The acres of designated wilderness are the same. Acres assigned to classes of the Wilderness Recreation Opportunity Spectrum (WROS) vary by alternative; there are no WROS classes in Alternative NC;
- Even-aged management and regeneration harvest through clearcutting are assumed in estimating timber outputs in all alternatives. However, the use of other systems is not precluded (refer to Appendix F in the DEIS Appendices for more information);
- All alternatives would make full use of vegetation management techniques including herbicides and fire. In 1988, the Pacific Northwest Region, USDA Forest Service completed a final EIS on managing competing and unwanted vegetation (USDA 1988b). That final EIS, the Mediated Agreement, and accompanying implementation direction is incorporated by reference into

this FEIS. It will guide vegetation management activities as the Forest Plan is implemented.

- All existing utility corridors, electronic sites, and administrative sites are retained in all alternatives.

ALTERNATIVE NC (NO CHANGE)

The No Change Alternative has been developed in response to decisions made regarding appeal number 1588, brought by the Northwest Forest Resource Council on May 19, 1986. The appeal centered on a decision by the Regional Forester to "require inclusion of minimum management requirements (MR's) in the Current Direction Alternative for each Forest Plan." The substance of the appeal was that a "true no-action alternative representing current management plans" was not included in Forest Plan EIS's.

The No Change Alternative is designed to continue the level of goods and services as set out in plans formulated and approved prior to the passage of the National Forest Management Act, specifically the 1963 Timber Management Plans. This alternative does not comply with all provisions of NFMA and the regulations promulgated by the Secretary of Agriculture to implement NFMA (it does not incorporate management requirements, including those designed to maintain viable plant and animal populations). The alternative could not be implemented or used in future management of the Forest under the Forest Plan without Congressional and/or Secretary of Agriculture action to change the law or regulations.

Design Criteria for Alternative NC (No Change):

Timber: the 1963 Timber Management Plans are the basis for the alternative.

Roads: the Naches Pass road would not be constructed.

Roadless Areas: an estimated 60% of the roadless areas would remain undeveloped; this estimate is based on the acres of commercial forest land assumed to be in the roadless areas.

Visual Resource: same as "Items Treated the Same in All Alternatives."

Wild and Scenic Rivers: no provision for study or protection of potential rivers is included in the TM Plans.

Research Natural Areas: no potential areas recommended.

Spotted Owls: no provisions made to protect old-growth habitat for wildlife.

Big Game Habitat: no provisions made for protection of big game habitat.

Cavity Excavators: no provisions made for protection of habitat.

Anadromous/Resident Fish: no provisions made for protection of fish habitat.

Municipal Watersheds: all are managed under current agreements, memoranda of understanding.

ALTERNATIVE A (NO ACTION)

Alternative A was developed to continue management direction as set out in plans formulated and approved prior to the passage of the National Forest Management Act. The alternative incorporates the requirements of the National Forest Management Act of 1976 (36 CFR 219.12 through 219.27). The goal of Alternative A is to provide maximum timber outputs while maintaining or exceeding existing recreation, wildlife, fisheries, and visual resource outputs. The plans approved prior to NFMA, plus current laws, regulations, and directions - including MR's - were used to assign management direction to different parts of the Forest. This is the No Action Alternative required by the Council on Environmental Quality Regulations for implementing the National Environmental Policy Act (NEPA).

Design Criteria for Alternative A (No Action):

Timber: an exception to "Items Treated the Same in All Alternatives", in FORPLAN, Alternative A was run with an objective of maximize timber volume for the first five decades, then was rerun to maximize PNV for 15 decades with the same timber outputs as in Decades 1-5. This resulted in some timber prescriptions having less than maximum economic efficiency. Approximately 70 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed for timber production. In the first two decades, approximately 26 miles of arterial and collector roads would be built. During that same period, about 330 miles of local roads would be constructed. The Naches Pass road would not be constructed.

Roadless Areas: would be managed under the direction contained in the Ranger District Multiple Use Plans; approximately 82 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: same as "Items Treated the Same in All Alternatives."

Wild and Scenic Rivers: the 15 rivers included in the National Park Service Nation-wide Inventory are recommended for designation as part of the National Wild and Scenic River System. These fifteen rivers include a total of 375 miles, of which 142 miles are within the national forest boundary.

Research Natural Areas: no potential areas recommended.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 36,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: habitat is provided for viable populations at the MR levels; additional habitat for some species in wilderness, RNA, and areas not suited for timber production.

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at 40% of their potential population levels.

Anadromous/Resident Fish: current populations are maintained through habitat maintenance or improvement at the MR level (low investment).

Municipal Watersheds: are managed under current agreements, memoranda of understanding.

ALTERNATIVE B (RPA)

The goal of Alternative B is to simultaneously produce high levels of timber, anadromous fish, commonly hunted species of big game, and dispersed unroaded recreation, as specified in the 1980 RPA Program.

Design Criteria for Alternative B (RPA):

Timber: is produced at the highest level possible, while meeting the other goals of the alternative. Approximately 64 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed for timber production. In the first two decades, approximately 28 miles of arterial and collector roads would be built. During that same period, about 280 miles of local roads would be constructed. The option to construct Naches Pass road is retained.

Roadless Areas: all roadless area acres that are tentatively suitable for timber production are available for assignment to a timber harvest prescription, unless needed to meet MR's. Approximately 87 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: same as "Items Treated the Same in All Alternatives."

Wild and Scenic Rivers: high timber goal precludes recommending any eligible rivers for Wild and Scenic designation.

Research Natural Areas: no potential areas recommended.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 79,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: alternative designed to increase population levels over time. Acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotation, sale design, smaller clearcuts, etc., provide an optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on land suitable for timber production, habitat is provided to maintain cavity excavators at the MR level - 20% of their potential population levels.

Anadromous/Resident Fish: anadromous fish production is increased through habitat improvements at a high investment level.

Municipal Watersheds: Cedar River - contains 2 SOHA's, retain NF lands, timber production on suitable lands, maintain old-growth habitat; Green River - high level of timber production, essentially closed to public recreation; Sultan

River - retain NF lands, full multiple use; Others - managed for a full range of outputs, timber production on suitable lands.

ALTERNATIVE C

The goal of Alternative C is to emphasize primitive and semi-primitive nonmotorized recreation (accomplished through retention of existing roadless areas and, over time, reversion of some roaded areas to unroaded condition); protect scenery, fish, and wildlife habitat; and protect sites and areas important to American Indians for religious and cultural use.

Design Criteria for Alternative C:

Timber: no production goals set; suitable acres and harvest level will be the lowest of all alternatives considered in detail. Approximately 43 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: roads to be closed include approximately 300 miles of existing arterial and collector roads. In the first two decades, about 15 miles of arterial and collector roads would be built, and about 180 miles of local roads would be constructed. *Construction of the the Naches Pass road is precluded by* management of surrounding lands for unroaded dispersed recreation.

Roadless Areas: nearly all (97%) of the roadless area acres are retained in an unroaded condition at the end of the fifth decade.

Visual Resource: high to moderately-high protection of the foreground and *middleground of all inventoried primary and secondary viewsheds.*

Wild and Scenic Rivers: all 47 rivers determined to be eligible for Wild and Scenic River designation are recommended for designation as part of the National Wild and Scenic River System. The total mileage of rivers included is 786, of which 441 miles are within the national forest boundary.

Research Natural Areas: *five potential RNA's are recommended for designation* - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 36,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: some acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotations, sale design, smaller clearcuts etc. provide optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat provided to maintain cavity excavators at 60% of their potential population levels.

Anadromous/Resident Fish: anadromous and resident fish production is increased through habitat improvements at a high investment level.

Municipal Watersheds: Cedar River - contains 2 SOHA's, with stipulation that habitat be maintained as old growth when lands exchanged to City of Seattle; Green River - current direction (timber production, dispersed recreation permitted); Sultan River - closed watershed, exchange NF lands; Others - no timber harvest, limited recreation use.

ALTERNATIVE G-MODIFIED

The goal of Alternative G-Modified is to emphasize maintenance of natural ecosystems and diversity of native plants and animals, emphasize providing uses not found on private lands, and produce timber in a way that is consistent with the other goals and is non-damaging to soils.

Design Criteria for Alternative G-Modified:

Timber: timber production will occur on currently accessed sites first. Maintenance or development of old growth, especially at lower elevations, is emphasized. Approximately 41 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: roads to be closed include approximately 65 miles of existing arterial and collector roads. In the first two decades, approximately 13 miles of arterial and collector roads would be built, and about 145 miles of local roads would be constructed. Construction of the Naches Pass road is precluded by management of surrounding lands for undeveloped recreation.

Roadless Areas: approximately 96% of the roadless area acres are retained in an unroaded condition at the end of the fifth decade.

Visual Resource: the foreground of selected corridors is protected, including the upper end of Mt. Baker Highway, portions of the Cascade River and North Fork of the Cascade, portions of the Mt. Loop Highway, the upper Sauk, lower Sultan, and Mather Memorial Parkway. Integral vistas within and from Class I airsheds and other wildernesses (not yet designated Class I) are protected.

Wild and Scenic Rivers: all 47 rivers determined to be eligible for Wild and Scenic River designation are recommended for designation as part of the National Wild and Scenic River System. The total mileage of rivers include is 786, of which 441 miles are within the national forest boundary.

Research Natural Areas: five potential RNA's are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Special Areas: special interest areas are recommended for designation at Twin Sisters, Monte Cristo, Baker Lake, Naches Pass, and along the Mather Memorial Parkway.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide with additional habitat areas being protected to meet the objectives of the alternative. Approximately 113,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: habitat provided for viable populations at the MR levels; some additional habitat for some species in wilderness, RNA.

Cavity Excavators: on lands suitable for timber production, habitat is provided for cavity excavators at the MR level - 20% of potential population levels.

Anadromous/Resident Fish: anadromous and resident fish production is increased through habitat improvements at a high investment level.

Municipal Watersheds: *Cedar River - managed to retain old-growth habitat with* stipulation that it be maintained when lands exchanged to City of Seattle; Green River - current direction (timber production, dispersed recreation permitted); Sultan River - current situation (exchange NF lands, moderate timber harvest, restricted recreation use); Others - managed for a full range of outputs, timber production on suitable lands.

ALTERNATIVE H

The goal of Alternative H is to provide an increased emphasis on unroaded recreation; protection of scenic values in the foreground and middleground of heavily traveled highway corridors; increasing big game populations; plus emphasis on timber production on tentatively suitable acres not assigned to other objectives.

Design Criteria for Alternative H:

Timber: about 60 per cent of the tentatively suitable acres are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed. About 20 miles of existing roads, located in areas assigned to unroaded dispersed recreation, will be closed. In the first two decades, approximately 11 miles of arterial and collector roads would be built. During that same period, about 250 miles of local roads would be constructed. The option to construct the Naches Pass road is retained.

Roadless Areas: *areas with a high percentage of tentatively suitable lands are* available for timber production emphasis, except where they also have a combination of high values for unroaded dispersed recreation, big game winter range enhancement opportunities, and are inventoried American Indian religious sites. Approximately 88 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: the foreground and middleground seen areas of heavily traveled highway corridors are managed for scenic quality (meet inventoried visual quality levels): I-90, U.S. 2, Mather Memorial Parkway, and Mountain Loop, Mt. Baker, and Baker Lake Highways.

Wild and Scenic Rivers: the five rivers determined in the DEIS to be eligible for Wild and Scenic River designation are recommended for designation - North Fork Nooksack, North Fork Skykomish, South Fork Skykomish, Tye, and Middle Fork Snoqualmie Rivers, a total of 154 miles, of which 71 miles are within the national forest boundary.

Research Natural Areas: five potential are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 61,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: some acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotations, sale design, smaller clearcuts etc. provide optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at 40% of potential population levels.

Anadromous/Resident Fish: anadromous fish production is increased through habitat improvements at a high investment level.

Municipal Watersheds: Cedar River - current direction (exchange NF lands to City of Seattle, no old-growth habitat maintained); Green River - current direction (timber production, dispersed recreation permitted); Sultan River - current situation (exchange NF lands, moderate timber harvest, restricted recreation use); Others - manage for a full range of outputs, timber production on suitable lands.

ALTERNATIVE I

The goal of Alternative I is to emphasize those resources with an established price in the market place: timber production, anadromous fish, developed recreation, and minerals. Emphasis is also placed on enhancement of big game wildlife and fish habitat, and developing/maintaining an extensive trail system to accommodate a wide variety of users on a year-round basis. Other resources are managed at levels that do not reduce the outputs from the market resources.

Design Criteria for Alternative I:

Timber: timber production is emphasized. Approximately 65 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed, to meet timber production goals. In the first two decades, approximately 34 miles of arterial and collector roads would be built. During that same period, about 290 miles of local roads would be constructed. The option to construct the Naches Pass road is retained.

Roadless Areas: all roadless area acres that are tentatively suitable for timber production are available for assignment to a timber harvest prescription, unless needed to meet MR's. Approximately 86 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual: the foreground of heavily-traveled highways are managed for scenic quality (I-90, U.S. 2, Mather Memorial Parkway, and Mountain Loop, Mt. Baker, and Baker Lake Highways).

Wild and Scenic Rivers: high timber goal precludes recommending any eligible rivers for Wild and Scenic River designation.

Research Natural Areas: *no potential areas are recommended for designation.*

Spotted Owls: spotted owl habitat is inventoried, identified, and protected *following the direction in the SFEIS amending the Regional Guide. About 93,000* acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: alternative designed to increase population levels over time. Acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotation, sale design, smaller clearcuts, etc., provide an optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at the MR level - 20% of potential population levels.

Anadromous/Resident Fish: anadromous fish populations are increased through habitat improvements at a high investment level.

Municipal Watersheds: Cedar River - contains 2 SOHA's, retain NF lands, timber production on suitable lands, maintain old-growth habitat; Green River - high level of timber production, essentially closed to public recreation; Sultan River - retain NF lands, full multiple use; Others - managed for a full range of outputs, timber production on suitable lands.

ALTERNATIVE J (PREFERRED)

This is the Preferred Alternative. It is a new alternative and was not displayed in the DEIS. Beginning with the draft EIS Preferred Alternative (H), Alternative J was developed to respond to public comment and new information. Differences between the draft and this Preferred Alternative include: a *considerable increase in trail mileage; an increase in the number of rivers* recommended for addition to the National Wild and Scenic Rivers System; allocation of three Special Areas (Botanic, Scenic, and Recreation/Education); an increased emphasis on unroaded recreation; and greater protection of scenic values within travel corridors. Timber production is emphasized on suitable acres assigned to a timber harvest prescription. Other resources will be managed at levels commensurate with the objectives of the alternative.

Design Criteria for Alternative J (Preferred):

Timber: about 58 per cent of the tentatively suitable acres are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed. Roads to be closed include about 25 miles of existing roads, located in areas assigned to unroaded dispersed recreation. In the first two decades, approximately 15 miles of arterial and collector roads would be built, and about 240 miles of local roads would be constructed. The option to construct the Naches Pass road is retained.

Roadless Areas: areas with a high percentage of tentatively suitable lands are available for timber production emphasis, except where they also have a combination of high values for unroaded dispersed recreation, big game winter

range enhancement opportunities, and are inventoried American Indian religious sites. Approximately 91 percent of the roadless area acres remain in an undeveloped condition at the end of the ~~fifth~~ 1st decade.

Visual Resource: the foreground and middleground seen areas of heavily traveled highway corridors are managed for scenic quality (meet inventoried visual quality levels): I-90, U.S. 2, Mather Memorial Parkway, and Mountain Loop, Mt. Baker, Baker Lake Highways, Cascade River road, and Crystal Mountain Highway.

Wild and Scenic Rivers: 30 of the 47 rivers determined to be eligible for Wild and Scenic River designation are recommended for inclusion in the National Wild and Scenic Rivers System. A total of 452 miles are recommended, with 276 of those miles located within the national forest boundary. This recommendation is a preliminary administrative recommendation that will receive further review and possible modification by the Chief of the Forest Service, Secretary of Agriculture, and the President of the United States. The Congress has reserved the authority to make final decisions on designation of rivers as part of the National Wild and Scenic Rivers System.

Research Natural Areas: five potential RNA's are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Special Areas: special interest areas are recommended for designation at Mather Memorial Parkway, Heather Meadows, and Sulfur Creek.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 54,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: some acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotations, sale design, smaller clearcuts etc. provide optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at 40% of potential population levels.

Anadromous/Resident Fish: anadromous fish production is increased through habitat improvements at a high investment level.

Municipal Watersheds: Cedar River - initiate negotiations on a new Cooperative Agreement to reestablish goals and management for the watershed; until then, do not enter into land exchanges affecting National Forest lands; Green River - current direction (timber production, dispersed recreation permitted); Sultan River - current situation (exchange NF lands, moderate timber harvest, restricted recreation use); Others - manage for a full range of outputs, timber production on suitable lands.

The Management Areas

To complement the description of alternatives, Table S-1 presents the acres assigned to each management area, by alternative. Management areas (MA's) are areas of the Forest to which a set of management practices, standards, and guidelines apply. (Alternative NC is not shown; it is based on the 1963 Timber Management Plans and has no management areas.) Multiple use will continue to be the overall goal of the Mt. Baker-Snoqualmie; one or more uses may be emphasized in a management area, but many uses are compatible and will occur in every MA.

Management areas are identified by a number or number/letter, plus a short, descriptive title. The letters are various "intensities" of a broader management area. Some MA's have only one intensity. The MA's are described on the alternative maps accompanying this package of documents. The standards and guidelines that apply to each MA are discussed in detail in the Forest Plan (for Alternative J (Preferred) and in FEIS, Appendix D. The maps show the on-the-ground location of the management areas for each alternative.

Table S-1 is a useful summary, but some items should be noted. The alternatives are presented in descending order of acres suitable for timber harvest, an indicator of the level of vegetative management. Many of the outputs and effects discussed later in this Summary are either directly or inversely correlated to the amount of vegetative management in the alternatives. This order of presentation facilitates quicker and easier comparisons among the alternatives.

Acres are assigned to management areas to meet the overall goals and objectives of each alternative, in response to the issues. Simply comparing the number of acres in each management area does not give the full picture of an alternative. Where compatible uses occur on the same area, the acres have been assigned and mapped to the set of management practices, standards, and guidelines that cover management for both uses. Example, an area assigned to nonmotorized dispersed recreation (MA 1A, 1B) may also be capable of providing old-growth wildlife habitat (MA 11). In this case, the MA mapped would be 1A or 1B, not 11 because old-growth habitat has been "overridden" by an MA that is more restrictive: roads cannot be built in 1A/1B; they may be constructed outside the core area in MA 11 (if habitat objectives can be met).

Note that the acres for the wildlife minimum management requirements (MR's) vary among the alternatives. This is primarily due to "overrides." For example, Alternative C shows the fewest acres assigned to MA 11 Old Growth, yet C has a goal of emphasizing wildlife. Old-growth habitat is protected at a high level in Alternative C but many acres of old growth habitat are located within MA's 1A or 1B, which provide for both wildlife habitat and nonmotorized recreation. The designated old growth acres are still "there", but they are mapped as 1A or 1B, and are listed in Table S-1 as 1A or 1B.

Table S-1

Acreages in Management Areas by Alternative 1/

Management Area	A (No Action)	I	B (RPA)	H	J (Preferred)	C	G-Modified
Lands Suitable for Timber Production	412 508	386,512	380 448	358,754	346 411	256,206	247,091
1 Dispersed Recreation							
1A Primitive	0	0	0	4,561	45,278	16,914	6,793
1B Semi-Prim Nonmotorized	0	0	134,585	248,479	225,104	387,168	369,889
1C Semi-Prim Motorized	0	143,102	5,123	2,501	2,981	0	3,608
1D Roaded Natural Rec	0	5,307	20,159	12,852	14,926	15,699	0
1E General Dispersed Rec	344,304 2/	0	0	0	0	0	0
1F 1926 Mt Baker Rec	7,991 3/	0	0	0	0	0	0
Subtotal	352,294	148,409	159,867	268,393	288,289	419,781	380,290
2 Scenic Viewshed							
2A Foreground	3,321	29,223	4,015	24,581	23,406	65,721	9,486
2B Middleground	0	0	0	81,573	95,795	57,500	0
Subtotal	3,321	29,223	4,015	106,154	119,201	123,221	9,486
3 Developed Recreation							
3A Public Sector Sites	1,813	1,809	1,764	1,810	1,819	1,761	2,273
3B Potential Rec Sites	0	0	0	0	0	0	0
3C Winter Sports Resorts	4,618	5,904	5,214	5,692	6,041	5,290	4,865
3D Private Sector Sites	556	555	541	555	558	540	557
Subtotal	6 986	8,268	7 519	8 057	8,418	7,591	7,695
4 Mt Baker Natl Rec Area	8 740	8 740	8 740	8 740	8 740	8,740	8,740
5 Recommended Wild & Scenic R	24,506	0	0	8,794	20 865	29 617	20,234
6 Skagit Wild & Scenic River	17,037	17,037	17,037	17,037	17,037	17,037	17,037
7 Amer Indian Relg/Cult Use 4/	0	0	0	0	0	0	0
8 Special Areas 5/	0	0	663	0	6,321	809	22,006
10 Wilderness							
10A Transition	12,067	21 878	14,402	7,982	15 078	7,032	7,644
10B Trailed	44,356	49 628	39 786	46,734	49,015	45,700	52,669
10C General Trailless	585,326	643,495	543,881	437,931	457,000	272,679	444,688
10D Dedicated Trailless	*80 000*	*0*	*121,409*	*219,292*	*191,606*	*386,992*	*207,930*
10E Special Area	0	6,715	2,238	9,777	9,017	9,313	8,785
Subtotal	721,716	721,716	721,716	721,716	721,716	721,716	721,716
11 Old Growth Habitat	36 247	93 037	79 328	60 977	54,191	36,072	112,987
12 Mature & Old Growth Habitat	14,074	27 691	23,344	19,185	19 282	13 071	10,648
13 Watershed, Wildlife, & Fisheries Emphasis in Riparian Areas 6/	52,436	46 772	41,288	49,872	47,048	23,219	31,857
14 Deer and Elk Winter Range	0	106,632	158 824	34,239	33,587	39,057	26,622
15 Mountain Goat Habitat							
15A Min Mgt Requirements	9,217	24 291	19,370	15,742	17,110	9,742	6,311
15B Habitat Improvement	0	0	20 158	0	0	3,040	0
Subtotal	9,217	24 291	39 528	15,742	17,110	12,782	6,311
16 Threatened & Endangered Species 7/							
16A Northern Bald Eagle	2,808	2,808	2,808	2,808	2,808	2,808	2,808

Table S-1 Page 2 of 2

Management Area	A (No Action)	I	B (RPA)	H	J (Preferred)	C	G-Modified
17 Timber Management Emphasis	321,470	273,572	235,711	198,559	166 611	89,267	201,023
18 Research Natural Areas 8/	2,364	2,364	2,364	5,233	5,233	5,233	5,233
19 Mtn Hemlock Zone	0	48,803	62,333	31,812	31,965	16,039	22,761
20 Cedar R Municipal Watershed							
20A Current Direction, Exchange NF Lands to City	13,398	11,804	0	12,517	0	0	0
20B Exchange NF Lands, City Maintains Old Growth	0	0	0	0	0	12,214	6,212
20C Retain NF Land, Maintain Old Growth Habitat	0	0	13,297	0		0	0
20D Negotiate New Coop Agreement	0	0	0	0	11,724	0	0
21 Green River Municipal Watershed							
21A Current Direction, Tmbr Harvest, Disp Rec OK	9,799	24,546	0	24,914	24,935	23,931	12,846
21B Timber Harvest OK, Most Public Rec Prohibited	0	0	23,839	0	0	0	0
22 Sultan River Municipal Watershed							
22A Closed Except Protect Water & Hydropower Production, Exchange NF Lands	0	0	0	0	0	8,935	0
22B Current Situation, Exch NF Lands, Moderate Timber Harvest, Restricted Rec	4,646	8,772	0	8,393	8,399	0	5,633
22C Retain NF Lands, Full Multiple Use	0	0	9,260	0	0	0	0
23 Other Municipal Watersheds							
23A Tmbr Harvest, Mod Rec	14,081	19 682	16 124	19 315	13,138	0	9,315
23B No Harvest, Limited Rec	0	0	0	0	0	21,068	0
25 Special Uses - Utilities							
25A Utility Corridors 9/	[1500]	[1500]	[1500]	[1500]	[1500]	[1500]	[1500]
25B Electronic Sites	1,014	1 014	1,014	1,014	1,014	1,014	1,014
26 Administrative Sites	143	143	143	143	143	143	143
27 Alpine Lakes Mgt Area 10/	106,950	97,981	94,606	99,647	95,305	89,991	79,466

1/ Total acres in each alt vary due to rounding MA 9 not used, MA 24 Min Mgt not assigned in any alternative.

2/ Applies only to Alt A, includes mostly unroaded, but some roaded recreation, from exisitng Multiple Use Plans

3/ Parcels of the 1926 area that remain outside of wilderness and the Mt. Baker NRA are included here.

4/ Acres are protected at varying levels in the alternatives, but not shown to protect confidential nature

5/ Includes Cultural-Historic, Geologic, Biologic, Botanic, and Scenic Special Areas

6/ Many acres of riparian zone fall within other MA's and are protected through those management prescritptions

7/ Management Areas 16B Grizzly Bear, 16C American Peregrin Falcon and 16D Gray Wolf have no acres assigned at this time, because no specific habitat has been identified or evaluated

8/ Acres of existing or proposed RNA located within wilderness are included in MA 10, not here

9/ These acres overlap other MA's

10/ Includes acres within the congressionally designated Alpine Lakes Management Unit that are not otherwise assigned to other, compatible management areas (Compatible MA's include 5, 11, 12, 14, 15, and 16)

PART 4 - COMPARISON OF ALTERNATIVES

The following figures show how the alternatives compare to each other in just a few of the Forest activities or resource outputs. The graphs tie to the detailed output tables in the next section (where other outputs are displayed). Again, the alternatives are arranged in order of decreasing acres of land suitable for timber production. Alternative NC (No Change) was not modeled in FORPLAN, therefore not all outputs for this alternative can be reasonably estimated. Refer to the text and footnotes for each figure.

Figure S-2 shows average annual timber sale program quantity (TSPQ) for Decade 1 (in million board feet). TSPQ includes live (green) wood, plus salvage, fuelwood, and other non-industrial wood. Figure S-3 shows the acres of final timber harvest, each decade, for Decades 1, 2, and 5. Refer to Table S-2 for more comparisons.

Figure S-2

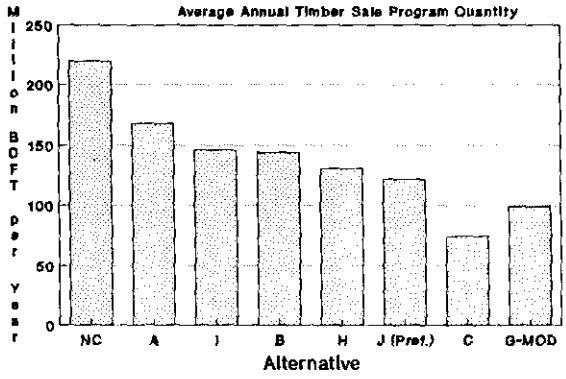


Figure S-3

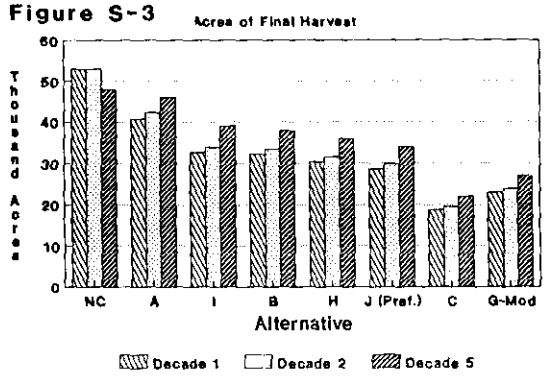


Figure S-4 shows the <u>total</u> amount of old-growth forest remaining, which includes old growth located in wilderness and other no-harvest areas. The starting point is the beginning of plan implementation. The figures then show acres remaining at the end of Decades 1, 2, and 5.

Figure S-4

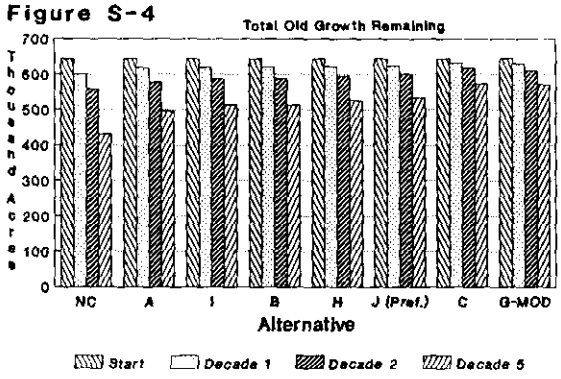


Figure S-5 shows total road construction, in miles per year. Most of the miles are local (timber purchaser) roads. Refer to Table S-2. In all alternatives, all arterial/collector road construction, but not all local road construction, will be completed by Decade 3. In Alternative C, about 300 miles of arterial and collector roads are closed starting in Decade 1; about 65 miles are closed in Alternative G; 20 miles closed in Alternative H; and about 25 miles closed in Alternative J (Preferred).

Figure S-6 shows the disposition of the 402,930 acres of roadless areas: the percent remaining undeveloped at the end of Decades 1, 2, and 5. No data can reasonably be estimated for Alternative NC. In the first 10 to 15 years, from 1% to 7% would be developed, depending on the alternative. The acres shown for Alternative A are an estimate.

Figure S-5 Average Annual Road Construction

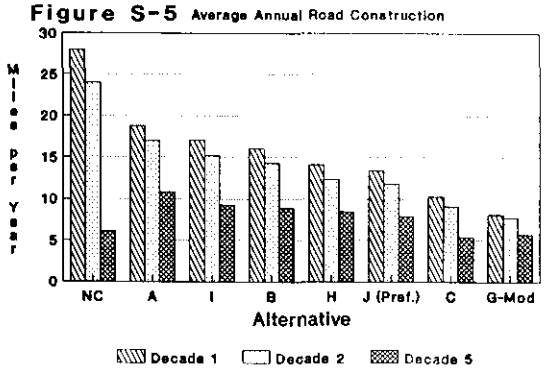
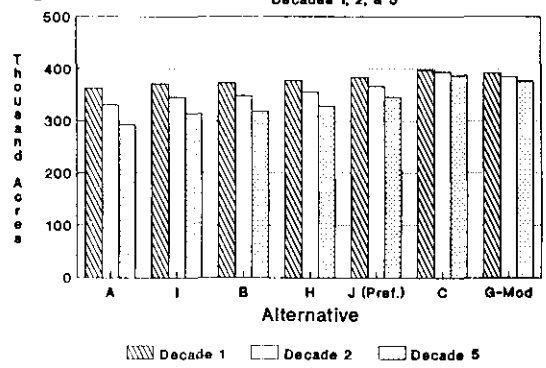


Figure S-6 Acres of Roadless Areas Remaining Undeveloped Decades 1, 2, & 5



Does not apply to NC Alt

Figures S-7 and S-8 show the acres of dispersed recreation by ROS classes. Alternative NC is estimated to be similar to Alternative A. The term "reached by Decade 4" is used because, as an alternative is implemented, land allocated to MA's, and standards and guidelines applied, the recreation setting will slowly change toward the desired future condition. The figures show the expected ROS acres after four decades of implementing each alternative. While no alternative can meet future demand for unroaded dispersed recreation,

Figure S-7 Unroaded ROS Acres Reached by Decade 4

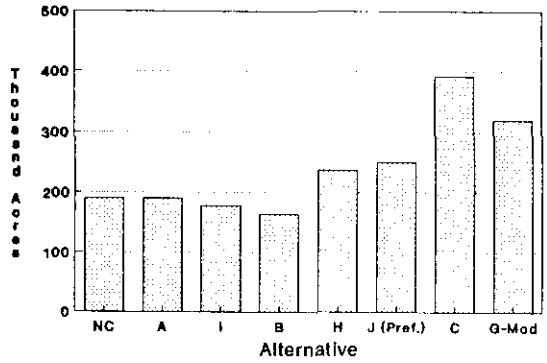
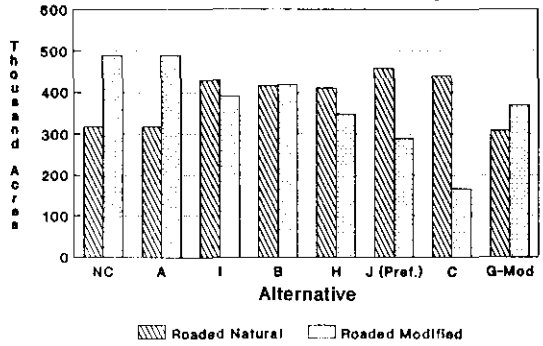


Figure S-8 Roaded ROS Classes Reached by Decade 4

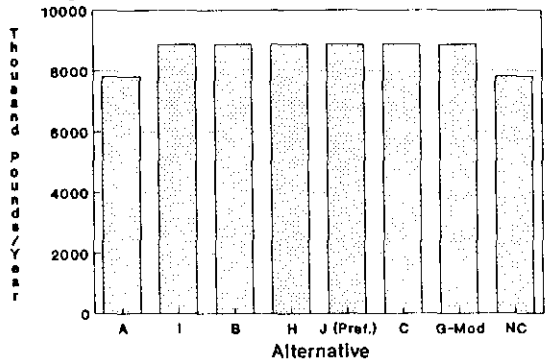


NC Alternative combines RN & RM

Alternatives C and G-Modified come the closest. Alternative B cannot meet the RPA target for dispersed recreation. Looking at Figure S-8, the alternatives with more timber harvest activities and associated road construction (NC, A, and I) provide the most roaded dispersed recreation; however, much of this recreation will occur in landscapes that have been heavily altered.

Figure S-9 shows the pounds of anadromous fish available for commercial harvest. The differences between alternatives are a function of investments in habitat improvements: a higher level of investment and more restoration/ enhancement results in more available fish. Alternative NC is similar to A. While not shown in this figure, resident fish habitat is also improved/enhanced in Alternatives C, G-Modified, and J (Preferred).

Figure S-9 Anadromous Fish for Commercial Harvest



Quantitative Outputs and Effects of the Alternatives

Tables S-2 and S-2a show some of the key outputs and effects of the eight alternatives. Again, the alternatives are displayed in descending order of acres suitable for timber harvest, an indicator of the level of vegetative management. Many outputs and effects are either directly or inversely correlated to this order.

Alternative NC (No Change) is based on the 1963 Timber Management Plans (as amended), which were not integrated resource plans and consequently did not address all resource uses and outputs. Data for Alternative NC is presented where it can be reasonably estimated, or where information was addressed in the 1963 Plans. Alternative NC was not modeled in FORPLAN, therefore, economic measures comparable with the other alternatives were not determined.

While the alternatives and the decision apply only for the life of this Forest Plan - 10 to 15 years - outputs and effects for Decades 2 and 5 are included to show some long-term trends of implementation.

Both allowable sale quantity and timber sale program quantity are shown; the footnotes explain the difference in these two terms. Allowable sale quantity (ASQ) is shown in board feet per year only for the first decade. ASQ and timber sale program quantity, by alternative, are shown in cubic feet per year for all time periods.

Generally, as suitable acres increase, the amount of harvest increases, as does road construction, and environmental effects, such as sediment index.

Summary

For the recreation and wilderness resource, the most useful way to compare the alternatives is to first look at current use and capacity, and then compare how well each alternative is able to provide for future demand, which is expressed as a range.

For this Forest, capacity means practical, or realistic, capacity not the theoretical maximum. 1/ It was assumed that projected recreation use will not exceed capacity for any particular activity. It is expected that use will be limited by a combination of direct management actions by the Forest Service (such as permits, area closures) and by the users themselves: when use of a site or area approaches capacity, people will substitute other activities (such as nordic skiing when alpine ski areas are full), or shift their activities to other lands, if they cannot satisfy their expected recreation experience on the Forest.

For non-wilderness unroaded dispersed recreation, current use already exceeds practical capacity. In total recreation use, current capacity far exceeds use (primarily due to the large reserve of developed capacity in ski areas, campgrounds, and in roaded dispersed recreation). However, by the fifth decade, all alternatives will fall short of meeting the range of total recreation demand.

Most of the miles of new trail construction, in all alternatives, are outside wilderness.

Note footnote number 8/ when comparing acres of old growth, by alternative. The "starting point" total acres of old growth, including acres within wilderness, is 643,538 acres. The acres within wilderness (232,500) remain constant in all alternatives over time. Proposed timber harvest will occur only on those old growth acres that are suitable for timber production and are assigned to a management prescription that includes timber harvest.

The pounds of anadromous fish available for commercial harvest are a direct function of the investment level for fish habitat improvement. MR's for water quality and riparian areas will also benefit this resource.

Population estimates for the spotted owl exceed the MR level in all alternatives, except Alternative NC, for all time periods. However, wildlife populations that primarily use mature and old-growth habitats (northern spotted owl, pine marten, pileated woodpecker) will decrease over time, in all alternatives, primarily due to harvest of mature and old-growth timber stands.

Winter range habitat capability for deer and elk increases from the current situation (which supports 9,140 deer and 470 elk) through the first decade, a result of increased forage from timber harvest activities. Habitat capability declines in Decade 2, as winter thermal cover becomes limiting. By Decade 5, habitat capability again increases, due to habitat improvements implemented in the first decade.

The text discussing Table S-2a, "Percentage of Inventoried American Indian Religious and Cultural Use Areas Assigned to MA's Providing High and Moderate Levels of Protection" follows all of the S-2 tables.

1/ Theoretical capacity is an estimate of the maximum use of the Forest, assuming all facilities are 100% full, all days of the maximum use season. Practical capacity recognizes physical and social limitations, such as low mid-week use and periods of unfavorable weather, when use declines.

Table S-2
Quantitative Resource Outputs, Inputs, Effects

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No. Act.)	I	B (RPA)	H	J (Preferred)	C	G-Mod.
Lands Tentatively Suitable for Timber Production	Acres	NA	597,199	597,294	597,307	597,293	597,280	597,303	597,284
Lands Suitable for Timber Production	Acres	546,500	412,508	386,512	380,448	358,754	346,411	256,206	247,091
Allowable Sale Quant. 2/									
Decade 1	MMBF Per Year	204	149	129	127	116	108	66	87
Allowable Sale Quant. 2/									
Decade 1	MMCF	41.7	31.0	26.6	26.3	24.1	22.4	13.8	18.3
Decade 2	Per	41.7	36.7	30.0	29.6	27.5	25.7	16.3	20.7
Decade 5	Year	41.7	39.0	33.7	32.3	31.3	29.7	19.8	22.2
Timber Sale Program Quantity 3/									
Decade 1	MMCF	45.0	35.0	30.1	29.8	27 3	25.5	15.8	20.4
Decade 2	Per	44.5	40.8	33.3	32.9	30.6	28.5	18.2	23 0
Decade 5	Year	42.5	41.5	35.8	35.4	33.3	31.6	21.0	23.6
Arterial and Collector Road Construction									
Decade 1	Miles	8.2	1.4	1.8	1.5	0.6	0.8	0.7	0.6
Decade 2	Per	6.7	1.2	1.6	1.3	0.5	0.7	0.8	0.7
Decade 5	Year	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Timber Purchaser (Local) Road Const./Recon.									
Decade 1 Const.		20.4	17.4	15.3	14.6	13.5	12.6	9.6	7.5
Reconstruct.	Miles	72.0	73.2	63.0	61.7	56.6	52.8	34.3	40.2
Decade 2 Const.	Per	17.8	15.8	13.6	13.0	11.8	11.1	8.3	7.0
Reconstruct.	Year	72.0	81.9	67.4	66.2	61 1	57.1	37.6	44.1
Decade 5 Const.		6.1	10.8	9.3	8.9	8 4	7.9	5.4	5.7
Reconstruct.		72.0	81.1	69.9	68.8	64.7	61.2	40.9	45.5
Sediment Index									
Decade 1	M Tons	Simi-	102.9	96.7	95.7	91.3	88.5	67.6	66.8
Decade 2	Per	lar to	102.6	96.5	95.4	91.0	88.2	67.5	67.1
Decade 5	Year	Alt. A	100.4	94.6	93.3	88.9	86.2	65.4	65.3

1/ The TM Plans upon which the No Change Alternative is based were developed in 1963. The outputs and effects are generated from previous inventories. All other alt. outputs and effects were calculated using updated inventories and yield tables and the latest method of calculating timber harvest levels. For Alt. NC, tentatively suitable lands were not determined and standard plus special commercial forest land is shown as lands suitable for timber production.

2/ ASQ: Quantity of timber that may be sold, from suitable land. Includes only chargeable, live (green) not salvage, fuelwood or other non-industrial wood. Potential yield from the TM Plan is shown for Alternative NC.

3/ Includes ASQ, nonchargeable mortality volume, volume not meeting utilization standards, and volume used for other than board products from lands suitable for timber production, and volume from unsuitable lands. Includes PY and all other volume for NC.

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No. Act.)	I	B (RPA)	H	J (Preferred)	C	G-Mod.
Non-Wilderness Disp. Rec. Use									
Roaded 4/									
Current Use (1989)	1,000	Similar	2,102	2,102	2,102	2,102	2,102	2,102	2,102
Current Capacity (1989)	RVD's	to Alt.A	3,199	3,199	3,199	3,199	3,199	3,199	3,199
Future Capacity	Per Yr.								
Decade 1		Similar	3,343	3,339	3,317	3,322	3,277	3,130	3,223
Decade 2		to	4,097	4,093	4,068	3,818	3,730	3,374	3,474
Decade 5		Alt. A	4,902	5,069	5,043	4,516	3,991	3,599	3,710
Future Demand									
Decade 1		Similar	----------1,854 to 2,266----------						
Decade 2		to	----------2,837 to 3,467----------						
Decade 5		Alt. A	----------4,817 to 5,887----------						
Non-Wilderness Disp. Rec. Use									
Unroaded 5/									
Current Use (1989)	1,000	Similar to	297	297	297	297	297	297	297
Current Capacity (1989)	RVD's	to	223	223	223	223	223	223	223
Future Capacity	Per Yr.	Alt. A							
Decade 1		Similar	201	208	200	205	208	222	218
Decade 2		to	164	182	157	174	182	220	210
Decade 5		Alt. A	115	149	102	134	149	218	201
Future Demand									
Decade 1		Similar	----------225 to 293----------						
Decade 2		to	----------328 to 492----------						
Decade 5		Alt. A	----------713 to 890----------						
Wilderness Recreation									
Current Use (1989)	1,000	Similar	459	459	459	459	459	459	459
Current Capacity (1989)	RVD's	to	500	500	500	500	500	500	500
Future Capacity	Per Yr.	Alt. A	500	675	511	422	539	375	440
Future Demand									
Decade 1		Similar	----------388 to 456----------						
Decade 2		to	----------565 to 673----------						
Decade 5		Alt. A	----------921 to 1,107----------						
Total Recreation Use 6/									
Current Use	1,000	Similar	5,182	5,182	5,182	5,182	5,182	5,182	5,182
Current Capacity	RVD's	to	8,966	8,966	8,966	8,966	8,966	8,966	8,966
Future Capacity	Per Yr.	Alt. A							
Decade 1		Similar	9,426	9,820	9,410	9,547	9,622	9,109	9,245
Decade 2		to	10,553	11,228	10,438	10,512	10,549	9,851	9,808
Decade 5		Alt. A	12,359	13,491	12,318	12,310	11,917	11,214	10,995
Future Demand									
Decade 1		Similar	----------5,301 to 6,479----------						
Decade 2		to	----------7,636 to 9,334----------						
Decade 5		Alt. A	----------13,169 to 16,095----------						

4/ Includes RN, RM, and Rural ROS classes
5/ Includes P, SPNM, and SPM ROS classes.
6/ Includes Developed, Roaded & Unroaded Dispersed, and Wilderness Recreation totals. Wildlife Fish User Days are included.

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No. Act.)	I	B (RPA)	H	J (Preferred)	C	G-Mod.
Developed Rec. Site Construct./Reconstruction									
Dec. 1	PAOT	Similar	10/800	130/220	10/400	130/220	130/220	10/800	0/0
Dec. 2	Per Yr.	to	50/850	200/100	0/400	100/900	100/900	100/900	0/0
Dec. 5		Alt. A	50/900	200/1200	0/400	100/1000	100/1000	100/1000	0/0
Trail Construction/ Reconstruction									
Dec. 1	Miles	Similar	7/6	35/12	5/7	9/12	22/49	9/8	35/12
Dec. 2	Per Yr.	to	7/6	0/12	5/7	9/12	0/2	9/8	0/12
Dec. 5		Alt. A	0/5	0/5	0/5	1/5	1/5	0/5	0/5
Roadless Areas 7/ Assigned Roaded Mgt. Prescript. But Not Developed For Next 15 Years	Acres	NA	70,215	98,181	87,955	61,598	61,482	23,101	18,368
Roadless Areas 7/ Assigned to Unroaded Management Prescriptions	Acres	NA	280,334	256,397	266,623	305,068	309,214 / 370,696	375,800	368,445
Rivers Recommended for W & S River Designation	No. of Rivers	0	15	0	0	5	30	47	47
	Miles	0	287	0	0	154	452	606	796
Non-Wilderness Old Growth Not Suited for Timber Production 8/	Acres	NA	247,869	253,378	253,212	265,260	270,221	307,793	330,346
Non-Wilderness Old Growth Suited and Allocated to Timber Harvest Prescription	Start	NA	163,169	157,660	157,826	145,778	140,817	103,245	80,692
	End Dec 1	NA	137,131	134,385	134,897	125,105	121,939	91,396	66,491
	End Dec. 2	NA	97,723	102,244	103,339	96,335	96,634	77,180	47,228
	End Dec. 5	NA	16,156	29,834	27,308	28,326	32,373	33,134	7,824
Anadromous Fish Commercial Harvest									
Decade 1	1,000	Similar	7809	8874	8874	8874	8874	8874	8874
Decade 2	Lbs/Yr	to	7809	9000	9000	9000	9000	9000	9000
Decade 5		Alt. A	7809	10,000	10,000	10,000	10,000	10,000	10,000

309,214 / 402,930 = 77% of total Wilderness S-33

370,696 / 462,930 = 92%

7/ RARE II roadless areas released by the 1984 Washington Wilderness Act.

8/ There are 232,500 acres of old growth in wilderness in all alternatives In all alternatives, there are 134,400 non-wilderness acres that are not suited for timber production due to ptential irretrievable or irreversible resource damage. The remaining acres in this line vary, based on the objective of the alternative. Total old growth on the Forest, starting point = 643,538 acres.

Table S-2

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No. Act.)	I	B (RPA)	H	J (Preferred)	C	G-Mod.
Northern Spotted Owl									
Decade 1	Habitat	108 9/	108	108	108	111	111	115	115
Decade 2	Capability	91	97	98	98	101	103	110	110
Decade 5	for Pairs	54	76	76	76	80	82	99	98
Roosevelt Elk Winter Range									
Decade 1	Habitat	Similar 9/	780	780	770	770	770	750	740
Decade 2	Capability	to	720	700	690	700	690	670	660
Decade 5	for Indiv.	Alt A	790	740	730	740	710	650	640
Black-tailed Deer Winter Range									
Decade 1	Habitat	Similar 9/	16,520	15,350	15,300	15,250	15,160	14,870	14,610
Decade 2	Capability	to	14,400	13,510	13,410	13,450	13,390	12,950	12,680
Decade 5	for Indiv.	Alt A	15,740	14,300	13,970	14,190	13,580	12,410	12,110
Mountain Goat									
Decade 1	Habitat	Similar 9/	1430	1440	1450	1440	1450	1450	1450
Decade 2	Capability	to	1400	1440	1440	1440	1440	1450	1450
Decade 5	for Indiv.	Alt A	1330	1400	1410	1410	1420	1450	1440
Total Budget									
Decade 1	Million	NA	20 0	18 4	18.7	18.3	18.0	15.4	15.7
Decade 2	Dollars	NA	21 0	18 9	18.9	18.5	19.3	15.7	16.6
Decade 5	Per Yr.	NA	18 3	16.8	16.8	16.7	15.9	13.3	14.0
Returns to Treasury									
Decade 1	Million	35.9	21.4	19.8	19.4	18.1	16.8	9.3	14.3
Decade 2	Dollars	36.6	34.9	28 1	27.7	25.6	23.9	14.4	19.6
Decade 5	Per Yr.	24.0	46.2	40.3	40.2	38.9	37.7	26.2	24.2
Payments to Counties									
Decade 1	Million	NA	5.9	5.4	5 3	4.9	4.9	2.6	3.8
Decade 2	Dollars	NA	9.2	7.4	7.3	6.8	6.3	3.9	5.1
Decade 5	Per Yr.	NA	11.9	10.4	10.3	10.0	9.6	6.7	6.2
Jobs Supported by the Alts. Decade 1	Thousands of Jobs Per Year	NA	29.3	29.1	29.1	28.9	28.8	28.0	28.4

9/ Populations would be expected to decline at a rate faster than Alternative A because no specific provision is made in Alt. NC to maintain viable populations and more of the old growth is suitable for timber harvest and will be fragmented.

Table S-2a

Percentage of Inventoried Acres of American Indian Religious and Cultural Use Sites Assigned to Management Areas Providing High and Moderate Levels of Protection

Type of Site	Alternatives													
	NC 1/ (No Change)		A (No Action)		I		B (RPA)		H		J (Preferred)		C		G-Modified	
	High	Mod.	High	Mod.	High	Mod.	High	Mod.	High	Mod.	High	Mod.	High	Mod.	High	Mod.
Spirit Quest	NA		37	3	44	2	44	6	41	15	48	11	40	26	43	22
Legend Site	NA		16	2	30	2	28	16	25	26	40	17	23	45	18	47
Cedar Areas	NA		22	1	28	1	28	5	27	8	27	8	23	27	29	25
Ceremonial Flora	NA		52	1	56	1	57	6	54	16	56	15	58	24	55	26

1/ The 1963 TM Plans, upon which Alternative NC is based, were not integrated resource plans, and consequently did not address all resource uses and outputs. The missing information in this table cannot be reasonably estimated because, except for cemeteries, the percentages were developed by overlaying inventoried areas with MA's; no MA's were assigned in Alternative NC.

Summary

Table S-2a shows, by alternative, an estimated percentage of the inventoried American Indian religious and cultural use sites assigned to management areas that generally preclude or limit ground-disturbing activities.

The percents given should be viewed as only an approximation as some use sites and areas were not identified in the Inventory, but were included in a larger "buffer" area by tribal respondents. Therefore, the actual degree of protection in each alternative can only be estimated.

In the table, the difference between "high" and "moderate" is derived from the expected frequency of human encounters. There is no timber harvest or road construction under either high or moderate protection. All cemeteries have high protection. The actual protection of all sites will be determined using Forest-wide Standards and Guidelines (Forest Plan, Chapter 4) and consultation with appropriate tribes. To protect the confidential nature of the inventory, use sites and areas are not reported in Table S-1 nor are they mapped.

Economic Tradeoffs Among Alternatives

Present net value (PNV) is an estimate of the potential economic effectiveness of managing the Forest. PNV is defined as the discounted dollar value of all benefits of an alternative, less the discounted costs of management and investments needed to implement the alternative. Discounting is a way of combining current and future values to show them in today's terms. The values used in this plan are expressed in terms of 1982 dollars, with a discount rate of 4%. This concept is discussed in detail in Appendix B of the FEIS.

Table S-3 compares PNV and the benefits and costs among alternatives for major resource groups. An exact relationship between the dollar benefits associated with a particular priced output and the resource costs should not be assumed. For example, some recreation and wildlife benefits are joint outputs of timber management. The dollar values assigned are discussed in Appendix B.

Table S-3 indicates that almost all of the variation in PNV, discounted costs, and discounted benefits is due to the variation in timber outputs of the alternatives. With some minor exceptions, as timber outputs decline, so do discounted costs and benefits

Discounted costs and benefits for recreation change very little from one alternative to another This is partly due to the fact that current recreation use is very close to capacity on the Forest for most types of recreation, except roaded dispersed. There is little opportunity to significantly increase the recreation supply in wilderness, primitive, semi-primitive nonmotorized, or semi-primitive motorized outside of wilderness. Although there is some variation between alternatives in these dispersed recreation capacities, it is a very small percentage of the current capacity and affects discounted recreation benefits only about 6% between the alternatives. Discounted recreation benefits exceed discounted timber benefits in all alternatives, though actual cash flow or returns to the Treasury are much lower than for timber.

Alternative C has the lowest discounted recreation benefits of all the alternatives but the highest levels of primitive and semi-primitive nonmotorized recreation capacity. Although primitive and semi-primitive nonmotorized recreation use has a higher value per Recreation Visitor Day (RVD) than motorized use, it has a lower RVD per acre coefficient (the number of

people who do or can recreate on an acre). The result is that on a per-acre basis, motorized use is more valuable than nonmotorized use.

The alternatives in Table S-3 are displayed in order of highest to lowest PNV.

Table S-3
Present Net Values and Discounted Benefits and Costs by Resource Group

Alternatives	PNV	...Discounted Benefits... Timber	Recreation	Other	.....Discounted Costs .... Timber	Roads	Recreation	Other
	.....Millions of Dollars.....							
B (RPA)	2343.2	1384.3	1904.2	146.2	746.8	147.2	34 8	162 7
I	2342.9	1400.0	1892 1	146.2	754 1	146.9	35.2	159.2
A (No Act.)	2283 5	1643.5	1880.0	33 7	916.2	165.1	34.8	157.6
H	2260.0	1288.6	1856 5	146.2	693.3	144 2	34.7	159.2
J (Pref.)	2258.8	1204.8	1892.1	146 2	650.3	136.2	35.2	162.7
G-Mod.	1997.0	940.8	1805.4	78.9	523.1	110 9	34.9	159.2
C	1970.9	760.5	1788.5	146 2	420.5	106.8	34.2	162.7
NC (No Change)	NA	NA	NA	NA	NA	NA	NA	NA

Major Tradeoffs Among Alternatives

Table S-4 presents tradeoffs among economic benefits of the alternatives and their response to the major issues and concerns, as measured by quantitative indicators (listed in the ICO section of the Summary). Across the top of the table are the quantitative measures selected to indicate responsiveness to an ICO.

To provide a partial framework for assessing these tradeoffs, the long-term resource demands or needs of the Nation, region, and local economic area are briefly summarized.

National, Regional, and Local Overview

National (RPA) planning estimates that total national demands will rise for all outputs of the National Forest. At the same time, there is a strong demand to protect and enhance the quality of the environment. Many people view the production of goods and services from the National Forests as competing with protection and enhancement of a quality environment.

Demands and prices for commodity products are generally determined in regional and national markets. The nation benefits most when supplies are provided from the most efficient sources of production.

Summary

The Mt. Baker-Snoqualmie National Forest is an efficient supplier of timber products. The 1980 RPA program assigned approximately 2.5 percent of the total projected timber outputs for the National Forest System in 1990 to the Mt. Baker-Snoqualmie National Forest. The Forests' share of the projected Regional outputs in 1990 is approximately 6 percent. The Mt. Baker-Snoqualmie produces about 15 percent of the logs consumed in the Puget Sound area; forest industry and other private owners are the major producers of logs consumed in the area. Nearly all (97%) of the logs produced on the Forest are processed in the local economic area (Larsen and others 1983). The resulting products are consumed primarily in the Western U.S. market.

Demands on the Forest for outdoor recreation uses are more localized than the regional and national demands for timber. Most of the Forest recreation users reside in the major population centers along the Interstate 5 highway corridor.

Recreation use and the demand for recreation of many types is growing, and at a rate faster than the population growth of the Puget Sound area. Total recreation use increased approximately 40 percent on the Forest in the 10 year period from 1975-1984. In a similar time period, the population of the five county area of the Forest increased approximately 20 percent. The fastest growing segment of the recreation spectrum is wilderness use: + 145 percent, compared to an increase of 65 percent in developed recreation use. Wilderness use represents approximately 4.5 percent of the total recreation use on the Forest for the period 1975 to 1984.

The Mt. Baker-Snoqualmie National Forest is a major supplier of National Forest wilderness in the Pacific Northwest and the nation. The Forest contains 16 percent of the National Forest wilderness in the Pacific Northwest Region and 2.2 percent of the total National Forest wilderness system. Available data collected in the late 1970's and early 1980's indicates that 82-94 percent of wilderness use on the Forest originated from Washington State, and 49-65 percent of the users are from the Puget Sound area. Several of the Forest wildernesses are among the most heavily used in the nation.

Salmon, by a large margin, is the most valuable fish or wildlife species, as measured by the market value of the harvest. An estimated 50 percent of the harvest of naturally produced (as opposed to hatchery produced) salmon for the Puget Sound area are produced from Mt. Baker-Snoqualmie National Forest water systems.

The Forest has extremely low capability to produce economically efficient forage for commercial grazing of domestic livestock.

How the Alternatives Respond to Major Issues, National Concerns. With the discussion above to set the stage, Table S-4 and the text that follows show the major differences among the alternatives. In this table, the alternatives are displayed in order of highest PNV to lowest. The main reason that alternatives differ is that each alternative is designed to respond to major ICO's in a different way. Note: two issues - Management of Municipal Watersheds and Adjacent and Intermingled Lands - are not listed separately in the table, but their indicators are included in other ICO's. When an indicator is used to measure responsiveness for more than one ICO, such as timber harvest level, the indicator is displayed only once. See page S-6 for the full list of indicators.

Table S-4
Response, By Alternative, to Major Issues and National Concerns

	National Concerns			Development Vs. Nondevelopment Issue 1/			Timber Supply Issue					
	Average Per Year for Decades 1/5											
	Present Net Value	Net Receipts	Noncash Benefits	Existing Roadless Areas Allocated to Nondevelopment		Roadless Areas Assigned to a Roaded Mgt. Prescription But Not Devel. in Next 15 Yrs.	Decade 1 - Average Annual Timber Sale Program Quantity (TSPQ)		Long Term Sustained Yield Capacity	Lands Suitable for Timber Product	Employment: Jobs Supported By the Alts.	Payments to County
Alternatives	.....Millions of Dollars.....			% Total Acres	M Acres	M Acres	MMCF	(MMBF)	MMCF	M Acres	M Jobs	MM Dollars
I	2342.9	5.8/25.6	61 3/85.5	64	256.4	98.2	30.1	(146)	34.0	386	29.1	5.4
B (RPA)	2343.2	5.3/24.8	61.0/86.8	66	266.6	88.0	29.8	(144)	33 4	380	29.1	5.3
H	2260.0	4.8/24.1	60.5/83.8	76	305.0	61.6	27.3	(131)	31.8	359	28.9	4.9
J (Pref.)	2258.8	3.4/23.1	61 2/85.5	77	309.0	61.5	25.5	(122)	30.4	346	28.8	4.6
A (No Act)	2283.5	6.5/29.6	60.9/85.2	70	280.3	2/ 70.2	35.0	(168)	38.6	412	29.3	5.9
G-Modified	1997.0	2.4/11.0	60.6/80.2	91	368.4	18.4	20.4	(99)	23.6	247	28.4	3.8
C	1970 9	-2.1/14 1	60.7/78.8	93	375.8	23.1	15.8	(75)	19.9	256	28.0	2 6
NC 3/	N/A	N/A	N/A	NA	NA	NA	45.0	(220)	N/A	547	30.1	9.5

1/ Roadless Areas refer to the 402,930 acres of remaining RARE II parcels

2/ This is an approximate figure. Alternative A is unique because an unspecified amount of development is permitted in the Upper Forest Resource Zone. See description of Management Area 1E

3/ The TM Plans upon which Alternative NC is based were developed in 1963; they are not integrated resource plans, and consequently did not address all resource uses and outputs. Missing data in this table (NA) cannot be reasonably estimated, since the TM plans were based on yield tables and resource relationships which do not reflect the latest scientific techniques and information, do not reflect standards in the NFMA regulations, or are otherwise inappropriate.

Table S-4
Response, By Alternative, to Major Issues and National Concerns

	Old Growth Ecosystems and Fish, Wildlife, & Plant Diversity Issue					American Indian Religious & Cultural Use Issue	
	Total Old Growth Remaining End of Decade 1/5	Old Growth Remaining on Suitable Acres End of Decade 1/5	Anadromous Fish Production Decade 1	"Effective" Areas Decade 1/5 Habitat for Old Growth Low Elevation Species 4/	Decade 1 Winter Range for Deer & Elk 5/	Inventoried Acres Afforded High/Moderate Protection 6/	
Alternatives	M Acres	M Acres	Thousand Lbs. Fish Per Year	M Acres	M Acres	High Percent	Moderate Percent
I	620 / 516	134 / 30	8,874	308/242	225	43	2
B (RPA)	621 / 513	135 / 27	8,874	309/239	253	43	7
H	623 / 526	125 / 28	8,874	309/246	257	40	17
J (Pref.)	625 / 535	122 / 32	8,874	310/250	280	47	11
A (No Act)	618 / 497	137 / 16	7,809	306/220	113	36	3
G-Modified	629 / 571	66 / 8	8,874	313/275	113	42	23
C	632 / 573	91 / 33	8,874	315/275	281	37	27
NC 7/	601 / 432	190 / 21	7,809	N/A	N/A	N/A	N/A

4/ Includes wilderness and non-wilderness acres of old growth located below 3,000 feet elevation. Indicator species for mature and old-growth habitats are Northern spotted owl, pileated woodpecker, and pine marten.

5/ Acres given include deer and elk winter range, management areas with compatible goals and which will incorporate winter range standards and guidelines, and some mountain goat habitat.

6/ Protection is afforded by those management areas that preclude or limit ground disturbing activities. Differences between "high" and "moderate" derived from expected frequency of human encounters. See Table II-9o.

7/ No management areas assigned in Alternative NC and the above information cannot be reasonably estimated. The TM Plans, upon which the No Change Alternative is based, were developed in 1963.

Table S-4
Response by Alternative, to Major Issues and National Concerns

	Recreation Opportunities Issue						Wild & Scenic Rivers Issue		Effects of Timber Management & Related Activities Issue	
	Demand Satisfied in Wilderness, Primitive, & Semi-Primitive Nonmotorized		Roads Open to Public Use, Passenger Car	Trail Construction/ Reconstruction	Lands Managed for High Visual Quality Level		Recommended for Designation as Wild and Scenic River		Decade 1 Annual Road Construction	Sediment Produced Annually, Decade 1 7/
					Meeting VQO of:					
Alternatives	Decade 1 Percent	Decade 5 Percent	Decade 1 Miles	Decade 1 Constr./Reconst. Miles	Retention M Acres	Partial Retention M Acres	No. Rivers	Total Miles	Miles	M Tons
I	94	45	1032	350 / 120	208	311	0	0	17	97
B (RPA)	76	34	1033	50 / 70	287	285	0	0	16	96
H	67	31	1039	90 / 120	407	181	5	154	14	91
J (Pref.)	79	38	1039	220 / 493	395	204	30	452	13	89
A (No Act.)	75	34	1039	70 / 60	120	342	15	287	19	103
G-Modified	70	35	933	350 / 120	573	56	47	796	8	67
C	64	33	1017	90 / 80	619	148	47	606	10	67
NC	N/A		Similar to A	Similar to A	N/A	N/A	0	0	28	125

7/ From all sources, including timber harvest, new road construction, old roads, and background (which includes sediment from previously disturbed ground and natural sedimentation).

Economic Benefit and Issue Response Tradeoffs Among Alternatives

The alternatives were designed to respond to specific major issues, or a combination of issues. In responding to one set of issues, some potential benefits or responses to other issues may be limited or "traded off." In Table S-4, the alternatives are displayed in order of highest PNV to lowest. Most of the indicators of response follow a specific pattern as PNV declines. The indicators of response are grouped into those patterns in the display below. A detailed discussion of why these changes occur in each alternative can be found in Chapter II of the FEIS.

Indicators That Decline As PNV Declines:

- Net Receipts
- Non-cash Benefits (slightly) in 5th Decade
- Timber Sale Program Quantity, Long-Term Sustained Yield, Suitable Lands
- Jobs (slightly), Payments to Counties
- Old Growth on Suitable Lands

Indicators That Remain More-or-Less Stable Among Alternatives As PNV Declines:

- Non-cash Benefits in 1st Decade
- Demand Satisfied for Wilderness, Primitive, Semi-Primitive Nonmotorized Recreation

Indicators That Rise As PNV Declines:

- Visual Quality, Retention Acres
- Habitat for Low-elevation Old-Growth Wildlife Species, 1st Decade
- Habitat for Low-elevation Old-Growth Wildlife Species, 5th Decade
- Old Growth Remaining on All Lands in 5th Decade
- Existing Roadless Areas Allocated to Nondevelopment
- Religious and Cultural Use Areas Afforded High/Moderate Protection

Indicators That Vary Irregularly As PNV Declines:

- Visual Quality, Partial Retention Acres
- Acres of Deer and Elk Winter Range in 1st Decade
- Anadromous Fish Production (in pounds)
- Old Growth Remaining on All Lands in 1st Decade

PART 5 - ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

In the following section, only the significant direct and indirect effects of implementing the alternatives are summarized. Brief narratives show how the acre assignments, outputs, and schedules of each alternative will affect the physical, biological, social, and economic environment. Refer to Chapter IV of the DEIS for more detail.

The Effects On Soils. In all alternatives, except Alternative NC (which has a high level), there will be moderate to moderately-high levels of "background" or existing erosion and sedimentation of streams. Some of this is natural, a result of unstable soils and steep terrain, and some results from old timber harvest areas and existing roads.

Implementing Alternative NC would result in the most erosion from timber harvest and roads during the 1st Decade; there would be moderately high erosion in Alternatives A, I, B, H, and J (Preferred). Alternatives C and G-Modified will result in considerably less erosion. Refer to the sediment index in Table

S-2 for the effects on the Forest aquatic systems. There is limited broadcast burning in all alternatives; the least in Alternatives G-Modified and C.

The Effects On Water. In all alternatives, the Washington State Water Quality Regulations (designed to protect fish and water for domestic use) will be met, through the application of site-specific, Best Management Practices (see Appendix I, FEIS). Meeting water quality and riparian management requirements in all alternatives, except NC, will allow watersheds in an unacceptable condition to recover. Mitigation measures will result in a reduction in stream sediment, in all alternatives, from a current level of 125,000 tons per year in Alternative NC. Total sediment produced is the lowest in Alternatives C and G-Modified; Alternative J (Preferred) is second lowest.

The Effects On Vegetation and Plant Diversity. Diversity is primarily affected by timber harvest and road construction. In Decade 1, timber harvest in all alternatives will occur almost exclusively in old-growth forest. As old growth is removed, significant changes occur in the ecosystems. Over time, there is a decrease in acres of old-growth age classes and an increase in younger trees. However, this will also result in an increase in timber growth rate in the regenerated stands.

Alternatives G-Modified and C have fewer suitable acres and assign more acres of old growth to non-development. Alternative A (NC would be similar) has the highest suitable acres and harvests old growth at the fastest rate, followed by Alternatives I and then B. Both of these alternatives retain some old growth for deer and elk winter thermal cover. Alternatives H and J (Preferred) have moderately high acres of suitable land, and harvest at a moderate rate.

Refer to Table S-2 for changes in acres of old growth, by alternative.

The Effects On Wildlife. Changes in wildlife habitats lead to a shift in the distribution and levels of wildlife habitats and populations. The most significant effects on wildlife are those resulting from timber harvest activities, road construction, and road use. However, MR's for viable populations of all species are met in all alternatives except Alternative NC; in that alternative no specific provisions are included to maintain viable wildlife populations. Federal Threatened and Endangered species are protected in all alternatives.

All alternatives reduce old-growth wildlife habitat. Population estimates for the spotted owl exceed the MR level in all alternatives, except Alternative NC, for all time periods. However, wildlife populations that primarily use mature and old-growth habitats (northern spotted owl, pine marten, pileated woodpecker) will decrease over time, in all alternatives, primarily due to harvest of mature and old-growth timber stands. They decrease the fastest in Alternatives NC, A, I, and B.

Winter range habitat capability for deer and elk increases from the current situation through Decade 1, especially in Alternatives NC and A, a result of increased forage from timber harvest activities. Habitat capability declines in Decade 2, as winter thermal cover becomes limiting. By Decade 5, habitat capability again increases in Alternatives NC, A, I, B, I and slightly in J (Preferred), due to habitat improvements implemented in the first decade.

The Effects On Fish. The major effect of all alternatives on fish is a change in habitat condition. Viable populations of fish are maintained on the Forest in all alternatives (viable defined as the current or existing levels of fish

production). The amount of fish habitat capability to support and maintain fish populations above the viability level varies by alternative, primarily in response to effects of forest management on key, in-channel and upslope conditions within stream systems, plus the emphasis on fish habitat restoration and improvement capital investment activities. Alternative A provides MR levels for anadromous fish. Alternatives I, B, and H provide high levels of capital investments for restoration/enhancement for anadromous fish habitat. Alternatives J (Preferred), G-Modified, and C provide high levels for both anadromous and resident fish.

The Effects On The Human Community. None of the alternatives will affect population in the five-county area. Only minimal effects to lifestyle would be noticed, and then, primarily among groups or individuals who work in forest products, who live near the Forest boundary, or who use the Forest for recreation, cutting firewood, or gathering forest products such as mushrooms or berries.

Implementation of any alternative will, at the most, decrease the total area employment/income by four-tenths to six-tenths of one percent. With or without implementation of the Forest Plan, traditional lifestyles in the smaller, rural communities will be challenged by new, more urban values and lifestyles. However, towns such as Darrington that are further from the urban areas, will experience change more slowly.

The Effects On American Indian Religious and Cultural Uses. In all alternatives, the consultation process will be continued for any proposed ground-disturbing project located in an inventoried site or area. Also, all cemetery sites will have high protection.

Refer to Table S-2a for the amount of protection afforded religious and cultural use areas. Alternative NC would have the greatest impact on religious and cultural use areas, because of high levels of timber harvest, road construction, and other development activities. Alternative G-Modified and C would have the least impact, with Alternatives A, B, H, I, and J (Preferred) resulting in intermediate levels of impacts.

The Effects On Archaeological and Historic Properties. Any ground disturbing activity, such as timber harvest or road building, has the potential to affect archaeological and historic properties. In all alternatives, ground-disturbing activities will include a professionally supervised inventory, evaluation, and mitigation, in compliance with the National Historic Preservation Act.

Implementation of Alternatives NC or A will result in the greatest loss of historic and cultural resources, due to the high level of timber production and road construction, plus high mitigation costs. Alternatives I, B, H, and J (Preferred) have moderate levels of impact. Alternatives C and G-Modified will result in the least amount of ground disturbance and the fewest losses.

The Effects On Scenery. Generally, alternatives that emphasize commodity production will, in the long term, result in a lower visual quality level and a more visually altered landscape than alternatives with a non-market emphasis. The foreground of Mather Memorial Parkway will be protected in all alternatives. In Alternatives J (Preferred) and G-Modified, the Mather Parkway is allocated to MA 8, Special Area; no scheduled timber harvest is allowed and scenery is emphasized.

Alternatives NC, A, and B will have the greatest effect on scenery. Visual quality will deteriorate over time for almost all the lands accessible by roads in these alternatives. Alternative I protects the foreground of selected, heavily traveled highways. In Alternative G-Modified, scenic quality would be reduced moderately in several significant viewsheds (as no middleground MA 2B is allocated), but would remain high in unroaded areas.

Alternatives C, H, and J (Preferred) protect both the foreground and middleground of selected major highway corridors; J (Preferred) manages for a high level of visual quality in additional viewsheds. Within these viewsheds, scenic quality will be retained at it's current level or improve gradually. Outside of the designated viewsheds and unroaded areas, scenic quality will decrease moderately.

The Effects On Recreation. Opportunities for various types of recreation vary among the alternatives. The supply of campgrounds is adequate to meet present demand; future demand can be met with a slight expansion of facilities. Expansion is planned, in varying degrees, in all alternatives except Alternatives B and G-Modified, which provide no further developed site construction.

The Forest will continue to be a supplier of dispersed motorized and a primary supplier of dispersed nonmotorized recreation for the Puget Sound area. All alternatives easily meet projected future demand for roaded motorized dispersed use; Alternatives NC, A, B, I and H provide the most. The major effect of alternatives with high, new road construction will be modification of the overall recreation setting. A shift will take place from the Semi-Primitive ROS classes, to Roaded Natural and Roaded Modified settings.

In all alternatives, under Regional and Forest standards of resource degradation, the Forest will not meet current or projected demand for non-wilderness, unroaded dispersed recreation. The deficit will be largest in those alternatives assigning the most unroaded acres to development. Alternatives A, B, and I develop 30%, 34%, and 36% of the roadless areas, respectively. Alternatives C and G-Modified develop the least acres of unroaded land and include large amounts of trail construction. I and J (Preferred) also include large increases in new trail construction.

While the demand already exceeds supply for Semi-Primitive Motorized, unroaded ORV opportunities, there is currently very little land suitable for this experience. This situation will not improve in any alternative, as most trails on the Forest are not suitable for ORV use due to terrain, unstable soils, and heavy precipitation.

The Effects On Wilderness. The total acres of wilderness are the same in all alternatives, but assignment of acres to different intensities of Wilderness Recreation Opportunity Spectrum (WROS) will vary the social and physical settings within the wilderness. Alternatives B, I, and J (Preferred) assign more acres to the Transition WROS class (over the current situation) and will generally provide for increased wilderness use. The average number of visitors per acre will be higher, resulting in degradation of naturalness and loss of solitude. All other alternatives reduce the amount of Transition, and offer a more natural setting with less social interaction. Alternative NC has no provision for management under the WROS system, therefore acres could not be reasonably estimated.

Easier road access in Alternatives NC, A, B, I, and H will likely result in more visitors, based on past experience, and will result in greater impact on the social and environmental features of wilderness. Alternatives C and G-Modified provide the fewest miles of new road construction, and close miles of existing roads, resulting in fewer impacts.

If more acres are available for primitive and semi-primitive dispersed recreation outside of wilderness, there is more opportunity to mitigate impacts on wilderness by offering alternative recreation sites. Alternatives NC, A, B, I and H will have the greatest potential effect on the wilderness, through elimination of alternate sites for primitive and semi-primitive nonmotorized recreation. Alternatives C and G-Modified will retain the most undeveloped area. Only Alternative C will increase acreage in primitive and semi-primitive ROS classes over the current situation.

The Effects On The Roadless Areas. A maximum of 36% of the total roadless area acres could be developed in any alternative, due to the lack of resource capability, the presence of wildlife habitat needed to meet the MR level for the Forest (except in Alternative NC), and because of the steep, high-elevation terrain of most of the areas. Only 40% of the roadless acres are tentatively suitable for timber production.

During the first decade, from 1 to 9 percent of the roadless areas will be developed in any alternative. The amount of proposed development cannot be estimated for Alternative NC; however, it is unlikely - based on the existing vegetation - that more than 50% of the total roadless areas would be developed in the foreseeable future.

Although additional wilderness is not being considered in this plan, areas left roadless now would maintain that option for the future. All alternatives foreclose that option to varying degrees. Alternatives NC, A, B, and I develop the most acres; Alternatives C, and G-Modified would assign the most acres to non-development, maintaining future wilderness consideration.

The Effects On Recommended Wild and Scenic Rivers. There were were 795.9 miles of rivers and streams in 47 segments studied for possible inclusion in the National Wild and Scenic River System. The direct effect of implementing any of the alternatives will be a decision to recommend (or not recommend) designation of a river for inclusion in the National System. If a river is recommended, then management will be oriented toward protecting the features of the river system which would be important under the National Wild and Scenic River Act. No activities would be allowed which could preclude future designation. Management will protect all eligible rivers until Congress acts on the Forest's recommendation.

The number of rivers recommended for Wild and Scenic River designation range from none in Alternatives NC, B, and I, to all 47 rivers in Alternatives C and G-Modified. Alternative A recommends 15 rivers and J (Preferred) has 30 rivers recommended for inclusion.

The Effects On Air Quality. Implementation of any of the alternatives should not significantly impact air quality in the Forest area. Residue burning in all alternatives should drop to 20 percent of the acres harvested by 1990. Also, the amount of residue will decrease over time, as more logging is done in second growth timber, which contains less cull or unusable material than does old growth. Visibility in the Class I areas (two wildernesses) should continue

to be good, with only brief periods of haze, often from urban pollutants or from activities off the Forest.

The Effects On Minerals. Mining operations may significantly impact soil, water, vegetative cover, plant diversity, wildlife, fish and recreation activities. On the Mt. Baker-Snoqualmie National Forest, such operations have occurred on a small scale and are very localized. However, mineral extraction could increase if market conditions become more favorable.

Implementation of some alternatives could make mineral access very difficult, due to acre assignments to management areas that restrict or prohibit various types of mineral activity. Access is a major consideration in determining whether commercial extraction is feasible. Alternatives NC and A are the least restrictive, with high miles of new road construction and only 13 percent (Alternative A - NC would be similar) of the Forest "withdrawn" or highly restricted for mineral activity. Alternatives B, I, H, and J (Preferred) withdraw or restrict a moderate amount of acres. Alternatives G C and G-Modified are most restrictive, two due to management of most of the roadless areas for non-development.

Relationship Between Short-Term Uses of The Environment and Maintenance and Enhancement of Long-Term Productivity

The relationship between short-term uses of the environment and the maintenance and/or enhancement of long-term productivity is complex. Short-term uses refer to those that would occur within the life of this plan, generally 10 years or less, but a maximum of 15 years. Long-term productivity refers to the capability of the land and water to produce a continuous supply of resources and values for future generations. Soil and water are the primary factors of productivity and represent the measurement of the relationship between short-term use and long-term productivity.

Some short-term uses can be detrimental to long-term productivity, particularly if effective mitigation measures are not implemented. Surface mining can leave an area with greatly diminished productivity for growing vegetation if the top soil is removed and not replaced. This adverse effect can be mitigated effectively by requiring stock piling and spreading of topsoil. Introduction of sediments into a stream on a continuous basis could adversely effect the future long-term productivity of that stream for production of fish. This potential adverse effect can be effectively mitigated by elimination of sediment sources or trapping sediment before it reaches the stream by maintaining vegetation along stream banks.

Some short-term uses also have the potential to increase long-term productivity. Harvest of old-growth timber stands and establishment of young faster growing stands increases the long-term productivity of the land to produce wood fiber. The current productivity of the Mt. Baker-Snoqualmie National Forest in terms of net timber growth is approximately 34 cubic feet per acre per year (1976 Timber Inventory). Harvest of these old growth stands can increases average annual growth on the Forest up to 90 cubic feet per acre per year.

The Multiple-Use Sustained-Yield (MUSY) Act of 1960, one of the principal laws relating to the Forest Service activities, requires the management of the various resources in such a manner that the productivity of the land will not be impaired. This law along with Forest Service Policy that was in effect

prior to the MUSY Act have provided the basic frame work for development of management activities that are centered around maintaining the long-term productivity of the National Forests.

Many of the mitigation measures described in detail in Chapter II, Mitigation Incorporated in Alternatives, are designed specifically to maintain or enhance long-term productivity as short-term uses (projects) are designed and implemented. In all resource ares, long-term productivity of soil and water will be maintained or enhanced as a result of implementing the alternatives.

Implementation of the Forest Plan, which accompanies this FEIS, includes a monitoring plan. This monitoring plan will provide the data necessary to determine if the prescribed mitigation measures are effective in maintaining long-term productivity.

Irreversible or Irretrievable Commitment of Resources

An "irreversible commitment of resources" results from decisions to use or modify resources or environmental components of the Forest that cannot be renewed, or are renewable only over long periods of time. Examples are: old growth, soil productivity, minerals, cultural resources, scenery, and roadless areas. Once these resources are used or modified, they are irreversibly lost.

Soil productivity can be irreversibly lost or reduced by dedicated uses of the land. Examples of these uses would be arterial and collector roads, administrative sites, and developed recreation sites. Soil erosion, as a result of management activities, is an irretrievable loss because once the soil particles are removed from the site and deposited into a stream or river, they are no longer available. Accelerated erosion rates can reduce soil productivity and also reduce the water-holding capacity of the soil.

Removal of mineral or energy resources is an irreversible commitment of resources. The removal and utilization of rock resources for road construction would be an example of a common use on the Forest.

Reductions in habitat capability for old-growth-dependent species due to timber harvesting involve an irreversible and irretrievable commitment of resources.

The development of roadless areas would mean an irreversible loss of the characteristics which qualify these areas for Wildernesses or Roadless Areas. Development could also mean an irreversible loss of natural scenery and, in some cases, old-growth habitat.

Archaeological resources may be damaged by ground-disturbing activities; Irreversible information loss can result. Even when mitigation occurs prior to the activity, future study with more advanced techniques is precluded.

For American Indian religious use, land development removes the spiritual influence on the environment; this irreversibly removes the opportunity to conduct religious activities.

An "irretrievable commitment of resources" refers to a resource that is lost because of land use decisions or designations and/or scheduling decisions. These are opportunities foregone for the period of time that the resource cannot be used. Timber stands in management areas where timber harvest is not permitted represent an irretrievable loss of growth increases that could be

made if the stands were being actively managed for timber production. Although the lost growth is irretrievable, the decision is not irreversible, since the stands could be managed at a later date in the future.

Probable Adverse Environmental Effects That Cannot Be Avoided

Implementation of Alternative J (Preferred) will result in some adverse environmental effects that cannot be avoided. The identification of an "adverse effect" is somewhat subjective, depending upon an individual's point of view. There are some effects considered to be adverse, by general agreement. The following effects are associated with implementation of Alternative J (Preferred). Although many of these effects can be reduced through the use of mitigation measures, they cannot be completely eliminated.

Timber harvest and associated road construction will result in adverse effects on scenery, water quality, soils, American Indian religious and cultural use areas, and dispersed recreation use in a non-motorized environmental setting.

Harvest of old-growth timber stands will reduce the amount of habitat available for old-growth dependent species and reduce their populations.

Ground-disturbing management activities and facilities management will probably result in inadvertent destruction or displacement of archeological and historical rsesources. Even when mitigation occurs, future study and interpretation are precluded.

Any mineral extraction activities that occur will result in destruction of vegetation, production of sediments, and effects on scenery.

Development and use of recreation facilities will result in compaction of soil, loss of vegetation, water pollution, dislocation of wildlife and disturbance of their habitat, noise and dust production in small areas, and localized air pollution from campfire smoke and vehicle exhaust.

Air quality will be degraded on a localized and short-term basis from prescribed fire and activities that generate dust from unpaved roads.

Any of the proposed small hydroelectric projects that reach the construction stage will result in adverse impacts on soil, water, and vegetation to some degree. These would generally be on a localized area. Construction techniques and mitigation measures can minimize most impacts and limit them to the construction effects on the visual resource. Some projects will also have long-term impacts on wildlife, American Indian religious and cultural use (effects on purity of streams), and recreation.

Development, especially timber harvest and hydroelectric projects, will create features and habitats out-of-keeping with traditional Indian religious use, and will reduce the availability of some plant materials, such as cedar.

Environmental Conditions Unchanged by Alternatives

Some environmental conditions and resource uses are essentially unchanged by any of the alternatives. These are resources which are often protected by law and are managed consistently in all alternatives. They include:

Summary

The wilderness acres are unchanged in any of the alternatives (refer to Chapter II, Alternatives Considered but Eliminated for Detailed Study). The acres assigned to each wilderness ROS class vary between alternatives, but total wilderness acreage does not.

Management of the Skagit Wild and Scenic River is unchanged across all alternatives. The existing management plan for this river system (which is incorporated into this Forest Plan) will provide the same set of environmental conditions in each alternative (refer to Chapter II, Alternatives Considered but Eliminated from Detailed Study).

The basic land allocations established through implementation of the Alpine Lakes Area Land Management Plan (1981) are the same in all alternatives (refer to Chapter II, Alternatives Considered But Eliminated from Detailed Study).

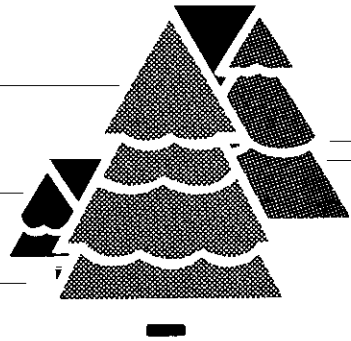
The Mt. Baker National Recreation Area, size and management, is unchanged in any of the alternatives.

Management of the North Fork Nooksack, Lake Twenty-two, and Long Creek Research Natural Areas will remain the same in all alternatives. Although the alternatives recommend different numbers of new research natural areas for designation, the existing ones remain unchanged.

None of the alternatives result in any environmental consequences on prime farmlands, prime rangelands, or prime forestlands. None of these prime lands would be converted to other uses as a result of the implementation of any of the alternatives.

None of the alternatives results in any change in Indian Treaty Rights.

Chapter



CHANGES BETWEEN DRAFT AND FINAL - CHAPTER I

The Final Environmental Impact Statement (FEIS) includes:
Summary and FEIS, Land and Resource Management Plan
Appendices A-I
Appendix J, Response to Public Comments
Packet of Maps

The content of this FEIS has been modified from the Draft Environmental Impact State (DEIS), in response to public comment. In Chapter I, changes include revisiting and modifying the issues, concerns, and opportunities (ICO's) in response to the 11,718 letters received, commenting on the DEIS.

- Wild and Scenic Rivers are identified as a separate major ICO, rather than as a facet of the recreation issue. This better reflects public concern.

- Based on public comment, two issues were dropped as major ICO's: Transportation Systems and Wood Residue. They are still considered, but as facets of other issues.

- Several other issues have been re-titled, or additional facets considered, to better respond to public comment on the DEIS. Increased recognition is given to diversity, old growth ecosystems, cumulative effects of management activities, watershed management, fisheries resources, and trails.

The Final Supplement to the EIS for an Amendment to the Pacific Northwest Regional Guide (USDA 1988a) that addressed spotted owl guidelines has been completed since the Mt. Baker-Snoqualmie DEIS was released. The FEIS for Managing Competing and Unwanted Vegetation (USDA 1988b) was also released since the DEIS. The relationship of these documents to this final EIS is discussed below.

CHAPTER I - PURPOSE AND NEED

A. INTRODUCTION

This Final Environmental Impact Statement (FEIS) culminates over ten years of public involvement and environmental analysis spent in preparing the Mt. Baker-Snoqualmie National Forest Land and Resource Management Plan (Forest Plan).

This FEIS describes eight alternative ways of managing the land and resources of the Mt. Baker-Snoqualmie National Forest (the Forest), the environment that will be affected when the plan is implemented, and it discloses the environment consequences, including significant impacts, of implementing each alternative. The FEIS identifies a Preferred Alternative.

Each of the eight alternatives address, in a different way, local, regional, and national public issues and management concerns. Each alternative provides a different mix of goods and service from the Forest. All eight alternatives provide for the use and protection of resources and (except Alternative NC) fulfill legislative requirements.

The guiding principle for each alternative is multiple-use and sustained-yield management. Each alternative is evaluated to determine its potential to provide a sustained yield of goods and services in a way that maximizes net public benefits, in an environmentally sound manner. Net public benefits are the overall long-term net value of all Mt. Baker-Snoqualmie National Forest outputs and activities, whether assigned a dollar value or not. Net Public Benefits are discussed in more detail in Chapter II, page II-2 and in Appendix B of the FEIS. The Preferred Alternative is the alternative which, in the considered opinion of the Forest Service, provides for a level of multiple uses, goods, and services that best maximize long-term, net public benefits while responding effectively to all the public issues.

The Forest Plan

The Preferred Alternative is the basis for the accompanying Land and Resource Management Plan (Forest Plan). The purpose of the Forest Plan is to direct and guide all natural resource management activities on the Mt. Baker-Snoqualmie National Forest. Forest Plan preparation is required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA), plus the associated National Forest System Land and Resource Planning Regulations, Title 36, part 219, Code of Federal Regulations (36 CFR 219).

Legal Requirements

The preparation of an environmental impact statement (EIS) is required by NFMA and the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality (CEQ) Regulations for implementing NEPA (40 CFR 1500-1508). For purposes of disclosure under NEPA, this FEIS and the accompanying Forest Plan are treated as combined documents. In accordance with NEPA, an EIS is required because the implementation of a Forest Plan is a "major federal action significantly affecting the quality of the human

environment." Its purpose is to disclose to the decision maker and the public alternative ways to manage the land and resources of the Mt. Baker-Snoqualmie National Forest, and to aid the decision maker in selecting a course of action.

This FEIS provides decision-makers with an environmental disclosure sufficiently detailed to permit a reasoned choice among the alternatives, to aid in the selection of management direction for the Mt. Baker-Snoqualmie National Forest. Equally important, the FEIS is a public document. Descriptions of the alternatives and the environmental consequences of implementing each alternative are available for public review. The public is encouraged to participate in the development and refinement of this information.

A Record of Decision (ROD) documenting the Pacific Northwest Regional Forester's decision for managing the Mt. Baker-Snoqualmie accompanies this FEIS. The ROD displays the decisions made, the rational for the decisions, and identifies what options were considered before making the decision.

The Plan Period

The alternatives presented in this document contain management direction for the plan period: the next 10 to 15 years. NFMA regulations define the plan period as one decade, while the law permits a 15-year maximum. Conditions on the Forest will be re-analyzed every 5 years; under certain circumstances, the plan may be revised.

Management actions, outputs, and environmental effects for several decades beyond the plan period are also discussed for each alternative. These discussions are included to: 1) provide an estimate of the long-term outputs for each alternative; 2) present a long-term analysis (for decision-makers and the public) of the management necessary to achieve and maintain the resource outputs of each alternative, in perpetuity, and without impairment to the productivity of the land; and 3) provide the required information for the Forest and Rangeland Renewable Resources Planning Act (RPA).

Program development for RPA requires information for four decades beyond the plan period (16 USC 1602). To link the analysis of alternatives for the RPA program to the actual conditions and local issues of the Mt. Baker-Snoqualmie, estimates of outputs, costs, and effects for the RPA time horizon are important. The total time period discussed throughout this FEIS is generally five decades.

The Forest Service is required to revise the plan within 15 years of its adoption. This revision may establish different long-term goals with different projected effects and outputs.

B. PLANNING PROCESS

National, Regional, and Forest Planning

As required by the RPA, NFMA, and the related implementing regulations cited above, the Forest Service has a multi-level, integrated planning process. At the national level, the RPA Program establishes long-range resources objectives. These are based on the present and anticipated supply of, and demand for, various resources, including: wildlife and fish, developed and dispersed recreation, timber, range, water, minerals, soils, and others. A portion of each national resource objective is distributed to each of the nine Forest Service Regions in the nation.

At the Regional level, a Regional Guide presents the tentative distribution of its portion of the national resource objectives to each National Forest. This Guide also establishes Regional management standards and guidelines. The Pacific Northwest Regional Guide (USDA 1984b) provides this direction for the Mt. Baker-Snoqualmie. Standards and guidelines for management of spotted owl habitat are established in the Final Supplement to the EIS for an Amendment to the Pacific Northwest Regional Guide (USDA 1988a). The EIS for Managing Competing and Unwanted Vegetation (USDA 1988b) provides direction for vegetation management.

At the Forest level, a Forest Plan is prepared, with an accompanying EIS. Both are tiered to the Regional Guide and include direction provided by RPA and NFMA (implementing regulations). Alternatives are developed, each with a different mix or range of resource objectives. One or more of these alternatives attempts to meet or exceed the resource objectives from the RPA Program, as distributed to the Forest in the Regional Guide.

This planning process is a continuous one. Data from the planning efforts at the Forest level, including project planning, flows up to the national level. The analysis of the outputs of Forest Plan alternatives and their effects provide valuable information regarding each Forest's capabilities and resource programs. This information is then incorporated into the National RPA Program.

The RPA Program is submitted to Congress as an aid to determine appropriation and authorization of the agency's annual budget. Since allocations in the annual budget have a major effect on forest management activities, many of the Forest's actual outputs and environmental effects are ultimately determined in large part by the annual budget. But, through the overall planning process, the annual budget can be responsive to demands on and capacities of the Forests.

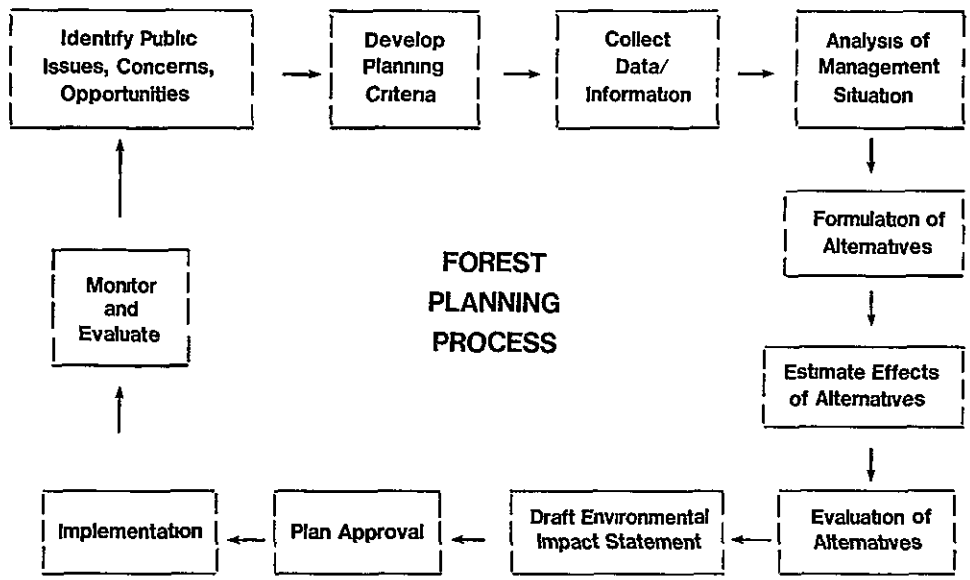
The RPA Program is updated every five years. The Forest Plan is reviewed every five years; ordinarily, it is revised every ten years, or at least every 15 years. When changes in the RPA Program significantly affect Forest programs, or whenever conditions or demands in the planning area change significantly, the Forest Plan will be amended.

The Steps in the Planning Process

The steps in the planning process are displayed in the figure and short table below. They are discussed in more detail in the CEQ regulations for implementing NEPA, and in the NFMA implementing regulations.

1. **Identify Purpose and Need and Major Issues and Concerns**
2. **Develop Planning Criteria**
3. **Collect Inventory Data and Other Information**
4. **Analyze the Management Situation**
5. **Formulate Alternatives**
6. **Estimate Effects of the Alternatives**
7. **Evaluate the Alternatives**
8. **Selection of a Preferred Alternative**
9. **Plan Implementation**
10. **Monitor and Evaluate**

Figure I-1



Government agencies and the public were asked to review and comment on the DEIS and Proposed Forest Plan. All comments received were considered and used to evaluate the results of the first seven planning steps and to develop a Preferred Alternative and Forest Plan. Appendix J describes the public involvement process between the DEIS and FEIS; is also displays the comments received and the Forest's response to those comments.

This FEIS will be used by the Regional Forester as the information base for a Record of Decision. The ROD will be made available to the public. Issuance of the Record of Decision will complete planning step 8 and initiate the last two planning steps.

Upon implementation, the FEIS will be used for "tiering" in accordance with CEQ regulations. Tiering means that environmental analysis conducted for projects arising from the Forest Plan will refer to the FEIS and associated documents rather than repeat information presented in the FEIS. This will help narrow discussions and concentrate on issues pertinent to the project. Project scoping, public involvement and other agency involvement, and the ensuing environmental analyses will then be able to focus on issues unique to those projects and site conditions.

Relationship to Previous Plans

The Forest Plan supersedes or incorporates all previous land and resource management plans for the Mt. Baker-Snoqualmie National Forest. Upon implementation, Forest management activities will comply with the Forest Plan. Appropriated budgets may alter the schedule of activities. In addition, all permits, contracts, and other instruments for the use and occupancy of National Forest system lands and resource uses must be in conformance with the Forest Plan as soon as possible (36 CFR 219.10(e)).

The following plans are incorporated into this Forest Plan: (36 CFR 219.2)

The Alpine Lakes Area Management Plan
The Skagit Wild and Scenic River Management Plan

The following plans are superseded by this Forest Plan: (36 CFR 219.10(e))

Multiple Use Plan, Glacier Ranger District
Multiple Use Plan, Baker River Ranger District
Multiple Use Plan, Darrington Ranger District
Multiple Use Plan, Monte Cristo Ranger District
Multiple Use Plan, Skykomish Ranger District
Multiple Use Plan, North Bend Ranger District
Multiple Use Plan, White River Ranger District
Timber Management Plan, Mt. Baker National Forest
Timber Management Plan, Snoqualmie National Forest
Wilderness Management Plan, Glacier Peak Wilderness
Land Adjustment Plan, Snoqualmie National Forest
Land Adjustment Plan, Mt. Baker National Forest

Planning Records - Using The Documents

All of the documents and files that chronicle the planning process on the Mt. Baker-Snoqualmie National Forest are available for review at the Forest Supervisor's Office, in Seattle. These documents and files are referred to as the "Planning Records" and contain the detailed information and decisions used to develop this FEIS and the Forest Plan. This information is available upon request.

A glossary defining terms, units, and abbreviations is located at the back of this document. An index of topics and a list of references cited in the FEIS is provided. The reader will find it useful to consult the maps for each alternative - in a packet with this FEIS - when reviewing the documents.

C. FOREST OVERVIEW

The Mt. Baker-Snoqualmie National Forest has over 1.7 million acres and serves a large and diverse population. The Forest is located in some of the nation's most beautiful country - the Cascade Mountains - in the northwest corner of the State of Washington. The Forest contains lush, forested valleys, steep and rugged mountain peaks, glaciers, and numerous high-elevation lakes. It is drained by seven major river systems. The diversity of both the physical and social settings adds to the complexity of issues facing Forest managers.

Administrative History

The Mt. Baker National Forest was proclaimed a National Forest in 1898. Its original name was the Washington Forest Reserve; the name was changed to Mt. Baker in 1924. The Snoqualmie National Forest was established from the proclaimed Pacific Forest Reserve in 1893. Several land withdrawals, additions, and name changes occurred between 1893 and 1908. In 1908, the name Snoqualmie was established. Portions of both of these proclaimed National Forests were combined, for administrative purposes, in 1974. They are collectively referred to as the Mt. Baker-Snoqualmie National Forest. It is this area that is considered in this FEIS and the accompanying Forest Plan. The portions of the Mt. Baker and the Snoqualmie that were administratively assigned to other Forests - the Okanogan, Wenatchee, and Gifford Pinchot National Forests - will be addressed in the Forest Plans for each of those Forests.

The Land Base and Human Community

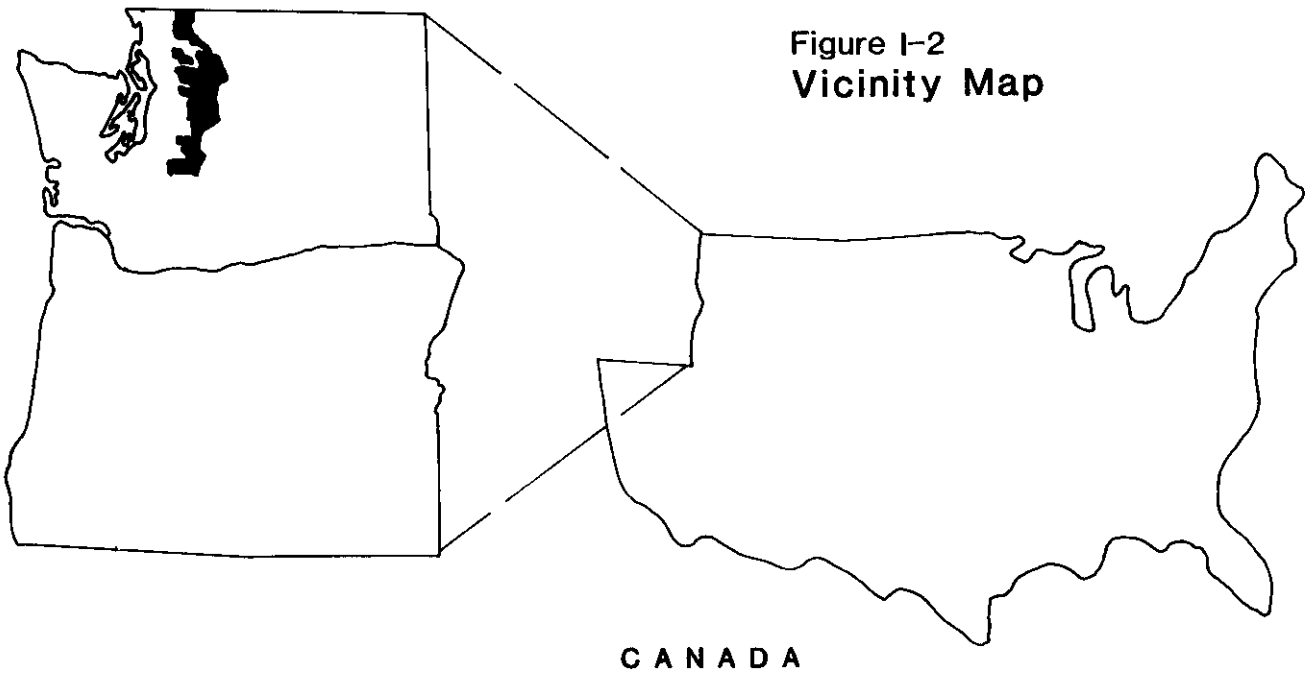
The Forest includes land from the Canadian border south, 130 miles, to the northern boundary of Mt. Rainier National Park, and is adjacent to: the North Cascades National Park, the Wenatchee National Forest, and Mt. Rainier National Park. The Mt. Baker-Snoqualmie occupies portions of Whatcom, Skagit, Snohomish, King, and Pierce Counties. See Figure I-2.

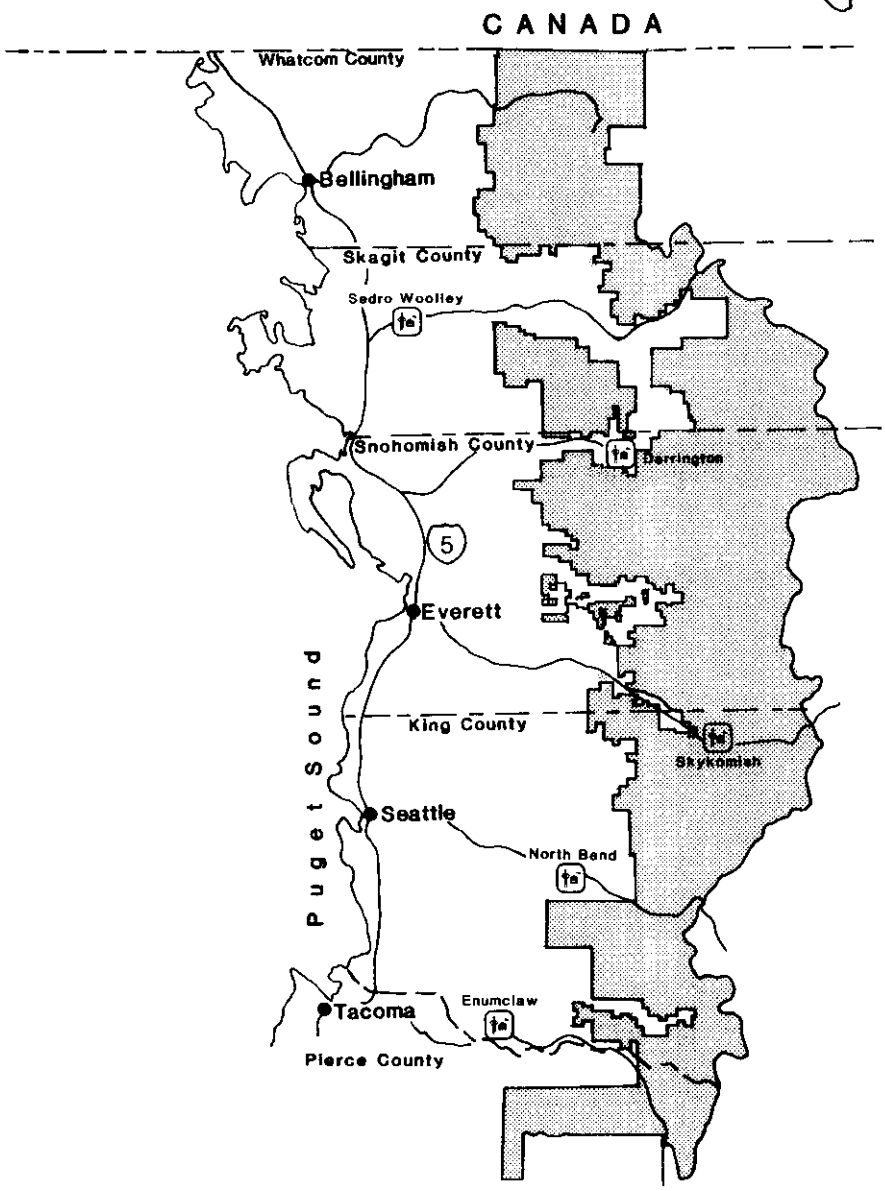
The five-county area has a population of more than 2.5 million persons, over 56 percent of the total State population. Most of these 2.5 million people live in the greater Seattle-Everett-Tacoma metropolitan area, only 40 to 70 miles west of the forest boundary. Just north of the Forest is the Vancouver, B.C., Canada metropolitan area, with a population of 3.0 million people. The Puget Sound economy is quite diverse today, although the aerospace industry is still a major employer (Pascall and others 1989). The metropolitan area is a major center for finance, trade - especially to Pacific Rim nations - administration, and government. Growth has not been even in the five-counties; the trade and service sectors and the high-technology industries continue to lead the economic growth. The forest products industry has experienced major changes over the last decade; wood products manufacturing outputs have been up the last three years, but with 25 percent fewer employees.

Forest Resources

The Mt. Baker-Snoqualmie National Forest contains a wide variety of land forms. The northern half of the Forest includes much of the North Cascade Mountains. These rugged peaks have been extensively glaciated and are dominated by the major Forest peaks: Mt. Baker - 10,778 feet; Glacier Peak - 10,568 feet; and other peaks 7,000 feet and higher.

Figure I-2
Vicinity Map





Volcanic rock types and less pronounced glaciation are prevalent on the southern half of the Forest. Winters are wet and mild, and summers are cool and relatively dry. The annual precipitation on the Forest ranges from 35 to 50 inches over the lowlands, 75 inches in the foothills, and from 100 to 200 inches near the Cascade Crest. Above 2,500 feet, most winter precipitation falls as snow.

The upper reaches of seven major river systems are located on the Forest and provide both seasonal and year-round spawning and rearing habitat for anadromous and resident fish. A rough estimate of anadromous fish (smolt) produced in Forest waters is 16 million fish. There are 18 municipal watersheds on the Forest serving a population of over 1.4 million. Only one of those watersheds provides treatment other than disinfectant, attesting to the high quality of the surface water.

The vegetation of the Forest consists of dense stands of western hemlock, Douglas-fir, and western redcedar at lower elevations, blending into Pacific silver fir, mountain hemlock, and true firs at the higher elevations. Underneath these stands of trees are numerous species of shrubs, forbs, and grasses. Above 6,000 feet, the vegetation is composed almost entirely of these low growing species with only an occasional tree, such as dwarf juniper or alpine larch.

This great diversity of plant and tree communities provides a variety of habitats for a wide variety of wildlife species. Four Federally listed threatened and endangered species may occur on the Forest: the bald eagle, American peregrine falcon, grizzly bear, and the gray wolf.

The Forest is rich in recreation opportunities and receives over 5 million recreation visits annually. Dispersed day-use recreation is emphasized; use occurs in unroaded nonwilderness areas, in roaded areas, and wilderness. Over 1,380 miles of trail provide recreation opportunities for hikers, horse riders, and motorized equipment users; over 100 miles of these trails are National Scenic or National Recreation Trails. The most popular developed use is alpine skiing, at seven areas on the Forest, followed by campground and picnic area use.

Nearly 42 percent of the Forest is designated wilderness. Additional Congressionally designated areas include the 158 mile long Skagit Wild and Scenic River System, the Mt. Baker National Recreation Area (8,700 acres), and the multiple use Alpine Lakes management unit (148,000 acres).

From 1975 to 1988, the dense forests of hemlock, cedar, and Douglas-fir have provided about 250 million board feet of timber sold annually. Changes in the land base over the last two decades (including designation of wilderness) have affected the amount of timber sold from Mt. Baker-Snoqualmie National Forest. The most recent revision to the 1963 Timber Management Plan (November 1984 Revision) included a timber sale potential of 203.8 million board feet. This reflects the addition of six new wildernesses to the Forest.

In 1986, 47 out of 87 lumber mills in the Puget Sound area (which does not include the 35 export mills) were one-third to 100 percent dependent on National Forest logs for their operations. Nearly all the timber cut from the Mt. Baker-Snoqualmie is consumed in the local area.

Approximately 159,700 acres of forest land are not suitable for timber production because of problems in replanting the land if the trees were cut. Many of these acres occur at higher elevations. Additional acres - over 95,500 - cannot be considered for potential timber cutting because of highly unstable soils. Approximately 597,000 acres, or 35 percent, of the Forest has been classified as tentatively suitable for timber production. Nearly half of this acreage is currently forested with old growth trees. (See Chapter III, Diversity for a definition and more discussion on old growth.) Almost 60% of the tentatively suitable old growth is in areas that are unroaded and undeveloped.

A more complete description of the Forest is located in Chapter III, FEIS, *Affected Environment*.

D. ISSUES, CONCERNS, AND OPPORTUNITIES

The complex natural systems of the Mt. Baker-Snoqualmie National Forest can be managed for many different mixes of land use, environmental conditions, and resource outputs. The elements of the physical, biological, social, and economic environment are interrelated; therefore, emphasizing one resource may necessitate changes, or less emphasis, in other resources.

There are certain limits to what can be provided in any alternative on the Mt. Baker-Snoqualmie. Some limits are biological, some physical, and some are legal. Other considerations in developing an alternative are the preferences of individuals and groups: the benefits people want in the form of goods, services and uses, and environmental conditions.

An important first step in the planning process is the identification of major public issues, management concerns, and resource use and development opportunities (ICO's). A public issue is a subject or question of widespread public interest relating to management of the National Forest System. A management concern is an issue, problem, or a condition which constrains the range of management practices.

Opportunities - to preserve, use, or develop the resources of the Forest - are the focus of many Forest Service programs. Resource use and development opportunities are the basis of many of the issues and concerns. Public issues and management concerns are generally part of every opportunity. Most opportunities are incorporated within the discussion of issues and concerns; they are also the principal focus of the alternatives developed in this FEIS.

The Tie to Alternatives and the Planning Process

These issues, concerns, and opportunities guide the planning process. They also play a key part in developing alternatives. By managing the land and resources in different ways, varied objectives can be achieved which respond to different issues, and provide different combinations of public benefits. Indicators of responsiveness measure how well the alternatives respond to the ICO's. The indicators are discussed in more detail below, and displayed in Table I-1.

Developing and Confirming the ICO's

Identifying the ICO's was a critical step in the planning process. An extensive process began in 1979. Involved were interested members of the public, adjacent private landowners, State and local agencies, Forest Service employees, Native American tribal leaders, and three liaison groups: the Conservation Liaison Group, the Timber Industry Liaison Group, and the Recreation Liaison Group.

An initial list of 70 potential ICO's was developed by the Planning Team and the Forest Management Team, using input from earlier planning efforts, letters to the Forest, newspaper articles, and from day to day contacts with Forest users and the interested public. This preliminary list was mailed to 3,300 individuals, groups, organizations, and agencies. Four public workshops were held within the five-county area of influence; written comments were also welcomed. More than 180 people commented on the preliminary list, either through participation in one of the workshops or through letters to the Forest.

The initial list of issues and concerns, along with the public response, was analyzed and the major issues and concerns were developed. See Appendix A for more detailed information on this process.

Confirming the ICO's

The ICO's have changed somewhat over time, to keep current with new events, changes in policy and procedure, and shifts in public values and concerns. Appendix A documents the changes occurring between draft and final. In addition - based on the public comments received on the DEIS - the ICO's have been confirmed or revised for this final EIS. Nearly 12,000 letters and cards were received in response to the draft EIS and proposed plan during the 110 day review period (the normal 90-day review period was extended).

Appendix J describes the public involvement process between the DEIS and FEIS; it also displays a summary of the analysis completed on all 11,718 letters and the substantive comments received plus the Forest's response to those comments.

The ICO's described below are the most current. It is around these issues that the alternatives contained in the FEIS are designed and analyzed, and on this foundation that the Preferred Alternative is selected. Several ICO's were re-titled, or refocused; Wild and Scenic Rivers is identified as a separate major ICO; and two issues were dropped. These changes were made in response to the considerable public comment. Refer to Appendix A for more information.

Indicators of Response

The measure of the Forest's ability to respond to the issues, concerns, and opportunities are referred to as "Indicators of Response." Indicators include the outputs, uses, or conditions that can be measured or described to gauge the response of each alternative to the ICO's. The indicators of response for each major ICO are shown in Table I-1. Refer to Chapter II, Table II-14 and accompanying narrative for an analysis of how each alternative responds to the issues, concerns, and opportunities.

Table I-1
Indicators of Response of Alternatives to the ICO's 1/

Issue, Concern, Opportunity *Indicator of Response*	Unit of Measure
Development versus Nondevelopment of the Forest	
Existing Roadless Areas Allocated to Nondevelopment	% Acres, M Acres
Roadless Areas Assigned to Roaded Mgt. Prescription But Not Developed in Next 15 Years	M Acres
Timber Supply	
Timber Harvest Level	MMCF/MMBF
Long-Term Sustained Yield Capacity	MMCF
Lands Suitable for Timber Production	M Acres
Employment: Jobs Supported by the Alternatives	M Jobs
Payments to Counties	MM Dollars
Old Growth Ecosystems and Fish/Wildlife/Plant Diversity	
Total Old Growth Remaining, End of Decades 1, 5	M Acres
Old Growth Remaining on Suitable Acres, Decades 1, 5	M Acres
Anadromous Fish Production	Pounds Per Year
Low-Elevation Old Growth Habitat for Wildlife	M Acres Under 3000'
Suitable Winter Range for Deer and Elk, Decade 1	M Acres
American Indian Religious and Cultural Use	
Inventoried Use Areas with High/Moderate Protection	% of Inventoried Ac.
Recreation Opportunities	
Demand Satisfied for Wilderness, Primitive, Semi-Primitive Nonmotorized Recreation, Decades 1 and 5	% of Capacity
Roads Open to Public Use, Passenger Car	Miles
Trail Construction, Reconstruction, Decade 1	Miles
Lands Managed for High Visual Quality Levels	M Acres Retention, Partial Retention
Wild and Scenic Rivers	
Rivers Recommended for Designation as Wild and Scenic	No. Rivers, Miles
Management of Municipal Watersheds	
Timber Harvest Level	MMCF (MMBF)
Effects of Timber Management and Related Activities	
Timber Harvest Level	MMCF (MMBF)
Old Growth Remaining on Suitable Acres, Decades 1, 5	M Acres
Annual Road Construction, Decade 1	Miles
Sediment Produced from All Sources, Annually, Decade 1	M Tons
Adjacent and Intermingled Lands	
Timber Harvest Level	MMCF (MMBF)

1/ Refer to the Glossary for an explanation of abbreviations used.

E. MAJOR ISSUES, CONCERNS, OPPORTUNITIES

Development versus Nondevelopment of the Forest

How should the released, roadless areas be allocated and how will the resources be managed?

At what rate should the Forest Service enter those roadless areas that are allocated for development?

The allocation and management of 402,930 acres of unroaded area remains a highly controversial issue. These acres equal approximately 55 percent of the roadless areas inventoried in RARE II, and 23 percent of the net acres on the Mt. Baker-Snoqualmie. These roadless lands were released from wilderness consideration by the 1984 Act. However, the legislation did not settle the issue.

This issue has been retitled, to better reflect public comments received on the DEIS. Some organizations and individuals referred to the "released" roadless areas, but many more focused less on the RARE II remnants and more on the general issue of whether the remaining unroaded and undeveloped lands on the Forest should be managed for commodity production/roaded recreation or remain undeveloped. This key issue encompasses facets of nearly all the other ICO's.

Some elected officials, environmental groups, many hikers, some Indian Tribes, and wildlife organizations want the unroaded areas to remain undeveloped and unroaded. Their concerns include: protection of wildlife habitat and old growth (especially low-elevation old growth), providing non-motorized recreation opportunities, and protection of water, soil, cultural, and scenic values. They also want to maintain the option of future consideration for wilderness. A number of individuals and groups support a proposal for Backcountry Areas, roughly corresponding to five roadless areas.

Timber and mining companies, trade organizations, energy-related industries, and some individuals feel that the 1984 Washington State Wilderness Act "released" these lands for multiple uses. They are concerned that nondevelopment will limit the amount of timber and minerals available for use, affect the local and regional economy, and lead to future wilderness designation. Many people feel there is a need for more motorized access to the roadless areas, to encourage recreation. Individuals, primarily living outside the Seattle metropolitan area, are concerned about saving timber jobs.

The commercial forest land within the roadless areas has been used to calculate the annual potential yield in the 1963 Timber Management Plan, as amended. However, this timber was not available for harvest from 1972 through 1984, resulting in a long-term concentration of timber harvesting on about one-half the land base. Approximately 164,500 acres, or 40 percent, of the unroaded areas are tentatively suitable for timber production.

Timber Supply

What is the capability and suitability of the Mt. Baker-Snoqualmie National Forest to produce timber?

What should the timber harvest level be considering all resources on the forest and their relationship to social, economic, and environmental factors including local, regional, and national demands?

A major public issue and management concern is the timber supply on the Mt. Baker-Snoqualmie National Forest. This issue has also been retitled since the DEIS, to better reflect public comments. The issue now includes facets of the wood residue opportunity, which was displayed in the DEIS, but dropped as a major ICO in this FEIS based on public comment. (See Appendix A, page A-18.)

Support for maintaining or increasing the timber supply comes from timber industry (management & employees), some community leaders, businesses dependent on the timber industry, and economic development agencies. Many individuals want the timber supply to be maintained, primarily to protect jobs. Environmentalists, some recreation users, wildlife and some hunting interests, fishing organizations, Indian tribes, some community leaders, and State Wildlife agencies strongly support restricting or reducing the timber harvest, especially in low-elevation old growth. A number of people feel the loss of mill jobs is due to factors other than timber supply.

Related issues and concerns are: how the National Forest timber supply affects jobs and the local and regional economy; the rate of harvest of old growth; the rate of entry into the unroaded areas; social and environmental effects; and wood residue utilization.

While the timber industry is a small part of the overall Puget Sound economy, it is still an important part. Four percent of the wage and salary jobs in two counties are based on lumber and wood manufacturing. The Forest currently supplies about 17 percent of the logs consumed in the Puget Sound area; a number of mills are dependent on National Forest logs.

The 1984 amendment to the 1963 Timber Management Plan reduced the annual potential yield to 203.8 million board feet (MMBF), to reflect the Washington State Wilderness Act. Over the 10-year period (1979-1988), the average timber volume sold was 235.8 MMBF and harvested was 229.6 MMBF, which is within the average annual potential yield for the decade: 229.7 MMBF. Refer to Chapter III, Table III-11. The timber supply potential on the Forest is considerably less than what past timber sale programs have indicated.

Approximately 597,000, or 35 percent, of the net Forest acres are considered to be tentatively suitable for timber production; about half of the tentatively suitable acres contain old-growth forest. The unroaded areas contain 164,500 acres of tentatively suitable (or 27% of the tentatively-suitable timber).

Old Growth Ecosystems and Fish, Wildlife, and Plant Diversity

What management direction is needed and where should action be taken that will maintain and/or enhance old growth and diversity to meet multiple use objectives?

The title of this ICO has been adjusted, in response to public comment. Old growth is a major issue on the Mt. Baker-Snoqualmie National Forest. Its value in providing biological diversity, wildlife and fisheries habitat, recreation, aesthetics, water quality, as well as industrial raw material is widely recognized by the public and the scientific community.

Environmental groups, wildlife societies and organizations, many individuals, Indian Tribes, and State wildlife agencies want the remaining old-growth forests protected. Old growth is important to American Indians for religious and cultural purposes.

Timber company representatives, industry trade associations, some State and local agencies, and many individuals feel these resources are an important contribution to timber production and maintaining local economies. Some feel that converting these stands into second growth timber is important for increasing long-term forest productivity.

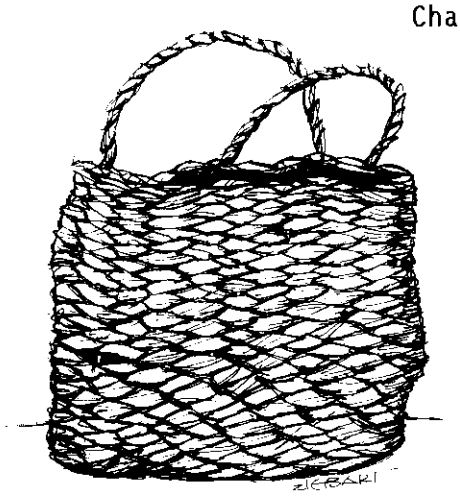
Old growth provides unique habitats for certain plant and wildlife species including the northern spotted owl. Habitat management for this indicator species has become increasingly controversial and is addressed in the Final Supplement to the Environmental Impact Statement for an Amendment to the Pacific Northwest Regional Guide (1988).

There are approximately 643,500 acres of old growth within the Forest; 232,500 acres (36%) are located in wilderness and are not available for harvest.

A related public issue and management concern is the maintenance and/or enhancement of plant, wildlife and fish diversity within the objectives of multiple use management. There is increasing recognition within the scientific community that ecosystem diversity is important; this issue also received considerable public comment. Many respondents to the DEIS felt national forest management should focus on wildlife.

The Forest provides habitat for a variety of wildlife species, including four Federally listed threatened and endangered species. The variety of elevation, aspect, soil depth, climate, and vegetation create a naturally diverse mosaic of habitats within the Forest boundary. An important facet of this issue is the distribution and protection of suitable habitat to ensure species viability through genetic exchange. State Department of Wildlife officials, hunters, and recreationists are concerned about the population and habitat needs of big game animals, such as deer, elk, and mountain goats.

There are approximately 1,500 stream miles and over 12,000 lake acres on the Forest that serve as both seasonal and year-round spawning and rearing habitat for anadromous and resident species. Indian tribes, sport and commercial fishing interests, and state and federal fishery agencies are increasingly concerned about the effects of water quality on the anadromous fish resource. The cumulative effects of management activities on fish/fish habitat was raised as a major concern by individuals, Indian Tribes, and State agencies.



American Indian Religious and Cultural Use

What policy and management direction is needed to comply with the Native American Religious Freedom Act and various treaties?

How can Inventoried religious and cultural use areas be protected within the objectives of multiple use management?

The 15 American Indian tribes who currently use the Mt. Baker-Snoqualmie for religious and cultural uses continue to challenge Forest management activities, primarily proposed road construction, timber harvest, and small hydroelectric power projects, that potentially threaten their religious use sites and areas. In 1981, an inventory of religious use, practices, and localities on the Mt. Baker-Snoqualmie National Forest was completed. Over 300 cultural use areas and sites were identified, totaling nearly 450,000 acres or 26 percent of the net Forest acres. About 34 percent of these areas are in designated wilderness. Some sites cover less than one acre; other larger areas average between 3,000 and 15,000 acres. Use-areas and sites are located throughout the Forest but are concentrated in the northern half.

The inventoried use areas can be placed in five broad categories: cedar sites, ceremonial flora, spirit sites, legendary sites, and cemeteries and archaeological sites. There is a wide variation in compatibility between types of management activities and categories of religious, ceremonial, and cultural use.

Since the completion of the 1981 inventory, the Forest has initiated a consultation process with the Tribes. When proposed projects fall within an inventoried use-areas, the proposed activity is reviewed in detail with representatives of the Tribe(s) which may be affected. As more management activities are proposed, there is the potential for increased conflict.

Individuals and Tribal representatives feel that the draft Forest Plan standards and guidelines and the inventory process were not adequate to protect Religious Freedom Act rights. Others, including some timber industry representatives, feel protection of religious and cultural use areas will constrain timber availability.

Puget Sound Indian Tribes also have a significant interest and concern for protection and enhancement of the anadromous fisheries resource. For many, this has been their traditional and principle means of income. They are strongly opposed to any management activities that might adversely affect anadromous fish habitat.

Recreation Opportunities

To what extent can the Mt. Baker-Snoqualmie National Forest provide recreation opportunities and how should they be managed?

How many miles of trails should be provided and in what locations?

Public comment on the DEIS reconfirmed that recreation use - of all types - is a major public issue on the Mt. Baker-Snoqualmie. One of the few areas of consensus, respondents agreed that recreation is a vitally important function of the Forest. Opinion is divided on what types of recreation opportunities should be provided.

Many groups and individuals - including hikers, horse users, some off-road vehicle users, naturalists, wildlife advocates, and environmentalists - want to preserve opportunities for unroaded dispersed recreation outside of wilderness. They prefer more remote, natural appearing recreation settings. National Forest lands are the major supplier of non-motorized dispersed recreation in the Puget Sound area. Many other recreationists spoke to the need for better recreation access for young families and the elderly, more ORV areas, more snowmobile opportunities, and more campgrounds.

A large majority of people commenting on the DEIS favor more trails. There was support from environmentalists and many recreation/commodity groups for the "Trails 2000" proposal, developed by one environmental organization. The proposal includes both new trail construction and reconstruction of existing trails. ORV and horse users want more trails open for their use. Many hikers feel that trails should be closed to motorized use.

Conflicts between recreation and other Forest resources are frequently mentioned. For example, the visual effects of clearcutting are generally not compatible with the values of many recreation users. Some users dislike the expanding road system needed for timber harvest, while others feel roads are important for their activities and access.

Many recreation attractions and opportunities on the Mt. Baker-Snoqualmie are found within eight wildernesses, which totals nearly 42% of the net Forest acres. A concern is the level of management required to accommodate the high recreation demand within these areas, while protecting the wilderness resource. Some recreation and environmental groups, who strongly supported wilderness status for favorite areas, now find themselves debating the need for management actions within the wilderness, including limiting use. Facets of this issue include: the need for new or relocated trails to disperse recreation use in heavily-used areas; and whether roads that access popular wilderness attractions should be kept open to the public.

The Mt. Baker-Snoqualmie contains some of the most scenic areas in the State. Its proximity to the major metropolitan areas along Puget Sound and the variety of opportunities available is reflected in the continual growth of recreation use. Use is now approximately 5 million RVD's (1989). It is expected that the demand for recreation on the Forest will grow through the end of the century. Some recreation uses are incompatible with each other; others cause resource damage because of the level or type of use. There is little public consensus regarding the quantity and type of recreation experiences the Forest should provide.

Wild and Scenic Rivers

How should the potential wild and scenic rivers of the Forest be managed and their values protected?

Wild and Scenic Rivers has been identified as a separate major issue, due to public response on the DEIS.

There is one designated Wild and Scenic River on the Forest (the Skagit, designated in 1978). The Wild and Scenic Rivers Act established criteria for the addition of other rivers to the National System. The National Park Service (formally Heritage Conservation and Recreation Service) conducted an inventory of potential rivers; portions of the sixteen rivers on that inventory are within the Forest boundary.

Portions of the Skykomish River system have been designated by the State of Washington as a Scenic River under the provisions of the State Scenic River System Act (RCW 79.72). This designation applies only to city, county, and State lands. This river features substantial runs of anadromous fish, bald eagle feeding and perching areas, and communal roost sites. Portions of the river, especially outside the Forest boundary, support a variety of boating opportunities including white-water rafting.

In 1988, the State of Washington released the Washington State Scenic River Assessment. This report documents the evaluation of several outstanding rivers in the state, and identifies 18 rivers which possess the natural, cultural, and recreational values that would make them suitable additions to the Washington State Scenic River System. The Carbon, Nooksack, and Stillaguamish Rivers are the rivers on the Mt. Baker-Snoqualmie that are included on this list.

There was considerable public comment on the DEIS eligibility study, plus support for many more miles of wild and scenic rivers than recommended for study in the DEIS. There was also vocal opposition to more designation.

Between draft and final plans, eligibility criteria were re-evaluated and the list of eligible rivers adjusted. A total of 51 rivers were identified and studied for their eligibility and 47 of these were determined to be eligible. There was considerable public and agency involvement in this process. A suitability study for the 47 eligible rivers was also completed, again in response to public comment on the draft.

Wild and scenic river legislation has been considered but no action taken. Public concern on all sides is high. The portions of seven major river systems that lie within the Mt. Baker-Snoqualmie contain sections with unparalleled anadromous fisheries values. There are also high recreational and scenic values. Resource compatibility with wild and scenic river designation includes riparian area, and fish and wildlife habitat protection, increased recreation opportunities (especially river-oriented), and visual quality.

Management of Municipal Watersheds

What activities should be permitted within municipal watersheds?

What measures should be taken that will maintain or enhance water quality?

The title of this major ICO has been changed, to better reflect an emerging key issue: the management of municipal watersheds. Maintenance of high water quality is still a facet of the issue, but it is also addressed on the Effects of Timber Management and Related Activities ICO. Changes in City of Seattle policies for the management of the Cedar River watershed may necessitate renegotiation of the existing, 1962 Cooperative Agreement. Under the 1989 Secondary Use Policies for the Cedar River, the City will set aside 50 percent of its lands in a reserve precluding timber harvest. The policies also call for acquiring 4-6,000 acres of old growth (currently national forest lands) to be maintained as old-growth habitat.

Maintaining high quality water remains as an objective of many individulas, sports and recreation organizations, municipalities, Indian Tribes, and State and federal agencies. These interests believe that timber harvest, road construction, mining, and some recreation activities are detrimental to water quality, primarily due to sedimentation and pollution. Most of the above interests support actions to limit, restrict, or prohibit developmental activities in the watersheds. Many also support maintenance of old growth habitat in the Cedar River watershed. Municipalities are concerned that increased access and recreation use will result in the need to install filtration facilities to assure potable water to the consumer.

Timber, energy, mining industries, plus a number of hunters feel that development can occur and any adverse impacts to water supply and quality can be mitigated. They believe that limiting or prohibiting activities unduly restricts the industry's ability to maintain or increase supplies of timber, electric power, and minerals. Hunters feel that big game populations could actually be enhanced with controlled hunts in the watersheds.

A significant portion of the watersheds supplying the cities of Seattle, Bellingham, Everett, and Tacoma is located on the Mt. Baker-Snoqualmie. Water is also provided for a number of smaller municipalities, ski areas, and other recreation sites. About 128,000 acres of national forest land supply municipal water to 1.4 million people. Water quality is high; only one municipality filters water, others use a disinfectant.

Currently, a wide range of activities occur within the municipal watersheds. Some watersheds have not been accessed by roads and remain primarily in a natural condition. Other watersheds have been developed, with extensive timber harvesting and road construction. Recreation is permitted or encouraged in some watersheds; in others, poor access and municipal opposition has limited recreation opportunities.

Effects of Timber Management and Related Activities

What management direction is needed for timber harvest and road construction activities to benefit or maintain the quality of other resources?

The effects of timber harvest and road construction, especially the cumulative effects of these activities, are of great concern to federal agencies, environmentalists, Indian Tribes, State Fish and Wildlife agencies and individuals. The effects of management activities on water quality, fish and fish habitat of of greatest concern, and this interest has increased since the DEIS was released. Other resources affected by timber harvest and road construction are wildlife, scenery, and dispersed unroaded recreation.

The timber industry, miners, and many individuals feel that the effects of these activities can be mitigated, and that not enough national forest land is open to full commodity production (and recreation use).

Management for the commercial production of timber includes a number of activities: road construction and/or reconstruction, preparation of the land for planting seedlings, possible thinning, et cetera. These activities have direct and indirect effects on other resources, including: fish and wildlife habitat, soil, water, and American Indian religious and cultural use. Recreation opportunities are changed, and the visual condition of the Forest changes. The visual impact of clear-cutting and loss of habitat for some wildlife species is a major concern. Changes in vegetation and the effects on diversity and sensitive plants have also been identified as concerns by some people commenting on the DEIS.

Adjacent and Intermingled Lands

How should National Forest lands adjacent to lands of non-federal owners be managed?

What management activities should be conducted on National Forest lands that are located near private developments?

The land ownership pattern within and adjacent to the National Forest boundary and the management of intermingled Federal and Private lands remains a major issue and concern.

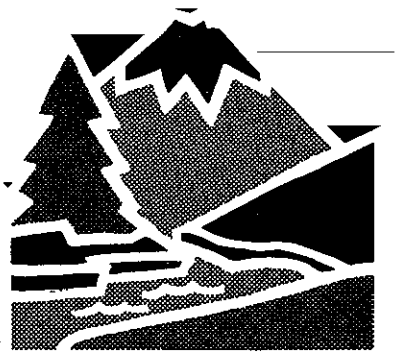
A few environmental groups are actively proposing legislative land exchanges that would exchange high-elevation, low timber site class private lands for low elevation, high-site federal lands. Some major industrial timber land owners support these types of exchanges. Independent mill operators and loggers who depend on National Forest timber and some public interest groups strongly oppose such exchanges, as the exchanges would further reduce timber supplies available to them. Some people commenting on the DEIS urged the Forest Service to retain all mineral rights in any exchange.

Environmentalists, State Fish and Wildlife agencies, Indian Tribes and some sporting groups believe that management activities, such as timber harvest, should be delayed or deferred on National Forest lands to mitigate the cumulative effects of large-scale timber harvest on private lands that are intermingled with Federal lands. Independent mill operators and loggers are opposed to any delays or deferrals that would reduce timber supplies available to them.

In many areas of checkerboard ownership, adjacent land owners have completely removed the old-growth timber (in approximately 640 acre blocks), leaving the timber present on National Forest land more vulnerable to wind-throw. Removing these blocks of old growth has also had the effect of reducing the amount of habitat available for wildlife species dependent on old-growth habitat. In areas of intermingled lands, the objectives and subsequent land practices of all owners affect the management of adjacent lands. Management of National Forest land affects adjacent lands of non-Federal landowners, and activities on non-Federal lands affect management of National Forest land.

Urban growth is steadily moving east toward the Forest boundary. Forest lands, regardless of ownership, are affected by this growth. Resources such as wildlife, water, and air do not recognize ownership boundaries, but they are directly impacted as shopping centers, subdivisions, and residences - plus an increased network of roads - spread closer to the Forest boundary. A question to be addressed: should National Forest land management practices be altered to compensate for these encroachments? Timber industry, adjacent land owners, County planners, and environmentalists are all involved in this concern.

Chapter 1



Changes Between Draft and Final - Chapter II

- o New yield tables were developed and technical corrections were made to the FORPLAN model in response to public input. Refer to Part B. Analysis Prior ot Formulation of Alternatives, this chapter, FEIS; also see Appendix B for more detailed discussion.

- o Alternatives D, E, E-Departure, F, and H-Departure received very little support in public comments on the DEIS. They are not needed to provide a full range of alternatives for analysis and were not carried forward to this FEIS. Alternative H, disclosed as the Forest Service Preferred Alternative in the DEIS, is not the preferred in this FEIS. Alternative G was modified to respond to public comment and to better meet its' objectives as stated in the draft; it is displayed in this FEIS as Alternative G-Modified.

- o Two new alternatives are disclosed in the FEIS. Alternative I was added in response to strong public support in comments on the DEIS. Alternative J is the new Forest Service Preferred Alternative. It was developed to respond to comments received on the draft preferred alternative and to public issues and concerns.

Table II-1 Alternatives Displayed in the Draft EIS and Final EIS

	NC	A	B	C	D	E	E-Dep	F	G	G-Mod	H	H-Dep	I	J
DEIS	x	x	x	x	x	x	x	x	x		x	x		
FEIS	x	x	x	x						x	x		x	x

- o The management requirements (MR's) were revisited with changes and additions made. Spotted Owl Habitat Areas changed to meet the Record of Decision for the Final Supplement to the EIS for an Amendment to the Pacific Northwest Regional Guide. Management requirements for mountain goats were enlarged, and deer and elk MR's were dropped to meet regional direction, as discussed in DEIS Appendix I. Changes are documented in new Appendix H, FEIS.

  In response to public comment, a hydrologic cumulative effects analysis was completed to develop a procedure for meeting water quality and riparian management requirements. The procedure to meet these MR's was developed with public and scientific review; refer to new Appendix H for detailed documentation of the process, with additional information in Appendix B.

- o The 1978 version of IMPLAN was used to predict changes in jobs and income in the DEIS. For the FEIS, the updated 1982 version of IMPLAN was used.

- o Mitigation measures, discussed in Chapter IV in the DEIS, have been moved to this chapter in the FEIS, and incorporated into the alternatives. New Appendix I, FEIS, describes in greater detail the Best Management Practices (BMP's) to protect soil and water. They are selected on the basis of site-specific conditions.

CHAPTER II - ALTERNATIVES, INCLUDING THE PROPOSED ACTION

A. INTRODUCTION

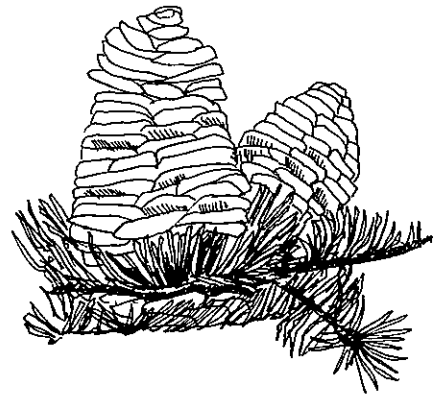
Chapter II is the heart of the FEIS. Alternative ways of managing the Mt. Baker-Snoqualmie National Forest and responding to the public issues are presented; alternative resource outputs, environmental effects, and economic costs and benefits displayed. This chapter also discusses how these alternatives were developed and how they compare to each other, including current Forest management. Chapter II of the FEIS summarizes information found in more detail in other chapters and in Appendix B. Chapter III describes the affected environment, and Chapter IV presents the environmental consequences that would result from implementation of any of the alternatives. There are seven parts of Chapter II:

A. Introduction
B. Analysis Prior to Formulation of Alternatives
C. Formulation of Alternatives
D. Alternatives Considered But Eliminated From Detailed Study
E. Alternatives Considered in Detail
F. Comparison of Alternatives:
G. Major Tradeoffs Among Alternatives

The alternatives displayed in this FEIS are designed to explore a variety of ways to respond to the public issues, management concerns, and resource use and development opportunities identified throughout the planning process. From this broad range of alternatives, the decision maker - the Regional Forester - has a basis for identifying the alternative (the preferred alternative) that best maximizes net public benefits while responding effectively to the issues and concerns.

Maximizing **net public benefits** is a goal of the forest planning process and a consideration in the development of alternatives. **Present net value** (PNV) is a component of net public benefit. PNV equals the discounted value (benefits) of all outputs to which a monetary value or established market price is assigned, minus the discounted costs of managing the area. Net public benefits are the overall, long-term value to the nation of all outputs and positive effects (benefits), less all associated inputs and negative effects (costs), whether or not they can be quantitatively measured. Net public benefits are estimated quantitatively by PNV and include some non-quantified components not reflected in PNV, such as threatened and endangered species protection benefits or the value of Forest visual quality.

A major objective of the forest planning process is to provide information that helps determine which alternative best responds to the issues and concerns while maximizing the net public benefits.



Process for Formulating Alternatives

The National Forest Management Act (NFMA) planning regulations [36 CFR 219.12(e) and (f)] prescribe a general process for formulating alternatives. Major points from these sections specify that alternatives must:

- be distributed to provide a broad range of outputs between the minimum resource potential and the maximum resource potential;
- be formulated to facilitate analysis of opportunity costs, resource use, and environmental trade-offs;
- be formulated to facilitate evaluation of the effects on PNV, benefits, and costs of achieving various outputs and benefits that are not assigned monetary values, but are provided at specified levels;
- provide different ways to address and respond to the major ICO's;
- be formulated to consider changes in existing laws or policy if necessary to address major ICO's;
- respond to and incorporate the RPA Program (in at least one alternative);
- reflect (in one alternative) the most likely amount of goods and services expected to be provided in the future if current management direction continues;
- represent the most cost-efficient combination of management prescriptions that can meet the objectives of each of the alternatives;
- state the conditions and uses that will result from long-term application of the alternative; the goals and services to be produced; the timing and flow of these resource outputs together with associated costs and benefits; resource management standards and guidelines; and the purpose of the management direction proposed.

In addition to the direction in the planning regulations, the Pacific Northwest Region of the Forest Service has provided guidance for the formulation of alternatives. This guidance requires inclusion of alternatives that:

- emphasize production of commodity outputs;
- emphasize production of amenity outputs;
- examine economic efficiency;
- evaluate roadless areas.

A broad range of alternatives has been developed using all of the above guidelines.

B. ANALYSIS PRIOR TO FORMULATION OF ALTERNATIVES

Forest Planning is a very complex process. A great deal of data must be considered in order to identify and analyze the many inputs, outputs, costs, benefits, and environmental effects of different ways of managing the Forest. Each acre of the Forest has biological limitations, as well as differing

opportunities to produce goods and services. The production of multiple goods and services on one part of the forest may have different costs and/or environmental effects associated with it than the production of those same goods and services on another portion of the forest.

In order to consider the almost infinite number of combinations of capabilities, opportunities, costs, and effects of producing desired outputs, a large, computerized linear programming model of the Forest called FORPLAN was used. The details of the FORPLAN model - and the entire analysis process - are discussed in Appendix B. It is summarized below.

Outline of the Analysis Process for Developing Alternatives

The alternatives are formed following the planning steps and direction identified in NFMA; the process includes a number of the 10 planning steps identified in Chapter I, page I-3.

- Identify public issues and concerns, and opportunities and consolidate into a series of planning problems. Refer to Chapter I and Appendix A. (Planning Step 1, in Chapter I.)

- Collect data from resource inventories and create a data base; the issues and concerns and the planning problems help determine what data should be collected (Planning Step 3).

- Develop analysis areas by grouping elements of the resource data - for selected resources - producing tracts of land assumed to be homogeneous in their capability to produce outputs and effects in response to alternative management options.

- Develop management direction, in the form of Forest-wide Standards and Guidelines and management strategies, that responds to the ICO's.

- Develop a range of potential alternatives by assigning unique combinations of management strategies, which group analysis areas, across the Forest. Each potential alternative will achieve a specific objective or set of objectives in responding to the issues.

- Analyze initial combinations of management strategies and prescriptions in the Forest computer model, "FORPLAN." The results of this analysis - called benchmarks - defined the maximum range of response to the issues for a given resource, consistent, in most cases, with meeting the management requirements (MR's). Arraying these resource production possibilities helped define different potential alternatives, and the range of alternatives to respond to the Forest issues. Opportunity costs of the MR's were also calculated. The results of this planning step were documented in the May 1985 Analysis of the Management Situation (Planning Step 4).

- Build alternative themes to respond to the issues and address concerns. Using these "themes," construct possible alternatives by applying management strategies to specific on-the-ground areas of the Forest. Once a management strategy is applied, the specific area becomes a management area (MA). Management area assignments are fixed for each alternative, but

vary among the alternatives. MA assignments determine which prescriptions are available for each analysis area. This tie to the land allowed outputs, costs, and effects of different management activities to be estimated for different land characteristics (Planning Step 5).

- Analyze the potential alternatives in FORPLAN for outputs, costs and effects (Planning Step 6).

Using this process, a broad range of alternative ways for managing the Forest, responsive to the public management's input on issues, concerns, and opportunities, was developed. Alternative NC (No Change) was not developed utilizing this process; it is based on the 1963 Timber Management Plans (USDA 1963).

Information Collection and Data Base Development

Information was collected prior to, during, and following the identification of issues, concerns, and opportunities. The interdisciplinary planning team assembled data on: resource capabilities, conditions, trends, existing supplies and demand, and expected outputs, benefits, and costs. Existing data were used and, in some cases, supplemented with new information to help address and resolve the issues. These numerous inventories helped to define the character, resource potentials, and limitations of the Forest. Between the DEIS and FEIS, the acres by condition class (poles, small sawtimber, etc.) were updated to reflect the harvesting that occurred between 1985 and 1988.

Table II-2, on the following page, summarizes the supply and demand information along with outputs under the existing situation (Alternative A, No Action), and Alternative J (Preferred). Refer to page II-13 for a discussion of benchmarks.

The planning team constructed a Forest-wide data base, aggregating most of the resource data. The data base, R2MAP, has the ability to track 46 attributes, such as acres of old growth. Information from the data base was used in FORPLAN to generate yield data for many resources.

Analysis Areas

Resource information on soils, slope, vegetation etc. was combined into a single map overlay, and like characteristics were aggregated into groups called analysis areas. Analysis areas are tracts of the Forest assumed to be homogeneous in terms of potential outputs and effects and responsiveness to forest management options.

Analysis areas serve as the basic units of land or building blocks in the planning model. They were based on the following delineation criteria:

- timber site class
- availability and suitability for timber production
- vegetative cover
- topographic class and soil stability
- timber size class and species composition
- road accessibility

Table II-2
Summary of Projected Supply and Anticipated Demand

	Decade 1 1986-1990	Decade 2 1991-2000	Decade 5 2021-2030
Recreation			
Developed Recreation Use (MRVD/Year)			
Projected Supply (Capacity)			
Alternative A (No Action)	5,382	5,792	6,842
Alternative J (Preferred)	5,598	6,098	7,238
Anticipated Demand 1/	2,834-3,464	3,848-4,702	6,718-8,210
Dispersed Recreation Use (Non-wilderness) Including Wildlife and Fish Use (MRVD/Year)			
Projected Supply (Capacity)			
Alternative A (No Action)	4,092	4,482	5,142
Maximum Recreation Benchmark 2/	7,458	7,468	7,481
Alternative J (Preferred)	4,030	4,487	4,751
Anticipated Demand	2,539-3,121	3,774-4,708	6,589-8,072
Roaded Recreation Use (MRVD/Year)			
Projected Supply (Capacity)			
Alternative A (No Action)	3,343	4,097	4,902
Maximum Recreation Benchmark	7,219	7,231	7,248
Alternative J (Preferred)	3,277	3,730	3,991
Anticipated Demand	1,854-2,266	2,837-3,467	4,817-5,887
Unroaded Recreation Use (MRVD/Year)			
Projected Supply (Capacity)			
Alternative A (No Action)	201	164	115
Maximum Recreation Benchmark	239	237	233
Alternative J (Preferred)	208	182	149
Anticipated Demand	225-293	382-492	713-890
Timber			
Allowable Timber Sale Quantity (MMCF/Year)			
Projected Supply			
Alternative A (No Action)	31.0	36 7	39.0
Maximum Timber Benchmark	68 4	68.4	68.4
Alternative J (Preferred)	22.4	25.7	29.7
Anticipated Demand 3/	≥ 22.4	≥ 25.7	≥ 29.7

1/ Anticipated recreation demand is based on historical use figures projected into the future and Puget Sound population projections.

2/ FORPLAN alternative runs (1989) have undergone changes in recreation modeling since the Benchmarks were run (3/85) to better reflect the spatial characteristics of the recreation opportunity spectrum (ROS) from a per acre to a per area basis.

3/ Projections indicate that demand for timber from the MBS will remain sufficiently high to allow the Forest to sell all the timber it can produce from lands allowing harvest, with no downward effect on prices

The criteria used to identify analysis areas were intended to capture the variations in outputs when different management prescriptions are applied. A total of 134 analysis areas were used, ranging in size from 212 acres to 494,871 acres. The analysis areas are fixed for all alternatives; the total acres of all 134 analysis areas equal the total Forest acres. Refer to Appendix B for a more detailed discussion.

Allocation Zones

The Forest land base was stratified into allocation zones, based on the boundaries of watersheds, roadless areas, wilderness, the Alpine Lakes Management Area, and the Skagit Wild and Scenic River. Allocation zones included all analysis areas contiguous to one another, within a specific geographic area, such as a watershed. Portions of an analysis area can be found across numerous allocation zones.

The allocation zones were used to control accessibility (for harvest dispersion requirements), to track the potential transportation system needs and costs, to analyze hydrologic cumulative effects (see Appendix H for more information), and to account for changes in the Recreation Opportunity Spectrum (ROS). Forest wide, a total of 86 allocation zones were identified and fixed for all alternatives. They range in size from 2,321 acres (a small watershed) to 282,161 acres (Glacier Peak Wilderness).

Management Strategies

Once the issues, concerns, and opportunities (ICO's) were identified, the interdisciplinary team generated 26 management strategies that responded to the range of public issues and demands on Forest resources. Some management strategies have several intensities of use or management. For example, the Dispersed Recreation management strategy includes six different management and use intensities, such as Primitive, Semi-Primitive Nonmotorized, etc.. These strategies/intensities were specifically developed to help address and resolve the ICO's, build and model alternatives, and identify implementation direction.

Management strategies/intensities define the overall direction and several means of achieving Forest goals, standards, and objectives. Strategies generally emphasize one or two resources, and contain guidelines and constraints for other resources. Each strategy also contains standards and guidelines for prescriptions to direct "on-the-ground" management. Standards and guidelines were written and/or incorporated from law, regulations, the Regional Guide, or other direction. For each strategy modeled in FORPLAN, one or more prescriptions (see below) were developed and available as choices in the model.

Each management strategy/intensity can be applied to a specific group of analysis areas whose resource characteristics and conditions are compatible with and capable of responding effectively to the strategy. For example, a big game winter range strategy could be applied to any analysis area or group of analysis areas located within existing winter range; this strategy would not be compatible with analysis areas located on summer range. Most analysis areas were able to respond to more than one strategy; thus, the sum of the areas suitable for each management strategy is greater than the total Forest acres due to overlapping capabilities.

The rationale for selection of harvest cutting methods for use in timber management strategies is documented in Appendix F. The rationale used in making this decision includes consideration of: blowdown; root rot; bole rot; dwarf mistletoe; genetics; stand composition; stand density; economics; big game habitat; and visual resource management.

Management Areas

When a management strategy/intensity is applied to a specific, on-the-ground area of the Forest, the specific area becomes a management area (MA). A management area is a group of analysis areas which have been allocated to the same management strategy/intensity. Management areas are the building blocks of the alternatives. The exception is Alternative NC (No Change), which is based on the 1963 Timber Management Plans; no management areas are assigned.

Management areas represent the site-specific response of management strategies/intensities to the issues. The number of acres in the management areas varies by alternative, as the alternatives are different ways of responding to the ICO's. Note that the sum of MA acres for each alternative equals the total Forest acres. Descriptions of the management areas are included later in this chapter; Tables II-8 and II-8a show MA acres by alternative.

Several factors influenced the choice of management strategies (and their acres) for assignment as management areas in an alternative. These factors were:

- Compatibility of the management strategy/intensity with the capability of an area. Some strategies, such as wilderness, are site specific and can only be applied to the given site.
- Response to the issues addressed by an alternative. The management strategy/intensity and number of acres of that strategy/intensity assigned to an alternative was a direct function of the goals and objectives of the alternative.
- Potential impacts on resource productivity. For example, maintenance of highly productive timber land for timber outputs was a factor in the management area assignment in many alternatives.
- Manageable on-the-ground boundaries.
- Planning requirements for a broad range of alternatives.

Management Prescriptions

A prescription is a set of management practices and intensities, and their application or sequence over time on a particular acre for a particular management strategy.

Management strategies determine the available prescriptions for a given analysis area. Each strategy can contain one or more prescriptions. Prescriptions are represented as decision choices in the Forest planning model.

(Table II-3, below, shows a summary of timber production prescription choices.) Selection of a particular prescription is based on: the objectives of the particular alternative; the production potential and benefits of the analysis areas within each management area in which prescriptions are available; and the cost of implementing the prescription within an analysis area.

The process of developing prescriptions used in the model included the development of timber yield tables, other resource yield coefficients, and the economic costs and benefits associated with each prescription. Timber yield tables were developed for managed stands (a timber stand where harvesting has occurred) and natural stands to meet timber, riparian, wildlife, and visual objectives. Other yield tables were developed for sediment, anadromous fish, wildlife, and big game; capacity levels were developed for recreation. A mathematical estimate of the economic costs and resource yields associated with each prescription was generated to identify the most efficient prescriptions and to schedule outputs. This is known as a Stage II suitability analysis; refer to Chapter III, section E in Appendix B, FEIS for more details.

FORPLAN

The primary analytical tool used in Forest planning to analyze alternatives is called FORPLAN (an acronym for FORest PLANning Model). FORPLAN is a large and complex computerized linear programming model. The FORPLAN model was specifically designed to help the interdisciplinary planning team analyze the economic and production tradeoffs associated with the recreation, timber, visual, and wildlife resources. The FORPLAN results for all alternatives provide output and economic information for comparing alternatives. That information was used to compare the alternatives (for efficiency and response to the ICO's) and to help identify an alternative that best maximizes net public benefits, while responding effectively to all the issues.

The FORPLAN model uses a series of mathematical equations to determine the optimal solution to a problem specified by an objective function (example, maximize present net value) and bounded by resource management opportunities and output objectives, priorities, or constraints. (These terms are defined later in this chapter and discussed in detail in Appendix B.) These boundaries and output levels incorporate goals, objectives, and physical targets; the goals, etc. are represented by technical constraints in the model. Within the limits of the FORPLAN computer software, the user is allowed a great deal of latitude in formulating the mathematical representation of the forest planning problem to be analyzed.

FORPLAN is used to optimize the design of each alternative (except Alternative NC) and quantify most of the results, inputs and, effects of each alternative. Each alternative has a different mix of goals and objectives, to respond to the issues, concerns, and opportunities.

The model formulation used in applying FORPLAN in the alternative development and analysis process included: analysis areas, allocation zones, prescriptions, time periods, resource constraints, estimates of resource outputs that result from applying prescriptions to analysis areas, and estimated benefits for the outputs produced.

Based on this information and the objectives of an alternative, FORPLAN determined which prescriptions to apply within each analysis area (and allocation zones), and when to schedule them for application. However, the management area assignments, which are fixed for each alternative, determine which prescriptions are available for each analysis area. For each alternative, the mix of management area assignments are different. See the discussion below.

In the Mt. Baker-Snoqualmie FORPLAN model, the outputs modeled were chosen because of their relationship to the issues, concern, and opportunities. Other outputs and effects were estimated outside of the FORPLAN model, or by interpreting the results of the FORPLAN solution. Because of model and computer limitations, and lack of knowledge about resource interrelationships, it was not practical to include all resource interactions in the FORPLAN model. Many of the elements of the alternatives were handled outside of FORPLAN, or used to develop constraints to apply to a particular alternative formulation. See Appendix B for more discussion on the FORPLAN model.

Use of FORPLAN in Alternative Analysis

A major step in formulating an alternative in FORPLAN is the assignment of management strategies to lands across the Forest. The decision is critical because each resultant management area determines the range of prescriptions or management choices available for that area.

The management areas are not assigned by FORPLAN, but are built into each alternative FORPLAN formulation to achieve the particular objectives of the alternative. When an analysis area, or part of an analysis area, is assigned to a management area that involves scheduled timber harvest, the FORPLAN model is given the choice of assigning that land to a no harvest prescription, or to one of the timber harvest prescriptions shown in Table II-3, on the next page. All of the timber harvest prescriptions shown across the top of Table II-3 were available for selection by FORPLAN on tentatively suitable lands in a management area where timber harvest was appropriate.

To assure that the alternatives developed could actually be implemented on the ground, the Forest Management Team reviewed the management areas assigned to respond to the ICO's addressed in each alternative. The Forest Management Team has on-the-ground knowledge of some physical, spatial and biological attributes of the Forest that are more detailed and site specific than the eight factors used to define the analysis areas.

In some portions of the Forest, there are small blocks or stringers of tentatively suitable timber that are not accessible by existing or potential road systems. These blocks can be characterized as less than 80 acres in size; low site productivity; low-valued species; would require helicopter logging; and are surrounded by lands not suitable for timber production. These blocks had been considered by the Forest Management Team for timber harvest during previous sale area planning activities, but eliminated through site-specific economic analysis, and consideration for other resource values. In all alternatives except those that emphasize timber production, the decision was made to include these blocks in the surrounding management area assignment which was not appropriate for timber production. In the alternatives that emphasized timber production, all such parcels were available for assignment to a prescription that included timber harvest.

Table II-3

Timber Harvest Prescription Choices Available for Each Management Area 1/

Management Area	17A NR-FH	17B NR-PCT-FH	17D PL-FH	17E PL-CT-FH	17F PL-PCT FH	17G PL-PCT-CT-FH	17H PL-PCT-CT(3)-FH 2/	17C PL-FH 3/	No Scheduled Harvest
1 Dispersed Recreation 1A 1B 1C									X
1D	X	X	X	X	X	X	X	X	X
1E , 1F 4/									X
2 Scenic Viewshed 2A 2B	X	X	X	X	X	X	X	X	X
3 Developed Recreation 3A 3B 3C 3D									X
4 Mt Baker Natl Rec Area	X		X					X	X
5 Recommended Wild & Scenic R 5/	X	X	X	X	X	X	X	X	X
6 Skagit Wild & Scenic River	X	X	X	X	X	X	X	X	X
7 Amer Indian Relig/Cultr Use 6/	X	X	X	X	X	X	X	X	X
8 Special Areas									X
10 Wilderness 10A 10B 10C 10D 10E									X
11 Old Growth Habitat (MR)									X
12 Mature & Old Growth Habitat (MR)									X
13 Watershed, Wildlife Fish Emphasis in Riparian Areas 13A 13C 13D	X	X	X	X	X	X	X	X	X
14 Deer and Elk Winter Range	X	X	X	X	X	X	X	X	X
15 Mountain Goat Habitat 15A									X
15B		X	X		X		X	X	X
16 T & E Species 16A									X
17 Timber Mgt 17A B, C, D, E, & F	X	X	X	X	X	X	X	X	X
18 Research Natural Areas									X
19 Mtn Hemlock Zone 7/									X
20 Cedar R Watershed 20A 20B 20D	X		X					X	X
20C	X	X	X	X	X	X	X	X	X
21 Green R Watershed 21A 21B	X	X	X	X	X	X	X	X	X
22 Sultan R Watershed 22A									X
22B	X		X					X	X
22C	X	X	X	X	X	X	X	X	X
23 Other Munic Watersheds 23A	X	X	X	X	X	X	X	X	X
23B									X
25 Special Uses 25A 25B									X
26 Administrative Sites									X
27 Alpine Lakes Mgt Area 8/	X	X	X	X	X	X	X	X	X

1/ NR = Natural Regeneration PL = Planting using genetically improved stock PCT = Precommercial Thinning
CT = Commercial Thin FH = Final Harvest

2/ Extended rotation, option for three commercial thinnings

3/ Does not use genetically improved stock Hardwood site

4/ Management Area applicable only to Alternative A (No Action)

5/ No Scheduled Harvest in wild segments

6/ Consultation with affected tribes will determine appropriate prescription

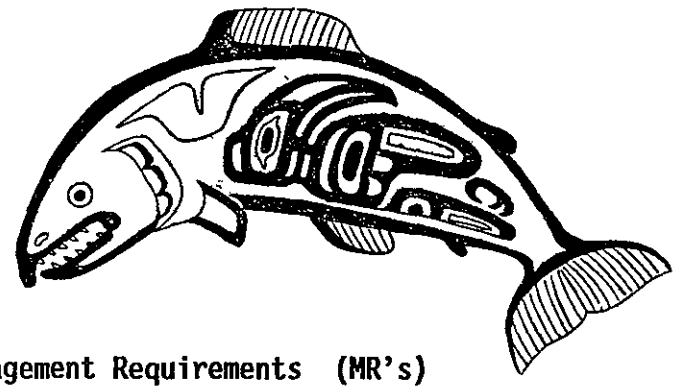
7/ Some limited harvest for experimental purposes is programmed

8/ All prescriptions are available in scenic forest and general forest management areas No timber harvest is appropriate in the special, dispersed recreation and developed recreation management areas

Some additional fixed prescriptions were used to meet non-timber resource objectives, including: the amount and schedule of developed recreation construction and reconstruction; the miles and schedule of trail construction and reconstruction; and the percent of the potential population of cavity nesters to be maintained in tentatively suitable lands.

The FORPLAN model was free to optimize the choice of timber prescriptions, subject to the resource management constraints and the objective of maximizing PNV. The resource management constraints were designed into the model to guarantee the spatial and temporal feasibility of management area assignments and harvest scheduling choices. While the management area assignments and other various resource design elements are fixed for each alternative, they vary across the range of alternatives. Once the model arrived at a feasible solution - by satisfying all of the constraints - the model searched for the set of prescriptions and timing choices which permitted an optimal solution according to the specified objective of maximum PNV.

Each FORPLAN solution was reviewed by the interdisciplinary team to determine operational feasibility. Several FORPLAN solutions were altered and reanalyzed before the team concurred on a final, feasible design for each alternative.



Development of Management Requirements (MR's)

While the analysis process was in the early stages, National direction was developed to assure compliance with the requirements of applicable laws and regulations. Subsequently, the Pacific Northwest Region developed specific direction for Region 6 to ensure that the requirements were applied consistently across the Region (USDA 1983).

The Regional Direction provided guidelines for MR's pertaining to the management of the following resources: timber; fish and wildlife; soil and water resources, and land productivity; water quality; riparian areas; and range. The MR's were not meant to establish a final or appropriate level of management. Instead, the MR's set the "floor" for alternative levels of management. They indicate the level below which management will not normally be considered.

The Regional direction recognized that some of the requirements were procedural in nature, could not be incorporated in the analysis, or were not likely to have an impact on analysis. These requirements have been incorporated into the Forest-wide Standards and Guidelines or into those standards and guidelines unique to a specific management area prescription.

Other requirements in the Regional direction that impose substantive standards and specific management direction were developed and incorporated in the Forest model. These include requirements for:

- maintenance of habitat for viable populations of fish and wildlife (anadromous fish, Northern spotted owl, pileated woodpecker, marten, mountain goat, black-tailed deer, Roosevelt elk, primary cavity excavators, bald eagle, peregrine falcon, and grizzly bear)
- dispersion of timber harvest units
- riparian area management
- compliance with the Clean Water Act, including consideration of hydrologic cumulative effects of management activities (see documentation in new Appendix H). The method used to meet MR's was developed in response to public review and comment.

The Regional Management Requirement direction has been reevaluated several times. The last evaluation resulted in two documents issued in July, 1986: "A Report on Minimum Management Requirements For Forest Planning on the National Forests of The Pacific Northwest Region" (USDA 1986), and "A Background Document on the Development and Review of Minimum Management Requirements For Forest Planning on the National Forests of the Pacific Northwest Region." The appendices of the latter document incorporate previous letters and documents containing pertinent direction.

Appendix B, Chapter IV discusses this direction in detail, including the constraints used in FORPLAN to model the MR's. Once the MR's were developed, they played a key role in the benchmark analysis (see below) and in formulating alternatives. The opportunity costs of MR's affecting timber supply are evaluated in Table II-5, following the Benchmark section.

The wildlife, riparian, dispersion, and water quality MR's, as discussed above, are included in all the alternatives considered in detail in this FEIS (except Alternative NC - No Change). Appendix H provides more detail on these MR's. In addition, the Best Management Practices (BMP's) for water quality (one of the MR's) are discussed in Appendix I.

The MR's with potentially significant interactions with other resources are: harvest dispersion, cavity excavators, riparian areas, northern spotted owls, and water quality. The development of the individual prescriptions and constraints to satisfy these minimum resource needs is documented in Appendices B and H. The requirements are based on the guidelines in the direction documents referenced above, and in the Regional Guide for the Pacific Northwest Region (USDA 1984). Specific requirements for the Mt. Baker-Snoqualmie National Forest were developed by the interdisciplinary team and are designed to accomplish each objective with the minimum adverse impacts on the resources.

A sensitivity analysis of MR's was conducted during development of the DEIS and FEIS. The effects of increasing and decreasing the individual MR's on selected outputs and effects for several alternatives are discussed in Appendix H. Because the emphasis of each alternative is different, the effects of varying the MR's are different in each alternative. The effects of increasing or

decreasing all of the selected MR's in combination is also analyzed and displayed in Appendix H.

MR's are based on the available research, supplemented by experience and professional judgement. MR's are designed to provide those minimum levels of resource protection required, while minimizing the adverse impacts to other values. As knowledge of these resources grows and additional research findings are revealed, the Forest Service is prepared to modify management direction, including the MR's, to stay current with the state-of-the-art in forest resource management.

Benchmarks

Prior to developing alternatives, an analysis of the current management situation, required by NFMA, was completed. Part of this required process is the "benchmark" analysis. The benchmarks have several purposes:

- They help define the maximum economic and biological resource production opportunities on the Mt. Baker-Snoqualmie;
- They assist in evaluating compatibilities and conflicts between market and nonmarket objectives;
- They define the range (decision space) within which integrated alternatives will be developed - refer back to Table II-2;
- and, among other purposes, they serve to analyze the implications and opportunity costs of legal and policy constraints.

Relationship of Benchmarks and Alternatives

Benchmarks are similar to alternatives in that they are a combination of land capability, management practices, and schedules to achieve certain objectives. Benchmark runs, like alternative runs, are done primarily in FORPLAN; resource outputs or results are analyzed and reported.

Unlike alternatives, benchmarks are not designed to respond to all the ICO's. Also, all the alternatives (except NC) must meet the management requirements of 36 CFR 219.27 (such as protecting the productivity of the land, meeting minimum air and water quality standards, and maintaining viable populations of fish and wildlife species.) Some of the benchmarks were also formulated to meet these MR's others were not. By comparing benchmarks with and without MR's, the opportunity costs of the MR's can be quantified. The opportunity costs are discussed later in this chapter.

Some benchmarks are economically based; others indicate the maximum biological productivity of the land for various resources, with a given set of constraints or requirements. In all cases, the benchmarks establish the decision space for developing a range of alternatives and the initial design dimensions of selected alternatives.

Required Benchmarks

There are several Benchmarks that are required by the regulations [36 CFR 219.12(e)] and National direction. They include:

Minimum Level. This benchmark specifies the minimum level of management which would be needed to maintain the Mt. Baker-Snoqualmie National Forest as part of the National Forest System.

Maximum Present Net Value Based on Established Market Price. This benchmark specifies the management of the Forest at a level which will maximize the present net value of those outputs that have an established market price.

Maximum Present Net Value Including Assigned Values. This benchmark specifies the management which will maximize the present net value of those outputs that have either an established market price or assigned monetary value (such as dispersed recreation.)

Current Level. This benchmark specifies the management of the Mt. Baker-Snoqualmie most likely to be implemented in the future if current direction is followed. This benchmark forms the basis for the "no action" alternative.

Maximum Resource Levels. Each of these benchmarks estimates the maximum capabilities of the Forest to provide a single resource emphasis level. On the Mt. Baker-Snoqualmie, the maximum resource benchmarks included timber and Primitive and Semi-primitive Nonmotorized Recreation. Because of the lack of demand for grazing (and except for transitory range, limited suitable grazing land), a maximum range benchmark run was not made.

A maximum wilderness benchmark was not developed due to the enactment of the Washington Wilderness Act of 1984. It added nearly 350,000 acres of wilderness. However, the maximum primitive and semi-primitive nonmotorized recreation benchmark allocated all released RARE II lands that were capable of producing these kinds of recreation to a non-development management strategy.

Results of Selected Benchmarks

Table II-4 displays several outputs and effects from selected benchmarks. Shown are several runs of required benchmarks, including three different current levels, three maximum resource level benchmarks, and two runs of maximum PNV benchmarks. The results shown in the table are only a small sample of the numerous benchmark runs that were made early in the analysis process. These eight, however, represent the resource outputs and economic decision space for formulation of the alternatives.

The additional benchmarks were used to analyze some of the required and discretionary constraints, such as rotation age and non-declining flow. The sensitivity of timber price trends, timber costs, and the discount rate were also analyzed through the benchmark analysis. Appendix B, Chapter VI includes a complete display of the benchmark analysis results.

Table II-4
Benchmark Analysis Results - Annual Figures

Benchmark	PNV (MM $)	LTSY (MMCF)	ASQ (MMCF) Decade 1	Suitable Land (M Ac)
Biological Timber Potential (Run #1) 1/	2599.7	72.6	68.4	606.9
Maximum PNV, No MR's (Run #3)	2630 9	66 2	63.9	606.9
Maximum PNV, with MR's (Run #7)	2254.0	37.5	37.5	463.8
Maximum Timber Resource (Run MXT) 1/	2302 3	62.9	57.2	529 7
Maximum P and SPNM Recreation (Run Max Rec)	2050.5	27.8	26.7	300.9
Current Direction (Run CD)	2319 8	56 9	44.8	473.7
Current Direct, Implementable With Timber Targets Specified in Current TM Plan	2192 7	51 9	41.7	434.3
Current Direction, Implementable With No Specified Timber Targets	2158 5	52 3	20.9	434.3

1/ Run #1 mazimizes timber outputs without consideration of resource integrating requirements; Run *MXT maximizes timber outputs with MR's as a constraint*

Opportunity Cost Analysis

As mentioned earlier, the benchmarks were also used to analyze the implications and opportunity costs of some legal and policy constraints that the alternatives must meet. The opportunity costs of four major constraint sets were analyzed: wildlife MR's, riparian area or streamside MR's, water quality management requirements, and dispersion of timber harvest units and accessibility requirements. 1/ The "cost" is measured in the amount of change from a Maximum PNV, without MR's benchmark in several areas: allowable sale quantity, acres of land suitable for timber production, PNV, and others.

The maximum opportunity cost of each of the four constraint sets was analyzed individually, then calculated with all four constraints applied simultaneously. Table II-5 shows the opportunity costs of the MR's. The effect of the MR constraint sets is largely additive, although there is some degree of interdependence, as the effects of all three constraint sets together is less then the sum of the effects of the three individual constraint sets.

1/ The latter include NFMA requirements for maximum size of timber harvest units and delaying cutting adjacent stands until the stands in cutover units are 4-1/2 feet in height.

Table II-5
Opportunity Costs of MR's

	LTSYC	ASQ 1st Decade	Suitable Lands	Final Harvest (5 Decade Total)	Planting (5 Decade Total)	Pre-Commercial Thin (5 Decade total)	PNV
Unit of Measure	MMCF	MMCF	M Acres	M Acres	M Acres	M Acres	$MM
Run #3 1/	66.2	63 9	606 9	39.0	29.5	21 4	2631
Dispersion MR	59 6	59.1	606.9	36.6	22 8	16.8	2484
Actual Change	-6 6	-4 8	0	-2.4	-6.7	-4.6	-147
Percent Change	-10%	-8%	0	-6%	-23%	-21%	-6%
Wildlife MR	51 3	50.1	529.5	31.4	18.7	14.2	2410
Actual Change	-14 9	-13.8	-77.4	-7.6	-10.8	-7.2	-221
Percent Change	-22%	-22%	-13%	-20%	-37%	-34%	-8%
Streamside MR	62.3	59.6	583.4	36.4	26.9	19.3	2580
Actual Change	-3.9	-4.3	-23.5	-2.6	-2.6	-2.1	+11
Percent Change	-6%	-7%	-4%	-7%	-9%	-10%	+0.4%
Water Quality & Riparian MR	41.3	41.0	482.0	26.4	11 3	9 2	2297
Actual Change	-24 9	-22.9	-124.9	-12.7	-18.2	-12.2	-334
Percent Change	-38%	-36%	-21%	-32%	-62%	-57%	-13%
Run #7 1/	37.5	37 5	463 8	24.4	8.4	7 3	2254
Actual Change, Run 3 to Run 7	-28.7	-26.4	-143.2	-14.6	-21.1	-14.1	-377
Percent Change, Run 3 to Run 7	-43%	-41%	-24%	-37%	-72%	-66%	-14%

1/ Run #3 is Maximum PNV without MR's. Run #7 is Maximum PNV with MR's.

A significant decline in allowable sale quantity (ASQ) and long-term sustained yield capacity (LTSYC - see glossary for definitions) occurs when MR's are applied. A primary cause of this decline is the reduction in acres available for timber harvest. This reduction is the result of assigning "no harvest" prescriptions to tentatively suitable lands to provide habitat for those wildlife species that require mature and old growth habitats. Another cause of the reduction in acres available for timber harvest is the "special attention" requirement in the Planning Regulations for riparian zones to protect water conditions and fish habitat. Twenty-five percent of the acres available for timber production in the riparian area were constrained to a "no harvest" prescription to simulate this "special attention".

Another major reason for the decline in timber harvest is the incorporation of the harvest dispersion and water quality MR's. The harvest dispersion constraint was used in FORPLAN to model the dispersion of openings and maximum size limit of clearcut units, required by the Regional Guide. This constraint limits the amount of acres that can be harvested in an allocation zone in each decade. The procedure for meeting water quality MR's developed in the hydrologic cumulative effects analysis constrains the number of acres, by watershed, that are available for final harvest to a level that maintains a watershed in its acceptable condition or allows watersheds in an unacceptable condition to recover to an acceptable level. The complete results of the opportunity cost analysis are found in Appendix B.

Sensitivity Analysis

The sensitivity of timber costs, timber price trends, and the discount rate were also analyzed utilizing the benchmarks. The detailed results of these sensitivity analysis are displayed in Appendix B, Chapter VI. In summary, as timber price trends are increased, LTSYC and PNV increase; however, first decade harvest decreases. Only insignificant (1 percent or less) changes in suitable acres occur as price trends change.

The sensitivity of timber costs utilized in the model were analyzed by increasing and decreasing costs by 20 percent. Timber outputs and PNV increase 10-20 percent as timber costs are reduced 20 percent. Acres selected for intensive timber management increase approximately 50 percent as costs are reduced 20 percent. When costs are increased by 20 percent, timber outputs are reduced 15-20 percent and PNV declines by approximately 10 percent. Acres selected for intensive timber management practices are reduced about 55 percent when costs are increased by 20 percent. Acres suitable for timber production vary by 2 percent or less, as costs are increased or decreased.

The 1980 RPA Program for timber is based on an assumption of substantial reductions of unit costs through improved cost effectiveness and new technology.

Benchmarks (and alternatives) were run using a 4 percent discount rate. To determine the sensitivity of the runs to varying discount rates, PNV, costs and benefits were also calculated using a 7 1/8 percent rate. At the higher discount rate, PNV costs and benefits all decline approximately 45 percent.

C. FORMULATION OF ALTERNATIVES

The alternatives displayed in this FEIS were formulated by the Interdisciplinary Team and the Forest Management team. They used the information developed in the benchmark analysis that defined the decision space, the range within which the Forest has the ability to formulate alternatives to respond to the ICO's. Refer back to Table II-2.

Existing Constraints

There are three categories of existing constraints that limit the range of feasible alternatives that could be developed. The management direction for a significant portion of the Forest is already established through legislation. Congress prescribed the management emphasis for approximately 895,000 acres (52 percent of the Forest) through various acts that designated wilderness, National Recreation Areas, Wild and Scenic Rivers, and the Alpine Lakes Management Unit.

Existing development and use on an additional 184,000 acres (11 percent of the Forest) also constrains the range of feasible alternatives. These include: municipal watersheds, Research Natural Areas, roads, utility corridors, special use authorizations, and recreation and administrative developments.

Finally, habitat necessary to maintain viable populations of wildlife management indicator species (wildlife MR's) was determined prior to the formulation of alternatives. To the extent possible, these habitat areas were placed in areas that had already been encumbered by congressional designation or existing uses and developments.

Mapping and Assignment to A Management Strategy

These three categories of land constraints (congressional designations, existing uses, and MR's) were mapped and assigned to management strategies. The management strategies for these areas are the same in all alternatives but the management intensity (prescription) varies between alternatives.

For example: small municipal watersheds were assigned to a municipal watershed management strategy in all alternatives. However, in an alternative that emphasized timber production, a watershed prescription that included timber harvest was available for selection (by the FORPLAN model). In an alternative that emphasizes unroaded recreation, the analysis areas in the watershed were assigned to a watershed prescription that excluded timber harvest. Note that Alternative NC (No Change) was not formulated using FORPLAN.

Required Alternatives

Several alternatives are required by regulation, Regional, and National direction; these required alternatives are listed and briefly described below.

No Change

This alternative, developed in response to a 1986 appeal, is designed to represent the existing direction in approved plans. The No Change Alternative represents the 1963 Timber Management Plans (as amended); coordination with

other resources is guided by the Ranger District Multiple Use Plans and the Forest Service Directives System. It does not comply with the provisions of the National Forest Management Act.

In this FEIS, Alternative NC is the No Change Alternative.

Current Direction (No Action)

This is the alternative of "No-Action" required by the Council on Environmental Quality (CEQ) regulations (40 CFR 1502.14) and the NFMA regulations (36 CFR 219.12(f)(7)). This alternative will continue the management of the Mt. Baker-Snoqualmie as defined by existing direction in approved management plans; continuation of existing policies, standards, and guidelines; management requirements; current budget updated for changing costs over time; and, to the extent possible, production of current levels and mixes of resource outputs.

In this FEIS, Alternative A is the "No-Action" Alternative.

Emphasis on the RPA Program

This alternative will determine how the 1980 RPA Program distributed to the Forests through the Regional Guide can best be implemented.

In this FEIS, Alternative B is the 1980 RPA Program alternative.

Emphasis on Nonmarket Opportunities

This alternative puts an emphasis on water, fish and wildlife, recreation, and other amenity values. Management for other resources will be consistent with the emphasis on amenity values.

Alternative C is the alternative which emphasizes nonmarket opportunities in this FEIS.

Emphasis on Market Opportunities

This alternative has an emphasis on outputs that have an established market price (timber, livestock range forage, commercial fish, developed recreation opportunities, and minerals). Management for other resources will be consistent with the emphasis on market-oriented outputs.

In this FEIS, Alternative I is the alternative which emphasizes market opportunities.

Additional Alternatives

Additional alternatives, including those necessary to respond to the full range of issues, concerns, and opportunities, were formulated to reflect a broad range of resource outputs and expenditure levels. The regulations, 36 CFR 219.12(f)(1), require alternatives to be "distributed between the minimum

resource potential and the maximum resource potential" to display the "full range" that a Forest could produce.

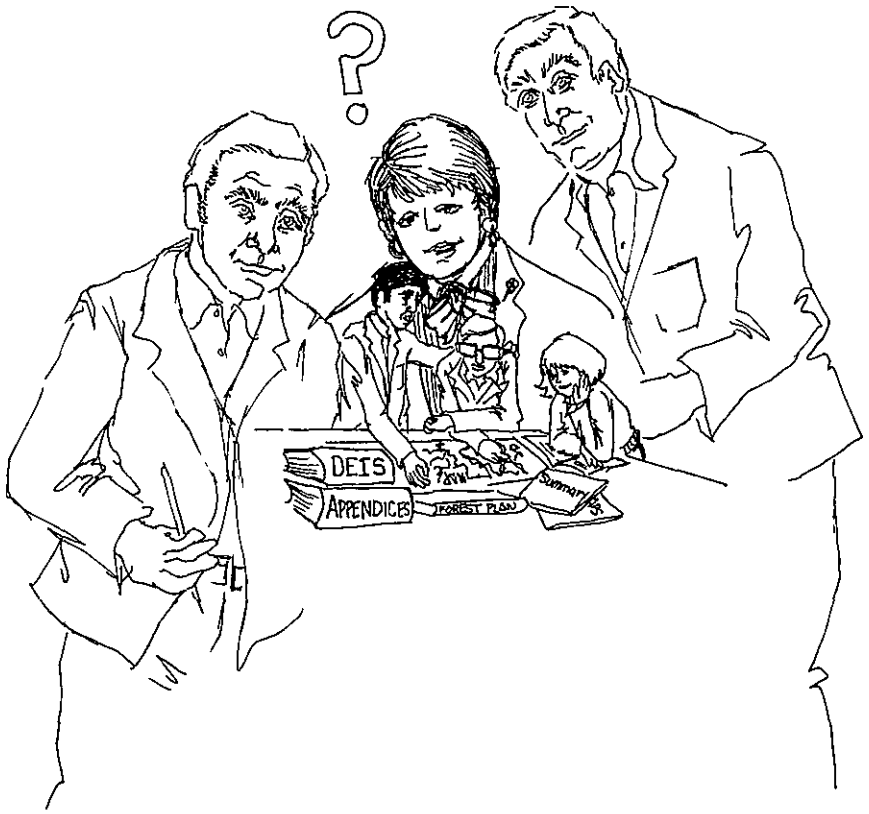
In this FEIS, Alternatives G, H and J are designed to provide a better distribution between the minimum and maximum resource potential.

The Preferred Alternative

A new Preferred Alternative is identified in this FEIS. This alternative was developed considering all comments received on the DEIS. It was selected as the Preferred Alternative only after careful comparison of all the alternatives on the basis of their resource outputs, environmental effects, implementation costs, and the trade-offs among them. The Preferred Alternative is that one alternative which the Forest Service determines best maximizes the net public benefits in an environmentally sound manner, thereby responding to issues.

After the Forest Supervisor reviewed the Interdisciplinary Team's evaluation, and after the Regional Forester and his staff had reviewed the alternatives,

Alternative J is selected as the Preferred Alternative in this FEIS.



D. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Within the range defined by the benchmarks, an almost infinite number of alternative ways to manage the Forest may be developed. And in the initial formulation of the alternatives, a large number of possible variations were considered.

The criteria used to reduce the number of possible alternatives for development in detail included: obtaining a good distribution of alternatives within the decision space available; responding to public issues (national, regional, and local); recent Congressional legislation; National and Regional direction for required alternatives; public reaction to alternatives presented in the DEIS; and, subjectively, limiting the alternatives to a number that could be reasonably reviewed and comprehended by both the decision-maker and the public. The following alternatives were considered but were not developed in detail.

Alternatives Developed in Detail in DEIS, But Eliminated From Detailed Study in FEIS

Alternatives D, E, E-Departure, F, and H-Departure were developed in detail in the DEIS but eliminated from further consideration because they received very few comments during the public review period and they are not needed to provide a full range of alternatives for analysis. The alternatives eliminated are described below:

Alternative D - The goal of this alternative was to emphasize those resources with an established price in the market. Other resources would be managed at levels that would not reduce the outputs of the market resources. While this alternative was dropped, a new alternative (I) with a similar goal has been added in response to public comment on the DEIS.

Alternative E - The goal of this alternative was to retain a large portion of the existing roadless areas in an unroaded condition, while producing the maximum timber volume on the remaining developed portion of the Forest to reduce the economic impact of retaining the roadless areas.

Alternative E-Departure - The goal of this alternative was the same as Alternative E except for relaxed non-declining flow and harvest utilization standards.

Alternative F - The goal of this alternative was to provide a moderate level of outputs for a number of resources, with some emphasis on unroaded recreation, timber production, and increasing big game populations.

Alternative H-Departure - The goal of this alternative was to provide an emphasis on unroaded recreation; protection of scenic values in the foreground and middleground of heavily traveled highway corridors; increasing big game populations; plus emphasis on timber production on tentatively suitable acres not assigned to other objectives. As a departure alternative, the timber harvest schedule was allowed to depart from non-declining flow.

Alternatives Received From The Public During Response to DEIS, But Eliminated From Detailed Study in FEIS

Several alternatives, or proposals for alternatives, were received from individuals or organizations during the comment period on the DEIS. One was developed as an alternative considered in detail (Alternative I); two others, described below, were considered but not developed in detail.

The Earth First! Alternative - The goal of this alternative was to halt logging and road construction in roadless areas and unfragmented old growth areas; phase out all logging on National Forest lands over a 15-year period; phase out road construction; complete protection of American Indian Religious and Cultural Use areas; recovery of native plant and animal species to historic population levels; rehabilitation in all streams for natural anadromous fish; recommendation of 47 wild and scenic rivers for designation; wilderness recommendations in nine areas; rehabilitation of the North Cascades Ecosystem; and elimination of the mountain hemlock study.

The Earth First! Alternative was not developed in detail. It does not meet the Multiple Use Sustained Yield Act. However, in developing Alternative J (Preferred), some elements of this alternative were incorporated, including rehabilitation of streams for anadromous fish, greatly increased mileage of recommended wild and scenic rivers, and larger, unfragmented areas of old growth.

Alternative C-Modified - This alternative was presented by the Pleasure Walking Horse Club of Washington and included mapped management areas: a blend of DEIS alternatives C and G. The goal of Alternative C-Modified was to minimize clearcutting, with more emphasis on selective cutting; more emphasis on wildlife and wildlife habitat, protection of old growth and rivers; and a harvest level between that of the two alternatives. While Alternative C-Modified was not developed in detail, as presented, in this FEIS, a large number of the components of the alternative were incorporated in the development of Alternative J (Preferred). These included more miles of wild and scenic river recommended, more wildlife habitat protection, increased scenic protection, a lower allowable sale quantity, and fewer miles of new road construction.

Designate Additional Wilderness

The Mt. Baker-Snoqualmie National Forest has over 400,000 acres of land that are unroaded and undeveloped and are suitable for wilderness. Some members of the public believe that additional wilderness recommendations should be considered in the Forest Planning process. An alternative that would recommend additional wilderness designation was considered but not developed in detail.

The primary reason this alternative was not developed in detail was the passing by Congress of the Washington State Wilderness Act of 1984. During deliberations on this Wilderness Act, Congress considered all the roadless areas on the Forest. They received many recommendations from diverse segments of the public. The Act represents their judgement on which areas should be designated wilderness. The Act contains specific language to the effect that the Forest Service is not required to consider wilderness recommendations for those "released" roadless parcels in the first generation of Forest Plans. The

statute does not prohibit the Forest Service from doing so, but for the Mt. Baker-Snoqualmie, it is not considered reasonable so soon after the '84 Act.

Revise Alpine Lakes Plan

The Alpine Lakes Area Management Act of 1976 required development of and periodic revision of the management plan for the Alpine Lakes Management Unit. This is a special plan required by Congress. No special planning criteria or process was specified. The NFMA planning regulations (36 CFR 219.2(b)) provide that, in those cases where a separate special area plan is required, such plan may be incorporated without modification into the Forest Plan.

Based on the fact that the Alpine Lakes Plan (USDA 1981) is relatively new, is consistent with the intent of the NFMA, only minor problems have been encountered in its implementation, and the existing Plan is not a major public issue or management concern, the decision was made to incorporate the Alpine Lakes Plan into the Forest Plan without modification. Thus, alternative management direction for the Alpine Lakes Area was not developed in detail.

Revise the Skagit Wild and Scenic River Management Plan

The Skagit Wild and Scenic River was classified by Amendment to the Wild and Scenic Rivers Act by P.L. 95-625 dated November 10, 1978. The Management Plan for the Skagit System was finalized and Notice of Availability published in the Federal Register on May 10, 1984. The Plan became effective on August 8, 1984.

Based on the fact that the Skagit Wild and Scenic River Management Plan is a recent Plan, that no major problems have been encountered during implementation that would require revision, that the Plan is reasonably consistent with the NFMA Planning regulations, and that it is not a major issue or concern, the decision was made to incorporate the plan into the Forest Plan without modification. Thus, alternative management direction for the Skagit Wild and Scenic River was not considered in detail.

Alternative to Meet RPA Goals

Several FORPLAN runs were made in an effort to produce all of the RPA Targets simultaneously. A departure analysis was made to determine if timber targets could be met for the first five decades. In addition rotation age constraints were relaxed to the point of utilization standards. None of these alternatives resulted in a feasible solution that would simultaneously meet all of the RPA targets. Thus, an alternative to meet all RPA targets could not be considered in detail.

Development of All and None of the Roadless Areas

NFMA Planning Regulations (36 CFR 219.12(f)(1)) require that "alternatives shall be distributed between the minimum resource potential and the maximum resource potential to reflect to the extent practicable the full range of major commodity and environmental resource uses and values that could be produced from the forest."

Regional Planning direction relating to this requirement and the roadless areas suggests a range of alternatives where 100 percent, 75, 50, 25, and 0 percent of the roadless areas remain undeveloped, unless this range does not produce practical alternatives.

Following the formulation of the alternatives, all those to be considered in detail were reviewed to determine whether they met this criterion. Alternatives A through J provide a range of 63 percent to 91 percent of the roadless acres remaining in an undeveloped condition.

An alternative where 100 percent of the roadless areas would remain undeveloped was not considered practical because of the size and location of a number of the individual roadless parcels. Fifty-five of the roadless parcels are less than 1,000 acres in size. These small parcels are generally slivers of roadless areas that remained after Congress established the wilderness boundaries in the Washington State Wilderness Act of 1984.

The character of the roadless parcels can be generally described as high elevation, steep terrain, with difficult or impossible development opportunities, although there are exceptions. These lands are still in an undeveloped condition for these reasons. Past National Forest managers have recognized these limitations and chose to concentrate development activities elsewhere.

A maximum of 36 percent of the roadless areas would be developed in any of the alternatives, due to the lack of resource capability, wildlife habitat necessary to meet MR's, and the character of the terrain.

Develop Benchmarks into Alternatives

The benchmarks were eliminated from detailed study as alternatives because they were not feasible to implement. As discussed above, the benchmarks were developed to study resource maximization potentials for the Forest, by which the decision space or the parameters within which alternatives could be developed was determined. Benchmarks do not consider alternative output combinations which address issues, concerns, or opportunities.

E. ALTERNATIVES CONSIDERED IN DETAIL

The alternatives considered in detail all specify different ways of managing the Mt. Baker-Snoqualmie National Forest. Each is a combination of land uses, management practices, and activity schedules which result in a unique combination of resource outputs, land uses, environmental conditions, and economic and social effects. Each responds to the issues and concerns in different ways.

Together, these alternatives present a broad range of reasonable management alternatives. They were formulated through an analysis process, discussed above, that explored a wide array of possibilities shown in the benchmarks and the required alternatives. A detailed description of the process used to formulate the alternatives can be found in Chapter VII of Appendix B. The following alternatives were selected for detailed study:

Alternative NC (No Change)
Alternative A (No Action)
Alternative B (RPA)
Alternative C
Alternative G-Modified
Alternative H
Alternative I
Alternative J (Preferred)

Elements Common to All Alternatives

A number of resource management programs are treated the same in all the alternatives considered in detail. These are described below and are **not** included in the alternative descriptions which follow.

- The Alpine Lakes Area Management Plan, implemented in 1981, is incorporated into all alternatives except Alternative NC.
- The Skagit Wild and Scenic River Plan, implemented in 1984, is incorporated into all alternatives except Alternative NC.
- The Mt. Baker National Recreation Area, established in 1984, is the same in all alternatives.
- The three existing Research Natural Areas - North Fork Nooksack River, Lake Twenty-two and Long Creek - are retained in all alternatives.
- The foreground of the Mather Memorial Parkway, designated in 1931, is managed to retain its scenic quality in all alternatives.
- The management requirements necessary to integrate the requirements of law and regulation are incorporated in all alternatives except Alternative NC.
- The rights established by the various Indian Treaties are retained in all alternatives. Consultation with Indian Tribal leaders will continue on any proposed projects within sites inventoried in response to the American Indian Religious Freedom Act.

- The acres of designated wilderness are the same in all alternatives. Acres assigned to classes of the Wilderness Recreation Opportunity Spectrum (WROS) do vary by alternative; however, there are no WROS classes in Alternative NC.

- Even-aged management and regeneration harvest through clearcutting are assumed in estimating timber outputs in all alternatives; the use of other systems, however, is not precluded. Refer to Appendix F for a discussion of those situations where other harvest methods are acceptable.

- All alternatives would make full use of vegetation management techniques including herbicides and fire. In 1988, the Pacific Northwest Region, USDA Forest Service completed a final EIS on managing competing and unwanted vegetation (USDA 1988b). That final EIS, the Mediated Agreement, and accompanying implementation direction is incorporated by reference into this FEIS. It will guide vegetation management activities as the Forest Plan is implemented.

- All existing utility corridors, electronic sites, and administrative sites are retained in all alternatives.

Alternative NC (No Change)

The No Change Alternative has been developed in response to decisions made regarding appeal number 1588, brought by the Northwest Forest Resource Council on May 19, 1986. The appeal centered on a decision by the Regional Forester to "require inclusion of minimum management requirements (MR's) in the Current Direction Alternative for each Forest Plan." The substance of the appeal was that a "true no-action alternative representing current management plans" was not included in Forest Plan EIS's.

The No Change Alternative is designed to continue the level of goods and services as set out in plans formulated and approved prior to the passage of the National Forest Management Act, specifically the 1963 Timber Management Plans. 2/ This alternative does not comply with all provisions of NFMA and the regulations promulgated by the Secretary of Agriculture to implement NFMA; the alternative could not be implemented or used in future management of the Forest under the Forest Plan without Congressional and/or Secretary of Agriculture action to change the law or regulations.

Alternative NC: does not use the most up-to-date inventories for assessing effects and estimating outputs; does not use current yield projection methods; its harvest schedule was not developed according to the concepts and philosophy of non-declining flow; and it does not incorporate management requirements, including those designed to maintain viable plant and animal populations.

2/ The 1963 Timber Management Plans (TM Plans) have been amended and updated to reflect major changes in the land base, such as the formation of North Cascades National Park, designation of wilderness, and transfer of administrative responsibility to other Forests. The TM Plans direct timber management activities; coordination with other resources is guided by Ranger District Multiple Use Plans and the Forest Service Directives System.

Design Criteria for Alternative NC (No Change)

Timber: the 1963 Timber Management Plans are the basis for the alternative.

Roads: the Naches Pass road would not be constructed.

Roadless Areas: an estimated 60% of the roadless areas would remain undeveloped; this estimate is based on the acres of commercial forest land assumed to be in the roadless areas.

Visual Resource: same as "Elements Common to All Alternatives."

Wild and Scenic Rivers: no provision for study or protection of potential rivers is included in the TM Plans.

Research Natural Areas: no potential areas recommended.

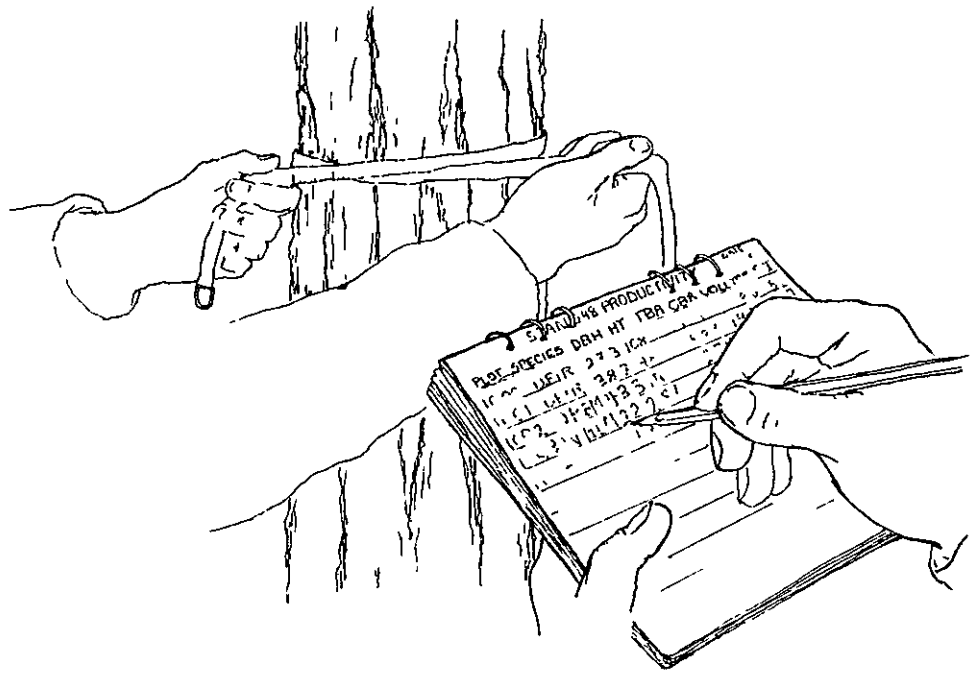
Spotted Owls: no provisions made to protect old-growth habitat for wildlife.

Big Game Habitat: no provisions made for protection of big game habitat.

Cavity Excavators: no provisions made for protection of habitat.

Anadromous/Resident Fish: no provisions made for protection of fish habitat.

Municipal Watersheds: all are managed under current agreements, memoranda of understanding.



Alternative A (No Action)

Alternative A was developed to continue management direction as set out in plans formulated and approved prior to the passage of the National Forest Management Act. The alternative incorporates the requirements of the National Forest Management Act of 1976 (36 CFR 219.12 through 219.27). The goal of Alternative A is to provide maximum timber outputs while maintaining or exceeding existing recreation, wildlife, fisheries, and visual resource outputs.

The plans approved prior to NFMA, plus current laws, regulations, and directions - including MR's - were used to assign management direction to different parts of the Forest. The most recent inventories were used to identify land base features, such as riparian zones and different timber condition classes. The NFMA process of land stratification for timber production was applied to commercial forest lands identified in the 1963 TM Plans. The latest technical processes were utilized to develop growth and yield projections for existing and regenerated timber stands. See the discussion below for more about the relationship of Alternative A (No Action) and the No Change Alternative.

This is the No Action Alternative required by the Council on Environmental Quality Regulations for implementing the National Environmental Policy Act (NEPA).

Design Criteria for Alternative A (No Action)

Timber: an exception to "Elements Common to All Alternatives", in FORPLAN, Alternative A was run with an objective of maximize timber volume for the first five decades, then was rerun to maximize PNV for 15 decades with the same timber outputs as in Decades 1-5. This resulted in some timber prescriptions having less than maximum economic efficiency. Approximately 70 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed for timber production. In the first two decades, approximately 26 miles of arterial and collector roads would be built. During that same period, about 330 miles of local roads would be constructed. The Naches Pass road would not be constructed.

Roadless Areas: would be managed under the direction contained in the Ranger District Multiple Use Plans; approximately 82 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: same as "Elements Common to All Alternatives."

Wild and Scenic Rivers: the 15 rivers included in the National Park Service Nation-wide Inventory are recommended for designation as part of the National Wild and Scenic River System. These fifteen rivers include a total of 375 miles, of which 142 miles are within the national forest boundary.

Research Natural Areas: no potential areas recommended.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide.

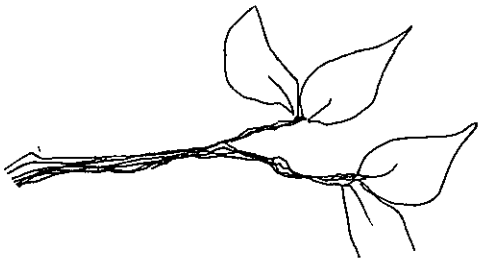
Approximately 36,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: habitat is provided for viable populations at the MR levels; additional habitat for some species in wilderness, RNA, and areas not suited for timber production.

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at 40% of their potential population levels.

Anadromous/Resident Fish: current populations are maintained through habitat maintenance or improvement at the MR level (low investment, MA 13A; see below.)

Municipal Watersheds: are managed under current agreements, memoranda of understanding.



Relationship of the No Change Alternative to the Alternative A (No Action)

The following brief section compares the No Change Alternative and Alternative A (No Action). Since Alternative NC is based on the 1963 Timber Management Plans - the only plan of those formulated and approved prior to NFMA that quantifies outputs - the following discussion is limited to the timber resource. Both Alternative A and Alternative NC are useful for comparison with the other alternatives.

Comparisons between the two alternatives are complex. Changes have occurred in the land base available for timber management, technology, timber inventory methods, analysis, and applicable laws and regulations.

One major difference between Alternatives NC and A (and the other alternatives) is the terminology used to express timber outputs. Potential yield (PY), used in the 1963 TM Plans, represents a level of chargeable volume that could be produced. It includes both net live (green) and dead (salvage) volume. Allowable sale quantity (ASQ) - used in Alternative A and the other alternatives - is the output objective that drives the timber program. ASQ includes only net live volume. Both PY and ASQ represent a ceiling on the amount of chargeable volume that could be sold for a given decade. Both are legitimate expressions of outputs.

Table II-6 shows a summary of the major differences between the development of PY and ASQ. Also refer to the narrative accompanying Table II-9b.

Table II-7 compares outputs between the No Change and No Action Alternatives. Timber sale program quantity (TSPQ), a term applicable to both NC and A, is the timber volume planned for sale in any one year. This could be potential yield plus any other volume, or allowable sale quantity plus other volume programmed for sale.

Table II-6
Summary of Major Differences Between Development of Potential Yield in Alternative NC and Allowable Sale Quantity in Alternative A (No Action)

Factor	PY Alt. NC (No Change)	ASQ Alt. A (No Action)
1. Land Base for Determining Timber Production	580,000 acres CFL, of which 33,000 acres are marginal and no yield is calculated, resulting in 547,000 for yield calculation.	597,000 acres tentatively suitable, with 184,000 acres not appropriate for timber production, 1/ resulting in 413,000 acres for yield calculation.
2. Acre Determination	Plot expansion to determine CFL acres.	Acres mapped in place.
3. Utilization Standards	11" DBH to 8" top.	9" DBH to 6" top for mature stands, 7" DBH to 4" top for others.
4. Sampling	No growth samples, mortality sampled on only one District.	Growth and mortality sampled Forest-wide.
5. Yield Calculation	Hanzlik formula used, plus an estimate of merchantable dead included in PY.	FORPLAN analysis used. Merchantable dead not included in ASQ, but is in TSPQ.
6. Commercial Thinning	No estimated yield; amended to include yield.	Included in ASQ.
7. Precommercial Thinning	No estimated yield.	Yield increases ASQ.
8. Genetics	No estimated yield.	Yield increases based on acres planted by area and species. Increases are between 1 and 2 percent.
9. Hardwoods	No estimated yield.	Hardwood volume chargeable to ASQ. 2/

1/ See Tables II-9d and II-9d(1) for a detailed breakdown of these acres.
2/ About 1.7% of inventory volume is in hardwood species.

Table II-7
Comparison of Timber Outputs Between the No Change and No Action Alternatives

Factor	Unit	Alt. NC 1/	Alt. A (No Action)
Land Base for Determining Timber Outputs	M Acres	547	413
LTSYC	MMCF	---	39
Potential Yield			
Yield Per Acre	BF	373	---
FY 85 - 88 Average	MMBF	204	---
FY 79 - 88 Average		230	---
ASQ			
Yield per Acre	BF	---	360
1st Decade	MMBF	---	149
Offered for Sale			
FY 85 - 88 Average	MMBF	252	---
FY 79 - 88 Average		267	---
Harvested			
FY 85 - 88 Average	MMBF	230	---
FY 79 - 88 Average		253	---
TSPQ			
1st Decade	MMBF	220	168

1/ See Table III-11, page III-46, FEIS for a detailed history of performance/ changes in 1963 TM Plans.

There is a 25 percent reduction in the acres used to determine timber outputs from Alternative NC to Alternative A. The two primary reasons are: the timber resource land suitability classification process used to determine lands tentatively suitable for timber production; and wildlife, riparian, and water quality MR's. As there is considerable overlap in acres not suited for timber production and those necessary to meet MR's, the best estimate of the effects of the two factors on the reduction in acres would be to assign 50 percent of the effect to each factor.

A long-term sustained yield capacity (LTSYC) was not calculated for Alternative NC. The average annual PY is lower in fiscal years 1985-88 than the average for the decade because adjustments were made in FY 1980 and FY 1984 to reflect the Rare II decision and the 1984 Washington State Wilderness Act.

The ASQ yield per acre per year - 360 BF (Alternative A) - is 3.5 percent less than PY per acre, 373 BF in Alternative NC, a result of decreased acreage used to determine timber outputs. This decrease would have been greater except for increased utilization standards, precommercial thinnings, and planting genetically improved seedlings. The average annual volume harvested is substantially less than the average sold for the periods shown in Table II-7. The differences are a reflection of the severely depressed timber market in the early 1980's. In Decade 1, projected TSPQ for Alternative A declines about 24% from the estimated TSPQ for Alternative NC. Refer to Table II-9b for comparison with the other alternatives, and to Table II-9n for budget, costs, employment and income outputs and effects.

Alternative B (RPA)

The goal of Alternative B is to simultaneously produce high levels of timber, anadromous fish, commonly hunted species of big game, and dispersed unroaded recreation, as specified in the 1980 RPA Program.

The RPA targets specified are:

Timber: annual programmed timber sales (TSPQ)
Decade 1 - 66 MMCF; Decades 2,3 - 69 MMCF; Decades 4, 5 - 70 MMCF
Developed Recreation: in thousand RVD's
Decade 1 - 2,381; Decade 5 - 2,660
Dispersed Recreation (includes hunting, fishing): in thousand RVD's
Decade 1 - 2,910; Decade 5 - 3,930
Wildlife Habitat Improvements: in acre equivalents
Decade 1 - 7,278; Decade 5 - 3,068

Design Criteria for Alternative B (RPA)

Timber: is produced at the highest level possible, while meeting the other goals of the alternative. Approximately 64 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed for timber production. In the first two decades, approximately 28 miles of arterial and collector roads would be built. During that same period, about 280 miles of local roads would be constructed. The option to construct Naches Pass road is retained.

Roadless Areas: all roadless area acres that are tentatively suitable for timber production are available for assignment to a timber harvest prescription, unless needed to meet MR's. Approximately 87 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: same as "Elements Common to All Alternatives."

Wild and Scenic Rivers: high timber goal precludes recommending any eligible rivers for Wild and Scenic designation.

Research Natural Areas: no potential areas recommended.

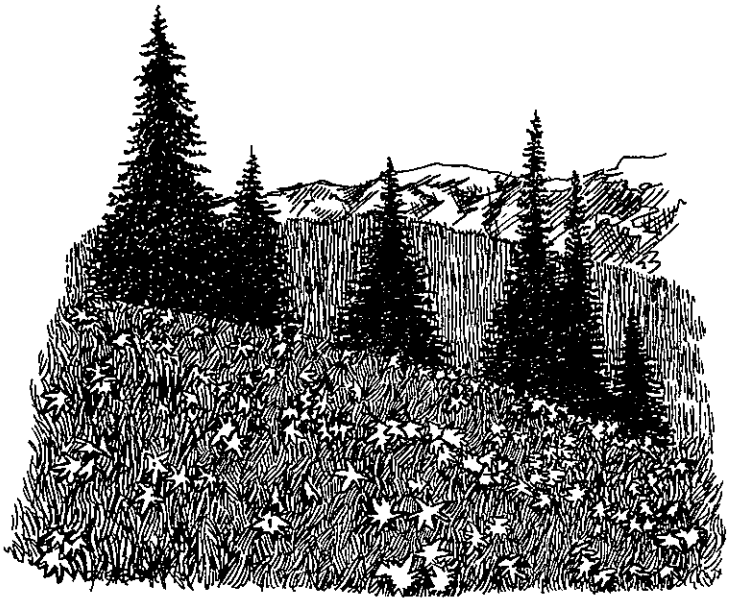
Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 79,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: alternative designed to increase population levels over time. Acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotation, sale design, smaller clearcuts, etc., provide an optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on land suitable for timber production, habitat is provided to maintain cavity excavators at the MR level - 20% of their potential population levels.

Anadromous/Resident Fish: anadromous fish production is increased through habitat improvements at a high investment level (MA 13C; see below).

Municipal Watersheds: Cedar River - contains 2 SOHA's, retain NF lands, timber production on suitable lands, maintain old-growth habitat; Green River - high level of timber production, essentially closed to public recreation; Sultan River - retain NF lands, full multiple use; Others - managed for a full range of outputs, timber production on suitable lands.



Alternative C

The goal of Alternative C is to emphasize primitive and semi-primitive nonmotorized recreation (accomplished through retention of existing roadless areas and, over time, reversion of some roaded areas to unroaded condition); protect scenery, fish, and wildlife habitat; and protect sites and areas important to American Indians for religious and cultural use.

Design Criteria for Alternative C

Timber: no production goals set; suitable acres and harvest level will be the lowest of all alternatives considered in detail. Approximately 43 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: roads to be closed include approximately 300 miles of existing arterial and collector roads. In the first two decades, about 15 miles of arterial and collector roads would be built, and about 180 miles of local roads would be constructed. Construction of the the Naches Pass road is precluded by management of surrounding lands for unroaded dispersed recreation.

Design Criteria for Alternative C (continued)

Roadless Areas: nearly all (97%) of the roadless area acres are retained in an unroaded condition at the end of the fifth decade.

Visual Resource: high to moderately-high protection of the foreground and middleground of all inventoried primary and secondary viewsheds.

Wild and Scenic Rivers: all 47 rivers determined to be eligible for Wild and Scenic River designation are recommended for designation as part of the National Wild and Scenic River System. The total mileage of rivers included is 786, of which 441 miles are within the national forest boundary.

Research Natural Areas: five potential RNA's are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 36,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: some acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotations, sale design, smaller clearcuts etc. provide optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat provided to maintain cavity excavators at 60% of their potential population levels.

Anadromous/Resident Fish: anadromous and resident fish production is increased through habitat improvements at a high investment level (MA 13D; see below).

Municipal Watersheds: Cedar River - contains 2 SOHA's, with stipulation that habitat be maintained as old growth when lands exchanged to City of Seattle; Green River - current direction (timber production, dispersed recreation permitted); Sultan River - closed watershed, exchange NF lands; Others - no timber harvest, limited recreation use.

Alternative G-Modified

The goal of Alternative G-Modified is to emphasize maintenance of natural ecosystems and diversity of native plants and animals, emphasize providing uses not found on private lands, and produce timber in a way that is consistent with the other goals and is non-damaging to soils.

Design Criteria for Alternative G-Modified

Timber: timber production will occur on currently accessed sites first. Maintenance or development of old growth, especially at lower elevations, is emphasized. Approximately 41 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: roads to be closed include approximately 65 miles of existing arterial and collector roads. In the first two decades, approximately 13 miles of arterial and collector roads would be built, and about 145 miles of local roads would be constructed. Construction of the Naches Pass road is precluded by management of surrounding lands for undeveloped recreation.

Roadless Areas: approximately 96% of the roadless area acres are retained in an unroaded condition at the end of the fifth decade.

Visual Resource: the foreground of selected corridors is protected, including the upper end of Mt. Baker Highway, portions of the Cascade River and North Fork of the Cascade, portions of the Mt. Loop Highway, the upper Sauk, lower Sultan, and Mather Memorial Parkway. Integral vistas within and from Class I airsheds and other wildernesses (not yet designated Class I) are protected.

Wild and Scenic Rivers: all 47 rivers determined to be eligible for Wild and Scenic River designation are recommended for designation as part of the National Wild and Scenic River System. The total mileage of rivers include is 786, of which 441 miles are within the national forest boundary.

Research Natural Areas: five potential RNA's are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Special Areas: special interest areas are recommended for designation at Twin Sisters, Monte Cristo, Baker Lake, Naches Pass, and along the Mather Memorial Parkway.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide **with additional habitat areas** being protected to meet the objectives of the alternative. Approximately 113,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

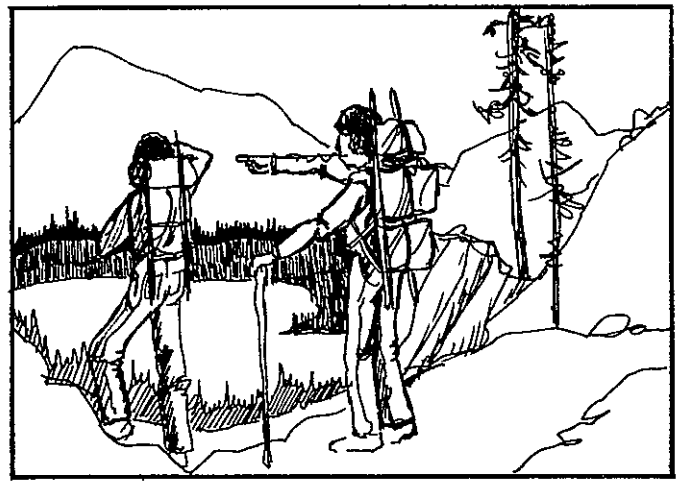
Big Game Habitat: habitat provided for viable populations at the MR levels; some additional habitat for some species in wilderness, RNA.

Design Criteria for Alternative G-Modified (continued)

Cavity Excavators: on lands suitable for timber production, habitat is provided for cavity excavators at the MR level - 20% of potential population levels.

Anadromous/Resident Fish: anadromous and resident fish production is increased through habitat improvements at a high investment level (MA 13D; see below).

Municipal Watersheds: Cedar River - managed to retain old-growth habitat with stipulation that it be maintained when lands exchanged to City of Seattle; Green River - current direction (timber production, dispersed recreation permitted); Sultan River - current situation (exchange NF lands, moderate timber harvest, restricted recreation use); Others - managed for a full range of outputs, timber production on suitable lands.



Alternative H

The goal of Alternative H is to provide an increased emphasis on unroaded recreation; protection of scenic values in the foreground and middleground of heavily traveled highway corridors; increasing big game populations; plus emphasis on timber production on tentatively suitable acres not assigned to other objectives.

Design Criteria for Alternative H

Timber: about 60 per cent of the tentatively suitable acres are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed. About 20 miles of existing roads, located in areas assigned to unroaded dispersed recreation, will be closed. In the first two decades, approximately 11 miles of arterial and collector roads would be built. During that same period, about 250 miles of local roads would be constructed. The option to construct the Naches Pass road is retained.

Design Criteria for Alternative H (continued)

Roadless Areas: areas with a high percentage of tentatively suitable lands are available for timber production emphasis, except where they also have a combination of high values for unroaded dispersed recreation, big game winter range enhancement opportunities, and are inventoried American Indian religious sites. Approximately 88 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: the foreground and middleground seen areas of heavily traveled highway corridors are managed for scenic quality (meet inventoried visual quality levels): I-90, U.S. 2, Mather Memorial Parkway, and Mountain Loop, Mt. Baker, and Baker Lake Highways.

Wild and Scenic Rivers: the five rivers determined in the DEIS to be eligible for Wild and Scenic River designation are recommended for designation - North Fork Nooksack, North Fork Skykomish, South Fork Skykomish, Tye, and Middle Fork Snoqualmie Rivers, a total of 154 miles, of which 71 miles are within the national forest boundary.

Research Natural Areas: five potential are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 61,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: some acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotations, sale design, smaller clearcuts etc. provide optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at 40% of potential population levels.

Anadromous/Resident Fish: anadromous fish production is increased through habitat improvements at a high investment level (MA 13C; see below).

Municipal Watersheds: Cedar River - current direction (exchange NF lands to City of Seattle, no old-growth habitat maintained); Green River - current direction (timber production, dispersed recreation permitted); Sultan River - current situation (exchange NF lands, moderate timber harvest, restricted recreation use); Others - manage for a full range of outputs, timber production on suitable lands.

Chapter II
Alternatives Considered in Detail

Alternative I

The goal of Alternative I is to emphasize those resources with an established price in the market place: timber production, anadromous fish, developed recreation, and minerals. Emphasis is also placed on enhancement of big game wildlife and fish habitat, and developing/maintaining an extensive trail system to accommodate a wide variety of users on a year-round basis. Other resources are managed at levels that do not reduce the outputs from the market resources.

Design Criteria for Alternative I

Timber: timber production is emphasized. Approximately 65 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed, to meet timber production goals. In the first two decades, approximately 34 miles of arterial and collector roads would be built. During that same period, about 290 miles of local roads would be constructed. The option to construct the Naches Pass road is retained.

Roadless Areas: all roadless area acres that are tentatively suitable for timber production are available for assignment to a timber harvest prescription, unless needed to meet MR's. Approximately 86 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual: the foreground of heavily-traveled highways are managed for scenic quality (I-90, U.S. 2, Mather Memorial Parkway, and Mountain Loop, Mt. Baker, and Baker Lake Highways).

Wild and Scenic Rivers: high timber goal precludes recommending any eligible rivers for Wild and Scenic River designation.

Research Natural Areas: no potential areas are recommended for designation.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. About 93,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: alternative designed to increase population levels over time. Acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotation, sale design, smaller clearcuts, etc., provide an optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at the MR level - 20% of potential population levels.

Anadromous/Resident Fish: anadromous fish populations are increased through habitat improvements at a high investment level (MA 13C; see below).

Municipal Watersheds: Cedar River - contains 2 SOHA's, retain NF lands, timber production on suitable lands, maintain old-growth habitat; Green River - high level of timber production, essentially closed to public recreation; Sultan River - retain NF lands, full multiple use; Others - managed for a full range of outputs, timber production on suitable lands.

Alternative J (Preferred)

This is the Preferred Alternative. It is a new alternative and was not displayed in the DEIS. Beginning with the draft EIS Preferred Alternative (H), Alternative J was developed to respond to public comment and new information. Differences between the draft and this Preferred Alternative include: a considerable increase in trail mileage; an increase in the number of rivers recommended for addition to the National Wild and Scenic Rivers System; allocation of three Special Areas (Botanic, Scenic, and Recreation/Education); an increased emphasis on unroaded recreation; and greater protection of scenic values within travel corridors. Timber production is emphasized on suitable acres assigned to a timber harvest prescription. Other resources will be managed at levels commensurate with the objectives of the alternative.

Design Criteria for Alternative J (Preferred)

Timber: about 58 per cent of the tentatively suitable acres are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed. Roads to be closed include about 25 miles of existing roads, located in areas assigned to unroaded dispersed recreation. In the first two decades, approximately 15 miles of arterial and collector roads would be built, and about 240 miles of local roads would be constructed. The option to construct the Naches Pass road is retained.

Roadless Areas: areas with a high percentage of tentatively suitable lands are available for timber production emphasis, except where they also have a combination of high values for unroaded dispersed recreation, big game winter range enhancement opportunities, and are inventoried American Indian religious sites. Approximately 91 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: the foreground and middleground seen areas of heavily traveled highway corridors are managed for scenic quality (meet inventoried visual quality levels): I-90, U.S. 2, Mather Memorial Parkway, and Mountain Loop, Mt. Baker, Baker Lake and Crystal Mountain Highways, and Cascade River road.

Wild and Scenic Rivers: 30 of the 47 rivers determined to be eligible for Wild and Scenic River designation are recommended for inclusion in the National Wild and Scenic Rivers System. A total of 452 miles are recommended, with 276 of those miles located within the national forest boundary. This recommendation is a preliminary administrative recommendation that will receive further review and possible modification by the Chief of the Forest Service, Secretary of Agriculture, and the President of the United States. The Congress has reserved the authority to make final decisions on designation of rivers as part of the National Wild and Scenic Rivers System.

Research Natural Areas: five potential RNA's are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Special Areas: special interest areas are recommended for designation at Mather Memorial Parkway, Heather Meadows, and Sulfur Creek.

Design Criteria for Alternative J (Preferred) (continued)

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 54,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: some acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotations, sale design, smaller clearcuts etc. provide optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at 40% of potential population levels.

Anadromous/Resident Fish: anadromous fish production is increased through habitat improvements at a high investment level (MA 13D; see below).

Municipal Watersheds: Cedar River - initiate negotiations on a new Cooperative Agreement to reestablish goals and management for the watershed; until then, do not enter into land exchanges affecting National Forest lands; Green River - current direction (timber production, dispersed recreation permitted); Sultan River - current situation (exchange NF lands, moderate timber harvest, restricted recreation use); Others - manage for a full range of outputs, timber production on suitable lands.

Mitigation Measures Common to All Alternatives

Some of the proposed management activities in the alternatives would cause significant environmental damage if implemented without means of mitigating the potential adverse effect. Based on research findings, the many years of experience in managing the resources on this Forest, and the professional judgement (and on-the-ground experience) of specialists involved in project design, many adverse environmental effects can be anticipated or predicted.

Activities can be prescribed and designed, in advance, using mitigation measures that will avoid, minimize, rectify, reduce, or compensate for undesirable environmental effects. Mitigation measures are incorporated into alternatives at different levels in several different ways:

- The management area allocations can mitigate potential adverse effects by separating incompatible uses, impacts, and conflicts.

- National Forest Management Act requirements are incorporated into the planning process; they are reflected in the allocations and Standards and Guidelines (refer to FEIS Appendices B, D, H and the Forest Plan, Chapter 4).

- Management activities in all alternatives will be governed by Standards and Guidelines, including Best Management Practices (BMP's). Best Management Practices are specifically designed to protect water quality, as required by Section 319 of the Clean Water Act, as amended by the Water Quality Act of 1987. Appropriate, site-specific BMP's will be selected and tailored for site-specific conditions of each proposed project. See Appendix I, FEIS for a discussion of the process and practices. Also, refer to Forest PLan, Chapter 4, Forest-wide Standards and Guidelines.

- The Forest Plan Monitoring Plan includes provisions for monitoring the effectiveness of mitigation measures; see Chapter 5, Forest Plan.

- Mitigation measures are developed at the site-specific project level of planning, and projects are tiered to other planning level mitigation measures.

- Management requirements established in accordance with Regional direction (1920, 2/9/83) are a major part of mitigation found in all alternatives.

- The standards and guidelines and management area prescriptions in Chapter 4 of the Forest Plan are a fundamental and integral part of the mitigation measures. Following are the Forest-wide Standards and Guidelines that apply to all alternatives.

Mitigation Measures Included in the Forest-wide Standards and Guidelines

The Recreation Resource

Public Information. Many of the recreating public are uninformed or inexperienced in using the forest for recreational purposes. Through ignorance of the Forest ecosystem and thoughtlessness, they often perform acts that are detrimental to their own safety, the enjoyment of the forest by others, or the

forest resource. Examples include: poor disposal of human waste and garbage, fire safety, wildlife harassment, lack of appropriate equipment, and destruction of desirable vegetation.

Past experience with public information and education programs has proved to be an effective way to minimize these adverse effects, but not completely eliminate them.

Off-Road Vehicle Use. Off-road vehicles (ORVs), have the potential to cause user conflicts, destruction of desirable vegetation, stress on wildlife, and adverse effects on soil and water.

Providing facilities specifically designed to accommodate ORV use is effective in reducing adverse effects on soil, water, and vegetation. Seasonal or year-long closures to ORV use are effective in preventing harassment of wildlife, and can protect soil and water when weather conditions are inappropriate for ORV use. User conflicts can be avoided or reduced by providing facilities that are specifically designated for use by ORVS. Recreationists that find ORV use objectionable can avoid these designated areas.

The Visual Resource

Many Forest management activities have the potential to cause adverse or undesirable effects on the visual resource. Activities that modify the landscape and scenery include: construction of roads, administrative or recreation facilities, and utility corridors; timber harvest activities; mining and energy exploration and development; burning wood debris; and fish and wildlife habitat improvements.

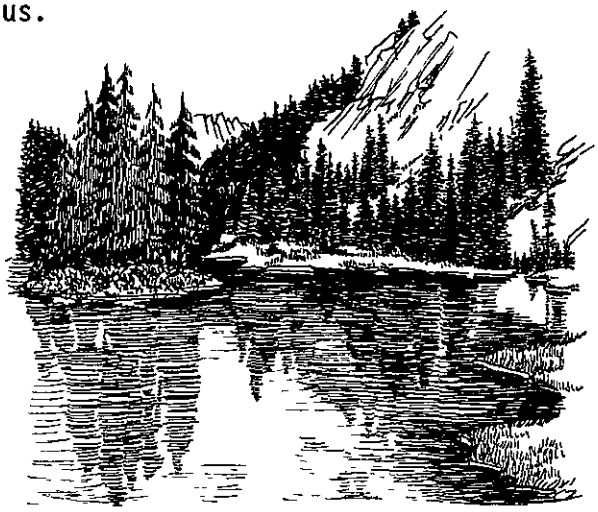
A number of handbooks regarding all aspects of landscape and visual resource management have been developed. These volumes were developed to provide a service-wide approach to National Forest landscape management. The basic concepts and principles are explained in Agriculture Handbook Number 434. The second volume, Handbook 462, describes the practical application of visual resource management concepts in administering various forest resources.

Handbook 462 describes the Visual Resource Management System. The system establishes a means of identifying visual quality objectives for National Forest management activities. All acres on the Forest are managed for an established visual quality objective (VQO). The minimum VQO on this Forest will be maximum modification but many management areas have a higher visual quality level.

Other handbooks describe detailed techniques for meeting visual quality objectives developed for the activities that have the greatest potential to cause undesirable visual impacts. These include utilities (#478), range (484), roads (483), timber (559), fire (608), and ski areas (617).

Wild and Scenic Rivers

Forest-wide Standards and Guidelines state that recommended rivers shall be managed to protect those characteristics that contributed to the eligibility of those rivers at their highest potential classification, until congress formally determines their status.



American Indian Religious and Cultural Use

A professional inventory of religious and cultural use areas and sites on the Forest was completed in 1981 (Inventory of Native American Religious Use, Practices, Localities and Resources, Study Location on the Mt. Baker-Snoqualmie National Forest, Washington State, 1981). Tribal members and the literature were surveyed to identify those sites and areas on the Forest that are important to American Indians for religious and cultural purposes. Confidentiality of these inventoried sites is maintained.

> Prior to planned activities, the Forest presents project information to tribal groups whose religious practices might be affected. Working with tribal religious leaders, National Forest managers attempt to develop mitigation measures. Mitigation may include complete avoidance of the site, delay of the project, redesign of the project, or seasonal restrictions on project activities.

The Cultural Resource

Archaeological & Historical Properties. A complete inventory of all significant sites on the Forest has not been completed. Forest management activities have the potential to adversely affect properties because their presence is unknown.

> A cultural resource inventory (professionally supervised) will be performed on all projects, prior to any ground-disturbing activity or modification or removal of older structures. Cultural properties that are identified will be protected until their significance has been evaluated, through consultation with the Washington State Historic Preservation Office (SHPO) and using the criteria for eligibility to the National Register of Historic Places. When sites are determined significant, mitigation measures will be developed in consultation with the SHPO, Advisory Council on Historic Preservation, and other interested parties, as specified in 36 CFR 800.

The Wilderness Resource

Prohibited Activities. The Wilderness Act and Title 36 of the Code of Federal Regulations (36 CFR) provide for the maintenance of the necessary environmental conditions to preserve the wilderness resource by prohibiting certain activities or uses.

With some exceptions, the following are generally prohibited: commercial enterprises, temporary or permanent roads, cutting of trees, use of motor vehicle, aircraft landing strips, heliports, helispots, landing of aircraft, dropping of materials from aircraft, motorized equipment, motor boats, mechanical transport, structures or installations, use of hang gliders, use of bicycles, and appropriation under the mining act or minerals leasing laws after January 1, 1984.

Recreation Use in Wilderness. Use by people pursuing recreational experiences is the major cause of adverse environmental effects on the wilderness resource.

Estimated carrying capacity has been established for each wilderness, by wilderness recreation opportunity spectrum (WROS) class. In addition, limits of acceptable change (LAC) have been established. Using these measures, recreation use in wilderness will be regulated or excluded when on-site conditions indicate that wilderness resource values are in jeopardy.

Carrying capacity and LAC were developed based on available research; actual wilderness management experience under these concepts is limited. However, both carrying capacity and LAC may be changed, by amending the Forest Plan, if, through experience and monitoring, it is found that they are not providing the desired results.

Any proposed improvements must be necessary for the protection of the wilderness resource and not for the convenience of users, and should be constructed of natural materials, and designed to harmonize with the environment.

Wilderness Vegetation. Natural biotic communities can be destroyed or disturbed if pack and saddle stock feed containing non-native plants is carried into wilderness. In heavily used areas, fragile vegetation can be trampled or destroyed by overuse from livestock or humans. Use of firewood for campfires may occur more rapidly then the accumulation of firewood supplies.

Introduction of non-native plants can be minimized by prohibiting the use of hay and unprocessed grain as supplemental feed for recreation livestock. Limits of acceptable change have been established, as a reference point for initiating closures of heavy-use areas or distributing use to other locations in the wilderness. Campfires are prohibited at many lower elevation, heavy use areas.

Public Information in Wilderness. The use of public information as a mitigation measure can be effective in wilderness. In addition to techniques discussed above (in Recreation Resource), special programs such as "no-trace camping" have proved to be effective in maintaining the wilderness resource.

Fish and Wildlife in Wilderness. Native species of fish and wildlife can be disturbed or destroyed by loss of habitat due to recreation use exceeding carrying capacity and limits of acceptable change (LAC). Species not native to the area also compete for available habitat, thus threatening native species.

Carrying capacity and LAC will be used to regulate use that assures adequate habitat for native species. The Forest Service will also continue to work closely with the Washington Departments of Game and Fisheries in all aspects of fish and wildlife management.

Use of Fire in Wilderness. Aggressive fire suppression actions may alter the natural ecosystems found in wilderness.

To allow fire to play a natural role in shaping vegetative patterns within wilderness, naturally-occurring fires will be permitted to burn in specific areas and under predetermined conditions. Fires will be closely monitored to assure that they continue to burn within those conditions. If the fire burns outside the pre-established conditions, appropriate suppression action will be taken. Considerable research is available on fire behavior and the different parameters that affect that behavior. Forest Service managers also have considerable experience in the use of prescribed fire. This combined research and experience indicate that this mitigation measure will be successful.

The Soil Resource

Some forest management practices have the potential to reduce soil productivity through soil loss, compaction, puddling, changes in soil chemistry, and nutrient loss. Activities that can cause undesirable effects on soils include: timber harvest, road construction, recreation use, and fuels treatment.

The standards and guidelines limit to 20 percent the activity area that can be compacted, puddled, displaced or severely burned. Standards are also prescribed for minimum effective ground cover, both by erosion-hazard class and year after activity. Special considerations - avoidance, smaller projects, more time between activities, use of specialized equipment - are required on and adjacent to soils susceptible to mass movement.

These mitigation measures are based on previous and extensive experience of forest managers and scientists in the field of soil science and hydrology.

The Air Resource

Wildfire and prescribed burning have the greatest potential to cause undesirable effects to the air resource. Suspended particulates introduced into the air reduce visibility. The State of Washington Department of Natural Resources (DNR) administers the State Smoke Management Plan.

> The Forest has established a standard that burning is to be the last resort method of fuel treatment. Good progress has been made in disposing of fuels by utilization of the wood fiber. All prescribed fire is coordinated with the DNR regarding time, location, and volume of material to be burned. In addition, for all wildfires (or prescribed burns if they exceed air quality regulatory standards), a standard has been established that requires suppression.

Under the Federal Clean Air Act (PL 88-206), as amended, the Federal land manager has responsibilities to the State Department of Ecology in the review and approval process involving facilities that may have potential impacts on air quality within Class I areas (wilderness, national parks, etc.). See Chapter III, FEIS, Air and Air Quality section.

> Before the State can grant approval and issue permits, it must have concurrence from the Federal land manager that the emmissions from the proposed facility, as mitigated by the permit requirements, are within acceptable limits and will not adversely affect the Air Quality Related Values, such as visibility, vegetation, water quality, etc. of the Class I areas under Federal jurisdiction.

The Water and Riparian Resource

Forest Management activities have the potential to affect water quality and the adjacent riparian zone. Activities that introduce sediment into the water, change water temperature or chemistry, alter water flows, or change timing of runoff can be detrimental to water quality (and to municipal and industrial use, fish habitat, recreation, and energy production). Changes to streambank stability or to riparian vegetation shading the stream can adversely affect habitat for fish and wildlife.

> Meeting management requirements for water quality and riparian areas (through the procedure developed in the hydrologic cumulative effects analysis) ensures that, along with the mitigation provided by the standards and guidelines, management activities prescribed in the Forest Plan do not result in unacceptable adverse effects on water quality and quantity.
>
> Special attention must be given to management activities within about 100 feet of perennial streams and bodies of water, or at least the area dominated by riparian vegetation. Inventories are not available for the riparian vegetation zone, but during project design, these areas will be identified and mapped. Interdisciplinary team specialists will consider soil, topography, vegetation, climate, and management objectives in specifying the special measures needed to prevent the detrimental damages. Measures that may be used include: avoidance of the riparian area, stream clean out, individual tree marking, directional falling, yarding away from the stream, full suspension of logs, seasonal restrictions on use, and site

hardening or rotation of recreation sites. These mitigation measures have proved effective in past forest management activities.

Standards are included for Class I, II, and fish-bearing Class III streams that state the maximum stream temperatures allowed, to avoid and/or minimized effects on fish.

Implementation of the State Water Quality Plan on lands administered by the USFS is described in a Memorandum of Understanding (MOU) between the Washington State Department of Ecology and the U.S. Department of Agriculture, Forest Service (1979), and in "Attachment A", referenced in the MOU, the Implementation Plan for Water Quality Planning on National Forest Lands in the Pacific Northwest (USDA 1978a). These provide the basis for the interagency agreement whereby the Governor of the State designates the Forest Service as the designated management agency for nonpoint source pollution control on lands under its jurisdiction. The agreement provides for annual meetings between Pacific Northwest Region, Forest Service and DOE to evaluate the program and progress being made and provides the basis for recertification by the Governor.

Available monitoring information is reviewed, revisions or additions to the BMP's are addressed, progress on problem identification and treatment is provided, and reports are written and submitted by the State to the Environmental Protection Agency.

Water Quality Regulations for waters of the State of Washington (Washington Administrative Code Chapter 173-201 WAC) are met through application of Best Management practices (BMP's). The key beneficial uses which BMP's are designed to protect are fish and water for domestic use.

Diversity and Long-term Productivity

Forest management activities have the potential to affect the diversity of plant and animal communities and impact the long-term productivity of forest resources.

In all forest management activities, the management requirement of diversity and long-term productivity will be met. Management area prescriptions plus the Forest-wide standards and guidelines address evaluation of opportunities to maintain or enhance stand, sub-basin, and Forest level components of diversity; provide for a ecologically sound distribution and abundance of plant and animal communities; and maintain large woody and small fine materials on the ground, plus standing dead and green trees (at varying levels, by alternative). Soil productivity and other elements will be monitored to determine the effectiveness of standards and guidelines.

The Wildlife Resource

Viable Populations of Wildlife Management Indicator species. A wide variety of Forest management activities that involve vegetative manipulation have the potential to adversely affect wildlife habitat, and in turn, directly affect wildlife populations. Activities include: timber harvest, fuels management, recreation development, road and trail construction, and water impoundments or diversions.

Wildlife habitat areas have been established to maintain at least a viable population of selected management indicator species (whose habitat is considered limiting). Data necessary to establish numbers and sizes of habitat areas, distribution, and habitat requirements (such as time of year used) for each species have been identified, based on research, available literature, and the experience and judgement of knowledgeable professionals. Sources include: Westside Habitat Relationships (in press), and Pacific Northwest Region Management Requirements for Wildlife, MR Report. Habitat areas will be monitored to determine their effectiveness in maintaining viable wildlife populations.

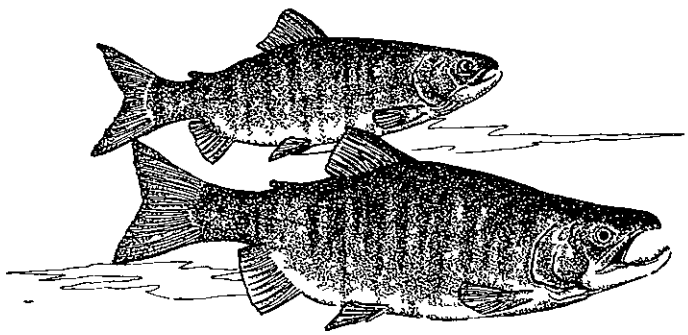
Forest-wide standards and guidelines state minimum levels of live and dead trees, snags, and large, dead and down logs to meet habitat needs.

The Fish Resource

Forest management practices, if conducted improperly, have the potential to cause environmental damage to fisheries habitat. Increases in water temperature, sedimentation, turbidity, loss of aquatic food sources, changes in water chemistry, and physical or velocity barriers to fish migration are examples of effects to fish habitat most commonly associated with forest management practices.

The Clean Water Act as amended by the Water Quality Act of 1987 sets forth a concept of Best Management Practices (BMP's). In part, it is designed to maintain existing populations of both resident and anadromous fish; fisheries habitat will be managed under this concept. It is covered under a 1979 Memorandum of Understanding between the Washington State Department of Ecology and the Forest Service. The implementation of BMP's is detailed in an Implementation Plan for Water Quality Planning on National Forest Lands in the Pacific Northwest (USDA 1978a). The effectiveness of BMP's is periodically reviewed by Environmental Protection Agency, Washington State Department of Ecology, and by Forest Service professionals to insure that application of BMP's is providing the desired results.

In addition, meeting management requirements for water quality and riparian areas, plus the Forest-wide standards and guidelines will benefit in-stream uses, including fish and fish habitat.



Threatened, Endangered, and Sensitive Species

The Endangered Species Act requires Federal Agencies to ensure that their proposed actions do not jeopardize the continued existence of any threatened or endangered (T&E) species or result in the destruction or adverse modification of their critical habitat. Recovery Plans are developed by an inter-agency team of experts and are designed to identify those actions necessary for the eventual delisting of the species from the Federal Threatened and Endangered species list.

When activities are proposed on National Forest lands that are likely to affect T&E species or their critical habitat, consultation with U.S. Fish and Wildlife Service is initiated. Threatened and endangered species habitat has been mapped (where information is available) and, for known habitat, special habitat management areas have been established. Management direction, designed to maintain or improve this habitat, has been developed. The direction is based on Guidelines developed by the U.S. Fish and Wildlife service. Additional habitat necessary to meet the recovery objectives identified in the Recovery Plan has also been identified and is managed using the same guidelines.

When management activities may affect the habitat of a Forest Service sensitive species, a biological evaluation will be completed (Forest Service Manual 2670); habitat for sensitive plants and animals will be managed to ensure that management activities do not contribute to these species becoming threatened or endangered.

The Timber Resource

Management of stands of trees for timber production has the potential to result in undesirable environmental and fluctuating economic effects.

Non-Declining Flow. Widely fluctuating levels of timber sales offered from the National Forest may result in economic hardship to the wood products industries, and can also result in increased consumer prices for timber products. Congress has determined (in the 1976 NFMA) that a relatively even, sustained flow of timber in perpetuity is appropriate public policy for National Forest lands. Congress also recognized that variance (departure) from this non-declining flow policy is appropriate under some circumstances if it meets the overall multiple-use objectives of the plan.

The timber harvest level of the alternatives in this FEIS is determined based on a policy of non-declining flow. Departure was examined in two alternatives developed in detail in the DEIS.

Rotation Lengths. Cutting trees for timber can occur at any time after they reach an age (or size) the tree can be utilized for commercial products. Harvesting very young trees can result in undesirable environmental effects on other resources such as scenery, fish and wildlife habitat, soil productivity, and water quality, or result in harvest of trees too small to be used for boards or plywood.

Timber harvest levels for all alternatives are calculated on the basis that for final harvest, trees will have at least reached 95% culmination of mean annual increment (see glossary). Rotation lengths are longer where other

resources requirements (such as visual corridors, wildlife and fish requirements, and protection of riparian values) permit harvest of trees but require larger sized trees. These rotation lengths are specified in the standards and guidelines for specific management areas.

Regeneration Assurance. Some stands of trees grow under environmental conditions where, if harvested, regeneration of a new stand of trees is difficult or impossible under existing technology. Serious adverse effects to wildlife habitat, scenery, water production and soil productivity could occur if these areas were harvested but not regenerated.

To mitigate these potential adverse effects, a standard has been established that prohibits the cutting of trees for timber production purposes unless there is reasonable assurance that the harvested stands can be reforested within five years.

Created openings. Too large openings in stands of trees, from even-aged harvest methods (such as clearcutting) can cause undesirable environmental effects on wildlife habitat, scenery, water quality, and reforestation success.

A standard has been established to limit the size of harvest units to 60 acres in the Douglas-fir type and 40 acres for other forest types; in the Pacific silver fir zone, units must be less than 40 acres. Exceptions are permitted for catastrophic events such as fire, windstorm, and insect or disease attack. These size-of-opening standards are somewhat arbitrary, so the environmental effects produced will be monitored during implementation of the Forest Plan and recommendations for change will be initiated when warranted.

Suitable lands. Cutting trees for timber production on all lands that support stands of trees could result in adverse environmental effects. Some stands of trees have been assigned, by higher authority, to uses that prohibit timber harvest. Some lands have been assigned to activities where cutting trees is not compatible; other lands have physical or environmental conditions where harvest would result in unacceptable results. A process to classify all lands as to their suitability for timber production has been developed.

All lands that are less than 10% covered by trees are excluded, as are all lands classified by higher authority to a use that prohibits tree cutting, such as wilderness and research natural areas. Lands being used for roads, administrative sites, and utility corridors are also removed. Those lands where soil stability is such that cutting of trees would result in a two-fold increase in mass soil movement, 75% of the time, are classified as not suitable for timber production. Also removed from timber production are those lands which are so rocky or have soil that is so thin that a new stand of trees could not be re-established.

The result of these exclusions is a land base called tentatively suitable for timber production. Only lands that are tentatively suitable are eligible for assignment to a timber harvest prescription. An economic screen of tentatively suitable lands is made during the determination of outputs from the alternatives. The linear program FORPLAN seeks a "solution" for each alternative that maximizes PNV. Those lands not selected for assignment to a timber production prescription because they do

not contribute to a maximum PNV solution are also dropped out of the suitable land base for that particular alternative.

The Mineral Resource

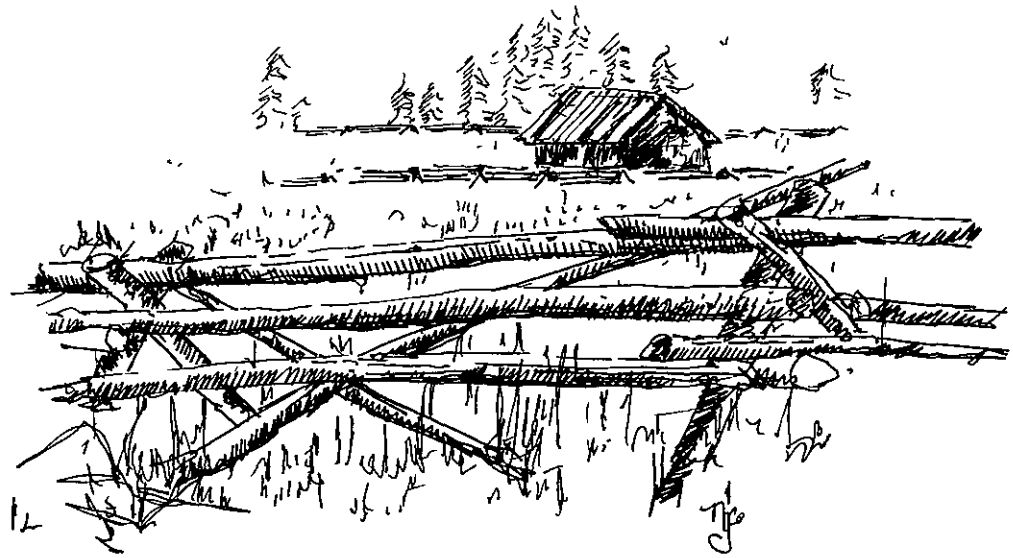
Management of mineralized areas for mining and energy development can potentially result in undesirable environmental effects.

When mining activities are proposed on National Forest lands, appropriate environmental analysis will be conducted to determine the stipulations necessary for the protection of other resources.

Processing and administration of all mineral, oil and gas and geothermal leases, exploration proposals, and development proposals will be in accordance with State and Federal rules, regulations, and standards.

All activities which involve significant disturbance of the surface resources require a notice of intent and/or an operating plan that must be submitted and processed in accordance with 36 CFR 228. Based on an environmental analysis prepared by the applicant, the Forest Service efforts will be directed toward minimizing adverse environmental impacts on the surface resources and toward reclaiming the site. Approval will be given when the Forest Service concerns are mitigated in a responsible and responsive manner.

Operations will be inspected periodically to ensure compliance with approved operation plans. Applications for patent will be investigated and contested when validity determinations reveal invalid claims. Questionable occupancy of mining claims will be investigated and contested where necessary.



F. COMPARISON OF ALTERNATIVES

The purpose of Forest Planning is to identify and select for implementation the alternative that most nearly maximizes net public benefits, while responding effectively to all the ICO's. Net public benefits are defined as the..."overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not - consistent with the principles of multiple use and sustained yield" (36 CFR 219.3).

There is no mathematical formula available to select the preferred alternative. In fact, there are differences of opinion about whether particular effects of alternatives are positive or negative. Therefore, it is necessary to separately identify all the major effects of each alternative as the basis for review, judgement, and an eventual selection.

The following pages summarize, in tables and narrative, the outputs and effects of the alternatives. Alternatives are presented in a manner that allows detailed comparison. Elements presented include:

1. Management Areas - the descriptions - also see the packet of maps;

2. Alternatives At A Glance - figures that graphically compare the outputs activities and uses of the alternatives;

3. Comparison of Resource Outputs, Inputs, and Environmental Effects - a detailed series of tables showing the inputs, yield, and effects of various resources and activities, by alternative; and

4. Economic Tradeoffs Among Alternatives - additional comparisons.

1. Management Areas

Multiple use management will continue to be the overall means of achieving goals of the Mt. Baker-Snoqualmie National Forest. In each alternative, every acre of the Forest will be assigned to a single management area (MA). Management areas are areas of the Forest to which a set of management practices, standards, and guidelines apply. One or more uses may be emphasized in a management area, but management for many other compatible uses will occur in every management area.

On the following pages, two tables show the acres assigned to each management area, by alternative. MA's are identified by a number or number/letter, plus a short descriptive title. The letters are various "intensities" of a broader management area. An example is Management Area 1 **Dispersed Recreation.** The intensities are **1A, 1B, 1C, 1D, 1E,** and **1F;** these are all types or intensities of dispersed recreation, but each has somewhat different management practices, standards, and guidelines. Some management areas, such as **4, 8,** and **19,** have only one intensity.

Note that the title, or descriptive phrase for each MA shows the emphasis of the management area. The section following Tables II-8 and II-8a includes a brief description for each MA (the management practices, standards, and guidelines).

The Management Areas used in the Preferred Alternative (Alternative J) are described in detail in the Forest Plan. Refer to Appendix D, FEIS for the descriptions of all the other MA's or intensities of MA's not used in the Preferred Alternative.

Management Areas and the Maps

Although the number of acres assigned to a management area may be quite similar in different alternatives, the location of those acres may vary by different alternatives. The alternative maps accompanying this FEIS show the on-the-ground location of management areas in each alternative.

Where compatible uses occur, the acres have been assigned and mapped to the set of management practices, standards, and guidelines that cover management for both uses. For example, an area assigned to nonmotorized recreation emphasis (1A or 1B) may also be capable of providing old-growth wildlife habitat (11). In this case, the MA mapped would be 1A or 1B, not management area 11 because old-growth habitat has been "over-ridden" by a management area that is more restrictive, primarily in terms of the appropriateness of road construction. (Roads cannot be built in 1A or 1B; they may be constructed through MA 11.)

In Table II-8, note that the acres for the wildlife MR's (MA 11, 12, 14, and 15A) vary among the alternatives. This is primarily due to "overrides." For example: in Table II-8, Alternative C shows the fewest acres in MA 11 Old Growth Habitat of any alternative, yet C has a goal of emphasizing wildlife habitat. Old-growth habitat is provided at the highest level in Alternative C, but many acres of old growth were assigned to Management Area 1A or 1B, which provide for both wildlife habitat and nonmotorized recreation. The output tables later in this chapter (Tables II-9a through II-9o) help show the differences among alternatives. Also, refer to the Wildlife Resource map.

Alternative NC (No Change)

No Management Areas are assigned in Alternative NC (No Change). However, indirect comparisons between Alternative NC and the other alternatives can be made. This must be done understanding that the 1963 Timber Management Plans, as amended, stratified lands by their availability and suitability for timber harvest, while land in the other alternatives is stratified by its suitability for timber harvest and management strategies, which when combined, equate to Management Areas. Table II-8a provides an indirect comparison of Alternative NC with the other alternatives.

The Order of the Alternatives

In Table II-8 and the tables that follow in this chapter, the alternatives are not arranged alphabetically (A, B, C etc.) but are displayed, from left to right, in order of decreasing acres of land suitable for timber production. This order is useful in understanding how the environmental consequences and effects will vary by alternative. The sequence is strongly correlated to the amount of vegetative management in alternatives. See additional discussion in part 3. Comparison of Resource Outputs, Inputs, and Environmental Effects, page II-75.

Table II-8

Acreages in Management Areas by Alternative 1/ (See Table II-8a for Alt NC) Page 1 of 2

Management Area	A (No Action)	I	B (RPA)	H	J (Preferred)	C	G-Modified
Lands Suitable for Timber Production	412,508	386,512	380,448	358,754	346,411	256,206	247,091
1 Dispersed Recreation							
1A Primitive	0	0	0	4 561	45 278	16,914	6,793
1B Semi-Prim Nonmotorized	0	0	134 585	248,479	225 104	387,168	369,889
1C Semi-Prim Motorized	0	143,102	5,123	2,501	2,981	0	3,608
1D Roaded Natural Rec	0	5,307	20,159	12,852	14,926	15,699	0
1E General Dispersed Rec	344,304 2/	0	0	0	0	0	0
1F 1926 Mt Baker Rec	7,991 3/	0	0	0	0	0	0
Subtotal	352,294	148 409	159 867	268 393	288,289	419,781	380,290
2 Scenic Viewshed							
2A Foreground	3,321	29,223	4,015	24,581	23,406	65,721	9,486
2B Middleground	0	0	0	81,573	95,795	57,500	0
Subtotal	3,321	29 223	4 015	106 154	119,201	123,221	9,486
3 Developed Recreation							
3A Public Sector Sites	1,813	1,809	1,764	1,810	1 819	1,761	2,273
3B Potential Rec Sites	0	0	0	0	0	0	0
3C Winter Sports Resorts	4,618	5,904	5,214	5,692	6,041	5,290	4,865
3D Private Sector Sites	556	555	541	555	558	540	557
Subtotal	6,986	8,268	7,519	8,057	8,418	7,591	7,695
4 Mt Baker Natl Rec Area	8,740	8,740	8,740	8,740	8,740	8,740	8,740
5 Recommended Wild & Scenic R	24,506	0	0	8,794	20,865	29,617	20,234
6 Skagit Wild & Scenic River	17,037	17,037	17,037	17,037	17,037	17,037	17 037
7 Amer Indian Relg/Cult Use 4/	0	0	0	0	0	0	0
8 Special Areas 5/	0	0	663	0	6 321	809	22,006
10 Wilderness							
10A Transition	12,067	21,878	14 402	7 982	15,078	7,032	7,644
10B Trailed	*44 356*	*49,628*	*39,786*	*46,734*	49,015	45,700	52 669
10C General Trailless	585 326	643,495	543,881	437,931	457,000	272,679	444,688
10D Dedicated Trailless	*80,000*	*0*	*121 409*	*219,292*	*191,606*	*386,992*	*207,930*
10E Special Area	0	6 715	2,238	9,777	9,017	9,313	8,785
Subtotal	721 716	721,716	721,716	721 716	721 716	721 716	721,716
11 Old Growth Habitat	36,247	93 037	79,328	60 977	54,191	36,072	112,987
12 Mature & Old Growth Habitat	14,074	27 691	23 344	19 185	19 282	13 071	10 648
13 Watershed, Wildlife & Fisheries Emphasis in Riparian Areas 6/	52 436	46,772	41,288	49,872	47,048	23,219	31,857
14 Deer and Elk Winter Range	0	106,632	158,824	34,239	33,587	39 057	26,622
15 Mountain Goat Habitat							
15A Min Mgt Requirements	9 217	24 291	19 370	15 742	17,110	9 742	6 311
15B Habitat Improvement	0	0	20,158	0	0	3,040	0
Subtotal	9,217	24,291	39,528	15,742	17,110	12,782	6,311
16 Threatened & Endangered Species 7/							
16A Northern Bald Eagle	2,808	2 808	2,808	2,808	2,808	2,808	2,808

Table II-8

Management Area	A (No Action)	I	B (RPA)	H	J (Preferred)	C	G-Modified
17 Timber Management Emphasis	321,470	273,572	235,711	198,559	166,611	89,267	201,023
18 Research Natural Areas 8/	2,364	2,364	2,364	5,233	5,233	5,233	5,233
19 Mtn Hemlock Zone	0	48,803	62,333	31,812	31,965	16,039	22,761
20 Cedar R Municipal Watershed							
20A Current Direction Exchange NF Lands to City	13 398	11 804	0	12,517	0	0	0
20B Exchange NF Lands, City Maintains Old Growth	0	0	0	0	0	12 214	6,212
20C Retain NF Land, Maintain Old Growth Habitat	0	0	13,297	0		0	0
20D Negotiate New Coop Agreement	0	0	0	0	11,724	0	0
21 Green River Municipal Watershed							
21A Current Direction, Tmbr Harvest, Disp Rec OK	9 799	24,546	0	24,914	24,935	23 931	12,846
21B Timber Harvest OK, Most Public Rec Prohibited	0	0	23,839	0	0	0	0
22 Sultan River Municipal Watershed							
22A Closed Except Protect Water & Hydropower Production, Exchange NF Lands	0	0	0	0	0	8,935	0
22B Current Situation, Exch NF Lands, Moderate Timber Harvest Restricted Rec	4,646	8,772	0	8,393	8 399	0	5,633
22C Retain NF Lands, Full Multiple Use	0	0	9 260	0	0	0	0
23 Other Municipal Watersheds							
23A Tmbr Harvest, Mod Rec	14,081	19,682	16,124	19,315	13 138	0	9 315
23B No Harvest Limited Rec	0	0	0	0	0	21 068	0
25 Special Uses - Utilities							
25A Utility Corridors 9/	[1500]	[1500]	[1500]	[1500]	[1500]	[1500]	[1500]
25B Electronic Sites	1,014	1,014	1,014	1,014	1,014	1 014	1,014
26 Administrative Sites	143	143	143	143	143	143	143
27 Alpine Lakes Mgt Area 10/	106,950	97,981	94,606	99,647	95 305	89,991	79,466

1/ Total acres in each alt vary due to rounding MA 9 not used, MA 24 Min Mgt not assigned in any alternative

2/ Applies only to Alt A, includes mostly unroaded, but some roaded recreation, from exisitng Multiple Use Plans

3/ Parcels of the 1926 area that remain outside of wilderness and the Mt Baker NRA are included here

4/ Acres are protected, at varying levels in the alternatives but not shown to protect confidential nature

5/ Includes Cultural-Historic, Geologic, Biologic, Botanic, and Scenic Special Areas

6/ Many acres of riparian zone fall within other MA s and are protected through those management prescritptions

7/ Management Areas 16B Grizzly Bear, 16C American Peregrin Falcon and 16D Gray Wolf have no acres assigned at this time, because no specific habitat has been identified or evaluated

8/ Acres of existing or proposed RNA located within wilderness are included in MA 10 not here

9/ These acres overlap other MA's

10/ Includes acres within the congressionally designated Alpine Lakes Management Unit that are not otherwise assigned to other, compatible management areas (Compatible MA's include 5, 11, 12, 14 15, and 16)

Table II-8a
Indirect Comparison Between Alternative NC and Other Alternatives

Timber Harvest Treatment	Land Status Under.. Alt. NC (No Change)	MA In Other Alternatives
No Timber Harvest Permitted	Reserved Land	MA's 10
	Deferred Land	5C
		13A-D
		25B Jim Creek Naval Stat.
		27 Mt. Index Special Area
No Scheduled Timber Harvest	Unregulated Land	1A-F
		3A-D
		8
		11
		12
		13A-D No Cut Portion
		15A
		16A
		19
		22A
		25A
		25B Except Jim Creek
		26
		27 SA (except Mt. Index) Devel. Rec., Disp. Rec.
Land Available for Scheduled Timber Harvest	Marginal and Special Lands	1D
		2A-B
		4
		5A,B
		6
		13A-D Reduced Yield Port.
		14
		15B
		23A
		27 Scenic Forest
Lands Available for Scheduled Harvest	Standard Lands	13A-D Full Yield Portion
		17
		20A-C
		21A-B
		22B-C
		27 General Forest
May Occur In All of The Above Treatments	Areas protected at varying levels through consultation with appropriate American Indian tribal leaders; see Forest-wide Standards and Guidelines, Chapter 4, Forest Plan.	7

Management Area Descriptions

1 Dispersed Recreation

1A Primitive. The goal of this management area is to provide dispersed recreation opportunities in a primitive ROS setting. Natural habitat for wildlife is also provided. Areas are remote (generally 3 miles from roads) with low concentration of users. No ORV use. The visual quality objective is preservation. No scheduled timber harvest and no roads. The only exception is salvage harvest of catastrophic forest loss for the purpose of limiting further loss; any temporary roads needed for this salvage will be returned to near-natural condition.

1B Semi-Primitive Nonmotorized. The goal of 1B is to provide dispersed recreation opportunities in a semi-primitive ROS setting. Very similar to 1A. Differences include: areas are generally one-quarter to 3 miles from roads. *Snowmobile use is permitted in some areas. The visual quality objective is* retention. As discussed above, no scheduled timber harvest or road construction except to salvage catastrophic loss.

1C Semi-Primitive Motorized. Somewhat similar to 1A and 1B, the goal of this management area is to provide dispersed recreation opportunities in a semi-primitive motorized setting. Areas are generally one-quarter to 3 miles from roads. Dispersed ORV use is permitted. Seasonal ORV closures may be used to protect wildlife or other resources. The visual quality objective is partial retention. As discussed above, only salvage of catastrophic forest loss is permitted; no scheduled timber harvest.

1D Roaded Natural. The goal of this MA is to provide a variety of dispersed recreation uses in a roaded natural setting; natural habitat for wildlife is also provided. Timber harvest is permitted, with silvicultural prescriptions designed to meet MA goals. Longer rotations are scheduled to meet visual quality objectives, which are partial retention along sensitive travel routes, and range from partial retention to modification elsewhere.

1E General Dispersed Recreation. This prescription is used only in Alternative A (No Action). Areas outside of wilderness managed primarily for roadless, dispersed recreation, but some roaded dispersed use, including ORV's, may occur. Natural habitat for wildlife is provided. No scheduled timber harvest is planned, though it is permitted on tentatively suitable lands where MA goals can be met. Any timber volume removed is nonchargeable.

1F Mt. Baker Recreation Area (1926). Includes the remaining parcels of the Mt. Baker Recreation Area, established in 1926, a total of about 6,005 acres. This prescription is used only in Alternative A (No Action). Area managed primarily for recreation and scenic values while also providing natural wildlife habitat. Timber harvest is permitted, however no scheduled harvest is planned and any volume cut is nonchargeable.

2 Scenic Viewshed

2A Foreground. The goal of this management area is to provide a visually appealing foreground landscape as viewed from major travel corridors and use areas, and to provide for recreation, wildlife, timber production, and water resources. The visual quality objective ranges from retention to partial retention. A diversity of tree species and age classes is maintained, with timber managed at less than full yield (about 65% of full yield).

2B Middleground. Similar to 2A, this management area includes the middleground area of visually sensitive landscapes viewed from major travel corridors and use areas. Differences include: visual quality objective ranges from partial retention to modification. A diversity of tree species and age classes is maintained through timber harvest scheduling. Timber harvest yield will be about 86% of full yield.

3 Developed Recreation

3A Public Sector Developed Sites. Includes existing areas such as campgrounds, day-use sites, trailheads, and boating and swimming areas. The purpose is to provide a wide variety of year-round recreation opportunities. Visual quality objectives range from preservation to partial retention. Any silvicultural activities shall meet recreation objectives and reduce risk of public injury. Any incidental timber volume removed is nonchargeable.

3B Potential Recreation Sites. The goal of 3B is to manage potential developed recreation sites to protect their value for future development and use. Potential areas include a full range of recreation sites, as listed in 3A. Management is very similar to that in 3A.

3C Winter Sports Resorts. Included are developed winter sports areas, located at a few selected sites throughout the Forest, that are managed through special use permits. These areas offer alpine and nordic skiing, and snowplay in winter, and horseback riding, tennis, day-use, and other activities in the summer. No timber harvest permitted, except to maintain an attractive, safe setting, or to clear areas for ski runs or other improvements. Any timber volume removed is nonchargeable.

3D Private Sector Sites. Included are organization camps, concession sites, and recreation residences located at a few selected sites. They are operated by the private sector on National Forest land under a special use permit. The goal is to plan and administer these areas to provide suitable, safe, and attractive sites. Any silvicultural activities shall meet recreation objectives; any volume removed is nonchargeable.

4 Mt. Baker National Recreation Area (1984)

The emphasis of this 8,743 acre management area is high-elevation, dispersed recreation and conservation of scenic, natural, historic, and other values. Winter season management emphasizes uses such as snowmobiles and nordic skiing; nonmotorized recreation is emphasized in the summer season. There is limited acreage suitable for timber production; all silvicultural practices are permitted, but long rotations are required to meet visual quality objectives of retention to partial retention. Timber yields are about 70% of full yield.

5 (5A, 5B, 5C) Recommended Wild and Scenic Rivers

The goal is to protect from degradation the outstandingly remarkable values and wild, scenic, and recreational characteristics of rivers and their environment. A suitability analysis, when completed, determines whether a potential river qualifies for inclusion in the National Wild and Scenic River system, and if so, as a Recreation, Scenic, or Wild River. Management activities are most restricted in 5C Potential Wild Rivers, and less restricted in 5A Potential Recreation Rivers, and 5B Potential Scenic Rivers. Timber management is at less than full yield to meet visual quality objectives in 5A and 5B. Timber harvest is not normally permitted in 5C; any volume removed is nonchargeable.

6 Skagit Wild and Scenic River

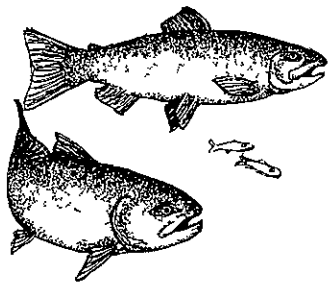
This management area includes the Skagit Wild and Scenic River System: 158.5 miles of designated portions of the Skagit, Cascade, Sauk, and Suiattle Rivers. The area totals 38,939 acres; about 44% are National Forest lands. The area is managed in accordance with the Skagit River Final Management Plan, Volume II, 1984. Management emphasis is to maintain or enhance the characteristics and outstandingly remarkable values for which these rivers were classified. Timber yields are about 65% of full yield.

7 American Indian Religious and Cultural Use Areas

The goal is to make available and protect environmental conditions and resources important to American Indians for religious and cultural uses. Included are all areas identified in the 1981 Inventory of Native American Religious Use, Practices, Localities and Resources. Consultation will be undertaken with the affected Tribes(s) for all projects falling within identified religious and cultural use areas. If adverse effects are found, mitigation measures may be developed through the consultation.

8 Special Areas

Includes areas with unique scenic, historic, biological, botanic, or geological features. Management emphasis is to protect and, if appropriate, foster public use and enjoyment of these areas. The visual quality objective is retention or preservation. Roads, trails, ORV use, and any facilities may be permitted, if they meet objectives of areas. Maintenance and habitat improvement for watchable wildlife or fish is emphasized. No scheduled timber harvest; any incidental volume harvested is nonchargeable.



10 Wilderness

Wilderness includes lands in the following designated wildernesses: Glacier Peak, Mt. Baker, Noisy Diobsud, Henry M. Jackson, Boulder River, Clearwater, and Norse Peak. See MA 27 for Alpine Lakes Wilderness.

The goal of wilderness management is to feature naturalness, provide opportunities for solitude, challenge, and inspiration, and - within these constraints - allow for recreation, scenic, scientific, educational, conservation, and historic uses.

No timber harvest or road construction is permitted. The visual quality objective is preservation. Refer to the Forest Plan, Management Prescriptions, for the specific standards and guidelines.

A number of management uses or emphases are compatible with wilderness, including (but not limited to): American Indian religious and cultural uses; old-growth and mature and old-growth habitat emphasis; deer, elk, and mountain goat winter range; and Research Natural Areas. Where these uses occur, or "overlap" wilderness, the acres will be assigned to wilderness, and on the maps, shown as "10" wilderness.

The total acres assigned to MA 10 will be the same in all alternatives; the acres within the five wilderness intensities discussed below will vary by alternative.

10A Transition. Transition areas within wilderness, in close proximity to popular trailheads and heavily-used trails entering wilderness. Typically, this is the day-use area of the wilderness. Frequent encounters with other users.

10B Trailed. Includes most of the system trails extending beyond the transition class. Visitors must be prepared for overnight camping. Less frequent encounters with other users.

10C General Trailless. No system trails, though some user-made trails may exist. It is characterized by a lack of attractions or destination spots, therefore, there are very infrequent encounters with other users.

10D Dedicated Trailless. These areas are not trailed and will be managed forever trailless. User-made trails are not permitted. Outstanding opportunities for isolation, solitude, and lack of evidence of humans. Cross country travel with very infrequent encounters with others.

10E Special Areas. These include Congressionally acknowledged areas, areas of significant cultural or historic value, areas with special wildlife considerations, and areas with limited management options. Special areas are unique and may not be found in all wildernesses.

11 Old-Growth Habitat (Spotted Owl)

Spotted Owl Habitat Areas (SOHA's). The goal of this MA is to provide and maintain old-growth forest ecosystems as habitat for wildlife species that depend upon or utilize old growth for a significant portion of their habitat. No motorized off-trail use. Road and trail construction may be permitted outside of the core area if habitat objectives can be met. No scheduled timber harvest. Catastrophic tree loss, which results in the area no longer being suitable habitat, may be salvaged as nonchargeable volume under certain conditions. The oldest adjacent stand replaces the acreage salvaged.

12 Mature and Old-Growth Wildlife Habitat (Pine Marten, Pileated Woodpecker)

The goal is to maintain mature and/or old-growth forest ecosystems for those species (such as pine marten and pileated woodpecker) that depend on or utilize such forests for a significant portion of their habitat. Road construction is permitted if objectives for the MA can be met. No scheduled timber harvest. Catastrophic loss, which results in the area no longer being suitable, may be salvaged as nonchargeable volume under certain conditions. The oldest adjacent stand replaces acreage salvaged.

13 Watershed, Wildlife, and Fisheries Emphasis in Riparian Areas

The goal of this MA is to maintain or improve water quality and to produce various levels of potential habitat capability for various species of fish within designated riparian areas. Also, maintain or enhance habitat for riparian associated wildlife species. A broad range of recreation permitted, while maintaining riparian resource values. Minimize activities that cause ground or water channel disturbance. These areas support a diversity of plant species and contain a variety of resource values: water, fish and wildlife habitat, and productive soils. Hardwood trees are common; there is a variety of ages of vegetation, including dead trees, standing and down. All silvicultural practices are permitted, with the objective of maintaining or improving riparian habitats. There is a variety of rotations, from extended rotation (160+ years), to normal rotation, to no-harvest, due to unstable soils or to maintain or improve riparian and aquatic habitats. Small harvest units will be widely distributed. Timber is managed at about 63% of full yield.

13A Management Requirements. The goal of this MA is maintain or improve riparian and aquatic ecosystems and maintain anadromous and resident fish at Level I (existing, MR). Requires the lowest investment to implement.

13B Level II Anadromous, Existing Resident Fish Habitat Capability. The goal of 13B differs from 13A in the special emphasis on rehabilitation or restoration of lost or degraded anadromous fish habitat. Anadromous fish habitat capability is increased to Level II, requiring a moderate investment level. Existing resident fish habitat capability is maintained.

13C Level III Anadromous, Existing Resident Fish Habitat Capability. In 13C, natural and degraded anadromous fish habitat is enhanced to Level III, requiring a high level of investment to implement. Existing resident fish habitat capability is maintained.

13D Level III Anadromous, Potential Resident Fish Habitat Capability. In addition to the goals of 13C, this MA emphasizes resident fish as well as anadromous. Natural and degraded habitat is enhanced, requiring a high level of investment.

14 Deer and Elk Winter Range

The goal for this management area is to provide improved winter range habitat for deer and elk. Improvement of the range is emphasized. A variety of improvement techniques are used, including planting desirable forage species, fertilization, thinning, and design of timber harvest units, with emphasis on a distribution and specified ratio of habitat types for forage, thermal/hiding cover, and optimal thermal cover. Seasonal road closures and restrictions on other activities are used. Timber harvest is scheduled to first, meet optimal thermal cover acreage; if met, then schedule harvest to meet forage requirements. Timber yields will be about 85% of full yield.

15 Mountain Goat Habitat

15A Management Requirements. The goal of this management area is to provide habitat, including winter range, for a viable population of mountain goat. Habitat includes some mature and old-growth forest, steep rocky cliffs, pinnacles, ledges, and talus slopes. Seasonal restrictions on ORV's are used. No new road constructed to access winter range; road closures may be used. No scheduled timber harvest. Any salvage of catastrophic timber loss shall be designed to maintain mountain goat habitat; any salvage volume is nonchargeable.

15B Emphasis on Habitat Improvement, Mountain Goat. This MA is similar to 15A but improvement of the mountain goat habitat is emphasized. ORV, trail, and recreation use, plus road use and construction are seasonally restricted. Road closures may be necessary. A variety of goat habitat improvement techniques, such as prescribed fire to increase forage, will be used. A maximum of 5% per decade of suitable lands may be harvested. Small, long, and narrow timber harvest units will be encouraged. Harvest is seasonally restricted to avoid conflict with goat habitat use. Timber yields will be about 70% of full yield.

16 Threatened and Endangered Species

For all intensities: the goal is management of existing habitat to provide for the long-term needs of the species, plus identification of potential habitat and management to enhance long-term viability of the species consistent with recovery objectives and for eventual delisting.

There are four threatened and endangered species: Northern bald eagle, grizzly bear, American peregrine falcon, and gray wolf. Large numbers of bald eagles winter on the Forest; one active nest site is known. Most sightings of grizzly bear have been in the Glacier Peak Wilderness, where management direction is compatible with protection of habitat and consistent with the Grizzly Bear Recovery Plan. The American peregrine falcon is an infrequent visitor; there are no areas on the Forest known to have been recently inhabited. Habitat for the gray wolf has not been identified or evaluated.

16A Northern Bald Eagle. Included as dedicated habitat are one existing and two potential nest sites, and two communal roost sites. There are additional acres of existing and potential feeding habitat that are managed for the eagle but assigned to MA's 13, 6, and perhaps others with compatible management direction. There is no scheduled timber harvest in dedicated areas. Timber yields in the managed portion of the eagle habitat will vary. Specific restrictions apply to almost all Forest activities in the dedicated areas. Some activities are prohibited, others are restricted, either by season or distance from the nest or roosting area. Some restrictions also apply to managed areas.

16B Grizzly Bear. Proposed timber harvest and other activities in or near potential grizzly bear habitat will be evaluated for their effects. Developed and dispersed recreation use will not degrade important potential habitat. No acres have been assigned to 16B at this time.

16C American Peregrine Falcon, and 16D Gray Wolf. No specific habitat has been identified or evaluated; no acres are assigned at this time. Meet Forest-wide Standards and Guidelines, Threatened, Endangered, and Sensitive species direction if use is discovered.

17 Timber Management Emphasis

For all intensities: the goal is to provide for the production of timber products on suitable lands. Also provided: unroaded and roaded dispersed recreation, including ORV use, opportunities for gathering firewood, and other forest uses. A number of large dead and down logs, plus live and dead trees will be left for primary cavity excavators; exact numbers vary by alternative. Wildlife and fish habitat enhancement may be permitted if timber production is not impaired. A number of silvicultural practices will be applied, including clearcutting, thinning, and planting. Timber harvest is full yield.

There are eight intensities in MA 17. The one selected for any acre assigned to MA 17 will vary with site productivity, timber type, accessibility by road and other objectives. Intensity 17H (plant, precommercial thin, option for three commercial thinnings, final harvest, genetic stock, and extended rotation) will actually be applied in other MA's (such as Scenic Viewshed), to meet specific objectives.

17A Natural Regeneration - Final Harvest. Natural reforestation is supplemented by planting to meet Forest minimum stocking standards. This is a minimum investment intensity.

17B Natural Regeneration - Precommercial Thinning - Final Harvest. Reforestation is natural, supplemented by planting to meet Forest minimum stocking standards. Precommercial thinning is planned. Release, growing stock protection measures, and fertilization may be prescribed. This intensity may be applied to existing reforestation condition classes. There are no location or species constraints.

17C Plant - Final Harvest. Reforestation is by planting. Release and growing stock protective practices may be prescribed.

17D Plant - Final Harvest - Genetic Stock. Reforestation is by planting, using genetically improved stock when available. Release and growing stock protective practices may be prescribed.

17E Plant - Commercial Thin (1) - Final Harvest - Genetic Stock. Reforestation is by planting, using genetically improved stock when available. Release, growing stock protection measures, and fertilization may be prescribed. Commercial thinning harvest is planned 10 to 20 years before regeneration (final) harvest. MA 17E may be applied to stands that have not been precommercially thinned. Commercial thinning permitted in timber stands accessible by road, in which 50% of the trees are Douglas-fir.

17F Plant - Precommercial Thin - Final Harvest - Genetic Stock. Reforestation is by planting, using genetically improved stock when available. Precommercial thinning planned. Release, growing stock protection measures, and fertilization may be prescribed. This intensity may be applied to existing reforestation condition classes. There are no location or species constraints.

17G Plant -Precommercial Thin - Commercial Thin (1) - Final Harvest - Genetic Stock. This intensity is designed to obtain the maximum timber production possible while meeting the Forest-wide and Management Area Standards and Guidelines. Every applicable approved practice should be used to increase production. Reforestation is by planting, using genetically improved stock when available. Precommercial thinning is planned; commercial thinning is permitted, as in 17E. This intensity may be applied to existing reforestation condition classes. Maximum rotation length is at the age volume production is equivalent to 100% culmination of mean annual increment (see Glossary).

17H Plant - Precommercial Thin - Commercial Thin (3) - Final Harvest - Genetic Stock - Extended Rotation. This intensity is designed to produce and maintain a portion of managed stands with a good range of large to very large trees, to meet visual quality requirements or other resource objectives. The basic rotation length is 200 years, with three intermediate thinning harvests; however, different rotation lengths may be prescribed. Reforestation is by planting. Precommercial and commercial thinning at 30 year intervals are planned. Release, growing stock protection practices, fertilization, or planting genetic stock may be prescribed. This intensity may be applied to existing reforestation condition classes.

18 Research Natural Areas

This management area includes existing Research Natural Areas and those proposed for designation as part of the Research Natural Area Program. The goal is to reserve typical or distinctive natural ecosystems for scientific and educational use. Management directed toward perpetuating natural processes, protecting natural features, and preserving naturally-occurring ecosystems in an unmodified environment. Only authorized scientific research and educational uses allowed. Recreation activities not encouraged. Existing use and trails will be allowed as long as they do not degrade the qualities for which the area was established. No scheduled timber harvest.

19 Mountain Hemlock Zone

The goal of this management area is to provide an opportunity for administrative study of regeneration harvest techniques within the Mountain Hemlock Zone. Acres assigned to MA 19 are located on the Mt. Baker, Darrington, and Skykomish Ranger Districts; the primary overstory species is mountain hemlock. These areas have been classified "not suited" for timber harvest because there is no reasonable assurance they can be reforested within 5 years after final harvest. A total of 250 acres of this management area may be harvested (in 25 plots of approximately equal size) to test various silvicultural systems to determine what portion of mountain hemlock forest can be successfully reforested, and thus returned to the tentatively suitable land base. Any timber harvested is nonchargeable. No new system roads constructed.

20 Cedar River Municipal Watershed (City of Seattle)

For all intensities: the goal of this management area is to provide municipal water for the City of Seattle at a level of quantity and quality that, with adequate treatment by the purveyor, will result in a satisfactory and safe water supply. The watershed contains 90,495 acres, with National Forest land intermingled with City of Seattle and private lands. Intensities 20A, 20B, 20C, and 20D apply to the National Forest lands.

20A Current Direction, Exchange NF Lands to City of Seattle. The goal of 20A is continuation of the current direction, defined in the 1962 Agreement with the City of Seattle. Management emphasis is timber production to the extent the water quality goal is met. Recreation use is limited; City and private lands are closed to public use, with no road access to interior NF parcels. No specialized wildlife habitat areas are left for old-growth dependent species. The long-term objective is exchange of all NF lands to the City to consolidate NF holdings elsewhere. All mature timber on available commercial land will be sold within about 30 years; land exchanges, about every 5 to 10 years, will occur after the timber is harvested. The entire watershed will be owned by the City of Seattle in about 35 years. Timber harvest on suitable lands is full yield, using the minimum investment intensity: 17A.

20B Exchange NF Lands, City of Seattle Maintains Old Growth Habitat. The goal of 20B is similar to 20A with one major exception. Habitat for old-growth dependent species necessary to meet viable population levels will be identified; these lands would then be exchanged to the City, with the stipulation that the old growth be maintained. Land exchanges of other NF lands will proceed as in 20A, after the old growth harvest. If a designated habitat area is destroyed (from blow down, etc.), the land exchange process will be halted until a suitable substitute area is acquired by the City, if available. Timber harvest will occur at a faster rate, though fewer acres will be harvested than in 20A, due to old-growth habitat areas. The watershed will be owned by the City in about 25 years. Timber harvest is full yield, using the minimum investment intensity, 17A.

20C Retain NF Lands, Maintain Old Growth Habitat. The goal of this management area is very different from 20A and 20B. There will be no further exchange of NF land; the Forest will pursue acquisition of public rights on roads leading to NF lands within the watershed. All other conditions of the 1962 Agreement remain in effect. Dispersed day-use recreation is emphasized.

No ORV's and water-related recreation is discouraged. Wildlife habitat for old-growth dependent species will be maintained. Timber management is emphasized on suitable lands not maintained as wildlife habitat, and to the extent the water quality goal is met. Timber harvest is full yield, using all investment intensities, 17A through 17G.

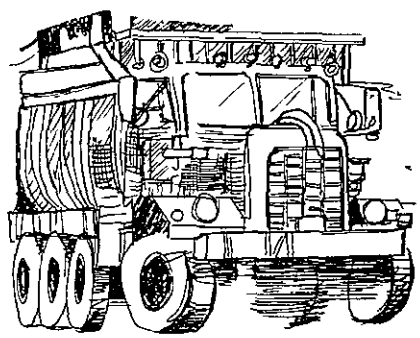
20D Negotiate a new Cooperative Agreement. The Forest Service will initiate negotiations on a new Cooperative Agreement between the City of Seattle and the Forest Service to reestablish goals and objectives for management of the watershed. Until a new agreement is negotiated, the Forest Service will not enter into new land exchanges affecting National Forest lands within the watershed. Pending a new agreement, the 1962 Cooperative Agreement will remain in effect. When a new agreement is reached, the Forest Plan will be amended to incorporate its goals and objectives.

21 Green River Municipal Watershed, City of Tacoma

For all intensities: the goal of this management area is to provide municipal water for the City of Tacoma at a level of quantity and quality that, with adequate treatment by the purveyor, will result in a satisfactory and safe water supply. The watershed contains about 142,000 acres of private, municipal, and National Forest land. The NF lands - about 35,828 acres - are intermingled with private lands in the east end of the watershed. The two intensities in this MA, 21A and 21B, apply only to the NF lands.

21A Current Direction, Timber Harvest and Dispersed Recreation Permitted. The goal of 21A is continuation of the current direction, as defined in the 1984 Memorandum of Understanding with the City of Tacoma. Timber production with dispersed recreation in a primarily roaded modified setting is emphasized, to the extent the water quality goal is met. Emphasis on public firewood cutting continues. Wildlife habitat is provided. About 9,000 acres of National Forest land will be exchanged; as exchange is completed, public rights on roads not needed to access NF land will be relinquished. Timber harvest on suitable lands is full yield, using all investment intensities, 17A through 17H.

21B Timber Harvest Permitted, Most Recreation Prohibited. The goal and management direction for 21B is similar to 21A, but most public recreation is prohibited except for persons authorized to participate in special, controlled big game hunts, and users of the Pacific Crest National Scenic Trail. All other aspects of this intensity are the same as 21A. Timber harvest on suitable lands is full yield.



22 Sultan River Municipal Watershed, City of Everett

For all intensities: the goal of this management area is to provide municipal water for the City of Everett at a level of quantity and quality that, with adequate treatment by the purveyor, will result in a satisfactory and safe water supply. The three intensities apply to 16,779 acres of National Forest land within the watershed.

22A Closed Watershed, Except for Production of High Quality Water and Hydropower; Exchange NF Lands. The long-term objective of this intensity is to exchange National Forest lands to some other ownership. The Forest will relinquish all rights except those necessary to administer the Federal Power Withdrawal. The management goal is production of high quality water and hydropower, with emphasis on improving water quality. The watershed will be closed to recreation, with no new trails or roads. All existing recreation sites and facilities will be closed. Once current timber sale contracts are completed, no new timber sales permitted.

22B Current Situation, Exchange NF Lands, Moderate Timber Harvest, Restricted Recreation. The land exchange objectives are the same as 22A. Management emphasis is on maintaining current high quality water, with moderate levels of timber harvest, fish and wildlife habitat improvement, and recreation. Watershed values are protected beyond legal requirements. General dispersed recreation is discouraged but not prohibited. Developed recreation sites will be distributed around Spada Lake, but water contact sports prohibited. Sanitation facilities provided at the lake and trailheads. Wildlife and fisheries habitat improvement encouraged; 20% of forest lands in the watershed maintained as old-growth habitat. Timber harvest from suitable lands will be full yield, using low investment intensity, 17D.

22C Retain NF Lands, Full Multiple Use. In this intensity, NF lands are retained. The management emphasis is meeting Washington State minimum legal standards for water quality and producing high levels of wildlife and fisheries habitat, recreation use, and timber products. Recreation site development is encouraged; dispersed recreation permitted. Habitat improvement projects are encouraged. Suitable forest lands will produce full yield, using all investment intensities, 17A through 17H.

23 Other Municipal Watersheds

For all intensities: provide water at a level of quality and quantity which, with treatment by the purveyor, will result in a satisfactory and safe water supply. This MA applies to the municipal watersheds not included in MA's 20, 21, and 22. They are located throughout the Forest, ranging in size from 84 acres to 30,100 acres. A total of 60,100 acres are included.

23A Timber Harvest, Moderate Recreation Opportunities. The management emphasis of 23A is a varying mix of timber, recreation, wildlife, and other outputs, while meeting legal standards for water quality. A variety of recreation is provided, including ORV use. New trails and roads will be located and constructed to meet water quality objectives. Timber production will be full yield using the low investment intensity, 17D.

23B No Timber Harvest, Limited Recreation Opportunities. The management goal of 23B is production of quality water for human consumption. There is no timber harvest and limited recreation. Water contact sports are discouraged. No developed sites (unless needed to protect water quality), no overnight use, and no ORV's. No new trails; new roads limited to those needed to access lands beyond the watershed. No scheduled timber harvest; any salvage of catastrophic timber loss is nonchargeable.

24 Minimum Management

The goal of this management area is to meet basic stewardship responsibilities at minimum costs. These include: protect life, health, and safety of incidental users; prevent unacceptable resource damage to NF or adjoining lands or downstream areas; administer non-Forest Service special uses, leases, and permits; and retain NF lands in Federal ownership and protect from theft and damage. No acres are currently assigned to this MA.

25 Special Uses

25A Utility Corridors. The goal of this management area is to provide utility corridors for effective and economical transmission facilities, with the least impact on natural resources. Utility corridors are located throughout the Forest, and vary in width and length from local water pipelines to major cross-state power transmission lines. Recreation opportunities may be provided (ORV use, hunting, gathering forest products, etc.); edge habitat for wildlife is provided. Similar special use development will be encouraged within existing corridors when use is compatible. No scheduled timber harvest; salvage and brush control for safety purposes is encouraged.

25B Electronic Sites. The goal of 25B is to provide for electronic sites for effective and economic transmission facilities, with the least impact on natural resources. Existing sites are located at a few selected sites on the Forest. Jim Creek Naval Station is 1,000 acres in size; others are quite small. Recreation and trail construction are not encouraged. Other types of special uses are discouraged. No scheduled timber harvest; salvage and brush control for safety is encouraged.

26 Administrative Sites

The goal of this management area is to provide appropriate sites and facilities for administration of the Forest. Included are: Ranger Stations, public service centers, engineering zone compounds, road maintenance compounds, seed orchards and seed production sites, scale stations, guard stations, and lookouts, where permanent facilities and utility systems are constructed. Older buildings will be renovated or replaced to maintain their functionality; improvements will be integrated into existing facilities. Appropriate recreation information, displays, and services provided at major administrative sites. No scheduled timber harvest. Hazard tree removal, salvage, and special cutting for safety or improvements permitted. Forest tree improvement is the primary goal of seed production areas and seed orchards.

27 Alpine Lakes Management Area

The goal of this management area is to provide for the administration and management of the Alpine Lakes Areas in accordance with the Record of Decision, Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981. Five management units were created (Special Areas, Dispersed Recreation, Developed Site, Scenic Forest, and General Forest). Timber harvest permitted in Scenic Forest (at about 70% of full yield) and in General Forest (full yield.) No scheduled harvest elsewhere. The FEIS and Management Plan provided for inclusion of the following Management Areas within the Alpine Lakes Area:

5 Potential Wild and Scenic River
11 Old Growth Habitat (Spotted Owl)
12 Mature and Old Growth Wildlife Habitat (Pine Marten, Pileated Woodpecker)
14 Deer and Elk Winter Range
15 Mountain Goat Habitat
16 Threatened and Endangered Species

Brief description of allocations in the Selected Alternative, 1981 FEIS:

Developed Site. Areas are substantially modified for campgrounds, boating, ski areas, summer home tracts, administrative sites, etc. Sights and sounds of people are evident; concentration of users is often high. Roads, trails, and parking are managed to provide access to the site, with emphasis on nonmotorized activity on the site. No scheduled timber harvest. Vegetative manipulation only for the enhancement or protection of the area.

Dispersed Recreation. Managed primarily in an unroaded condition with emphasis on dispersed recreation, scenic, wildlife or other amenity values. No new road construction. ORV use permitted, depending on the ROS class. No scheduled timber harvest. The only exception is salvage harvest of catastrophic forest loss for the purpose of limiting damage on adjacent lands. Visual Quality Objective is Retention and Partial Retention. Concentration of recreation users is low; relatively minimal contact with other users. If no alternative road access available for intermingled lands, access may be granted for a non-public minimum standard road.

General Forest. Timber harvest occurs, with a full range of silvicultural prescriptions used on suitable lands. The visual quality objective ranges from Retention to Modification. Dispersed recreation sites are common; encounters between recreationists may be numerous. Motorized activities are common. Rustic facilities may be provided. Land in this allocation is generally accessible by road. Road and trail standards range from optimum, for high-volume mixed traffic, to closed after project completion.

Special Area. Areas protected for their uniqueness and natural conditions, and, where appropriate, to foster public use, enjoyment, or study. Each Special Area has a specific management direction. Refer to FEIS, Alpine Lakes, 1981. No scheduled timber harvest. Roads, facilities (such as parking, picnic areas, and interpretive sites, etc.) will enhance and protect the area. Other resource manipulation, including removal of trees, will occur only for the enhancement or protection of the area.

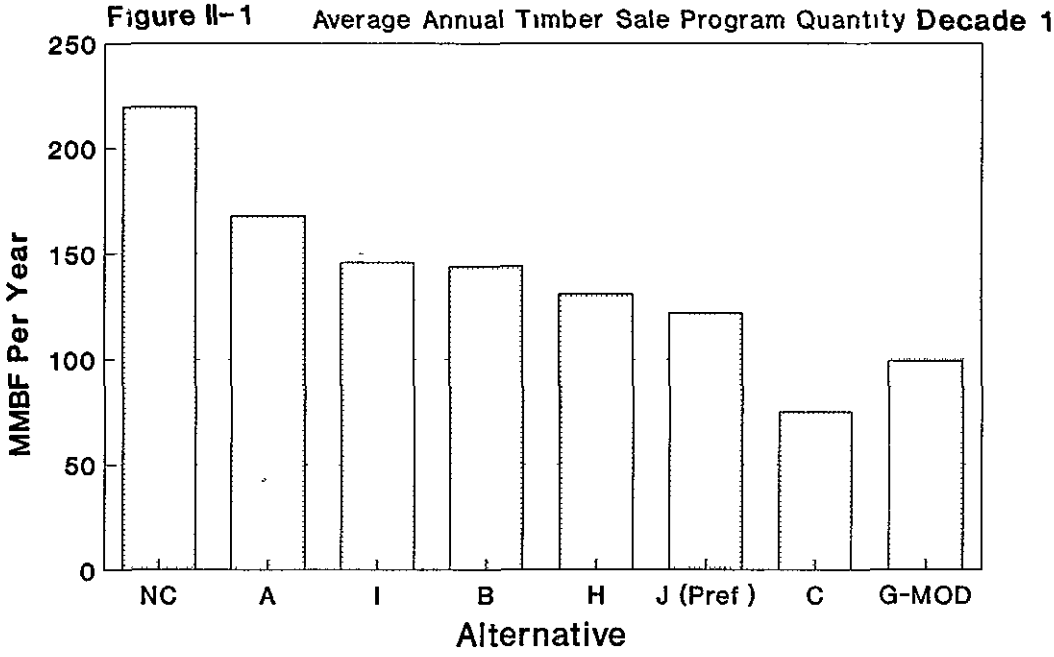
Scenic Forest. The objective is to retain or enhance viewing and recreation experiences. Developments and use in the seen area from recreation sites, roads, and trails within Scenic Forest will meet visual quality objectives. Use will be integrated with the natural landscape. Timber harvest permitted; a full range of silvicultural prescriptions will be used to meet the visual and recreational objectives.

Note: the wilderness portion, Alpine Lakes Wilderness managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

2. Alternatives At A Glance

The following figures show how the alternatives compare to each other in just a few of the Forest activities or resource outputs. The graphs tie to the detailed output tables in the next section (where other outputs are displayed). Again, the alternatives are arranged in order of decreasing acres of land suitable for timber production. Alternative NC (No Change) was not modeled in FORPLAN, therefore not all outputs for this alternative can be reasonably estimated. Refer to the text and footnotes for each figure.

Figure II-1 shows average annual timber sale program quantity (TSPQ) for Decade 1 (in million board feet). TSPQ includes live (green) wood, plus salvage, fuelwood, and other non-industrial wood. Figure II-2 shows the acres of final timber harvest, each decade, for Decades 1, 2, and 5. Refer to Table II-9a for more comparisons.



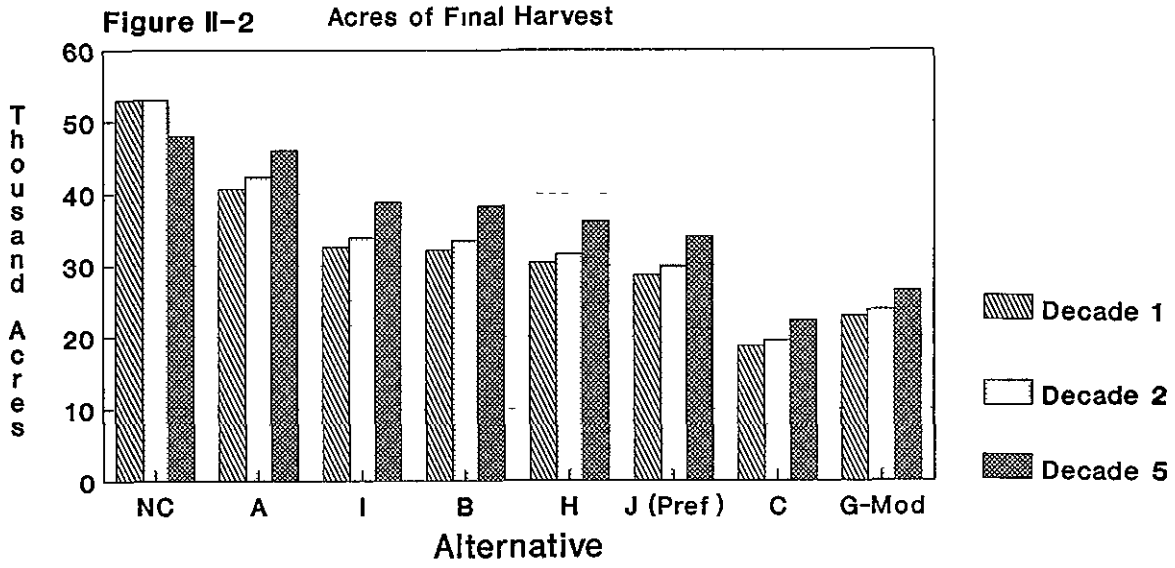


Figure II-3 shows the total amount of old-growth forest remaining, which includes old growth located in wilderness and other no-harvest areas. The starting point is the beginning of plan implementation. The figures then show acres remaining at the end of Decades 1, 2, and 5. Refer to Table II-91.

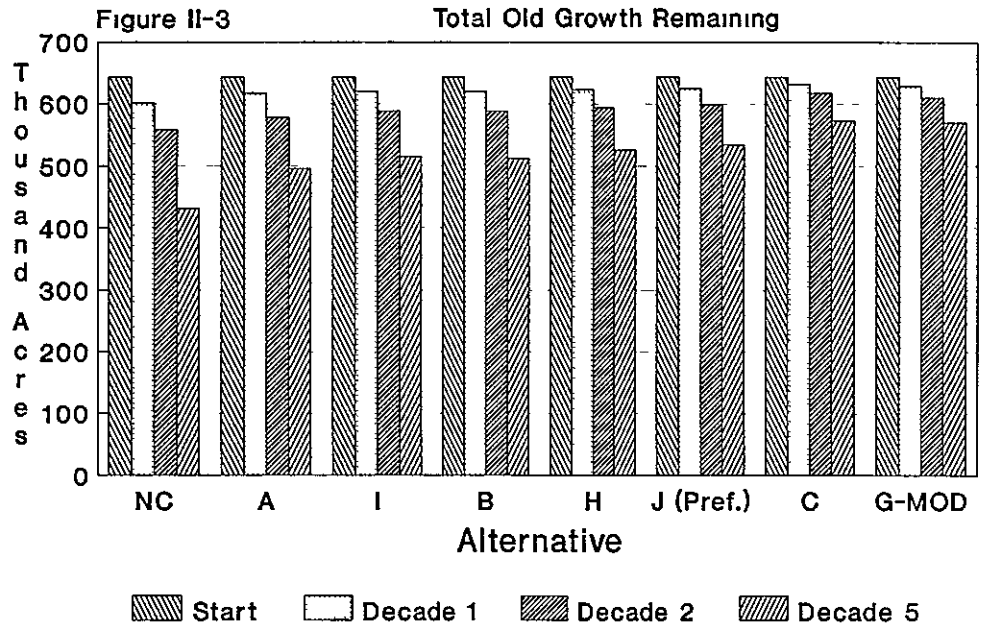


Figure II-4 shows total road construction, in miles per year. Most of the miles are local (timber purchaser) roads. For example; in Alternative J (Preferred), 0.8 miles of arterial/collector roads and 12.6 miles of local roads will be built per year in the first decade. In all alternatives, all arterial and collector road construction, but not all local road construction, will be completed by Decade 3. In Alternative C, about 300 miles of arterial and collector roads are closed starting in Decade 1; about 65 miles are closed in Alternative G, about 20 miles closed in Alternative H, and about 25 miles closed in Alternative J (Preferred).

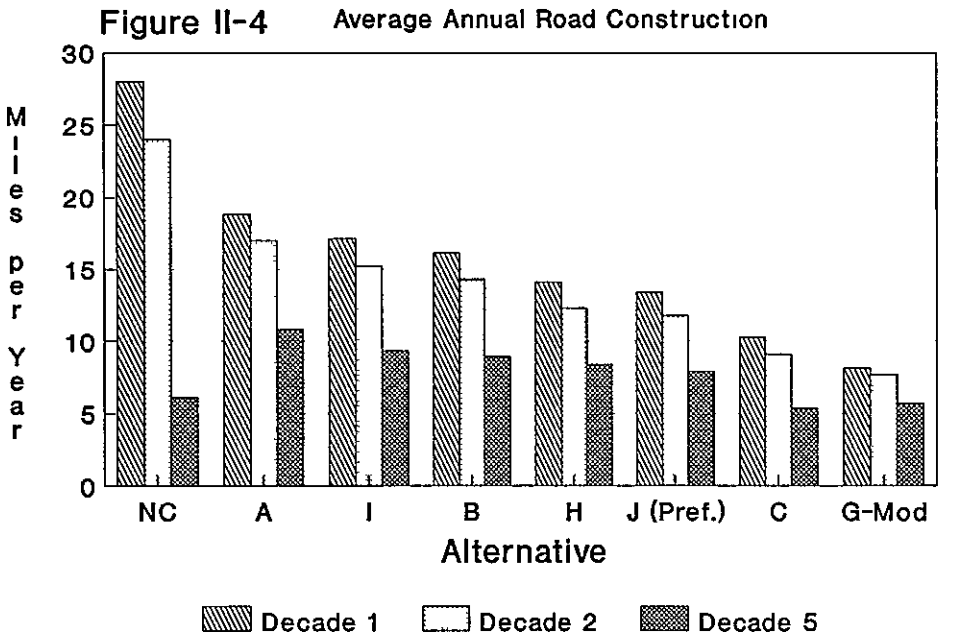
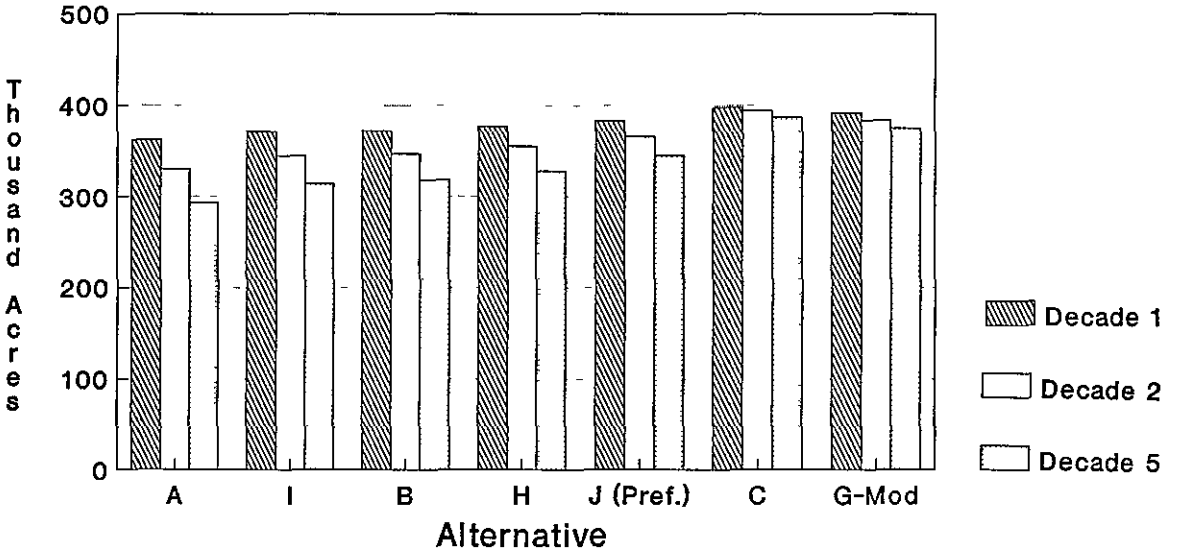


Figure II-5 shows the disposition of the 402,930 acres of roadless areas: the percent remaining undeveloped at the end of Decades 1, 2, and 5. No data can reasonably be estimated for Alternative NC. In the first 10 to 15 years, from 1% to 7% would be developed, depending on the alternative. The acres shown for Alternative A are an estimate; refer to the text accompanying Table II-9g.

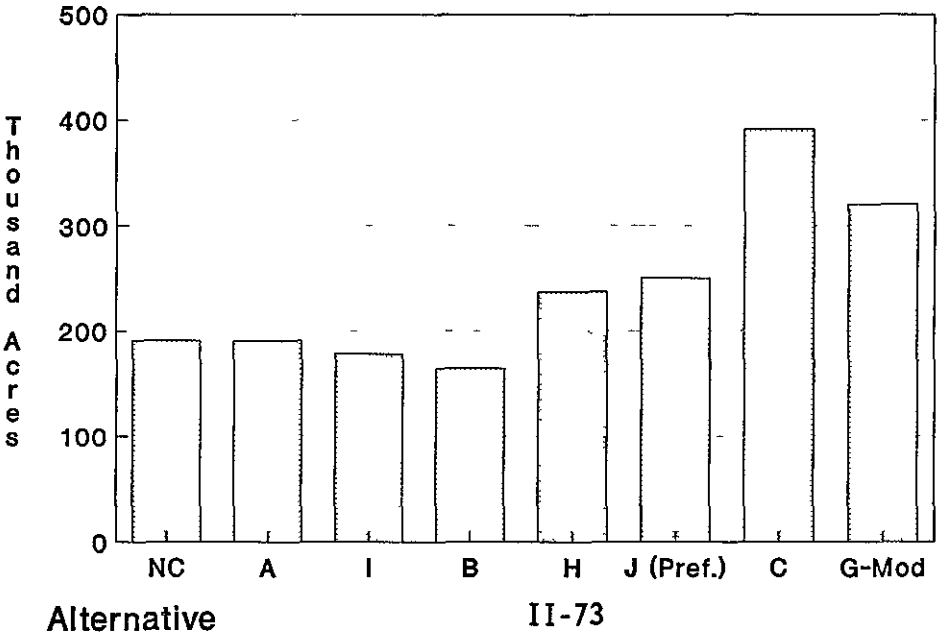
Figure II-5 Acres of Roadless Areas Remaining Undeveloped
Decades 1, 2, & 5



Does not apply to NC Alt

Figures II-6, below, and II-7, on the next page, show the acres of dispersed recreation by ROS classes. Alternative NC is estimated to be similar to Alternative A. The term "reached by Decade 4" is used because, as an alternative is implemented, land allocated to MA's, and standards and guidelines applied, the recreation setting will slowly change toward the desired future condition. The figures show the expected ROS acres after four decades of implementing each alternative.

Figure II-6 Unroaded ROS Acres Reached by Decade 4



While no alternative can meet future demand for unroaded dispersed recreation, Alternatives C and G-Modified come the closest. Alternative B cannot meet the RPA target for dispersed recreation. Looking at Figure II-7, the alternatives with more timber harvest activities and associated road construction (NC, A, and I) provide the most roaded dispersed recreation; however, much of this recreation will occur in landscapes that have been heavily altered.

Figure II-7 Roaded ROS Classes Reached by Decade 4

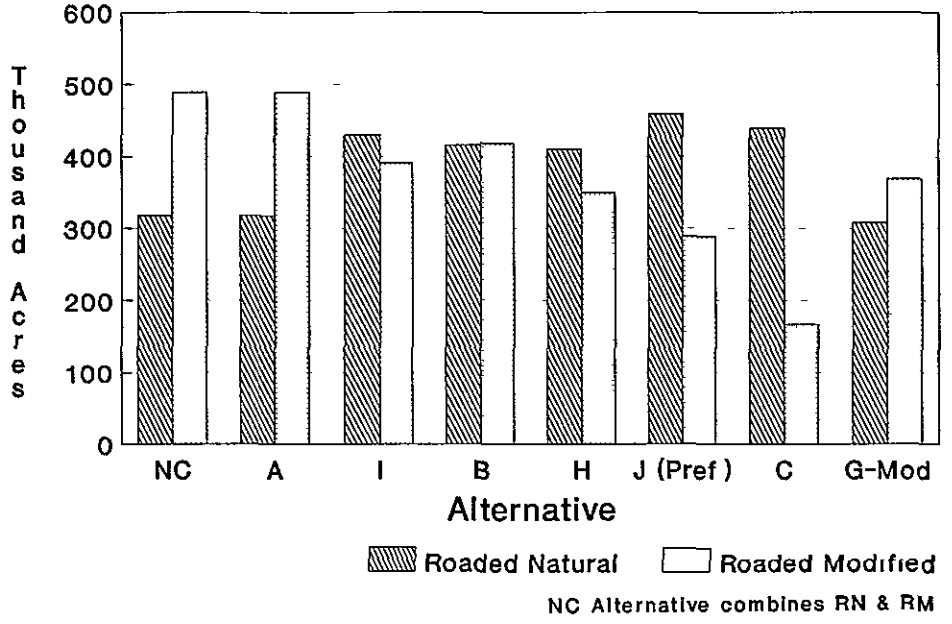
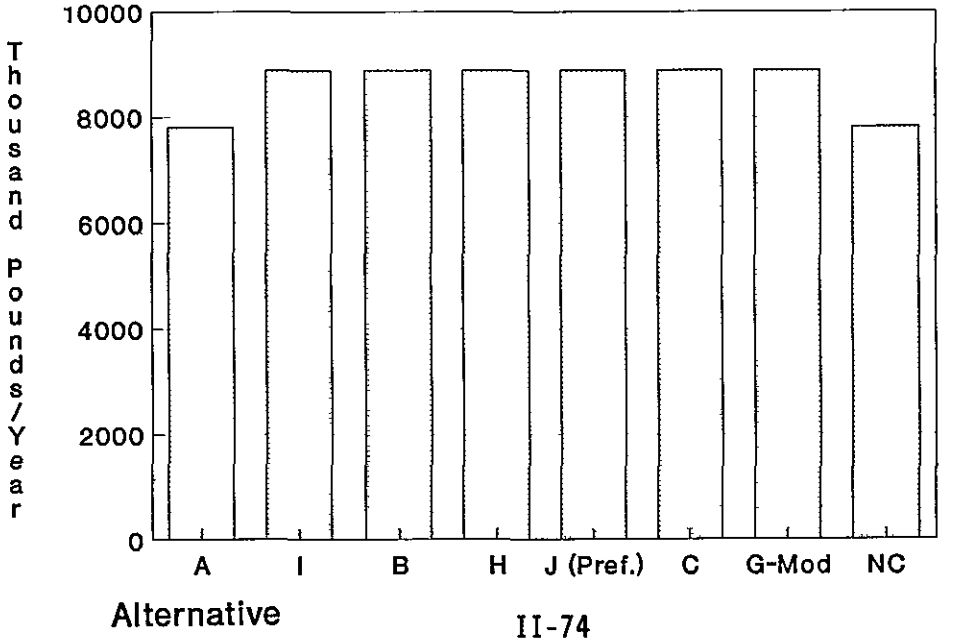


Figure II-8 shows the pounds of anadromous fish available for commercial harvest. The differences between alternatives are a function of investments in habitat improvements: a higher level of investment and more restoration/ enhancement results in more available fish. Alternative NC is similar to A. While not shown in this figure, resident fish habitat is also improved/enhanced in Alternatives C, G-Modified, and J (Preferred).

Figure II-8 Anadromous Fish for Commercial Harvest



3. Comparison of Resource Outputs, Inputs, and Environmental Effects

The following pages of tables show the inputs, yields, and effects of various resources and activities, by alternative. The numbers in the II-9 Tables and in Table II-10 are derived primarily from analysis completed in the FORPLAN model, or in a few cases, from analysis done outside of the model. Table II-10 is a narrative comparison of outputs and environmental effects that are qualitative in nature; also refer to the quantitative II-9 tables.

As mentioned earlier in this chapter, the alternatives are displayed, from left to right, in order of decreasing acres of land suitable for timber production. This order is useful in understanding how the environmental consequences and effects will vary by alternative. The sequence is strongly correlated to the amount of vegetative management in the alternatives. Total suitable acres also correlate with the objectives of each alternative. For example: Alternative I (emphasis on timber/other resources with established market prices) has a large number of suitable acres and a high allowable timber sale quantity (ASQ). Alternative C, near the other end of the spectrum, emphasizes primitive/semi-primitive dispersed recreation; it has the second-lowest number of acres suitable for timber harvest and the lowest ASQ.

The first set of data is presented in sub-tables: Table II-9a through II-9o. Outputs and effects that are generally related, such as timber/roads/sediment or recreation/wilderness/scenery, are grouped and displayed together. Please refer to the narratives preceding each sub-table for information to help understand the tables, and the differences among the alternatives.

Alternative NC (No Change) is based on the 1963 Timber Management Plans. These Plans were not integrated resource plans, and consequently did not address all resource uses and outputs. Data for Alternative NC is presented as available. Refer to the footnotes for each table.

Although these tables show outputs and effects over the long term, the results of this planning process will apply for only 10 to 15 years, the life of the Forest Plan.

Long-term Timber, Water, and Sediment Inputs and Yields (Table II-9a)

Table II-9a compares, by alternative, the long-term yields, effects, and activities related to the timber, water, and soils resources. With few exceptions, as suitable acres increase, the following increase: the amount of vegetative management (all aspects of timber harvesting: reforestation, timber stand improvement, fuel treatment, and regeneration harvest), miles of road construction and reconstruction, and finally, the environmental effects from these activities.

To put the allowable sale quantity for the five decades in perspective, the potential yield for the 1963 TM Plans (as amended), plus the average annual cut and sold volume for 1975-1988 are shown. Potential yield for the Mt. Baker-Snoqualmie was last reduced to reflect the 1984 Washington State Wilderness Act, from 259.4 MMBF to the current level: 203.8 MMBF. TSPQ was also reduced. The PY and TSPQ for Alternative NC (No Change), which are based on the TM Plan, are also shown in Table II-9a. More information about outputs in the timber resource can also be found in Tables II-9b through 9e.

Table II-9a
Long Term Timber, Water, and Sediment Inputs and Yields

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No Act)	I	B (RPA)	H	J (Preferred)	C	G-Mod.
Lands Tentatively Suitable for Timber Production	Acres	NA	597,199	597,294	597,307	597,293	597,280	597,303	597,284
Lands Suitable for Timber Production	Acres	546,500	412,508	386,512	380,448	358,754	346,411	256,206	247,091
Allowable Sale Quant 2/									
Decade 1	MMBF Per Year	204	149	129	127	116	108	66	87
Allowable Sale Quant. 2/									
Decade 1	MMCF	41.7	31 0	26 6	26 3	24.1	22 4	13.8	18.3
Decade 2	Per	41.7	36 7	30 0	29 6	27.5	25.7	16.3	20.7
Decade 5	Year	41 7	39.0	33.7	32 3	31.3	29.7	19 8	22.2
Long Term Sustained Yield Capacity	MMCF Per Year	NA	38.6	34.0	33.4	31 8	30 4	19 0	23 6
For Comparison	MMBF	1975-88 Average Annual Timber Cut (Chargeable to Potential Yield)					212 8		
	Per	1975-88 Average Annual Timber Sold (Chargeable to Potential Yield)					249.9		
	Year	1975-88 Average Annual Potential Yield - Timber Management Plan					237 4 3/		
Timber Sale Program Quantity 4/									
Decade 1	MMBF Per Year	220	168	146	144	131	122	75	99
Timber Sale Program Quantity 4/									
Decade 1	MMCF	45.0	35.0	30 1	29.8	27.3	25 5	15 8	20.4
Decade 2	Per	44.5	40 8	33 3	32.9	30 6	28 5	18 2	23.0
Decade 5	Year	42.5	41 5	35 8	35.4	33.3	31 6	21.0	23.6
Fuel Wood 5/									
Decade 1	MCF	2,252	1,715	1,467	1,449	1,326	1,234	759	1,007
Decade 2	Per	1,976	1,779	1,449	1,433	1,327	1,238	788	997
Decade 5	Year	560	541	466	460	433	410	273	306

1/ The TM Plans upon which the No Change Alternative is based were developed in 1963. The outputs and effects are generated from previous inventories. All other alt. outputs and effects were calculated using updated inventories and yield tables and the latest method of calculating timber harvest levels For Alt NC, tentatively suitable lands were not determined and standard plus special commercial forest land is shown as lands suitable for timber production

2/ ASQ· Quantity of timber that may be sold, from suitable land. Includes only chargeable, live (green) not salvage, fuelwood or other non-industrial wood. Potential yield from the TM Plan is shown for Alternative NC.

3/ Potential yield is a ceiling on amount of chargeable timber volume that can be sold; includes both net live and salvage volume Current potential yield equals 203.8 MMBF/yr. Potential Yield 1975-1979 = 240.9 MMBF/yr ; 1980-1983 = 259.4 MMBF/yr., 1984-1988 = 203.8 MMBF/yr. See Table III-11 for further explanation on potential yield values.

4/ Includes ASQ, nonchargeable mortality volume, volume not meeting utilization standards, and volume used for other than board products from lands suitable for timber production, and volume from unsuitable lands Includes PY and all other volume for NC

5/ The fuelwood conversion is 95 cubic feet per cord. Volumes are estimated as a % of submerchantable timber outputs associated with regeneration harvest. This volume is included above in Timber Sale Program Quantity and in 1975-84 Cut and Sold It is not included in ASQ or PY.

Table II-9a
Long Term Timber, Water, and Sediment Inputs and Yields

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No. Act)	I	B (RPA)	H	J (Preferred)	C	G-Mod.
Reforestation 6/									
Decade 1	Acres	4,360	4,068	3,260	3,221	3,042	2,865	1,873	2,291
Decade 2	Per	4,240	4,231	3,390	3,350	3,163	2,980	1,948	2,382
Decade 5	Year	4,240	4,605	3,879	3,832	3,619	3,409	2,229	2,652
Timber Stand Improvement									
Decade 1	Acres	3,000	1,141	996	989	1,005	996	615	873
Decade 2	Per	3,000	5,603	3,481	3,207	3,106	2,911	1,491	3,022
Decade 5	Year	3,000	3,407	2,605	2,461	2,465	2,124	1,390	1,932
Arterial and Collector Road Construction									
Decade 1	Miles	8 2	1 4	1.8	1.5	0.6	0.8	0.7	0.6
Decade 2	Per	6.7	1.2	1.6	1.3	0.5	0 7	0.8	0 7
Decade 5	Year	0.0	0.0	0.0	0.0	0.0	0 0	0 0	0 0
Timber Purchaser (Local) Road Const /Recon.									
Decade 1 Const.		20 4	17.4	15 3	14.6	13.5	12 6	9 6	7.5
Reconstruct.	Miles	72 0	73.2	63 0	61 7	56.6	52.8	34.3	40.2
Decade 2 Const.	Per	17.8	15.8	13.6	13.0	11.8	11.1	8.3	7.0
Reconstruct.	Year	72.0	81.9	67.4	66.2	61.1	57.1	37.6	44.1
Decade 5 Const.		6.1	10.8	9.3	8.9	8.4	7.9	5.4	5.7
Reconstruct.		72.0	81.1	69.9	68.8	64.7	61 2	40 9	45.5
Sediment Index									
Decade 1	M Tons	Simi-	102.9	96.7	95.7	91.3	88.5	67.6	66.8
Decade 2	Per	lar to	102.6	96.5	95.4	91.0	88.2	67.5	67.1
Decade 5	Year	Alt. A	100.4	94.6	93.3	88.9	86.2	65.4	65.3
Water Yield									
Decade 1	M Ac Ft	15,616	15,616	15,616	15,616	15,616	15,616	15,616	15,616
Decade 2	Per	15,616	15,616	15,616	15,616	15,616	15,616	15,616	15,616
Decade 5	Year	15,616	15,616	15,616	15,616	15,616	15,616	15,616	15,616
Improved Watershed Condition									
Decade 1	Acres	Sim-	40	35	35	35	35	20	20
Decade 2	Per	lar to	40	35	35	35	35	20	20
Decade 5	Year	Alt. A	40	35	35	35	35	20	20
Fire Management Effectiveness Index									
Decade 1	Annual Dollars	930	930	930	930	930	930	930	930
Decade 2	Per M Acres	930	930	930	930	930	930	930	930
Decade 5	Protected	930	930	930	930	930	930	930	930
Fuel Treatment									
Decade 1	Acres	5,396	4,068	3,260	3,221	3,042	2,865	1,873	2,291
Decade 2	Per	5,394	4,231	3,390	3,350	3,163	2,980	1,948	2,382
Decade 5	Year	4,783	4,605	3,879	3,832	3,619	3,409	2,229	2,652

6/ Acres shown are those planted with seedlings; however all acres regeneration harvested (see Table II-6c) are reforested by planted or natural seedlings.

Acres of reforestation are determined by the mix between natural and planting reforestation intensities in each alternative. However, in all alternatives, most acres will be reforested by planting by hand, rather than through natural reforestation. Estimates for Alternative NC are based on reforestation by planting. The acres of timber stand improvement shown in Table II-9a are acres of precommercial thinning.

The soil sediment index is a reflection of the amount of new timber harvest and road construction/reconstruction, plus the amount of background sediment (from old roads and other acres of previously-disturbed ground, and natural sediment). The index increases as total suitable acres increase.

The Forest annual water yield shows no change, by alternative; research has shown the effects of management activities on annual yield to be unmeasurable.

Acres of improved watershed conditions reflect planned improvement/rehabilitation of watersheds damaged either by natural or human-caused disturbance.

Comparison: Past, Present, and Alternative Timber Outputs (Table II-9b)

This section is included in Chapter II to give the reader an idea of the differences between the 1963 Timber Management Plans (the basis for Alternative NC) and the projected outputs and effects of the Forest Plan alternatives. Also included is a brief history of the timber sale "performance" of the recent past for the Mt. Baker-Snoqualmie, and some of the economic and social impacts.

These comparisons are similar to material presented earlier: "The Relationship of Alternative No Change to Alternative A (No Action)" on page II-29. Also, refer to Chapter III for more information about timber supply and demand.

Table II-9b shows timber outputs for: the actual annual timber sold (average for 1979 through 1988) under the 1963 Plans; potential yield for Alternative NC; and first decade allowable sale quantity projected for each alternative.

Discussion of Table II-9b

The potential yield (PY) exceeds the allowable sale quantity for all alternatives; even if salvage volume is subtracted from PY, it still exceeds ASQ for all alternatives. The percent decrease in ASQ from PY ranges from -27 percent in Alternative A to -67 percent in Alternative C. Alternative J (Preferred) is 47 percent below the 1963 Plans potential yield.

The commercial forest land base for the 1963 Timber Management Plans is larger than the suitable land base of all alternatives. However, all alternatives have a higher per acre yield, primarily due to increased utilization standards; increased yields from precommercial thinning and use of genetically improved stock; and inclusion of hardwood volumes.

The timber sale program quantity for each alternative is also less than in the existing 1963 plan, though the decrease is less than for ASQ (primarily because salvage volume for each alternative is included in TSPQ.) In all alternatives except Alternatives A and NC, timber sale program quantity includes volume from the study plots in MA 19 Mountain Hemlock Zone (a total of up to 250 acres in 25 plots of approximately equal size).

Table II-9b
Comparison Past, Present, and Alternative Timber Outputs
Volume in Million Board Feet

Timber Outputs	Actual Av Tbr Sold 1979-88	Alternatives: NC (No Change)	A (No Act)	I	B (RPA)	H	J (Pref.)	C	G-Modified
I. Allowable Sale Quantity (ASQ) 1/			.. .. .Annual Figures for Decade 1						
A. Green	227.8	196.9	148 6	128.7	127 1	115.8	107.5	65 7	87 2
B. Salvage	8.0	6 9	0	0	0	0	0	0	0
TOTAL (PY) 2/ or ASQ	(235.8)	(203.8)	148 6	128.7	127 1	115.8	107.5	65.7	87 2
% ASQ Decreases from Potential Yield	0	NA	-27	-37	-38	-43	-47	-68	-57
II Other Sawtimber 3/									
A. Sawtimber from Lands Designated Unsuitable 4/									
1 Green	2 0	1.6	1 34	2 15	2.13	2.03	1.95	1 58	1.77
2. Salvage	0 2	0.2	0	.04	.04	.04	.04	04	.04
Subtotal - Sawtimber from Unsuitable Lands	2.2	1.8	1.4	2.2	2 1	2.1	2.0	1.6	1 8
B. Dead Sawtimber from Lands Designated Suitable 5/	0	0	5 8	4.5	4.5	4 3	4 3	2.9	3.3
TOTAL OTHER SAWTIMBER	2.2	1 8	7.2	6.7	6.6	6.4	6.3	4 5	5.1
III. Submerchantable Volume From All Lands 6/									
A Fuelwood 7/	(6.4)	(6.8)	(8 2)	(7.1)	(7.0)	(6 4)	(5 9)	(3.6)	(4 8)
B. Other (Includes Cull)	28.8	14 5	11 8	10.4	10.3	9 2	8 3	5.0	6 9
TOTAL SUBMERCHANTABLE VOL.	28 8	14 5	11 8	10 4	10.3	9.2	8 3	5 0	6.9
TOTAL NET MERCHANTABLE SAWTIMBER (I + II)	238 0	205.6	155.8	135 4	133 7	122.2	113.8	70.2	92.3
TOTAL NONCHARGEABLE (II + III)	31.0	16.3	13 2	12.6	12 4	11.3	10 3	6.6	8 7
IV. Timber Sale Program Quantity (TSPQ) (I + II + III) 8/	266.8	220.1	167 6	145.8	144.0	131.4	122.1	75 2	99.2
% TSPQ Decreases from 1963 TM Plans	NA	0	-24	-34	-35	-40	-45	-68	-55

Footnotes appear on the following page

Footnotes for Table II-9b

1/ ASQ for Alternative A (No Action) was calculated by modeling direction from the 1963 Timber Management Plans, projected into the future. New, scientific information was used, such as improved yield tables, land suitability classification for timber production, and FORPLAN analysis.

ASQ includes only live (green) volumes resulting from the yield projections of FORPLAN. ASQ is obtained from lands designated as suitable for timber production under NFMA standards. ASQ volumes meet utilization standards in the Regional Guide. When sold, the volume is called "chargeable", and is used to determine achievement of planned allowable sale quantity goals.

2/ Potential Yield from the 1963 Timber Management Plans (upon which Alternative NC is based) is shown in parenthesis to distinguish from ASQ; it includes both net live (green) and dead (salvage) volume.

3/ Meets utilization standards in the Regional Guide, but is not considered "chargeable" against the planned ASQ goals.

4/ Sawtimber from lands designated unsuitable for timber production. This volume is estimated based on the incidental volume of timber that will be sold from lands not designated for timber production.

5/ This dead (salvage) volume from suitable lands was not included in yield tables in FORPLAN.

6/ The estimated timber volume that does not meet utilization standards in the Regional Guide, but which could be utilized for products other than sawtimber. It is not considered "chargeable" against planned ASQ goals.

7/ Fuelwood volume in parenthesis is not added to Total Submerchantable, Nonchargeable Volume, or to the TSPQ to avoid "double counting." There are two reasons: in the first two columns, nearly all of the 6.4 MMBF of fuelwood sold is already included in nonchargeable Other Sawtimber or submerchantable volume remaining in timber harvest sale areas. In the alternative projections, fuelwood is estimated as a percentage of submerchantable timber outputs associated with regeneration cutting. An unestimated volume of fuelwood may be available from other activities, e.g. commercial thinning.

8/ TSPQ includes the allowable sale quantity for Decade 1 and estimated additional volume planned for sale during the first decade, such as fuelwood.

Differences in Terminology. One major difference between the 1963 TM Plans and the Forest Plan alternatives is the terminology used to report timber outputs. Both potential yield (PY) and allowable sale quantity (ASQ) are legitimate expressions of outputs. Refer to the discussion of Alternatives NC and A, page II-29, and to the glossary. Both PY and ASQ represent a ceiling on the amount of chargeable volume that could be sold for a given decade; in this context, the terms are comparable. PY includes both net live (green) and dead (salvage) volume, while ASQ includes only net live (green) volume. **Table II-9b(1)**, on the following page, shows major differences between calculation of PY (1963 Plans) and ASQ (Alternative J (Preferred). It is similar to Table II-7, on page II-31, which displayed the differences between PY for Alternative NC and ASQ for Alternative A.

Table II-9b(1)
Major Differences - 1963 TM Plans PY and Forest Plan ASQ (Alternative J)

Factor	PY 1963 TM Plans	ASQ Forest Plan (Alt J)
Land Base for Determining Timber Production	Consider available forest land producing 20 or more CF per acre per year	All forest land considered in Land Suitability for Timber Production Process
	CFL classified available for timber production (Timber Key Value Areas & Special, Modified Cut)= 579,800 acres Of these, 33,300 acres are Marginal CFL or Modif cut, currently not economically or technologically feasible to manage for timber prod Result 546,500 acres can be managed for timber production	Land classified Tentatively Suitable for Timber Production = 597,000 acres Of these, for Alt J, 175,000 acres are proposed for other resource uses that preclude timber prod FORPLAN analysis determines that, for Alt J, another 76,000 acres are not cost-efficient in meeting alt objectives or cannot be scheduled for harvest in the next 150 years Result 346,000 acres are suitable for timber production (in Alt J
Inventory, Utilization Standards		
-Mapping	Identified broad Timber Key Value & Modified Cutting Areas	In-place ecoclass mapping of entire Forest (lattr'75)
-Acre Determination	Plot expansion to determine total CFL acres (USDA 1960)	Data base extract of mapped in-place acres
-Utilization Stds		
Existing Mature	11 inch DBH to 8 inch top	9 inch DBH to 6 inch top
Commercial Thin	No standards specified	7 inch DBH to 4 inch top, for Decade 1
All Stands Except Existing Mature	NA	7 inch DBH to 4 inch top, after Decade 1
-Sampling	No growth samples taken Mortality sampled on only one Ranger District	Growth and mortality sampled Forest-wide
Yield Calculations	LTSYC undetermined	LTSYC calculated in FORPLAN
-Annual Regeneration Harvest Yields	In Timber Key Value CFL Yield calculated by dividing total live timber volume over rotation age by 100-year rotation, plus estimated ann growth in Key Value CFL less than rotation age	In Suitable lands Net live timber volume from timber yield tables entered into FORPLAN where analysis determines yields Included in ASQ
	Added estimate for merchantable dead (the volume per acre x estimated acres clear-cut annually) Included in PY	Same calculation, but dead volume is not included in ASQ
	In Marginal CFL, No Yield	In suitable lands where reduced timber yield provides other resource opportunities, yield is calculated as in suitable above Included in ASQ
	In Special CFL, Gross growth is estimated yield (excluded mechantable dead volume) Is included in PY	
-Commercial Thinning Yields	No estimated yield	Net live timber volume, yield calculated as in suitable land, above
-Pre-commercial Thinning	No estimated yield	Yield reflected in timber yield tables
-Genetics	No estimated yield	Yield increases based on acres planted by area and species Increases are between 1 and 2 percent
-Hardwoods	No estimated yield	Hardwood volume is chargeable to ASQ Only 1 7% of inventory is hardwoods

The Effects of the Previous Decade

In order to understand some possible effects of the projected ASQ for the alternatives, the events of the previous decade can add some perspective. Both the performance of the Mt. Baker-Snoqualmie National Forest and the performance of the timber industry in the Puget Sound area are summarized. Refer to Chapter III, Commercial Timber section for more detailed information.

Past Performance Under the 1963 Timber Management Plans. The average annual PY sold during the ten year period 1977-88 was 235.8 MMBF; the average annual PY planned for this period was 229.8 MMBF. The PY sold in any fiscal year may exceed the PY in effect that year, but the cumulative total chargeable sell cannot exceed the cumulative total planned chargeable sell during the fiscal years the plan has been in effect.

Through fiscal year 1988, the cumulative total chargeable volume sold (5,822.1 MMBF) was 9.8% less than the total cumulative total planned chargeable sell (6,452.4 MMBF) over the 25 year plan period. 3/ This is a good record, especially in view of the changing land base, the return to the government of 87 timber sales under the Federal Timber Contract Payment Modification Act of 1984 in contract defaults, and the fact that the 1963 TM Plans were issued as "interim" five-year plans. 4/

The actual cut volume in any fiscal year, averaging 200.6 MMBF per year between 1979 and 1988, is a function of log market prices and other factors, rather than the volume sold that year.

A general recession in the Northwest in the early 1980's and severely depressed timber markets resulted in the return to the government of a number of timber sales. Purchasers who bought timber in the late 1970's at high stumpage rates elected to not harvest this volume and sell it at the prevailing low rates of the early 1980's. During an eight month period on this Forest (Nov. 1985 - June 1986), a total of 87 unharvested timber sales were returned to the government, with a volume of 640.7 MMBF (592.3 MMBF chargeable.) Sixty-nine of the 87 sales were authorized under the Federal Timber Contract Payment Modification Act of 1984, and 18 were returned through contract defaults. Most of this volume has been resold, or will be sold in the near future.

Adjusting the PY for the ten year period, 1979-1988, for the chargeable volume returned to the government for resale produces an actual PY sold of 1850.4 MMBF for the period. 5/ This compares to the planned PY sell volume of 2297.5 MMBF for the period. The Forest has undersold the planned PY sell volume by 447.1 MMBF for the time period, or 19.5 percent less than planned.

3/ Volume sold values based solely on the Forest "Timber Management Control Record - Sell" for the timber period.

4/ The PY was amended to reflect wilderness designation in 1964, 1976, and 1984; creation of the North Cascades National Park and Recreation Area and designation of Wild and Scenic Rivers in 1968; and the roadless area reviews.

5/ This volume can be termed the "effective" PY sold during the period, in that only 185.0 MMBF of timber was effectively available to the timber industry and the area economy, not the 235.8 MMBF per year actually sold.

This volume - 185.0 MMBF - falls between the ASQ of the alternatives and the PY of the 1963 Plans (203.8 MMBF) and is only 9.2% less than the latter. See Table II-9b.

Comparing effective sold to the planned sell for the 1963 through 1988 period, the Forest sold 630.3 MMBF less than was planned. 6/ All except 38 MMBF of the difference can be accounted for by the 87 sales returned to the Government (592.3 MMBF) and, in fiscal year 1985, underselling the planned PY by 2.5 MMBF. Some reasons for the 38 MMBF difference are:

- o appropriation and national policy affected the sell;
- o from 1963 through fiscal year 1979, the Forest undersold the planned PY by 118.7 MMBF, while during 1975 through 1984, the Forest oversold the PY by 60.6 MMBF. The Forest undersold the PY during five fiscal years since 1971 (1972, '74, '82, '83, and 1985);
- o market or recession lows in 1967, 1969, 1971, and 1981-82 partly accounted for less sold than planned;
- o designation of wilderness, wild and scenic rivers etc.; the growth of the conservation movement during this period; and a tremendous increase in concern for wildlife and the preservation of old growth have all affected the timber sale program. Timber sales were not planned, were canceled, or delayed in certain areas because of pressure from special interest groups or pending legislation.

Timber Mill Situation. A direct effect of the 1981-82 recession was a decline in the number of mills. From 1972 through 1978, the total number of mills in the State of Washington, excluding the export industry, increased 35.7%. From 1978 to 1982, the number of mills decreased 29.6%. The number of mills in the Puget Sound area (excluding export) dropped 20 % in two years - 1980-82. Part of this is due to increasing mill efficiency: by 1982, mills utilized 97 percent of wood and bark residue.

Between 1982 and 1984, another 18 percent of the mills in the Puget Sound area closed; another 11 percent shut their doors by 1986. In all, the recession and restructuring of the wood products industry saw Puget Sound area mills (not including export operations) decrease by almost half. Yet, there were major improvements in productivity among the remaining mills. For instance, lumber mills, which had dropped by 23 percent in number by 1986, were producing 9 percent less lumber than in 1978.

In the Puget Sound area in 1986, 49 of the 87 mills (excluding the 35 export mills) were not dependent on National Forest timber; 11 mills were dependent for 1-33% of their log supply; 6 were dependent on National Forest timber for 34-66% of their supply; and 21 were 67-100% dependent on National Forest log supply. As discussed in detail in Chapter III, Commercial Timber section, this situation is expected to continue for at least the next decade.

6/ The cumulative planned chargeable sell from 1963 to 1988 was 6,452.4 MMBF. The effective sold was 5,822.1 MMBF.

Timber Resource Management Data, By Alternative (Table II-9c)

Table II-9c on pages II-86 and 87, and the accompanying narrative compares timber-related information for the alternatives and two of the benchmarks. The benchmarks selected, Maximum Timber and Maximum PNV with management requirements (MR's), represent the "benchmark ceilings" or maximum timber resource outputs that could be achieved on the Mt. Baker-Snoqualmie National Forest, while meeting the NFMA requirements. The columns in Table II-9c are numbered to help the reader track information, and the narrative below is organized by these columns.

Some data is not shown for Alternative NC (No Change). The alternative is not directly comparable with the other alternatives, due to differences in inventory, land classification, modeling, etc., previously discussed in this chapter.

Some general comparisons for the data in Table II-9c are as follows. The remainder of the narrative for this table will focus only on the inter-relationship of Alternatives A (No Action) and J (Preferred) and the two benchmarks.

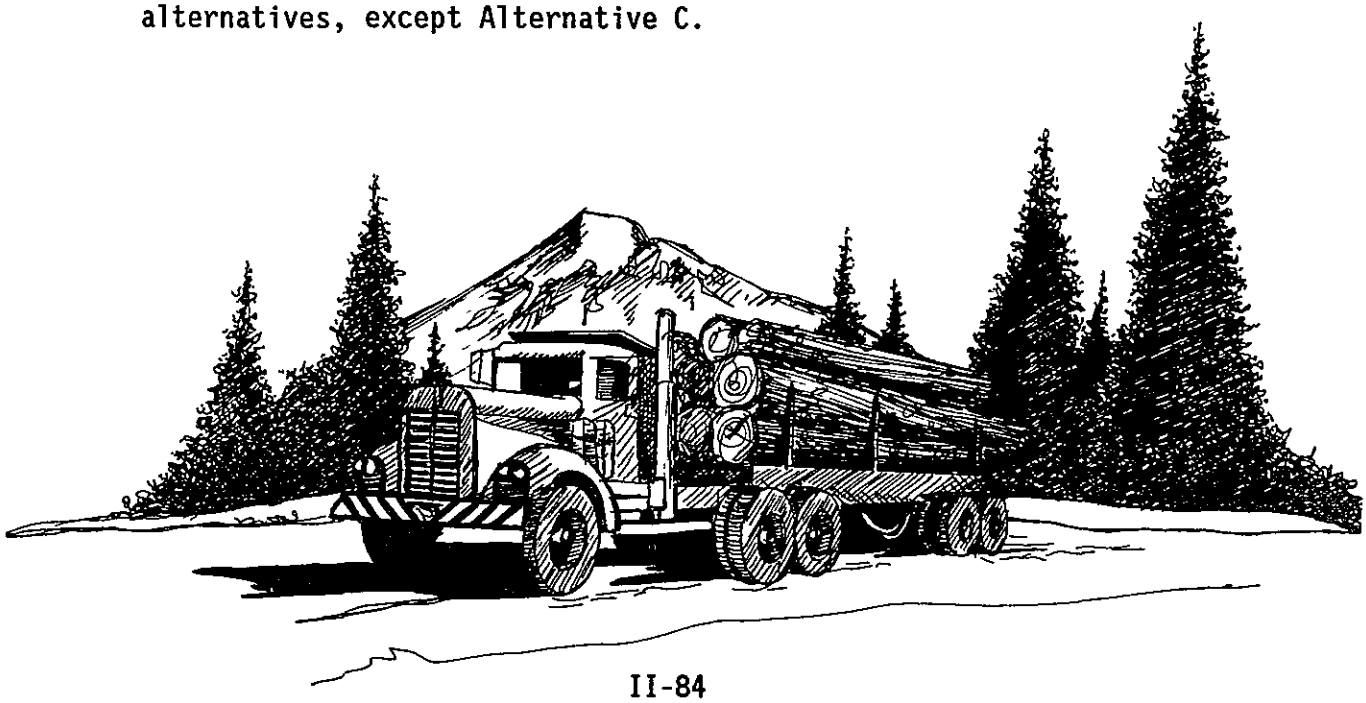
Suitable Acres, Column (1): see footnote 1, Table II-9c.

Inventory, Columns (2), (3), (4): was determined for Alternative NC using inventory data for the 1963 (amended) TM Plans and current standard and special (suitable acres).

Average Annual ASQ, Columns (5), (6), (7): previously compared in this chapter.

Area and % of Suitable Lands by Yield Level, Columns (14) through (19): standard lands have full yield. Special lands have 50-99% yield.

Regeneration Harvest in 1st Decade, Columns (20) through (23): clearcut acres are the greatest, reflecting the highest timber output of any alternative. Percent of suitable acres harvested is smaller than all other alternatives, except Alternative C.



Suitable Acres, Column (1)

The acres suitable for timber production include lands where timber management activities will occur; they are a reflection of the different multiple-use objectives of each alternative or benchmark. In the two benchmarks, multiple-use objectives are limited to those needed to meet minimum policy and legal requirements. Alternatives must meet these requirements, plus additional objectives to meet the goals of the alternative. Thus total suitable acres in the alternatives are much lower than in the benchmarks.

Suitable acres decrease from Alternative NC to Alternative G-Modified. This decrease reflects the acres in each alternative that are tentatively suitable for timber production (except Alternative NC) but, to meet the multiple resource objectives of the alternative - including timber resource objectives - were not assigned suitable for timber production. Some of these acres were assigned to MA's that do not allow scheduled timber harvest (see Table II-9d), and others are not cost efficient in meeting the management objectives of the alternative or were not scheduled for harvest during the 150 year planning horizon. (see Tables II-9d and 9d(1)).

Inventory (on Suitable Lands), Columns (2), (3), and (4)

These columns show the inventory volume of growing stock trees on suitable lands, calculated from timber yield tables in FORPLAN. Column (2) shows inventory at the beginning of the first decade, before any timber harvest. The inventory is generally proportional to the total suitable acres; the mix of timber age classes also affects inventory volume. For example, 61 percent of the beginning inventory volume of Alternative J (preferred) is made up of mature sawtimber age classes (age 100 and above). Alternatives G-Modified and C have the lowest beginning timber inventory, reflecting their management objectives: more emphasis on nonmarket and amenity values.

Column (3) shows the average volume per acre of the beginning inventory; it is calculated by dividing Column (2) by Column (1).

It is apparent in Column (3) that Alternatives B and I have the highest volume per acre. These alternatives have objectives that included high timber outputs and have a high proportion of mature sawtimber acres in suitable lands. These alternatives develop the most acres of unroaded lands, which have 76% of tentatively suitable acres in the mature sawtimber age classes compared to only 46% mature sawtimber in roaded areas. Both of these alternatives have approximately 62 percent of their beginning inventory, suitable acres, in mature sawtimber. Alternative B has the most management area acres with emphasis on enhancement of big game wildlife habitat. Acres in these MA's have proportionately more mature sawtimber for big game thermal cover and winter forage. The beginning per-acre inventory of Alternative B is 2.5% higher than Alternative J (Preferred) and 0.8% higher than Alternative I. This difference is attributed to the mix of age classes; Alternative B has 0.7% more acres of mature sawtimber than J (Preferred), and 0.3% more than Alternative I in its suitable base.

Table II-9c

Timber Resource Management Information by Benchmark and Alternative

	Suitable 1/... Lands	Inventory 2/ Begin		End	1st Decade Average Annual		ASQ	LTSYC ,			Average Annual Net Growth 3/			
	M Acres	MMCF	Begin/Ac CF	MMCF	MMCF	% of Col(2)	MMBF	MMCF	% of Col(4)	Decade Met	CF/Ac Present 4/	CF/Ac 2035	MMCF 2035	Decade Meets LTSYC
Col	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(13a)
Benchmark														
Max Tbr	530	2,676 6	5 054	1,802 4	57 2	2 1	280	62 9	3 5	10	27 7	110 4	58 5	8
Max PNV	529	2 678 6	5,064	1 921 2	48 8	1 8	239	49 6	2 6	15	27 6	83 4	44 1	6
Alternative														
NC (No Chg) 5/	547	3 294 2	5 499	NA	41 7	0 7	204	NA	NA	NA	NA	NA	NA	NA
A (No Action)	412	2 030 6	4 929	1 664 4	31 0	1 5	149	38 6	2 3	5	27 7	98 7	40 7	5
I	386	2,030 3	5 260	1,778 4	26 5	1 3	129	34 4	1 9	8	27 7	87 8	33 9	6
B (RPA)	380	2,032 9	5 350	1,783 7	26 3	1 3	127	33 4	1 9	7	27 7	86 4	32 9	6
H	359	1 867 5	5,202	1 615 6	24 1	1 3	116	31 8	2 0	8	27 7	87 5	31 4	6
J (Preferred)	346	1 805 6	5 218	1 612 1	22 4	1 2	108	30 4	1 9	8	27 7	85 9	29 7	6
C	256	1 346 4	5 259	1,340 6	13 8	1 0	66	19 9	1 5	8	27 7	75 0	19 2	6
G-Mod	247	1 151 3	4,661	1 102 0	18 3	1 6	87	23 9	2 1	8	27 7	102 9	25 4	4

1/ Tentatively suitable lands for all benchmarks is 604 800 acres for all alternatives is 597,000 acres, except Alt NC (tentatively suitable lands were not determined for Alternative NC) The reduction in suitable lands between benchmarks and alternatives resulted from correcting data base boundaries updating for land exchange and better defining recreation site area

2/ Some standard volume does not appear in the inventory and growth columns All volume that has reached utilization standards is included

3/ The Forest-wide cubic foot site class is 4 a natural growth potential of 85-119 cubic feet per acre per year

Table II-9c

	Area and % of Suitable Land by Yield Level						Regeneration Harvest in 1st Decade			
	Full Yield		50-99% Yield		Under 50% Yield		Clearcut	Shelterwood/ Seed Tree	Selection	Harvest Total %
	M Ac	% of Col(1)	M Ac	% of Col(1)	M Ac	% of Col(1)	M Acres	M Acres	M Acres	of Col(1)
								Decade Totals		
Col	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
Benchmark										
Max Tbr	521	98	9	2	0	0	76	0	0	14 3
Max PNV	520	98	9	2	0	0	64	0	0	12 1
Alternative										
NC (No Chg) 5/	402	73	145	27	0	0	42	0	0	7 7
A (No Action)	183	44	229	56	0	0	40	0	0	9 7
I	156	40	230	60	0	0	33	0	0	8 5
B (RPA)	146	38	234	62	0	0	32	0	0	8 4
H	142	40	217	60	0	0	32	0	0	8 9
J (Preferred)	133	38	213	62	0	0	29	0	0	8 4
C	104	41	152	59	0	0	19	0	0	7 4
G-Mod	102	41	145	59	0	0	23	0	0	9 3

4/ Region 6 NFI statistics, corrected, 5/20/78, unpublished, show 33 7 CF/Ac/yr growth on 685,658 acres of poles and larger inventoried, growth applied to the total CFL (834,939 acres) inventoried in 1976 equals 27 7 CF/Ac/Yr

5/ Elements of the 1963 TM Plans upon which the No Change Alternative is based include

a) Potential yield 203 8 MMBF 41 7 MMCF

b) Average annual chargeable volume sold Through FY 1988 (23 years) 232 9 MMBF, or 47 6 MMCF including an adjustment reducing total volume sold

c) Total acres of standard and special CFL lands used to develop the potential yield, the 547,000 CFL acres are comparable to suitable lands

Column (4) is the inventory of growing stock trees at the midpoint of Decade 15, after fourteen decades of harvest, growth, and inventory have been projected over the planning horizon. This ending inventory is controlled by a constraint (ending inventory constraint.) It's purpose is to assure that enough timber volume remains at the end of the planning horizon to continue management, at the long term sustained yield level, indefinitely. See the discussion for Column (9).

Alternative G-Modified has the lowest ending inventory volume (Column 4) of all the alternatives; it has the second lowest growth total, only Alternative C is lower (Column 13); and it has the greatest growth rate of all the alternatives (Column 12). The high per acre growth rate is due to the selection of high intensity prescriptions and a small overall suitable base.

The volume in all timber yield tables in FORPLAN was reduced to provide sufficient numbers and sizes of hard snags per acre to maintain varying viable population levels of primary cavity excavators, thus meeting part of the NFMA requirement to maintain viable wildlife populations (36 CFR 219.27(a)(6)). Yield tables were reduced 1.5% for the two benchmarks, Alternatives B, I, and G-Modified; reduced 3.0% for A, H, and J (Preferred); and reduced 4.5% for Alternative C.

Average Annual Allowable Sale Quantity, Columns (5), (6), and (7)

Columns (5) and (7) show the first decade average annual allowable sale quantity (ASQ), in cubic feet and board feet. With a few exceptions, ASQ is a direct function of the number of suitable acres and the timber management prescription intensities assigned in FORPLAN. Generally, ASQ decreases as suitable lands decrease. The ASQ in the alternatives is also reduced by prescriptions that project less-than-full timber yield on suitable lands, to provide for multiple-use opportunities for other resources.

The two benchmarks have the highest number of suitable acres plus fewer multiple-use objectives; therefore, they have a higher ASQ. The Max PNV benchmark has a lower ASQ than Max Timber because the objective was to select the most cost-efficient prescriptions in achieving maximum PNV. The Max Timber benchmark, with the highest ASQ, was run in FORPLAN twice: first, with the objective of maximizing timber output without regard to cost efficiency; then, to select the most cost-efficient timber prescriptions while still achieving those maximum timber outputs.

Allowable sale quantity for the alternatives decreases in order of decreasing suitable acres, with a few exceptions. Some of the decline in ASQ is due to high allocations of suitable acres to reduced yield: 50-90% of full yield. (See Columns (16) and (17).) Alternative G-Modified had some unique constraints, which resulted in higher ASQ's than might be expected from its suitable acres.

Alternatives B, C, G-Modified, H, I, and J (Preferred) were run in FORPLAN with an "objective function" of maximizing PNV over 15 decades. 7/ However, the ASQ for Alternative A (No Action) was determined from a combination of FORPLAN runs maximizing timber output and PNV.

Alternative A (No Action) was first run to maximize timber over the first five decades without regard to cost efficiency. The alternative was then re-run with an objective function to maximize PNV with an absolute constraint to meet the same timber outputs as the first run.

The ASQ for Alternative G-Modified is higher than Alternative C even though Alternative C has more suitable acres than Alternative G-Modified. Alternative G-Modified has more acres assigned to Management Area 17 with its higher timber intensities than Alternative C, thus a higher output from these lands contributing to the ASQ in Alternative G-Modified.

Column (6) shows the relationship of the first decade ASQ to the beginning inventory: Column (5) divided by Column (2) multiplied by 100.

Long-Term Sustained Yield Capacity (LTSYC), Columns (8), (9), and (10)

Column (8) shows the annual long-term sustained yield capacity (LTSYC); column (9) shows the relationship of LTSYC to the ending inventory: Column (8) divided by Column (4), multiplied by 100. Column (10) shows the decade in which the average annual allowable sale quantity equals or exceeds the LTSYC.

In FORPLAN, the LTSYC is calculated through the use of a LTSYC coefficient. A coefficient is calculated for each prescription by summing all the harvest volumes and dividing by the rotation age. The LTSYC for an alternative is calculated by summing the products of the LTSYC coefficient for each prescription times the suitable acres assigned to that prescription.

The LTSYC varies directly with suitable acres and management intensities in the timber prescriptions. LTSYC is best compared when expressed as yield per acre, per year (Divide Column (8) by (1)). 8/

Although FORPLAN had wide latitude in selecting timber management intensities, the multiple-use objectives of each alternative affects the timber yield per-acre (through minimum rotation lengths and the percent of the suitable lands in certain management areas that could be harvested each decade.)

In Alternative C, which has the lowest per-acre yield (77.7 CF/ac/yr) and the most acres with emphasis on management for high visual quality, the timber minimum harvest rotation in the foreground viewshed management areas is 200 years, and harvest is limited to only five percent of the area per decade.

7/ In addition, all alternative runs were subject to common constraints plus unique constraints to meet the multiple-use objectives of each alternative.

8/ LTSYC, expressed in cubic feet per acre, per year equals: Max Timber and Max PNV Benchmarks - 118.7 and 93.8 CF/ac/yr; Alternative G-Modified - 95.9 CF/ac/yr, followed by Alternatives A - 93.7; I - 89.1; H - 88.6; B - 87.9; J - 87.8; and C - 77.7 CF/ac/yr.

The LTSYC expressed as a percent of ending inventory, Column (9), is very similar for all alternatives except C, which is somewhat lower and A which is larger. This reflects the fact that timber management intensities in Alternative C average the lowest timber production per acre of any alternative. It also reflects the timber management intensities in Alternative A which has the second highest growth rate of all alternatives.

All alternatives except A (5th decade) and B (7th decade) achieve or exceed LTSYC in the eighth decade (Column 10). The time needed to achieve or exceed LTSYC is determined by three major factors in each alternative: 1) the number of acres allocated to prescriptions allowing timber management; 2) the selection of acres for harvest based on the economics of the prescription; and 3) the scheduling of prescriptions over the planning horizon. The combination of these three factors result in the LTSYC being reached by all alternatives except A at or after the seventh or eighth decade.

Alternative A reaches LTSYC in the fifth decade. Here, the large number of suitable acres (highest of all alternative); large number of acres assigned to Management Area 17 (timber emphasis) with shorter rotations; and few acres assigned to extended rotations produce few conflicts in scheduling, thus a shorter time period to reach LTSCY.

Average Annual Net Growth, Columns (11), (12), (13), and (13a)

Columns (11) through (13) show information about net timber growth on the Forest. Average annual net growth is a reflection of age class distribution, site productivity mixes, and timber production intensities on suitable lands.

Average annual net growth - Columns (12) and (13) - is the change in net inventory volume of growing stock between decades, adjusted for harvest. For example, if total inventory change equaled harvest, then ASQ and net growth between two decades would be the same. Growing stock volume is represented in timber yield tables in FORPLAN.

Yield tables in FORPLAN are slightly different for existing mature stands and regenerated (managed) stands because different utilization standards apply. Existing stands 20 years old or less are treated as managed stands. Utilization standards (refer to Regional Guide) for existing pole and larger stands are 9 inches DBH to a 6 inch top, while regenerated stands have a utilization standard of 7 inches DBH to a 4 inch top. Thinnings from existing stands have a utilization standard of 7 inches DBH to a 4 inch top.

Yield tables are developed for each timber management intensity that has been selected for use.

In the FORPLAN yield tables, no volume is shown prior to the time that a particular intensity produces trees that meet the utilization standards: no volume is shown for managed stands until they equal or exceed an average stand diameter of 7 inches, or for existing pole and larger stands until they equal or exceed an average diameter of 9 inches.

All existing pole or larger stands (in the FORPLAN model) already exceed 9 inches DBH (the utilization standard), therefore all volume is represented. For regenerated stands, the volume of the stands less than 7 inches in diameter is not stated. This volume is not "lost" for the purposes of calculating

timber outputs. It accumulates from the time the stand begins to grow until it reaches utilization standards. At that time, the total volume appears in the yield table.

Since no volume is represented in the yield tables for age classes below utilization standards, the inventory at any given time is understated by the volume in those stands between 5 and 7 inches DBH. This understatement of growth cannot be calculated from the information in the FORPLAN model.

The unstated volume in the yield tables has no affect on the LTSYC (see LTSYC discussion above) or on ASQ. ASQ is the sum of the volume in yield tables representing growing stock at the time of harvest. The unstated inventory volume and the growth thereon is reflected in the harvest volumes making up the ASQ, therefore, the unstated volume below utilization standards has no affect on ASQ.

Old growth has a lower net growth than younger, fast-growing stands; old growth has a net growth of about 12 cubic feet/acre/year. As the old-growth stands on suitable lands are harvested and "converted" to younger, fast-growing age classes, the Forest-wide per acre growth rate increases. In 1966, the Forest-wide net growth on commercial forest land was estimated at 21.3 cubic feet/acre/year. By the 1976 timber inventory, the growth rate had increased 30 percent, to 27.7 cf/ac/yr, Column (11).

Net growth will continue to increase for 4 to 6 decades in all alternatives; subsequently net growth alternately decreases and increases through the planning horizon. The growth rate increase from 1976 to 2030, Column (12), ranges from 371 percent in Alternative G-Modified to 271 percent in Alternative C. At some future date, when the age-class distribution on suitable lands is fully regulated, LTSYC and net growth will be the same, indefinitely.

The average annual net growth in the alternatives, Column (12), decreases as the percent of suitable lands in the alternative decreases and/or the number of acres producing less-than-full timber yield, Column (17), increases. There is one exception, which is explained below.

Alternative G-Modified has the highest average annual net growth of all the alternatives, yet it is in the middle of the range of the suitable acres going to less than full yield timber prescriptions (Column 17). It has the highest percentage of suitable acres assigned to Management Area 17 when compared to suitable acres. Management Area 17, with its full yield prescriptions and higher yield less-than-full yield prescriptions, produces more wood fiber than other management areas that provide for timber production. This selection of high yield prescriptions combined with a small number of suitable acres produces the highest level of growth per acre at LTSYC.

Column (13a) shows the decade in which net growth for each alternative meets the long-term sustained yield capacity. Alternatives B, C, H, I, and J (Preferred) meet or exceed the LTSYC in decade 6. Alternative A meets or exceeds LTSYC in the 5th decade.

Alternative G-Modified growth reaches the LTSYC first because it has the highest proportion of suitable acres (35%) in young timber stands - 10 to 20 years - and the lowest proportion of old growth (33%). In this alternative, inventory meeting utilization standards and growth in the young age classes is

picked up earlier (Decades 2 to 4) than in regenerated age classes (Decades 3 to 5).

Area and Percent of Suitable Land by Yield Level, Columns (14), (15), (16), (17), (18), and (19)

These columns report, in acres and percent, the suitable lands producing full timber yield or less-than-full yield for each alternative based on growth potential, mean annual increment of timber prescription by type. Most are discussed above. No suitable lands are producing less than 50 percent of full yield even when extended rotations are considered.

Regeneration Harvest in 1st Decade, Columns (20), (21), (22), and (23)

The acres of regeneration harvest in the first decade, Columns (20) - (23), generally vary with the ASQ. Planning projections were made using clearcutting which is the most commonly appropriate harvest cutting method on this Forest. The actual harvest cutting method will be selected on a site specific basis, as identified in the project environmental analysis. Appendix F, FEIS, describes selection criteria and rationale for selection of the harvest cutting method. The Forest Plan will include some sales where miscellaneous acres of shelterwood or selection regeneration harvest methods will be selected as the harvest cutting method.

Those alternatives that have the most acres assigned to Management Area 17 relative to their suitable base and have more flexibility in selecting a harvest schedule - A, and G-Modified - achieve a higher first decade ASQ volume per acre. Based on the area harvested, it would require from 103 to 105 years (Alternatives A and G-Modified respectively) to 134 years (Alternative C) to cut-over the suitable lands at the first decade harvest rates.

The percentage of suitable acres harvested in decade one, (Column 23), does not appear to reflect a pattern among alternatives that relates to the other resource objectives of the alternative except for Alternative C. A lower percentage of suitable acres is harvested in Alternatives C because the harvest rate is reduced by the entry rate and rotation constraints of the reduced yield acres, (Column 16) and a reduced suitable acre base (Column 1). Maximum entry rates and minimum rotation lengths of 160-200 years constrain 152,000 acres of the reduced yield acres in Alternative C.

It should be noted that all alternatives have approximately the same conversion period, 103 to 119 years. Two exceptions are Alternatives NC and C. In Alternative NC, it will take 130 years to harvest all of the commercial forest lands. This is the largest land base on which harvest could occur; 33 percent higher than Alternative A. In Alternative C, it will take 134 years to harvest all of the suitable acres. This can be attributed to the large number of acres assigned to timber prescription with extended rotations of 160-200 years needed to meet other resource objectives.

Comparison of 1963 Timber Management Plans and Alternative J (Preferred).

Timber management data from Table II-9c for the 1963 Timber Management Plans (TM Plans) land base and Alternative J (Preferred) are summarized below.

Standard and special areas in the TM Plans are comparable to suitable acres in the Forest Plan, because both have timber production. No yield is calculated for marginal lands. Standard, special, and marginal are defined and discussed in detail in the planning records.

The potential yield (PY) of the 1963 Timber Management Plans is 86.2% greater than the allowable sale quantity (ASQ) of Alternative J (Preferred). The land base for timber production in the 1963 TM Plans (the standard and special components) is 58.1% greater than the suitable land base for Alternative J (Preferred).

Table II-9c(1)
1963 TM Plans and Alternative J (Preferred) Timber Data

Plan	PY	ASQ	Suitable Lands	CFL Components		
				Standard & Special	Marginal 1/	Total
	..MMCF/Year..			.....Thousands of Acres.....		
1963 TM Plans	41.7			547	33	580
Alt. J (Pref.)		22.4	346			

1/ Marginal acres are comparable to not suited forested lands or tentatively suitable lands that were determined unsuitable because they were not cost efficient (not appropriate) for managing timber in meeting the objectives of a plan alternative.

Although the 1963 TM Plans have a larger land base with timber yield (547,000 acres), Alternative J produces a greater annual timber yield per acre by the fifth decade. The figures are: 87.9 CF/Ac/yr for J compared to 76.2 CF/Ac/yr in the TM Plans. The difference is due primarily to changes in planning methods and tools since 1963: managed yield tables were developed, using the latest techniques, and were used in FORPLAN. Increased yield from planting genetically improved stock was incorporated into the managed yield tables. FORPLAN calculated nondeclining timber yields over a 150-year planning horizon, selecting suitable acres and the most cost-efficient timber management prescriptions from a large number available. See Table II-1. Prescription rotations in timber emphasis MA's ranged from 70 to 120 years.

These methods compare to those used in the 1963 TM Plans, where full yield is based simply on available over-mature volume per year for 100 years, plus an estimate of growth. The dead timber salvaged within regeneration harvest units

was also included in PY, but only net live timber volume is included in the ASQ for the alternatives. In the TM Plan, reduced yields were estimated as a percentage of full yield. There were no provisions included to increase yield from timber stand improvement practices, or from planting with genetically improved seedlings.

The 1963 Plans originally had an "annual allowable cut", a term similar to ASQ. It was calculated using a forest land base stratified into "timber key value areas" for the standard component, and "timber modified cutting areas" for the special component (for such areas as landscape management areas, where visual quality is the management emphasis.) The area of these components was determined by plot expansion; 9/ and the Hanzlick process (Davis 1966) was used to determine annual regeneration harvest yield: it equals over-mature timber volume divided by a 100 year rotation, plus estimated growth.

Administrative changes in terminology amended the annual allowable cut to potential yield (PY) in 1973, and labeled the land base standard, special, and marginal commercial forest land. The PY for the 1963 TM Plans is not exactly the same as the PY calculated for Region 6 Forests during the 1970's, when computer program models were used to calculate yields.

Since 1963, there have been notable official changes in the land base, most discussed earlier.

The PY has been amended six times, changing from 60.7 MMCF (296.9 MMBF) in 1963, to 41.7 MMCF (203.8 MMBF), effective October 1, 1983. 10/ The amendments were made on a proportional basis of CFL added or subtracted; each acre had the same effect. There was no in-place map showing exact boundaries of the standard, special, and marginal components. The RARE process added more uncertainty to the amendments because the source of determination of CFL varied between land management planning and timber inventory records.

9/ Inventory plots are located over the entire Forest on a systematic grid; each plot represents so many acres of the total.

10/ This discussion compares the 1963 TM Plans with a similar administrative unit in 1963. The 60.7 MMCF excludes portions of the Mt. Baker-Snoqualmie in the 1963 unit now administered by the Wenatchee, Gifford Pinchot, and Okanogan National Forests, and the National Park Service.

Comparison of Allowable Sale Quantity and Long-Term Sustained Yield Capacity

The figures below compare, by alternative (except Alternative No Change), the allowable sale quantity (ASQ) over the fifteen decades of the planning horizon with the long-term sustained yield capacity (LTSYC). In general, both ASQ and LTSYC are a function of the number of suitable acres and the timber management prescription intensities assigned in FORPLAN. No LTSYC was calculated for Alternative NC. Refer to the text that accompanies Table II-9c for more discussion.

In all alternatives, long-term sustained yield capacity appears as a constant line over the decades. Alternative A has the highest LTSYC of all the alternatives because of large numbers of suitable acres and higher management intensities in the timber prescriptions. Alternatives B, H, I, and J (Preferred) have approximately the same per acre and annual LTSCY value. This is the result of a combination of similar suitable acres, mix of full yield and less-than-full yield timber prescriptions (see Table II-9c). Alternative C has the lowest per acre and annual LTSYC value. This is due to a combination of few suitable acres, long rotations to meet other resource objectives, and less-than-full yield prescriptions. Alternative G-Modified has the second lowest annual LTSYC, but the highest per acre value. This is attributed to the high percentage of acres that are managed for timber production at full yield or at the upper end of the less-than-full yield category on a small total suitable acre base (see Table II-9c).

ASQ equals or exceeds LTSYC in the eighth decade in all alternatives except A and B. In Alternative B, LTSYC is reached one decade earlier. Alternative A reaches LTSYC three decades earlier in the fifth decade, earliest of all alternatives. This is due to the larger number of acres allocated to Management Area 17, full yield prescription. (See Table II-9c).

Figure II-9 LTSYC-ASQ ALT A

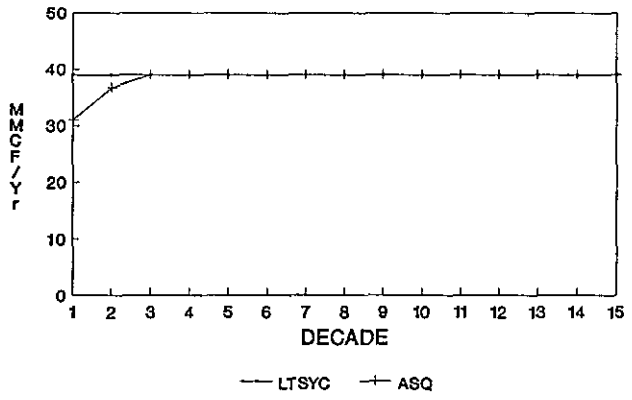


Figure II-10 LTSYC-ASQ ALT B

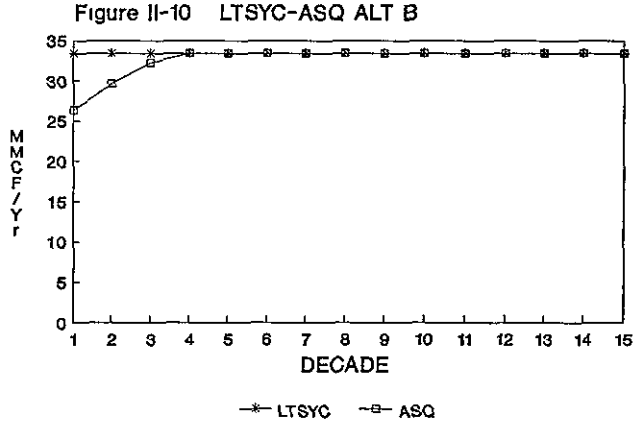


Figure II-11 LTSYC-ASQ ALT C

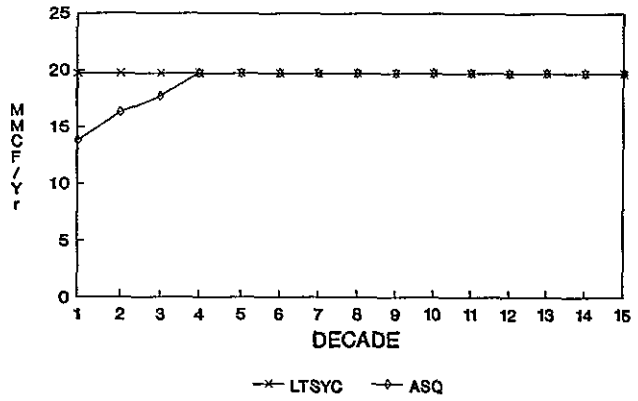


Figure II-12 LTSYC-ASQ ALT G-Modified

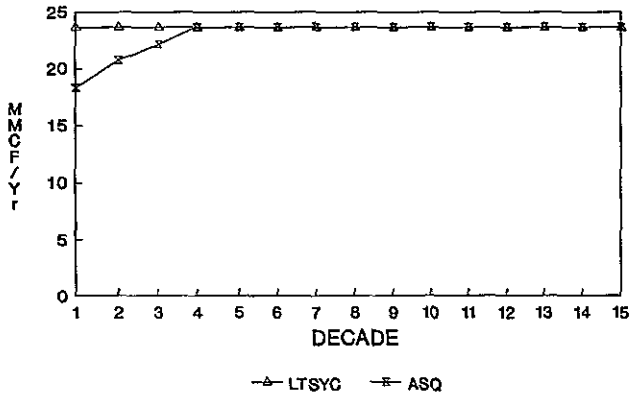


Figure II-13 LTSYC-ASQ ALT H

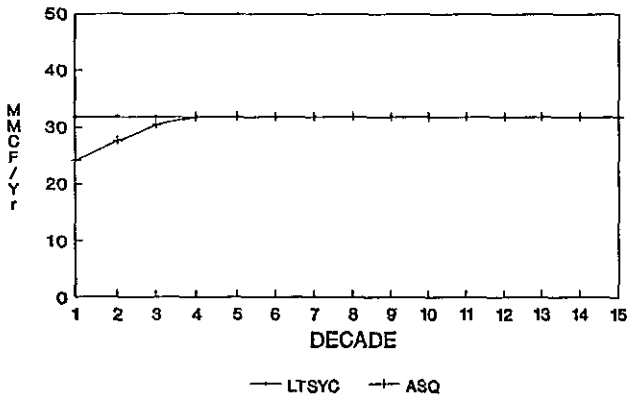


Figure II-14 LTSYC-ASQ ALT I

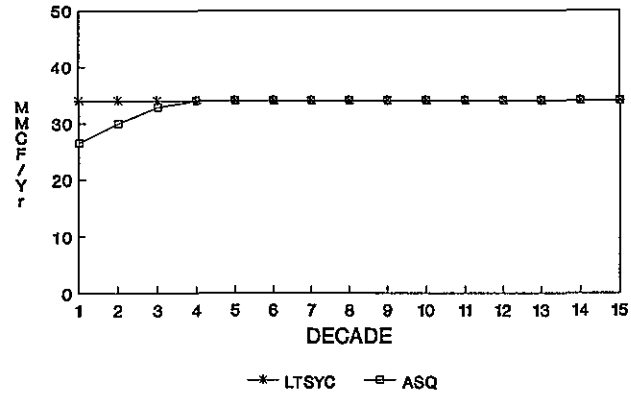
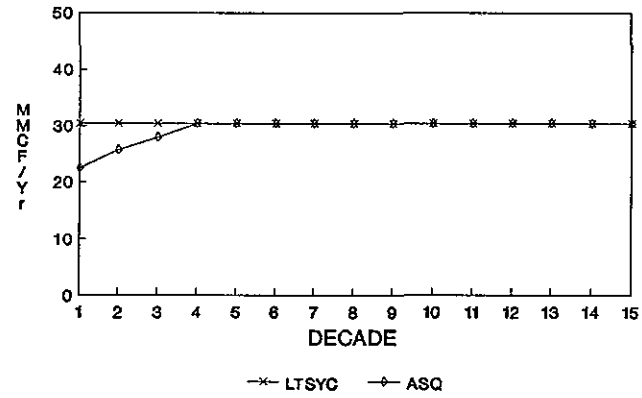


Figure II-15 LTSYC-ASQ ALT J (Prefered)



Disposition of Tentatively Suitable Acres (Table II-9d)

Table II-9d shows the disposition, by alternative and management area, of all acres that are tentatively suitable for timber production but, in the alternatives, were not assigned to suitable. Alternative NC is not shown, as it has no tentatively suitable acres.

As shown in the first part of Table II-9d, some of these acres were assigned to "no-harvest" MA's because timber production on those acres is inconsistent with other objectives of the alternatives. In the second part of II-9d, the tentatively suitable acres which are not cost-efficient in meeting the objectives, including timber production, of an alternative or not scheduled for harvest during the 150-year planning horizon - classified not suitable for timber production - are summarized for the management areas listed. The last three lines of Table II-9d show the total not suitable acres; added to the suitable acres for each alternative, these equal the total tentatively suitable acres (597,000).

The "no cut portion" of MA 13, Watershed, Wildlife, and Fisheries Emphasis in Riparian Areas, is the estimated number of acres that will remain uncut in each alternative to meet the standards and guidelines. Also included are tentatively suitable acres in MA 13 that are not cost-efficient - over the planning horizon - in meeting alternative objectives, including timber production.

Table II-9d

Tentatively Suitable Acres Not Assigned to Timber Production

	Alternatives 1/						
	A (No Action)	I	B (RPA)	H	J (Pref.)	C	G-Modified
Timber Harvest is Inconsistent With Objectives of the Alternatives 2/	...Thousand Acres.....						
MA 1A, 1B, 1C	0	5.6	11 5	59 9	73.2	178.0	158.0
MA 1E	57.5	0	0	0	0	0	0
MA 1F	0	0	0	0	0	0	0
MA 8	3.4	3.5	3.5	3.4	8 4	3 6	10 6
MA 11, 12, 14A, 15A	45 0	96.5	90.2	75.0	68.8	46.8	102.0
MA 13A, 13B, 13C, 13D ("No Cut Portion" 3/)	15.3	11.8	10.5	13.1	12.3	6.8	8.7
MA 22A	0	0	0	0	0	3.7	0
MA 23B	0	0	0	0	0	15.3	0
MA 27 (Scenic Forest)	9.8	9.8	9.8	9.8	9.8	9.8	9.8
MA 3C, 16A, 18, 19 & 26 with Small Acreages	8	1.1	9	1 3	1.9	3.8	1.5
Subtotal	131.8	128.3	126.4	162.5	174.4	267.8	290.6
Not Cost Efficient in Meeting Objectives of the Alternatives or Not Scheduled for Harvest During the 150-Year Planning Horizon							
MA 1D, 2A, 2B, 4, 5A, 5B, 6, 13A-D 4/, 15B, 17A-H, 20A-C, 21A-B, 22B-C, 23A, and 27 (General Forest)	52 2	81.7	90.6	75.5	76.6	73.2	59.4
Total Not-Suitable Acres	184	210	217	238	251	343	350
Total Suitable Acres	413	387	380	359	346	256	247
Total Tentatively Suitable Acres	597	597	597	597	597	597	597

1/ Alternative NC not shown as it has no tentatively suitable acres.
2/ 36 CFR 219.14(c) Lands not appropriate for timber production
3/ The estimated number of no-harvest acres to meet standards and guidelines.
4/ The portions of MA 13A-D where timber harvest prescriptions apply.

With the exception of Alternative G-Modified, the allowable sale quantity decreases as the not-suitable acres increase.

Table II-9d shows that Alternative G-Modified contains the fewest suitable acres of all alternatives. This, in combination with the heavy emphasis on intensive timber management prescriptions results in the second lowest ASQ while achieving the highest per acre outputs of all alternatives (Table II-9c, Columns 5 and 12). Alternative C has the second lowest suitable lands but the lowest ASQ of all alternatives. This can be attributed to the emphasis on nonmarket values including dispersed recreation, scenery, and wildlife.

Alternative B has the most suitable acres assigned to minimum level intensity (not cost-efficient or not scheduled in the 150 year planning horizon); more than 8,000 acres more than Alternative I, the second highest. This is the result of one of the goals of Alternative B: high levels of habitat improvement for commonly hunted big game species. Constraints to extend rotation ages and dispersion of harvest units to provide the mix of successional stages to meet the forage and cover requirements of these management areas were applied. These constraints reduce timber production on some analysis areas to the point that they do not make a positive contribution to PNV, thus are not cost efficient or are not scheduled during the 150-year planning horizon. See Appendix B, Chapter VII for more information.

Alternative A has the lowest number of suitable acres assigned to a minimum level intensity of all the Alternatives. Alternative G-Modified has the second lowest number.

Tentatively Suitable Acres Assigned to Timber Production, Reduced Yield (Table II-9d(1)

Table II-9d(1) shows the disposition of tentatively suitable acres, by alternative, to: 1) nontimber objectives; 2) no yield; 3) timber harvest at full yield; 4) timber harvest at 50-99% reduced yield; and 5) timber harvest at 1-49% reduced yield. Alternative NC (No Change) is not shown because tentatively suitable acres were not determined for that alternative. The total suitable acres by yield category for each alternative also appears in columns 14, 16, and 18 of Table II-9c.

Table II-9d(1)
Disposition of Tentatively Suited Acres

Alternatives 1/

	A No Act	I	B RPA	H	J Pref	C	G-Mod
TENTATIVELY SUITABLE LANDS	597,280	597,280	597,280	597,280	597,280	597,280	597,280
Tentatively Suited Lands Allocated to Nontimber Prescription	131,816	128,152	126,433	162,289	174 503	267,719	290,347
Additional Tentatively Suited Lands with No Yield 2/	52,956	82 616	90,399	76,237	76,366	73,355	59,842
Sub-total	(184,772)	(210,768)	(216,832)	(238,526)	(250,869)	(341,074)	(350,189)
SUITABLE LANDS	412,508	386 512	380,488	358,754	346,411	256,206	247,091
Full Yield	183,454	156,517	145,878	142,123	132,844	103,682	102,199
Reduced Yield							
50-99%	229,054	229,995	234,570	216,559	213,567	152,524	144,892
1-49%	0	0	0	0	0	0	0

1/ Tentatively suitable acres were not determined for No Change (NC) Alternative

2/ Includes not cost efficient or not scheduled for harvest over the 150 year planning horizon. 36 CFR 219.14(c) Lands not appropriate for timber production.

Effects of Alternatives on Aggregated Timber Supply (Table II-9e)

Puget Sound Area mills are expected to face a fluctuating timber supply over the next five decades. Projections indicate that the supply of non-National Forest stumpage will increase approximately 22 to 24 percent (over the 1980-84 level) in the next two decades, and then begin to decline until, by the fifth decade, it is only 1.6 percent greater than the 1980-84 supply.

Table II-9e shows the average total Puget Sound Area harvest volume for the 1980-84 period and the expected volume for the next five decades under each alternative. The assumption is made that the Mt. Baker-Snoqualmie National Forest's contribution to this total area harvest is equal to the Timber Sale Program Quantity for each alternative.

In all alternatives, except NC, the aggregate timber supply level falls short of the high level of the estimated demand range for the next five decades. Alternative NC exceeds the high level in Decade 1. In Decade 1, in all alternatives except Alternative C, the projected supply levels exceed the low range demand levels.

During the second decade, Alternatives NC and A supply levels would fall between the upper and lower estimated demand levels. All other supply levels would fall below estimated demand levels.

By the third decade, when non-National Forest supply levels start to decline, only Alternative NC produces high enough timber outputs so that the aggregate supply level falls within the estimated demand range. The aggregate supply level is below the lower limits of the estimated demand for all other alternatives.

During the fourth and fifth decades, as non-National Forest Supply levels continue to decline, all alternatives fall below the estimated demand range.

Table II-9e
Total Projected Puget Sound Harvest by Alternative

	1980-1984	Decade 1	Decade 2	Decade 3	Decade 4	Decade 5
	.....Annual Volumes in Million Board Feet.....					
Projected Harvest from Non-NF Lands	1548	1886	1925	1876	1805	1573
Total Projected Harvest, NF and Other Ownership,						
NC (No Change)	1840	2106	2143	2092	2017	1781
A (No Action)	1840	2056	2123	2078	2001	1774
I	1840	2031	2087	2047	2070	1747
B (RPA)	1840	2028	2085	2044	1969	1745
H	1840	2017	2073	2031	1955	1731
J (Preferred)	1840	2009	2063	2022	1946	1722
C	1840	1961	2013	1955	1890	1675
G-Mod	1840	1985	2036	1990	1916	1687
Demand Range		1964-2088	|---------- 2088-2211 ----------|			

Recreation, Wilderness, and Related Inputs and Outputs (Table II-9f)

Table II-9f compares the effects and activities of the various alternatives upon the recreation, wilderness, and other amenity resources.

The first five subheadings include current use and current capacity figures, as well as projected future capacity and future demand. For this Forest, capacity means practical, or realistic capacity not the theoretical maximum. 11/ Future demand is expressed as a range (±10% from the absolute figures developed in the analysis process). As demand is an expression of public desire, it is the same for all alternatives in a given decade. The planned future capacity reflects the management response of the various alternatives to recreation, and the ability to meet the expected demand.

An assumption concerning the relationship between future recreation capacity and demand is the key to understanding Table II-9f. It was assumed that projected recreation use will not exceed the estimated capacity for any particular activity. It is expected that use will be limited by a combination of direct management actions by the Forest Service (such as permits, area closures, etc.) and by the users themselves: as use of a particular site or area approaches the capacity level, users will begin to shift, and substitute other activities or move their activities to other lands, if they cannot satisfy their expected recreation experience on the Forest.

This assumption has major significance in the discussion of recreation economic benefits later in this chapter. Since it is assumed that no use will occur above the estimated capacity, no economic benefits are assigned above this level.

Developed Recreation

Currently, the demand for developed recreation (which is primarily alpine skiing and developed campgrounds) is well below the Forest capacity. Alpine ski areas currently have more than enough capacity, and are now expanding to meet a market demand for a higher quality skiing experience. Developed campgrounds are operating well below capacity, except for selected summer weekends, and in certain geographic areas.

Depending on the actual demand in later decades, the alternatives may or may not have enough developed recreation capacity. Alternatives H, I, and J will have the greatest future capacity. Also, see Table II-9f(1) on page II-108, which shows new day-use and campground construction, by alternative.

See page II-106 for further narrative for Table II-9f.

11/ Theoretical capacity is an estimate of the maximum use of the Forest, assuming all facilities are 100% full, all days of the maximum use season. Practical capacity recognizes physical and social limitations, such as low mid-week use and periods of unfavorable weather, when use declines.

Table II-9f
Recreation, Wilderness, and Related Inputs and Outputs

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No Action)	I	B (RPA)	H	J (Preferred)	C	G-Modified
Developed Rec. Use									
Current Use (1989)	1,000	Similar	2,324	2,324	2,324	2,324	2,324	2,324	2,324
Current Capacity (1989)	RVD's	to Alt A	5,044	5,044	5,044	5,044	5,044	5,044	5,044
Future Capacity	Per Yr								
Decade 1		Similar	5,382	5,598	5,382	5,598	5,598	5,382	5,364
Decade 2		to	5,792	6,278	5,702	6,098	6,098	5,882	5,684
Decade 5		Alt. A	6,842	7,598	6,662	7,238	7,238	7,022	6,644
Future Demand									
Decade 1		Similar	----------2,834 to 3,464----------						
Decade 2		to	----------3,848 to 4,702----------						
Decade 5		Alt. A	----------6,718 to 8,210----------						
Non-Wilderness Disp Rec	Use								
Roaded 2/									
Current Use (1989)	1,000	Similar	2,102	2,102	2,102	2,102	2,102	2,102	2,102
Current Capacity (1989)	RVD's	to Alt.A	3,199	3,199	3,199	3,199	3,199	3,199	3,199
Future Capacity	Per Yr								
Decade 1		Similar	3,343	3,339	3,317	3,322	3,277	3,130	3,223
Decade 2		to	4,097	4,093	4,068	3,818	3,730	3,374	3,474
Decade 5		Alt. A	4,902	5,069	5,043	4,516	3,991	3,599	3,710
Future Demand									
Decade 1		Similar	----------1,854 to 2,266----------						
Decade 2		to	----------2,837 to 3,467----------						
Decade 5		Alt A	----------4,817 to 5,887----------						
Non-Wilderness Disp. Rec	Use								
Unroaded 3/									
Current Use (1989)	1,000	Similar to	297	297	297	297	297	297	297
Current Capacity (1989)	RVD's	Alt. A	223	223	223	223	223	223	223
Future Capacity	Per Yr.								
Decade 1		Similar	201	208	200	205	208	222	218
Decade 2		to	164	182	157	174	182	220	210
Decade 5		Alt. A	115	149	102	134	149	218	201
Future Demand									
Decade 1		Similar	----------225 to 293----------						
Decade 2		to	----------328 to 492----------						
Decade 5		Alt A	----------713 to 890----------						

1/ The TM Plan upon which Alternative No Change is based was developed in 1963. The Plan was not an integrated resource plan, and consequently did not address all resource uses and outputs.
2/ Includes RN, RM, and Rural ROS classes.
3/ Includes P, SPNM, and SPM ROS classes

Table II-9f

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No Action)	I	B (RPA)	H	J (Preferred)	C	G-Modified
Wilderness Recreation									
Current Use (1989)	1,000	Similar to	459	459	459	459	459	459	459
Current Capacity (1989)	RVD's	Alt A	500	500	500	500	500	500	500
Future Capacity	Per Yr.		500	675	511	422	539	375	440
Future Demand									
Decade 1		Similar	----------388 to 456----------						
Decade 2		to	----------565 to 673----------						
Decade 5		Alt. A	----------921 to 1,107----------						
Wildlife and Fish Use									
Current Use (1989)	1,000	Similar	396	396	396	396	396	396	396
Current Capacity	RVD's	to Alt. A	581	581	581	581	581	581	581
Future Capacity	Per Yr.								
Decade 1		Similar	548	547	552	545	545	531	530
Decade 2		to	581	580	595	575	575	535	527
Decade 5		Alt. A	625	623	654	611	611	538	509
Future Demand									
Decade 1		Similar	----------460 to 562----------						
Decade 2		to	----------609 to 749----------						
Decade 5		Alt A	----------1,059 to 1,295----------						
Total Recreation Use 4/									
Current Use	1,000	Similar	5,182	5,182	5,182	5,182	5,182	5,182	5,182
Current Capacity	RVD's	to Alt. A	8,966	8,966	8,966	8,966	8,966	8,966	8,966
Future Capacity	Per Yr.								
Decade 1		Similar	9,426	9,820	9,410	9,547	9,622	9,109	9,245
Decade 2		to	10,553	11,228	10,438	10,512	10,549	9,851	9,808
Decade 5		Alt. A	12,359	13,491	12,318	12,310	11,917	11,214	10,995
Future Demand									
Decade 1		Similar	----------5,301 to 6,479----------						
Decade 2		to	----------7,636 to 9,334----------						
Decade 5		Alt. A	----------13,169 to 16,095----------						
Developed Rec. Site Construct./Reconstruction									
Dec. 1	PAOT	Similar	10/800	130/220	10/400	130/220	130/220	10/800	0/0
Dec. 2	Per Yr.	to	50/850	200/100	0/400	100/900	100/900	100/900	0/0
Dec. 5		Alt A	50/900	200/1200	0/400	100/1000	100/1000	100/1000	0/0
Trail Construction/ Reconstruction									
Dec. 1	Miles	Similar	7/6	35/12	5/7	9/12	22/49	9/8	35/12
Dec. 2	Per Yr.	to	7/6	0/12	5/7	9/12	0/2	9/8	0/12
Dec. 5		Alt A	0/5	0/5	0/5	1/5	1/5	0/5	0/5

4/ Includes Developed, Roaded & Unroaded Dispersed, and Wilderness Recreation totals WFUD's are included within these subheads.

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No Action)	I (PLUS)	B (RPA)	H	J (Preferred)	C	G Modified
Visual Quality Objectives									
Preservation 5/	Acres	NA 6/	724,463	724,104	724,083	733,227	771,958	747,461	735,255
Retention		NA	119,889	207,804	287,483	407,309	395,440	618,787	572,961
Partial Retention		NA	341,546	310,819	284,894	181,026	204,214	148,060	56,406
Modification and Maximum Modification		NA	428,765	380,383	327,988	301,527	256,587	119,804	278,712
Alpine Lakes Mgt. Unit VQO Varies 7/	Acres	NA	110,132	101,685	100,375	101,706	96,595	90,682	81,369
Roadless Areas 8/ Assigned Roaded Mgt. Prescript. But Not Developed For Next 15 Years	Acres	NA	70,215	98,181	87,955	61,598	61,482	23,101	18,368
Roadless Areas 8/ Assigned to Unroaded Mgt. Prescriptions	Acres	NA	280,334	256,397	266,623	305,068	309,214	375,800	368,445
Roads Suitable for Public Use									
By Passenger Car 9/									
1986	Miles	Similar	1,039	1,032	1,033	1,039	1,039	1,017	933
2000		to	1,214	1,205	1,198	1,193	1,204	1,106	1,017
2030		Alt. A	1,363	1,367	1,351	1,341	1,353	1,188	1,096
By High Clearance Vehicle Only									
1986	Miles	Similar	1,483	1,472	1,476	1,483	1,483	1,451	1,332
2000		to	1,731	1,720	1,711	1,703	1,719	1,578	1,452
2030		Alt. A	1,945	1,951	1,929	1,915	1,932	1,697	1,563
Rivers Recommended for W & S River Designation	No. of Rivers	0	15	0	0	5	30	47	47
Miles	Miles	0	287	0	0	154	452	606	796
Research Natural Areas Recommended for Designation	No. of Areas	0	0	0	0	5	5	5	5

5/ Includes 721,600 acres of preservation VQO in wilderness, which is the same in all alternatives.

6/ The visual quality terms here were not in use in 1963. Modified cutting areas termed "Landscape Management Areas (LMA) were managed to protect other resource values. These LMA's included "Present Occupency Areas" (e g Mather Memorial Parkway and developed recreation sites); "Proposed Occupancy"; and roadside, streamside, lakeside, and buffer zones where reduced timber harvest was part of the regulated PY. Terminology amendment to the 1963 Plan termed the CFL in LMA's as Special or Unregulated Actual acres assigned to VQO cannot be reasonably estimated, but would be similar to Alternative A.

7/ VQO for these acres was assigned by the 1981 Alpine Lakes Land Management Plan. These acres vary by alternative depending upon the amount of wildlife habitat assigned in that alternative.

8/ RARE II roadless areas released by the 1984 Washington Wilderness Act.

9/ System roads tentatively closed to all travel are not included.

Roaded Non-wilderness Dispersed Recreation

Current capacity for roaded dispersed recreation far exceeds the current use. Future capacity will be able to accommodate expected demands on the Forest until the fourth decade, when population growth begins to affect all recreation sectors.

Since the dominant use in this sector is "driving for pleasure," those alternatives with the most new road construction (A, B, and I) will best meet expected demand. Any future expansion of the Interstate Highway system could also increase roaded dispersed recreation, since a high proportion of this use is made up of people driving through Forest areas on public highways. A doubling of the number of traffic lanes would greatly increase the future capacity for roaded dispersed recreation on this Forest.

Unroaded Non-wilderness Dispersed Recreation

Unroaded dispersed recreation use currently exceeds the capacity of the Forest. The result, at present, is a reduction in the quality of the local experience, or a displacement to another location to satisfy current demand. With future population growth, this situation will not improve. All alternatives show a decline in the ability of the Forest to supply this form of recreation. Under no alternative will capacity ever meet projected demand. The amenity alternatives merely come closer, for a longer period of time, than commodity-oriented alternatives.

Wilderness Recreation

Use data is based on: 1983 Alpine Lakes and Glacier Peak use plus an estimate for the wilderness acreage added by the 1984 Washington Wilderness Act; and 1986 use data for all eight wildernesses (RIM 1986). Total wilderness acres on the Forest are 721,716.

As can be seen in Table II-9f, wilderness on this Forest is nearing its practical capacity, due in large part, to its proximity to the Puget Sound metropolitan area. By the second decade, projected demand will have exceeded capacity in all alternatives. Capacity is increased in some of the alternatives (I, B) by building trails in currently trailless areas.

Total Recreation Use

Currently, the Forest is operating at about 60% of practical capacity, primarily due to the large existing reserve of developed capacity in alpine ski areas and campgrounds. It overshadows the existing deficit in unroaded dispersed recreation. Demand will exceed capacity sometime in Decade 4 in all alternatives. However, the differences in the ability of each alternative to meet future demand is probably less statistically significant than the error factor in projecting recreation demand so far into the future.

Fish and Wildlife Use

The recreation visitor days of fishing, hunting and nature study are included within the figures reported for wilderness and roaded and unroaded dispersed recreation. These RVD's cannot be added with other subheadings for a Forest total recreation use figure. The figures for WFUD's are based on preliminary data. Current trends predict large increases in non-consumptive and fish use with a smaller gain in hunting. These figures will be updated when more accurate data becomes available.

Visual Quality Objectives

As the visual quality objectives in wilderness (preservation) and the Alpine Lakes Management Unit (varied) remain the same in all alternatives, these acres are not included in Table II-9f. The acres shown also do not total, by alternative, due to wildlife designations overlapping with the Alpine Lakes Management Unit. The overlap differs by alternative, and was not corrected here.

The acres of retention shown in Alternative A differ significantly from the other alternatives due to the general dispersed recreation management area (1E), which is used only in A. Acres in this management area were assigned a prescription of partial retention instead of the retention VQO used in other dispersed recreation MA's (1A,1B) in the rest of the alternatives. Alternative A, thus has the greatest number of acres in partial retention.

Alternatives B and I, with higher timber harvest levels, show significantly more acres of modification and maximum modification. Conversely, Alternative C, with an emphasis on visual quality and unroaded recreation, shows the greatest acres in partial retention and retention.

Unroaded Areas

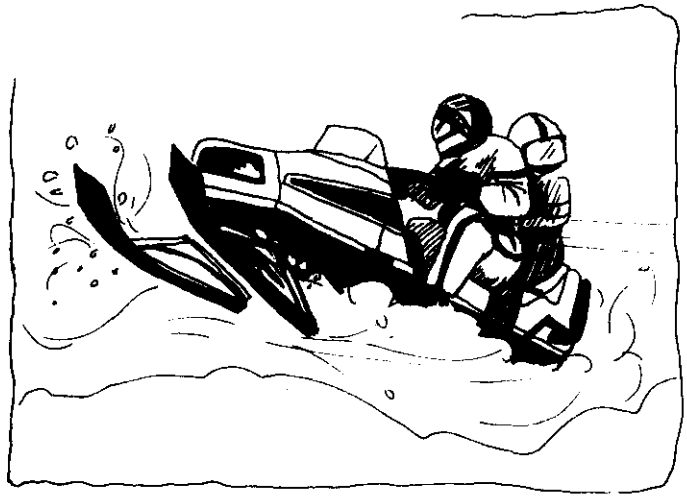
Because of its unique design, Alternative A merits a brief discussion. In Alternative A, under the existing Multiple Use Plans, most of the roadless areas fall within the Upper Forest Resource Zone (and are assigned to MA 1E). While generally not a high timber producing area, this zone does allow an unspecified amount of development. In Alternative A, it is estimated that about 30 percent of the roadless area acres would be developed.

New Day-Use Sites and Campground Construction (Table II-9f(1))

For some additional comparison among the alternatives, Table II-9f(1) shows the planned new day-use sites and campgrounds, by alternative. Construction would be completed over a period of five decades.

Table II-9f(1)
New Day-Use Sites and Campground Construction Over 5 Decades
Number of Sites

Alternative	Day-Use Sites	Campgrounds
NC (No Change)	Similar to A	Similar to A
A (No Action)	5	2
I	20	8
B (RPA)	0	0
H	10	4
J (Preferred)	10	4
C	10	4
G-Modified	0	0



Roadless Area Disposition, By Alternative (Table II-9g)

Table II-9g shows a summary of the disposition of the roadless areas on the Forest, by alternative. For each area, the table shows the acres assigned to MA's allowing development and acres that will remain undeveloped. Roadless area information was not determined for Alternative No Change; see footnote number 2 in the table.

As can be seen in the preceding table, II-9f, not all the acres assigned to a development prescription will be developed within the next 15 years. For example: in Alternative J, 93,716 total roadless acres are allocated to development. However, 61,598 of those acres (or 66%) will **not** be developed in the next 15 years.

Alternative A is unique, because most of the roadless acres fall into the existing Multiple Use Plan's "Upper Forest Resource Zone." In mapping Alternative A, these acres were assigned to MA 1E, General Dispersed Recreation, a prescription that matches that of the Upper Forest Zone. While this is generally not a timber harvest area, it allows an unspecified amount of mostly moderate development - some roaded dispersed recreation, including ORV use, but no scheduled timber harvest. In Alternative A, an estimated 30 percent of the total areas will actually be developed.

A maximum of only 155,739 acres, 39 percent of the total roadless acres, are tentatively suitable for timber harvest in any alternative. The acres assigned to development are not limited to lands suited for timber production but may also include non-timber related activities, such as wildlife enhancement. Further information on each separate roadless area can be found in Appendix C, FEIS.

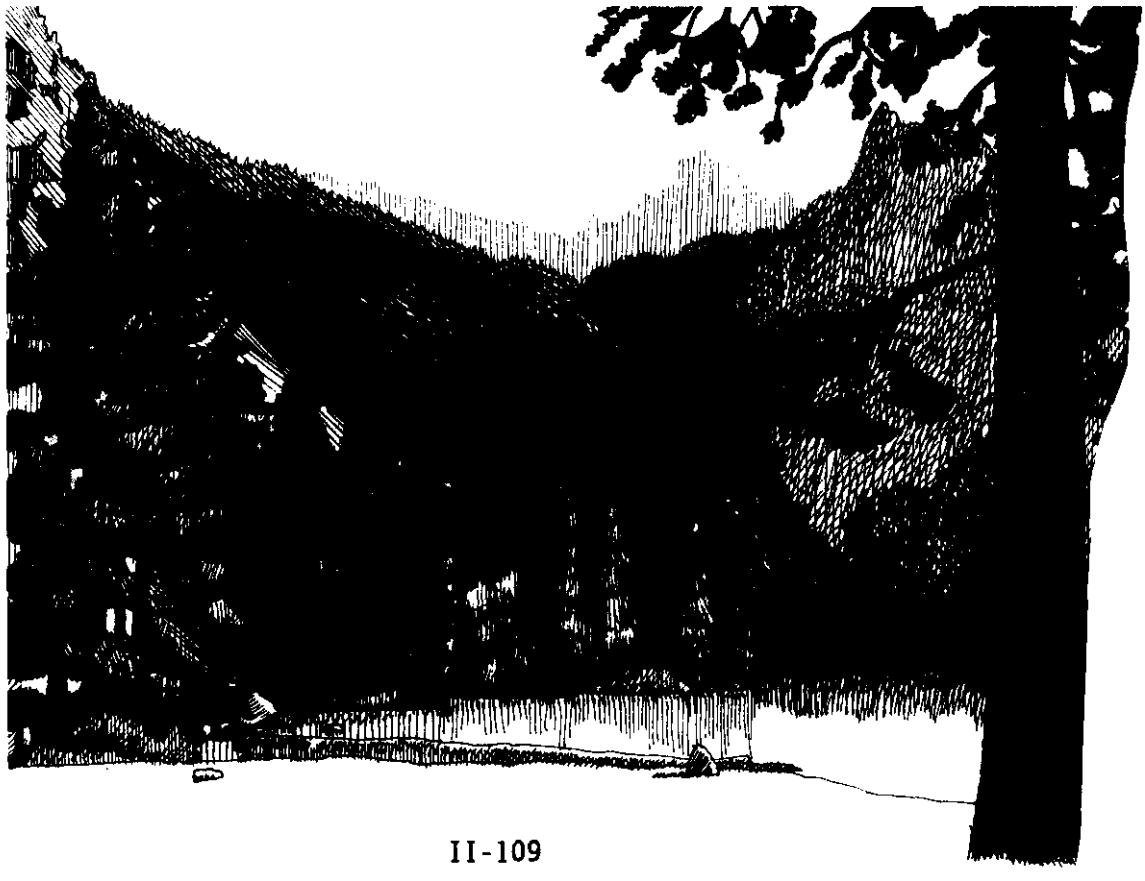


Table II-9g

Roadless Area Disposition by Alternative

Acres Assigned to Developed or Undeveloped

No.	Area Name	Number of Parcels	NC ALT 1/	A (No Action) 2/		I		B (RPA)	
				Devel.	Undevel.	Devel.	Undevel.	Devel.	Undevel.
1A	Mt. Baker (Canyon Creek)	1	NA	5,067	19,979	4,687	20,359	3,969	21,077
1B	Mt. Baker (North Block)	11	"	8,652	7,773	5,591	10,834	5,613	10,812
1C	Mt. Baker (West Block)	5	"	8,760	18,058	10,198	16,620	10,026	16,792
1D	Mt. Baker (South Block)	4	"	5,531	844	3,883	2,492	3,864	2,511
1E	Mt. Baker (Noisy-Diobsud)	1	"	18,203	32,164	19,850	30,517	21,855	28,512
2	Oales Peak	1	"	633	971	696	908	611	993
3	Alma Copper	1	"	3,336	4,857	4,329	3,864	4,117	4,076
4	Hidden Lake	1	"	1,752	4,900	1,920	4,732	1,477	5,175
5	Glacier Peak H	2	"	2,997	4,942	2,765	5,174	2,005	5,934
6	Glacier Peak I	1	"	3,695	9,060	3,420	9,335	4,117	8,638
7	Glacier Peak G	9	"	2,277	6,460	2,321	6,416	1,581	7,156
8	Glacier Peak J	11	"	11,650	14,321	14,731	11,240	15,025	10,946
9	Glacier Peak M	1	"	654	401	717	338	696	359
10	Glacier Peak A	2	"	42	401	126	317	168	275
11	Glacier Peak L	12	"	3,521	10,706	6,559	7,668	5,968	8,259
12	Glacier Peak B	2	"	2,786	15,860	3,736	14,910	4,137	14,509
13	Glacier Peak K	5	"	4,010	41,499	11,231	34,278	8,593	36,916
14	Pressentin	1	"	6,082	8,975	6,588	8,469	6,905	8,152
15	Higgins Mountain	1	"	6,293	6,884	8,002	5,175	7,432	5,745
16	Prairie Mountain	1	"	2,090	1,732	2,027	1,795	2,279	1,543
17	White Chuck Mountain	1	"	929	4,794	1,857	3,866	1,414	4,309
18	Boulder River	10	"	7,557	24,750	9,097	23,210	6,584	25,723
19	Eagle Rock	1	"	4,158	29,018	6,797	26,379	4,559	28,617
20	Tolmie Creek	1	"	168	106	274	0	274	0
21	Clearwater	8	"	6,311	2,492	6,077	2,726	5,401	3,402
22	Lonesome Lake	1	"	63	232	190	105	190	105
23	Sun Top	1	"	1,583	803	1,794	592	1,562	824
24	Silver Creek	1	"	189	866	696	359	399	656
25	Norse Peak	4	"	3,608	6,485	6,374	3,719	5,486	4,607
Totals				122,597	280,333	146,533	256,397	136,307	266,623
Percent				30%	70%	36%	64%	34%	66%

1/ The Timber Management Plans upon which the No Change Alternative is based were developed in 1963. They are not integrated resource plans, and consequently did not address all resource uses and outputs. The missing information in this table cannot reasonably be calculated. However, based on the existing vegetation, it is unlikely that more than 50% of the total roadless area acres would be developed in the foreseeable future.

2/ Estimate. Alternative A is unique because an unspecified amount of development is permitted in Upper Forest Resource Zone. See the description of MA 1E, earlier in this chapter.

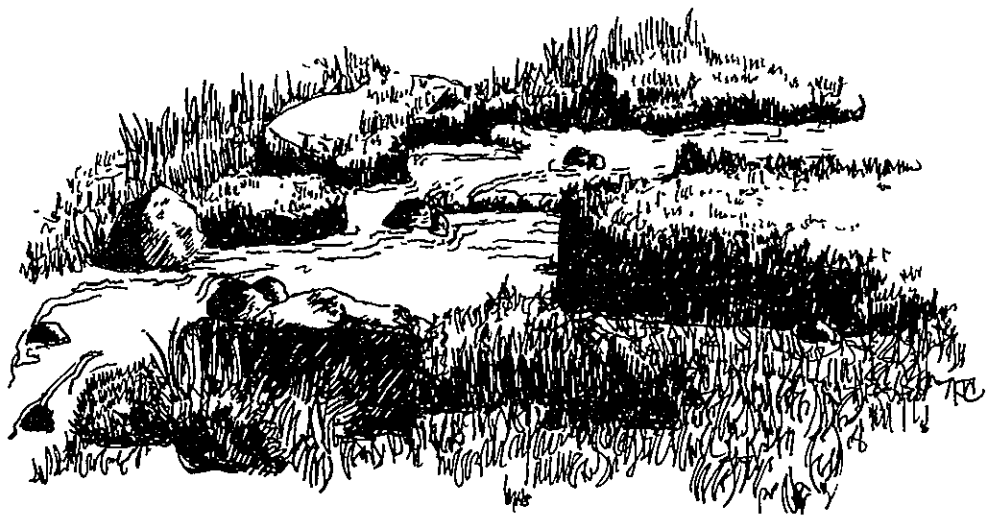
Table II-9g

Area	H		J (Preferred)		C		G Modified	
No	Devel	Undevel	Devel	Undevel	Devel	Undevel	Devel	Undevel
1A	3207	21,839	2,976	22,070	547	24,499	3,399	21 647
1B	5758	10,667	5,612	10,813	1,094	15,331	2,213	14,212
1C	10217	16,601	9,688	17,130	1,707	25,111	2,933	23,885
1D	2784	3,591	2,152	4,223	780	5,595	737	5,638
1E	3483	46 884	5,468	44,899	441	49,926	1,963	48,404
2	612	992	654	950	21	1,583	147	1,457
3	2132	6,061	1,752	6,441	42	8,151	0	8,193
4	421	6,231	569	6,083	231	6 421	442	6,210
5	2068	5 871	2,153	5 786	759	7,180	675	7,264
6	3145	9 610	2,850	9,905	2,828	9,927	696	12,059
7	357	8 380	378	8,359	105	8,632	443	8,294
8	11289	14 682	11 373	14,598	5,462	20,509	5,675	20 296
9	718	337	695	360	0	1,055	0	1,055
10	0	443	0	443	0	443	0	443
11	2233	11,994	2,360	11,867	1 791	12 436	1,096	13,131
12	2891	15 755	3,482	15,164	1 097	17 549	906	17,740
13	6016	39 493	6,776	38,733	2,404	43,105	1,223	44,286
14	7221	7 836	7,157	7,900	633	14,424	2,892	12,165
15	7474	5,703	7,517	5,660	400	12 777	147	13,030
16	2280	1 542	2 237	1,585	274	3,548	2,027	1,795
17	1477	4 246	1,603	4,120	927	4,796	1,161	4,562
18	5169	27 138	5,465	26,842	1,327	30,980	1,538	30,769
19	2415	30,761	1,625	31,551	2,765	30,411	780	32,396
20	274	0	274	0	21	253	105	169
21	5549	3 254	4,092	4,711	422	8,381	1,053	7,750
22	190	105	42	253	42	253	63	232
23	1793	593	1,244	1,142	105	2,281	210	2 176
24	971	84	105	950	189	866	718	337
25	5718	4,375	3,417	6,676	716	9,377	1,243	8,850
Total	97,862	305 068	93 716	309,214	27,130	375,800	34,485	368,445
Percent	24%	76%	23%	77%	7%	93%	9%	91%

Wild and Scenic Rivers Eligibility and Suitability (Table II-9h)

There are 47 eligible wild and scenic river segments on the Mt. Baker-Snoqualmie National Forest. The suitability and potential classification of these river segments varies by alternative. The variation is based on the amount of roading, vegetative manipulation, or other development activities that would occur within and adjacent to the eligible river corridor.

Table II-9h provides information about the rivers found eligible for inclusion in the National Wild and Scenic Rivers System. The first three data columns display for each river the miles, by classification type (Wild, Scenic, or Recreation), found eligible for classification. Following the eligibility determination information are the results of the suitability study made for each river for each alternative. This part of the table shows those rivers found suitable for recommendation for inclusion in the National Wild and Scenic Rivers System for each alternative.



Footnotes for Table II-9h:

1/ Only upper three segments recommended: 3.0 miles Scenic, 2.3 miles Wild, and 4.3 miles Scenic.

2/ Only 42.8 miles recommended.

3/ Only lower 12 miles recommended: Scenic.

4/ Recommended for Recreation River.

Table II-9h

Wild & Scenic Rivers Eligibility and Suitability

	Eligible Miles at Highest Classification			Alternatives (X = Suitable for Designation)							
Eligible Rivers	Wild	Scenic	Rec	NC	A	B (RPA)	C	C-Mod	H	I	J (pref)
Silesia Creek	10 4	--	--	--	--	--	X	X	--	--	--
North Fork Nooksack	3 5	30 3	9 5	--	X	--	X	X	X	--	X
Wells Creek	2 6	3 4	--	--	X	--	X	X	--	--	--
Middle Fork Nooksack	2 7	10 2	7 1	--	X	--	X	X	--	--	--
South Fork Nooksack/ Bell Creek	2 3	27 3	12 9	--	X	--	X	X	--	--	X [1]
Baker River	11 2	2 1	--	--	--	--	X	X	--	--	X
Noisy Creek	6 1	--	--	--	--	--	X	X	--	--	X
Diobsud Creek	8 3	--	2 2	--	--	--	X	X	--	--	X
Illabot Creek	4 3	--	11 0	--	--	--	X	X	--	--	X
Buck Creek	10 1	1 0	--	--	--	--	X	X	--	--	X
Downey Creek	10 0	0 8	--	--	--	--	X	X	--	--	X
White Chuck River	10 5	--	12 0	--	--	--	X	X	--	--	X
North Fork Sauk River (Extension)	9 2	--	--	--	--	--	X	X	--	--	X
South Fork Sauk River (Extension)	1 0	7.4	--	--	--	--	X	X	--	--	--
North Fork Stillaguamish	--	--	49 8	--	X	--	X	X	--	--	--
North Branch	--	--	5 1	--	--	--	X	X	--	--	--
Deer Creek	--	--	23 5	--	--	--	X	X	--	--	--
Boulder River	9 0	--	4 0	--	X	--	X	X	--	--	X
South Fork Stillaguamish	--	36 6	15 9	--	X	--	X	X	--	--	X
Canyon Creek/ South Fork Canyon Creek	1 3	7 1	11 9	--	X	--	X	X	--	--	--
Skykomish River including South Fork Skykomish/Tye	--	--	63 1	--	X	--	X	X	X	--	X [2]
North Fork Skykomish	8 2	8 4	12 0	--	X	--	X	X	X	--	X
Troublesome Creek	4 4	0 1	--	--	--	--	X	X	--	--	X
West Cady Creek	4 8	--	2 7	--	--	--	X	X	--	--	X
Miller River (to fork)	--	3 7	--	--	X	--	X	X	--	--	X
West Fork Miller River	2 1	4 2	--	--	--	--	X	X	--	--	X
East Fork Miller River	0 8	6 0	--	--	--	--	X	X	--	--	X
Foss River (to fork)	--	--	4 4	--	X	--	X	X	--	--	X
West Fork Foss River	3 1	1 5	--	--	--	--	X	X	--	--	X
East Fork Foss River	6 7	--	1 2	--	--	--	X	X	--	--	X
Beckler River	--	--	13 5	--	X	--	X	X	--	--	--
Rapid River	7 0	6 0	--	--	X	--	X	X	--	--	--
Deception Creek	9 8	0 5	--	--	--	--	X	X	--	--	X
South Fork Tolt River	--	--	5 4	--	--	--	X	X	--	--	--
North Fork Snoqualmie R	1 0	17 2	8 0	--	--	--	X	X	--	--	X [3]
Lennox Creek	0 3	6 9	--	--	--	--	X	X	--	--	X
Middle Fork Snoqualmie	6 4	29 1	4 2	--	X	--	X	X	X	--	X
Taylor River	6 6	--	1 6	--	--	--	X	X	--	--	X
Pratt River	9 5	--	--	--	--	--	X	X	--	--	X [4]
South Fork Snoqualmie R	--	--	30 6	--	--	--	X	X	--	--	--
Carbon River	4 0	--	28 4	--	--	--	X	X	--	--	--
White River	--	20 0	17 7	--	--	--	X	X	--	--	X
Clearwater River	3 6	--	6 2	--	--	--	X	X	--	--	--
Greenwater River	8 4	--	13 0	--	--	--	X	X	--	--	--

Research Natural Areas (Tables II-9i and II-9j))

There are three established Research Natural Areas (RNA's) on the Mt. Baker-Snoqualmie National Forest. Five potential additions to the system have been identified. The existing and potential Research Natural Areas are listed in listed in Table II-9i

Table II-9j Displays which potential RNA's are recommended for designation in each alternative.

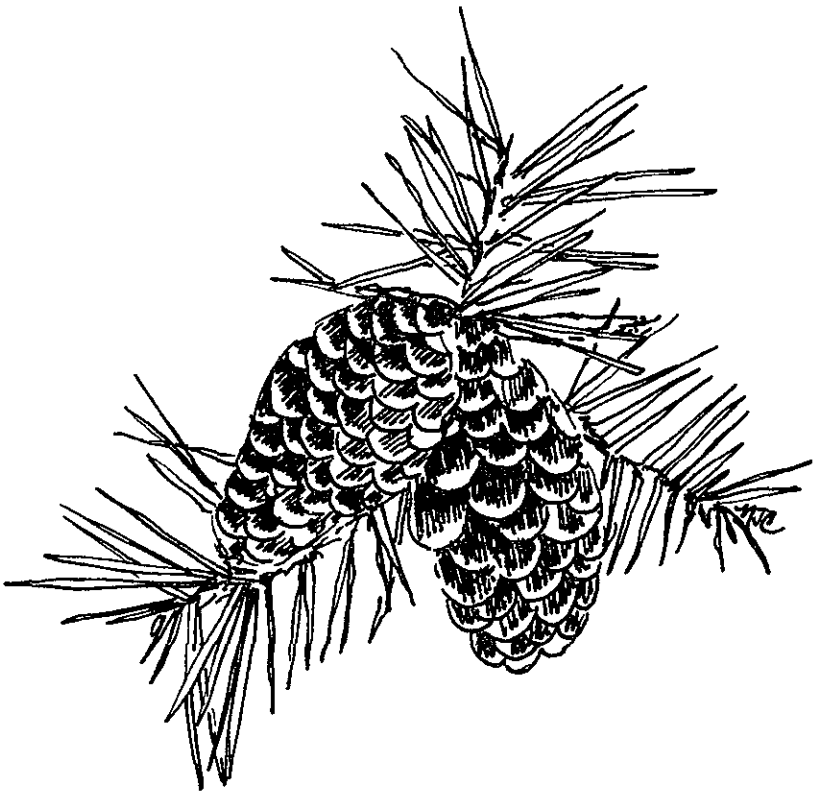
Table II-9i

Name	Acres	Principle Features
Established		
N.F. Nooksack River	1,407	Douglas-fir, western hemlock forests.
Lake Twenty-two	790	Western redcedar, western hemlock forests and subalpine lake.
Long Creek	640	Western hemlock forest, climax red alder forest.
Potential		
Addition to North Fork Nooksack RNA	2,460	Example of Douglas-fir, 75 year old burn. Also includes wide array of subalpine meadow communities found in existing RNA.
Lily Lake	800	Represents high-elevation mountain hemlock-Pacific silver fir forest. Lake is typical of mid-to-high-elevation subalpine lakes.
Perry Creek	2,066	Represents unique assemblage of rare fern species. Also has Alaska cedar (in stand with mountain hemlock and subalpine fir) and heather-huckleberry community.
Green Mountain	2,060	Represents subalpine parkland mosaic, heather-huckleberry communities, and subalpine lush herbaceous communities.
Chowder Ridge	1,920	Alpine community mosaic with Krummholz tree groups.

Table II-9j
Recommended Research Natural Areas, by Alternative

	Alternatives							
	NC (No Chg)	A (No Ac)	I	B (RPA)	H	J (Pref)	C	G-Modified
N. F. Nooksack Addition 1/					x	x	x	x
Lily Lake 1/					x	x	x	x
Perry Creek					x	x	x	x
Green Mountain 2/					x	x	x	x
Chowder Ridge 1/					x	x	x	x

1/ Within wilderness.
2/ 80% within wilderness.



Fish and Wildlife Inputs and Outputs (Table II-9k)

Table II-9k shows inputs and outputs for anadromous fish and selected wildlife species at the end of Decades 1, 2, and 5, by alternative.

Anadromous Fish

Commercial harvest of anadromous fish is related to the anadromous fish habitat improvement (and the level of investment). Commercial harvest will not vary through time. Improvements completed in Decade 1 will remain and be maintained through Decade 5, thereby providing the same amount of additional fish production each decade. Alternative NC production is similar to Alternative A.

Management Indicator Species

The wildlife species shown are the majority of the indicator species for the Forest. Population estimates are shown, as a measure of habitat capability. These population estimates are based on the maximum available habitat in each alternative for the decade shown. Reliable population inventories are not available for most species; numbers shown are based on current estimates projected into the future, based on expected changes in habitat (from management activities, etc.). Trends in populations should be given more weight than the actual numbers. Data for Alternative NC cannot be reasonably estimated.

Bald eagle numbers are derived from recovery plan population objectives for pairs in breeding territories. (There is currently one active nest.)

Two other management indicator species, the American peregrine falcon and grizzly bear, are not included in the table. Occasional sightings of these species have been recorded but no habitat capability or population estimates have been developed, due to lack of data.

Mature and Old-Growth Habitats

Wildlife populations that primarily use mature and old-growth habitats (northern spotted owl, marten, pileated woodpecker) decrease over time in all alternatives, primarily due to harvest of these timber age classes.

Population estimates for mature and old growth management indicator species exceed the MR population levels in all alternatives, except Alternative NC, for all time periods. In alternatives other than NC, population levels will approach MR levels in those portions of the Forest where timber harvest occurs, but will remain above MR levels in the undeveloped portions of the Forest.

Acres of spotted owl habitat, by land classification include:

Acres in Reserved Areas:	166,200 acres (1989)
Acres Not Suited for Timber Production:	137,037 acres
Acres Suited for Timber Production Outside of SOHA's	146,000 acres
All Acres of Suitable Habitat	499,237 acres

Primary Cavity Excavators

On lands suitable for timber production, habitat will be provided for varying percents, by alternative, of the total population potential for primary cavity excavators. Alternative NC is estimated is to similar to Alternative A (No Action). Potential populations are based on home ranges, vegetative types, and other factors (Brown 1985 and others). Also, refer to Chapter III, FEIS, Wildlife. Forested areas with no timber harvest will generally have higher populations.

Big Game Species

Thermal cover on big game winter range is reduced in all alternatives. However, winter range habitat capability for deer and elk increases from the current situation (which supports 9,140 deer and 470 elk) through the first decade, a result of increased forage from timber harvest activities. In the second decade, habitat capability declines as winter thermal cover becomes limiting. By the fifth decade, habitat capability again increases due to improving forage/cover ratios, from habitat improvements implemented in the first decade. Summer deer and elk populations increase due to forage production in timber harvest areas.

Mountain goat habitat provides both winter and summer range, so the populations are limited by winter range capability.

Wildlife habitat improvements result in additional habitat capability for some of the above species - big game - as well as for other wildlife, such as osprey and waterfowl.

Consultation with U.S. Fish and Wildlife Service

A biological assessment of the effects of the Forest Plan alternatives on Federal threatened and endangered species was completed and submitted to the USDI Fish and Wildlife Service. The finding of this assessment was that, under all alternatives, federally-listed species would not be affected detrimentally. These species will receive special management under Forest-wide Standards and Guidelines and the standards and guidelines for individual species. The Forest will confer with the Fish and Wildlife Service on any future actions which may affect a listed species.

Table II-9k

Fish and Wildlife Inputs and Outputs 1/

Outputs/Effects	Unit of Measure	NC 2/ (No Change)	A (No Action)	I	B (RPA)	H	J Preferred	C	G Modified
Anadromous Fish Commercial Harvest									
Decade 1	1,000	Similar	7809	8874	8874	8874	8874	8874	8874
Decade 2	Lbs/Yr	to	7809	9000	9000	9000	9000	9000	9000
Decade 5		Alt. A	7809	10,000	10,000	10,000	10,000	10,000	10,000
Anadromous Fish Habitat Improvement									
Decade 1	1,000	Similar	0	1065	1065	1065	1065	1065	1065
Decade 2	Lbs/Yr	to	0	1200	1200	1200	1200	1200	1200
Decade 5		Alt. A	0	1300	1300	1300	1300	1300	1300
Bald Eagle									
Decade 1	Pairs	----------4 (One Active + 3 potential breeding territories)----------							
Decade 2									
Decade 5									
Northern Spotted Owl									
Decade 1	Habitat	108 3/	108	108	108	111	111	115	115
Decade 2	Capability	91	97	98	98	101	103	110	110
Decade 5	for Pairs	54	76	76	76	80	82	99	98
Marten									
Decade 1	Habitat	4210 3/	4207	4214	4216	4327	4337	4489	4479
Decade 2	Capability	3565	3800	3915	3832	3951	4018	4309	4281
Decade 5	for Indiv.	2113	2800	2937	2910	3110	3213	3870	3823
Pileated Woodpecker									
Decade 1	Habaitat	842 3/	841	843	844	865	867	898	899
Decade 2	Capability	713	760	783	766	790	804	862	856
Decade 5	for Pairs	423	560	587	582	622	643	774	765

1/ Values for wildlife species other than bald eagle and primary cavity excavators are population estimates based on maximum habitat potential.

2/ The TM Plans upon which the No Change Alternative is based were developed in 1963. They are not integrated resource plans and consequently did not address all resource uses and outputs.

3/ Populations would be expected to decline at a rate faster than Alternative A because no specific provision is made in Alt. NC to maintain viable populations and more of the old growth is suitable for timber harvest and will be fragmented.

Table II-9k

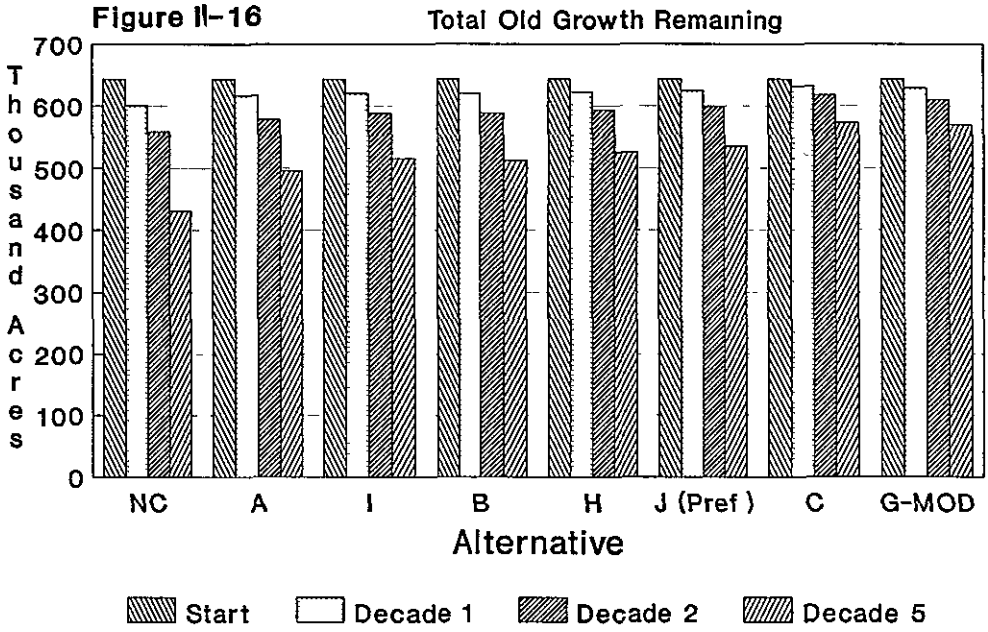
Outputs/Effects	Unit of Measure	NC 2/ (No Change)	A (No Action)	I	B (RPA)	H	J Preferred	C	G-Modified
Primary Cavity Excavators									
Decade 1	% of 4/	Similar	40	20	40	20	40	20	60
Decade 2	Potential	to	40	20	40	20	40	20	60
Decade 5	Population	Alt A	40	20	40	20	40	20	60
Roosevelt Elk									
Winter Range									
Decade 1	Habitat	Similar 3/	780	780	770	770	770	750	740
Decade 2	Capability	to	720	700	690	700	690	670	660
Decade 5	for Indiv	Alt A	790	740	730	740	710	650	640
Summer Range									
Decade 1	Habitat	Similar 3/	1240	1230	1240	1240	1240	1240	1240
Decade 2	Capability	to	1260	1260	1250	1260	1250	1250	1250
Decade 5	for Indiv.	Alt A	1300	1290	1270	1270	1280	1280	1270
Black-tailed Deer									
Winter Range									
Decade 1	Habitat	Similar 3/	16,520	15,350	15,300	15,250	15,160	14,870	14,610
Decade 2	Capability	to	14,400	13,510	13,410	13,450	13,390	12,950	12,680
Decade 5	for Indiv	Alt A	15,740	14,300	13,970	14,190	13,580	12,410	12,110
Summer Range									
Decade 1	Habitat	Similar 3/	19,750	19,740	19,730	19,740	19,720	19,680	19,670
Decade 2	Capability	to	19,720	19,690	19,670	19,700	19,670	19,520	19,530
Decade 5	for Indiv.	Alt A	19,970	19,800	19,720	19,740	19,650	19,510	19,400
Mountain Goat									
Decade 1	Habitat	Similar 3/	1430	1440	1450	1440	1450	1450	1450
Decade 2	Capability	to	1400	1440	1440	1440	1440	1450	1450
Decade 5	for Indiv.	Alt A	1330	1400	1410	1410	1420	1450	1440

4/ On acres suitable for timber harvest. Percentages are higher on other portions of the Forest.

Old Growth Forest (Table II-91)

Old growth timber stands are valued as wildlife habitat, for their contribution to ecosystem diversity, and for their aesthetic qualities. Old growth is also valued as a timber resource to supply mills. The acres of old growth remaining varies by alternative; the acres of old growth inside wilderness and Research Natural Areas will not change by alternative. Refer to Table II-91. Management requirements are included in every alternative except Alternative NC and retention for ecosystem diversity and aesthetics is considered in each alternative.

Figure II-16 is a duplicate of Figure II-3, on page II-72 of this chapter. Figure II-17 shows acres of old growth remaining on lands suitable for timber production. At the end of five decades, Alternatives C and G-Modified will have the most old growth remaining and Alternatives A (No Action), I, and B the least.



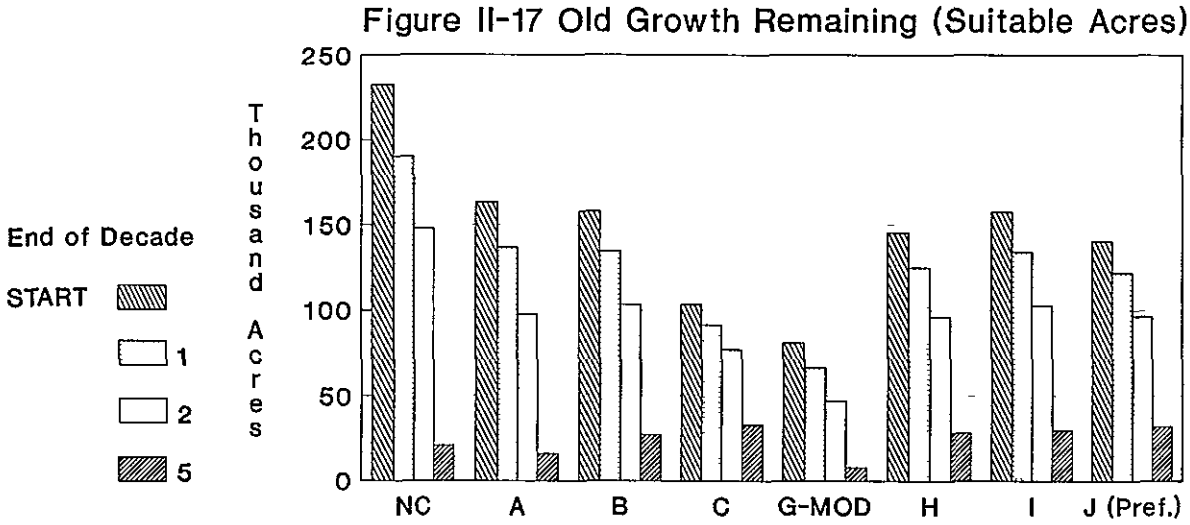


Table II-91

Old-Growth Acres by Alternative 1/

Alternative	Old Growth in Wilderness	Non-wilderness Not Suited for Timber Production Because of Other Resource Objectives 2/	Non-wilderness Not Suited for Timber Production Because of Potential Irretrievable or Irreversible Resource Damage	Non-wilderness, Suited for Timber Production and Allocated to a Prescription Allowing Timber Harvest			
				Start	End Decade 1	End Decade 2	End Decade 5
A (No Act)	232,500	113,469	134,400	163,169	137,131	97,723	16,156
I	232,500	118,978	134,400	157,660	134,385	102,244	29,834
B (RPA)	232,500	118,812	134,400	157,826	134,897	103,339	27,308
H	232,500	130,860	134,400	145,778	125,105	96,335	28,326
J (Pref.)	232,500	135,821	134,400	140,817	121,939	96,634	32,373
C	232,500	173,393	134,400	103,245	91,396	77,180	33,134
G-Mod.	232,500	195,946	134,400	80,692	66,491	47,228	7,824

1/ The total acres of old growth, at the starting point, wilderness and non-wilderness = 643,538 No reasonable estimates for Alt NC.

2/ Other resource objectives include allocations such as wildlife MR's, riparian MR's, or non-motorized dispersed recreation, etc These vary by alternative, depending upon the objectives or goal of the alternative.

Grazing, Minerals and Energy Yields (Table II-9m)

Table II-9m compares, by alternative, the long-term yields for range and minerals, and the acres available for mineral exploration. The current low demand for domestic livestock range is expected to continue.

The acres available for mineral exploration do not vary much between alternatives, ranging from 53.7 percent to 50.1 percent of the total Forest, in Alternatives A and G-Modified, respectively. Alternative NC is similar to A. Alternative G-Modified is lower due to the acres assigned to Special Areas (Management Area 8).

Energy mineral production varies according to location and access to areas prospectively valuable for energy minerals, especially geothermal energy. Outside wilderness, MA prescriptions that restrict access and/or mineral development were assigned to 41 percent and 35.8 percent of the Forest in Alternatives C and G-Modified, respectively. Alternative H has similar restrictions on 32.2 percent to 28.7 percent of the total Forest outside wilderness. Significant production of oil, gas, or coal in the Forest during this period is not expected.

Non-energy minerals include salable minerals (stone or gravel) and locatable minerals. It is assumed that production of salable minerals will continue to meet off-Forest demand in all alternatives; Forest Service demand is generally proportional to road construction and reconstruction.

Production of locatable minerals depends on a number of factors: technology, demand, location relative to withdrawn areas, and management emphasis of the selected alternative. Commodity-oriented Alternatives B and I have the least decrease in production from the present, followed by H.

The U.S. Bureau of Mines data (USDI 1985) indicates demand for non-energy mineral commodities from this Forest is expected to increase at the rate of 2 percent per year through the year 2000, with no prediction beyond that year.

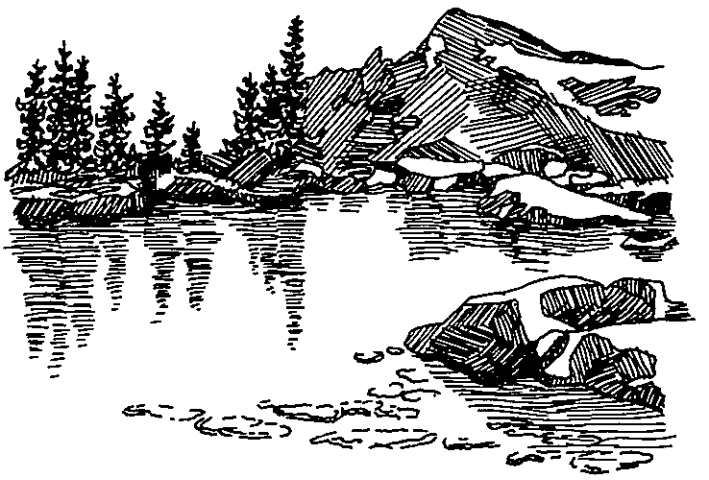


Table II-9m
Grazing, Minerals, and Energy Yields

Outputs/Effects	Unit of Measure	Alternatives: NC 1/ (No Change)	A (No Action)	I	B (RPA)	H	J (Preferred)	C	G-Modified
Range 2/									
Decade 1	1000	1	1	1	1	1	1	1	1
Decade 2	AUM's	1	1	1	1	1	1	1	1
Decade 5		1	1	1	1	1	1	1	1
Acres Available for Grazing		4000	4000	4000	4000	4000	4000	4000	4000
Energy Minerals Prod.									
Decade 1	Billion	Sim.	.. ..	..	...No Energy Production Anticipated..		....	....	
Decade 2	BTU's	to	135	97	114	86	86	48	48
Decade 5	Per Yr	Alt. A	750	537	636	477	477	265	265
Non-Energy Minerals Produced	Percent	Sim							
Decade 1	Change From	to	0	-10	-8	-16	-16	-19	-19
Decade 2	Present	Alt A	... Increase at a rate of 2% per year through the year 2000. Not estimated beyond 2000.						
Acres Available for Mineral Exploration 3/	Acres	Sim to Alt A	924,675	912,954	920,367	916,102	916,102	915,700	864,087

1/ The 1963 Timber Management Plans, upon which Alternative No Change is based, were not integrated resource plans, and consequently did not address all resource uses and outputs.
2/ Two sheep allotments with an estimated capacity of 950 AUM's, have been in non-use status the past 5 years.
3/ Area other than Wilderness where MA prescriptions call for withdrawal These acres include Mt. Baker National Recreation Area, 8,743 acres, which is withdrawn from geothermal entry.

Budget, Costs, and Social and Economic Outputs and Effects (Table II-9n)

Table II-9n presents, by alternative, the projected total budget and costs for Decades 1, 3, and 5. Also included are a number of social and economic outputs and effects.

The total budget is made up of operational costs plus capital investment costs. Operational costs include all salaries and expenses (excluding capital investment costs) dispersed in managing the Mt. Baker-Snoqualmie National Forest and producing outputs. Capital investment costs include costs for road construction and preconstruction engineering (such as location, survey, and design of a road), plus campground and/or facility development.

Returns to the Treasury include: all receipts from timber stumpage (a marketing term, meaning the dollar value assigned to timber still standing in the forest - "on the stump" - rather than its value in the mill, etc.); recreation fees; special use permits; or other permits or sales minus timber purchaser road credits.

Timber Purchaser Credits. The appraised price of timber sales sold is calculated as if roads needed to remove the timber were already constructed. If roads are required in the sale, timber purchaser credits are paid to the timber sale purchaser (or applied to stumpage). If the sale appraised at $100 per MBF and roads cost $10 per MBF, the purchaser could receive $10 per MBF purchaser credit for completing all roads; thus, only $90 of the $100 per MBF appraised price would be returned to the Treasury. If the purchaser bid more than $100 per MBF to buy the sale, additional dollars would be returned to the Treasury.

In Table II-9n, the payments to counties shown are higher than the 25 percent of Returns to the Treasury, as the figure includes 25 percent of the purchasers road maintenance and fuel treatment payments, which, in the planning process, were excluded from Returns to Treasury.

The human resource program includes various programs operated by the Forest that provide employment, training, and experience to members of the community. These programs accomplish work that would not otherwise be accomplished. Programs included are: the Senior Community Employment, the Forest Volunteer, Touch America Project, and Youth Conservation Corps. Demand for these programs is high, however the Forest is limited in its ability to utilize these programs by personnel and funds needed to train, supervise, and manage people in the programs. For this reason, the program is projected to be the same for all alternatives.

The last outputs shown in Table II-9n are the direct, indirect, and induced jobs and income generated by alternative outputs. Jobs and income generated by average Forest outputs for the periods, 1985-86 and 1977-86, are inserted into the table for comparison with jobs and income projected for each alternative. All calculations relative to timber outputs are based on Timber Sale Program Quantity (TSPQ), assuming timber sold and harvested will be equal.

Table II-9n

Budget, Costs Social and Economic Outputs and Effects

Outputs/Effects	Unit of Measure	Alternative NC 1/ (No Change)	A (No Act)	I	B (RPA)	H	J (Preferred)	C	G-Mod
Operational Costs									
Decade 1	Million		14 7	13 7	13 8	13 3	13 3	11 6	12 2
Decade 2	Dollars		16 5	14 7	14 7	14 2	15 3	11 9	13 0
Decade 5	Per Yr		16 8	15 5	15 5	15 5	14 7	12 6	13 3
Capital Investment Costs									
Decade 1	Million		5 3	4 7	4 9	5 0	4 7	3 8	3 5
Decade 2	Dollars		4 5	4 2	4 2	4 2	4 0	3 8	3 6
Decade 5	Per Yr		1 6	1 4	1 3	1 2	1 1	8	8
Total Budget									
Decade 1	Million		20 0	18 4	18 7	18 3	18 0	15 4	15 7
Decade 2	Dollars		21 0	18 9	18 9	18 5	19 3	15 7	16 6
Decade 5	Per Yr		18 3	16 8	16 8	16 7	15 9	13 3	14 0
Returns to Treasury									
Decade 1	Million	35 9	21 4	19 8	19 4	18 1	16 8	9 3	14 3
Decade 2	Dollars	36 6	34 9	28 1	27 7	25 6	23 9	14 4	19 6
Decade 5	Per Yr	24 0	46 2	40 3	40 2	38 9	37 7	26 2	24 2
Payments to Counties									
Decade 1	Million		5 9	5 4	5 3	4 9	4 9	2 6	3 8
Decade 2	Dollars		9 2	7 4	7 3	6 8	6 3	3 9	5 1
Decade 5	Per Yr		11 9	10 4	10 3	10 0	9 6	6 7	6 2
Human Resource Program									
Decade 1	Person Yrs	29 0	29 0	29 0	29 0	29 0	29 0	29 0	29 0
Decade 2	Per Yr.	29 0	29 0	29 0	29 0	29 0	29 0	29 0	29 0
Decade 5		29 0	29 0	29 0	29 0	29 0	29 0	29 0	29 0
Jobs Supported by the Alts	Thousands of Jobs								
Decade 1	Per Year		29 3	29 1	29 1	28 9	28 8	28 0	28 4
For Comparison		30 1 Thousand Jobs Supported by 1985-86 Average Forest Outputs							
For Comparison		30 0 Thousand Jobs Supported by 1977-86 Average Forest Outputs							
Income Based On Projected Outputs for Alts	Mil $		537	532	531	526	522	501	512
Decade 1	Per Year								
For Comparison		558 Mil $ - Income Based on 1985-86 Average Forest Outputs							
For Comparison		556 Mil $- Income Based on 1977-86 Average Forest Outputs							

1/ The 1963 TM Plans, upon which Alternative NC is based were not integrated resource plans, and consequently did not address all resource uses and outputs Alternative NC was not modeled in FORPLAN, information in this table was calculated outside of FORPLAN

Inventoried American Indian Religious and Cultural Use Sites (Table II-9o)

Table II-9o shows, by alternative, an approximate percentage of the inventoried American Indian religious and cultural use sites protected by management areas that generally preclude or limit ground-disturbing activities. The percentages given in Table II-9o should be viewed as only an approximation as some use sites and areas were not identified in the Inventory, but were included in a larger "buffer" area by tribal respondents. Therefore, the degree of actual protection in each alternative can only be estimated.

Inventoried use sites and areas are not mapped as MA 7, American Indian Religious and Cultural Uses in order to protect the confidential nature of the areas as authorized by the Archeological Resource Protection Act (P.L. 96-95), the National Historic Preservation Act (P.L. 89-665), and exemptions to the Freedom of Information Act (P.L. 93-502).

In the table, the difference between "high" and "moderate" protection is derived from the expected frequency of human encounters. There is no timber harvest or road construction in either. All cemeteries have high protection. Management Areas 1A, 10B through 10E, 11, 12, 15A, and 18 afford high protection. Management Areas 1B, 5C, 10A, 16, and 23B afford moderate protection. Not all of the inventoried acres are currently in an undeveloped state.

The actual protection of all sites will be determined using the Forest-wide Standards and Guidelines for the mapped Management Areas (see Chapter 4, Forest Plan) and through the consultation process. Consultation will be conducted with appropriate tribes before initiating any field activity that may affect these areas or sites. It is this process that will determine the actual level of on-the-ground protection for religious and cultural use areas and sites.

The percentage of "high" protection provided for each type of site (except cemetery sites) does not vary much between alternatives. While the number of acres "protected" in one of the above listed MA's versus another varies considerably among the alternatives, the overall percentage does not vary much.

Alternatives C and G-Modified provide the highest percentage of management area acres providing moderate protection for all types of religious and cultural sites. There is a much wider variation between alternatives in the percentage of moderate protection provided, excluding cemeteries. This is because there is a much wider range between alternatives in the combined total acres of assigned MA's affording moderate protection (MA's listed above).

Because of goals and the design criteria of the alternatives, overall protection is highest in Alternatives C and G-Modified. These alternatives would show higher percentages of high protection in Table II-9o if the MA's affording high protection were not "over-ridden" by MA's that provide moderate protection (e.g. 1B and 10A "over-riding" MA's 11, 12, and 14).

Table II-9o

Percentage of Inventoried Acres of American Indian Religious and Cultural Use Sites Assigned to Management Areas Providing High and Moderate Levels of Protection

Type of Site	Alternatives															
	NC 1/ (No Change)		A (No Action)		I		B (RPA)		H		J (Preferred)		C		G-Modified	
	High	Mod	High	Mod.	High	Mod	High	Mod	High	Mod.	High	Mod.	High	Mod.	High	Mod
Spirit Quest	NA		37	3	44	2	44	6	41	15	48	11	40	26	43	22
Legend Site	NA		16	2	30	2	28	16	25	26	40	17	23	45	18	47
Cedar Areas	NA		22	1	28	1	28	5	27	8	27	8	23	27	29	25
Ceremonial Flora	NA		52	1	56	1	57	6	54	16	56	15	58	24	55	26

1/ The 1963 TM Plans, upon which Alternative NC is based, were not integrated resource plans, and consequently did not address all resource uses and outputs. The missing information in this table cannot be reasonably estimated because, except for cemeteries, the percentages were developed by overlaying inventoried areas with MA's; no MA's were assigned in Alternative NC.

Qualitative Resource Outputs and Environmental Effects (Table II-10)

Table II-10 displays selected qualitative resource outputs and environmental effects that could not be adequately shown in the II-9 tables. Again, the alternatives are discussed in order of decreasing acres of land suitable for timber production. This order is strongly correlated to the amount of vegetative management in each alternative, and is useful in understanding how the environmental consequences and effects will vary by alternative.

Alternative NC (No Change) is based on the 1963 Timber Management Plans; they were not integrated resource plans and consequently did not address all resource uses and outputs. Data for this alternative is presented, or estimated, as available.

Note: although the outputs and effects occur over the long-term, the results of this planning process will apply for only 10 to 15 years, the life of this Forest Plan.

Refer to Chapter IV, Environmental Consequences, for a complete discussion of the effects of implementing the alternatives on the physical, biological, social, and economic environments.

Table II-10 Page 1 of 6
Qualitative Resource Outputs and Environmental Effects

Archaeological and Historical Properties

NC (No Change)	Estimated to be similar to Alternative A (No Action), by highest frequency of resource damage.
A (No Action)	High frequency of resource damage in developed areas, with high mitigation costs. Information gained through site discovery and recovery.
I	Intermediate frequency of resource damage in developed areas, with high mitigation costs. Some information gained.
B (RPA)	Similar to Alternative I in developed areas.
H	Similar to Alternative I in developed areas.
J (Pref)	Similar to Alternative I, with more potential for information gain and interpretation.
C	Has the fewest adverse effects on cultural and historic resource, but also fewer opportunities for information gained through site discovery and interpretation
G-Mod	Only Alternative C has fewer adverse effects. Somewhat less opportunity for gaining information.

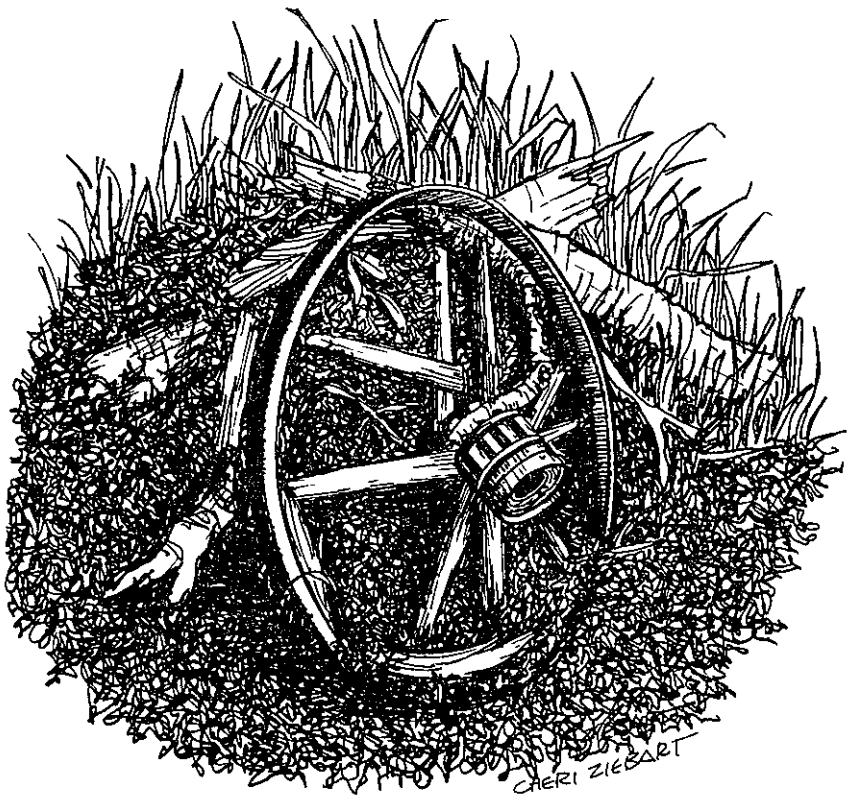


Table II-10 Page 2 of 6

Visual Quality

Same in All Alternatives: Visual quality in Alpine Lakes Management Area (which includes Snoqualmie Pass and Stevens Pass Highways) and Skagit Wild and Scenic River will be managed as prescribed in approved plans, except where overridden by wildlife MR's. Wilderness is Preservation in all alternatives.

NC (No Change	The foreground of Mather Memorial Parkway is managed as a scenic corridor; timber harvest permitted but not scheduled. Effects of NC on other areas of the Forest are estimated to be similar to Alternative A.
A (No Action)	With emphasis on timber harvest at low elevations, coinciding with many heavily used rec. areas, there would be some conflict between commodity production and scenic quality. The cumulative effect of Alt. A would be a "moderately" altered character even in highly scenic areas. Only the foreground of Mather Memorial managed as scenic corridor.
I	With an emphasis on managing tentatively suitable lands for timber production, only the foreground of heavily traveled corridors will be managed to retain high visual quality: Mather Memorial Parkway, Mtn. Loop Highway, Mt. Baker Highway, Baker Lake Highway, and North Cascades Highway 20. Outside these viewsheds and the roadless areas, the Forest will be managed at a moderately to heavily-altered state.
B (RPA)	With high emphasis on managing all tentatively suitable lands for timber production, scenic quality will deteriorate for almost all lands accessible by road. Only the foreground of Mather Memorial Pkwy will be managed as scenic area; only sites unsuitable for timber production will remain roadless.
H	The foreground and middleground of five heavily traveled corridors will be managed to retain high visual quality: Mather Memorial Pkwy, Mtn. Loop Hwy, Mt. Baker Hwy, Baker Lake Hwy, and North Cascades Hwy 20. Outside these viewsheds and the roadless areas, the Forest will be managed at a moderately to heavily altered-state.
J (Pref)	The foreground and middleground of 7 heavily traveled corridors will be managed to retain high visual quality: Mather Memorial Pkwy (MA 8, Special Area), Mtn. Loop Hwy, Mt. Baker Hwy, Baker Lake Hwy, North Cascades Hwy 20, Cascade River road, and Crystal Mtn. Hwy. Outside these viewsheds and the roadless areas, the Forest will be managed at a moderately to heavily altered-state. Wild and scenic river recommended (30 rivers) will add to visual quality.
G	With low level of timber harvest and emphasis on retaining old growth and wild and scenic rivers, many foreground areas will be visually unaltered. Some scenic acres assigned: upper end of Mt. Baker Hwy, portions of Cascade and N. Fk. Cascade R., portions of Mtn. Loop Hwy, upper Sauk, lower Sultan, and Mather Memorial Pkwy. Middleground views will be "moderately altered". Roadless areas will be undisturbed.
C	Nearly all existing roadless areas will remain roadless and be visually undisturbed. Both primary and secondary recreation corridors will be managed as scenic viewsheds. Opportunities for roaded and remote scenic viewing are high.

Table II-10

Water and Riparian Resources

NC (No Change	Emphasis for water quality similar to Alt. A. Some riparian values protected via land stratification in TM Plan (no regulated harvest on Marginal). Mitigation measures - similar to Alt. A.
A (No Action	Emphasis on maintaining water quality. Riparian values managed at MR level. Intensive mitigation measures needed to mitigate effects of high road construction and vegetation disturbance from timber harvest.
I	Water quality maintained or improved slightly from Alternative A. Riparian values managed with special emphasis on enhancement. More intensive mitigation measures than in Alternative A, required to mitigate direct effects of roads and timber harvest on soils which result in sedimentation.
B (RPA)	Water quality will improve slightly over Alt. A due to longer harvest rotations in large areas managed for wildlife habitat improvement. Riparian values managed with special emphasis on enhancement. Fewer acres harvested and miles of road constructed/reconstructed than in Alt. A require less mitigation of direct effects of road construction and timber harvest.
H	Water quality improved over Alt. A due to fewer acres harvested and fewer new roads. Management of riparian values and mitigation measures needed are similar to Alt. I.
J (Pref)	Water quality improved over Alt. A due to fewer acres harvested and fewer new roads. Management of riparian values and mitigation measures needed are similar to Alt. I.
G-Mod	Water quality will improve significantly over Alt. A due to fewer developed areas, reduced road construction and timber harvesting, and closure of about 65 miles of existing road. Riparian values managed with special emphasis on enhancement. Lowest mitigation costs except for Alt. C.
C	Water quality will improve significantly over Alt. A due to reduced timber harvest, road construction, plus closure of 300 miles of existing road. Riparian values managed with the highest emphasis on enhancement of any alternative. Least mitigation required.

Diversity of Plant Communities

Same in All Alternatives: Timber harvest or the lack of timber harvest, will have a great effect on the kinds and distributions of plant communities found on the Forest. On those areas where timber harvest is precluded, natural processes will continue uninterrupted and more late successional communities will prevail. These areas will be dominated by large diameter trees of advanced age and other plant species associated with this condition.

In those areas where timber harvest occurs, there will be a transformation from the late successional communities to early successional communities. These areas will be dominated by small to medium size trees of relatively younger ages, less than 160 years old, and other plant species associated with this condition. These plant communities will take on a mosaic appearance because of the schedule of harvest activities and their distribution across the landscape. In addition, there will be intermingled areas of late successional communities. The amount and distribution of these intermingled older communities will depend on the theme of the individual alternative.

NC (No Change	There will be an increase in early successional plant communities on all commercial forest lands. By the end of the 5th decade, approximately 435,000 total forested acres will be in successional stages 100 years or less in age.
A (No Action	Late successional plant communities will be found on 739,000 forested acres (480,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 147,000 acres will have been converted to earlier successional stages. This combined with the starting acreage of stands in successional stages under 50 years of age (223,000 acres) produces a total of 370,000 total forested acres in successional stages 100 years of age or less.
I	Late successional plant communities will be found on 744,000 forested acres (486,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 128,000 acres will have been converted to earlier successional stages. This combined with the starting acreage of stands in successional stages under 50 years of age (223,000 acres) produces a total of 351,000 total forested acres in successional stages 100 years of age or less.
B (RPA)	Late successional plant communities will be found on 744,000 forested acres (486,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 130,000 acres will have been converted to earlier successional stages. This combined with the starting acreage of stands in successional stages under 50 years of age (223,000 acres) produces a total of 353,000 total forested acres in successional stages 100 years of age or less.
H	Late successional plant communities will be found on 757,000 forested acres (450,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 117,000 acres will have been converted to earlier successional stages. This combined with the starting acreage

of stands in successional stages under 50 years of age (223,000 acres) produces a total of 340,000 total forested acres in successional stages 100 years of age or less.

J (Pref) Late successional plant communities will be found on 763,000 forested acres (503,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 108,000 acres will have been converted to earlier successional stages. This combined with the starting acreage of stands in successional stages under 50 years of age (223,000 acres) produces a total of 331,000 total forested acres in successional stages 100 years of age or less.

C Late successional plant communities will be found on 806,000 forested acres (540,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 70,000 acres will have been converted to earlier successional stages. This combined with the starting acreage of stands in successional stages under 50 years of age (223,000 acres) produces a total of 293,000 total forested acres in successional stages 100 years of age or less.

G-Mod Late successional plant communities will be found on 832,000 forested acres (563,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 73,000 acres will have been converted to earlier successional stages. This combined with the starting acreage of stands in successional stages under 50 years of age (223,000 acres) produces a total of 296,000 total forested acres in successional stages 100 years of age or less.

Civil Rights

Same in All Alternatives: Various Civil Rights, Affirmative Action, and Equal Employment Opportunity Acts require that Forest Service hiring, supervisory, and contracting practices be conducted in a manner conducive to meeting established Regional and Nation-wide goals in these areas. In all alternatives, positive steps are included to ensure that facilities, sites, and activities will not be denied to any individual on account of race, color, creed, religion, sex, marital status, age, handicap, or National origin.

Table II-10

Social Environment

Same in All Alternatives: There is no measurable effect on urban communities. See Table II-9n for the economic effects. Jobs lost/gained will often affect residents in the rural and agricultural communities east of the Interstate Highway 5 corridor.

NC (No Change)	Lifestyle and minority employment: estimated to be similar to Alternative A (No Action).
A (No Change)	No apparent changes in lifestyle. Some of the employment generated in Decade 1 will be filled by minorities.
I	Opportunities increases for individual pursuing roaded recreation experiences, although these people will encounter strong evidence of altered landscapes. The most favorable alternative for minority employment.
B (RPA)	Similar to Alt. D; less favorable than the current situation for minority employment.
H	No apparent changes in lifestyle would occur. Less favorable than the current situation for minority employment.
J (Pref)	No apparent changes in lifestyle would occur. Less favorable than the current situation for minority employment.
G-Mod	Opportunities are enhanced for those who seek leisure or work in a more natural environment, and diminished for those pursuing roaded recreation experiences. Less favorable than the current situation for minority employment.
C	Opportunities increase for those pursuing activities in a natural setting and decrease for those pursuing roaded recreation experiences. Least favorable for minority employment.

4. Economic Tradeoffs Among Alternatives

Present Net Value (PNV) is an estimate of the potential economic effectiveness of managing the Forest. Since each alternative is a different way of managing the Forest, each alternative has its own PNV. By comparing PNV of the alternatives, the economic effectiveness of the alternatives can be compared.

As discussed in the first pages of this chapter, PNV is defined as the discounted dollar value of all priced outputs, less the discounted cost of all expenditures for management and investments. Discounting is a way of combining current and future values to show them in todays terms; values are expressed in terms of 1982 dollars and the discount rate used is 4%. A more complete discussion of PNV is included in Appendix B.

Priced outputs include resource outputs with a market price and those non-market resource outputs that have an assigned price (commensurate with market prices). Market resources include: timber, developed recreation, commercial anadromous fish, minerals, and special uses for which fees are collected. The displayed economic benefits for market resources include actual dollar receipts plus additional assigned dollar benefits for developed recreation. Non-market resource benefits are dollar benefits assigned to dispersed recreation, wilderness, and wildlife and fish-dependent recreation. The purpose of assigning dollar benefits is to reflect the full economic benefit, even though none, or only part, of that benefit associated with particular resources is actually collected as fees under current laws and policies. Economic benefits associated with market and non-market resources are displayed in detail in Appendix B, Table B-16.

As discussed in the text preceding Table II-9f, an assumption made concerning the relationship between recreation capacity and use has a significant effect on the economic benefits of recreation discussed here. It was assumed that recreation use will be limited to estimated capacity. Under this assumption, no use would occur above capacity levels; therefore, no economic benefits were assigned above that level.

If this assumption is incorrect and recreation use occurs to the level of predicted demand, recreation benefits have been underestimated by $698 million to $801 million, depending on the alternative. This potential underestimation would increase PNV by approximately one-third.

Since projected demand in Decade 1 is below estimated capacity for all classes of recreation - except non-wilderness unroaded dispersed, 6 percent of total demand - the possible underestimated economic benefits would not occur until after the first decade, or beyond the life of this plan.

Costs

Two types of costs are included in Forest management: operation and maintenance, and capital investment.

Operation and maintenance costs are the costs of activities required to plan and manage outputs, and maintain existing capital assets at standard levels. These include fixed costs such as general administration, and variable costs

which vary with different levels of outputs. Fixed costs are constant across all alternatives, while variable costs differ among the alternatives.

Capital investment costs are the costs of creating or enhancing capital assets, such as roads, trails, or fish habitat improvement structures. Road construction costs are a main component of capital; they are a direct function of the timber program. Other capital investment costs, such as fish and wildlife, vary independently of the timber program.

Table II-11: PNV, Discounted Costs and Benefits of Alternatives

Table II-11 summarizes the economic information used to determine PNV for each alternative, except Alternative NC, and for the Maximum PNV, with MR's Benchmark. This benchmark is not considered to be a viable alternative for the reasons discussed earlier in this chapter; it is shown as a reference point. The alternatives are ranked in order of decreasing PNV.

Discounted costs are the sum of all the costs which would be incurred to implement the alternative, discounted to their present value at a four percent interest rate. Discounted benefits are the sum of all the benefits produced by an alternative, discounted to their present value using a four percent interest rate.

The "change" is the difference in either PNV, discounted costs, or discounted benefits between successionally ranked (in descending order of PNV) pairs of alternatives. The incremental changes in PNV are a measure of the net economic benefits of the priced resources that would be foregone if a lower ranked alternative were to be selected over the preceding one. These priced resources that would be foregone would have to be weighed against the response to public issues and any net difference among the non-priced outputs.

As a general rule, PNV declines because benefits decline faster than costs, mainly due to a decline in timber benefits, although recreation benefits also fall. There are, however, some exceptions to this general rule.

When comparing Alternative A (No Action) to Alternative J (Preferred), Alternative A has markedly higher discounted costs (30%) and benefits (10%) than Alternative J (Preferred) but only slightly higher (1%) PNV. The objective function (in FORPLAN) for Alternative A is to maximize timber outputs in the first five decades. As a result, Alternative A has higher timber outputs with accompanying increased benefits, but these increased outputs are achieved at the cost of less efficient investments in timber management practices, which increases cost. Alternative A has the highest road construction program of any of the Alternatives, which also increases costs.

Another general trend: as roaded dispersed recreation use declines, so does PNV. Again, there are some minor exceptions. All alternatives have the same roaded dispersed recreation use in Decade 1, as capacity exceeds demand, thus limiting the benefits of roaded recreation to actual use.

Although there is a strong correlation between roaded dispersed recreation and PNV, this relationship is attributable to timber outputs and the accompanying road construction program. Thus, timber outputs are the real driver of PNV.

Table II-11

Present Net Values and Discounted Costs and Benefits of Alternatives

Alternative/Benchmark	PNV	Change	Discounted Costs	Change	Discounted Benefits	Changes
Benchmark	.....	.....	Millions of Dollars.....			
Max PNV with MR's (run #7)	2590.7	-247.5				
Alternatives						
B (RPA)	2343.2	-0.3	1091.5	3.9	3434.7	3 6
I	2342 9	-59.4	1095.4	178.3	3438.3	118.9
A (No Act.)	2283.5	-23.5	1273 7	-242.4	3557.2	-265.9.2
H	2260.0	-1.2	1031 3	-46.9	3291.3	-48.1.9
J (Pref.)	2258.8	-261.8	984.4	-156.2	3243.2	-418.0
G-Mod.	1997.0	-26.1	828.1	-103.9	2825.1	-130.0
C	1970.9		724.3		2695.2	
NC (No Change)	NA	NA	NA	NA	NA	NA

Table II-12: PNV, Discounted Benefits and Costs By Resource Group

In Table II-12, the total costs and benefits for each alternative are assigned to selected major accounting or budgeting categories. A complete and exact relationship between the dollar benefits associated with a particular priced output and the cost figure assigned to it should not be assumed. Forest-wide production of any specific priced output is generally supported by complex combinations of input costs. As an example, some recreation and wildlife benefits are joint outputs of timber management.

In Table II-12 the total discounted costs and benefits have been disaggregated into the broad resource groups of timber, recreation, and other. "Timber" benefits include sawtimber and fuelwood. "Recreation" benefits include dispersed and developed recreation, and wildlife and fish use. Benefits for commercial fish are included under "other." Discounted costs for roads are shown as a separate entry, since it is very difficult to accurately separate these costs into the resource groups. Costs shown under "other" include fish habitat improvement investments, share-cost road maintenance, and fixed costs.

Table II-12 indicates that almost all of the variation in PNV discounted costs and discounted benefits is due to the variation in timber outputs of the alternatives. First decade timber outputs vary by 125% between Alternative C (13.8 million cubic feet) and Alternatives A (31.0 million cubic feet). The discounted costs and discounted benefits for timber follow the same general trend as timber outputs with some minor exceptions: as timber outputs decline, so do discounted costs and benefits.

Discounted costs and benefits for recreation change very little from one alternative to another. This is partly due to the fact that current recreation use is very close to capacity on the forest for most types of recreation except roaded dispersed. There is little opportunity to significantly increase recreation supply in wilderness or primitive, semi-primitive nonmotorized, or semi-primitive motorized outside of wilderness. Although there is some variation between alternatives in these dispersed recreation capacities, it is a very small percentage of the current capacity and affects discounted recreation benefits only about 6% between the alternatives. Discounted recreation benefits exceed discounted timber benefits in all alternatives.

Alternative C has the lowest discounted recreation benefits of all the alternatives but the highest levels of primitive and semi-primitive nonmotorized recreation capacity. This inverse relationship is true throughout all the alternative rankings. Although primitive and semi-primitive nonmotorized recreation use has a higher value per RVD than motorized use, it has a lower RVD per acre coefficient. The result is that on a per acre basis, motorized use is more valuable than nonmotorized use.

Table II-12

Present Net Values and Discounted Benefits and Costs by Resource Group

Alternatives	PNV	Discounted Benefits			Discounted Costs			
		Timber	Recreation	Other	Timber	Roads	Recreation	Other
		Millions of Dollars						
B (RPA)	2343.2	1384 3	1904.2	146.2	746.8	147.2	34.8	162.7
I	2342.9	1400.0	1892.1	146.2	754.1	146.9	35.2	159 2
A (No Act.)	2283.5	1643.5	1880.0	33.7	916.2	165 1	34.8	157.6
H	2260.0	1288.6	1856.5	146.2	693.3	144.2	34.7	159.2
J (Pref)	2258.8	1204.8	1892.1	146.2	650.3	136 2	35.2	162.7
G-Modified	1997.0	940 8	1805.4	78.9	523 1	110.9	34.9	159.2
C	1970.9	760.5	1788.5	146.2	420.5	106.8	34.2	162.7
NC (No Change)	NA	NA	NA	NA	NA	NA	NA	NA

Table II-13: Average Annual Cash Flows, Non-cash Benefits

In Table II-13, the alternatives are ranked in order of decreasing net receipts; all alternatives show a positive cash flow (net receipts) to the treasury in Decade 1 except Alternative C. Alternative A has the highest cash flow, with $6.5 million, while Alternative C has the lowest with a ($0.2) negative flow. There is an almost identical ranking of the alternatives in terms of cash flow and ASQ, because timber receipts make up nearly all of the total receipts on the Forest.

All of the alternatives have a positive cash flow in the fifth decade. Again the ranking of the alternatives in terms of cash flow mirrors the ranking of alternatives by ASQ.

Net receipts increases from Decade 1 to Decade 5 in all alternatives. In the first decade, the water quality and riparian management requirement result in reduced acres of harvest in some watersheds and thus lower receipts than in later decades when the HCE management requirement allows increased harvest. Alternative A net receipts increase most ($23.1 million) and Alternative G-Modified the least ($8.9 million) between the first and fifth decade.

From Decade 1 to Decade 5, total receipts in Alternative J (Preferred) increase approximately 121%. At the low end, Alternative G-Modified total receipts increase approximately 67%, and at the high end Alternative C total receipts increase approximately 182%.

Non-cash benefits increase from first to fifth decades in all alternatives. This is a function of increased recreation benefits that are valued as demand increases in Decade 5. By the fifth decade, development will have converted more lands from nonmotorized recreation opportunity to motorized recreation. Motorized recreation is more valuable on a per acre basis than nonmotorized. This also explains why Alternative C has the lowest non-cash benefits, as it maintains more land in a nonmotorized condition than any of the other alternatives.

Table II-13

Average Annual Cash Flows and Non-cash Benefits
Decades 1 and 5, By Alternative

Alternatives	Decade 1 Net Receipts	Decade 1 Total Costs	Decade 1 Total Receipts	Decade 1 Non-Cash Benefits to Users	Decade 5 Net Receipts	Decade 5 Total Costs	Decade 5 Total Receipts	Decade 5 Non-Cash Benefits to Users
	Millions of Dollars Per Year							
A (No Action)	6.5	15.3	21.8	60.9	29 6	16 7	46.3	85.2
I	5.8	14.3	20.1	61 3	25 6	15 4	41.0	85 5
B (RPA)	5.3	14.4	19.7	61 0	24.8	15 4	40.2	86.8
H	4.8	13.6	18.4	60 5	24.1	14.9	39 0	83.8
J (Preferred)	3.4	13 6	17.0	61.2	23.1	14.6	37 7	85.5
G-Modified	2.1	12 4	14.5	60 6	11.0	13.2	24 2	80.2
C	-2.4	11 8	9.4	60.7	14.1	12.4	26.5	78.8
NC (No Change) 1/	NA	NA	NA	NA	NA	NA	NA	NA

1/ The 1963 TM Plans, upon which the No Change Alternative is based, were not integrated resource plans, and consequently did not address all resource uses and outputs. Since Alternative NC was not modeled in FORPLAN, economic measures comparable to the other alternatives were not determined.

G. MAJOR TRADEOFFS AMONG ALTERNATIVES

This section summarizes the relationships among the economic values (discussed in detail above) and the differing responses of the alternatives to selected issues, concerns, and opportunities (ICO's). The purpose is to highlight major economic tradeoffs and public issue-response tradeoffs and non-economic trade-offs (or combinations of differences) that can be quantified, through the use of indicators of responsiveness to ICO's, as a means of comparing the alternatives. However, a complete understanding of differences among alternatives requires reading all of this chapter and Chapter IV. The ICO's are discussed in detail in Chapter I and Appendix A.

To provide a partial framework for assessing tradeoffs, the long-term resource demands of the nation, region, and local economic area are briefly summarized. In part two, selected economic values and quantified indicators of responsiveness to major ICO's are tabulated (Table II-14). Finally, differences and similarities among individual alternatives are summarized in terms of major tradeoffs among competing objectives or responses to expressed public issues, management concerns, and resource use and development opportunities.

1. National, Regional, and Local Overview

National (RPA) planning estimates that total national demands will rise for all outputs of the National Forest. At the same time, there is a strong demand to protect and enhance the quality of the environment. Many people view the production of goods and services from the National Forests as competing with protection and enhancement of a quality environment.

Demands and prices for commodity products are generally determined in regional and national markets. The nation benefits most when supplies are provided from the most efficient sources of production.

The Mt. Baker-Snoqualmie National Forest is an efficient supplier of timber products. The 1980 RPA program assigned approximately 2.5 percent of the total projected timber outputs for the National Forest System in 1990 to the Mt. Baker-Snoqualmie National Forest. The Forests' share of the projected Regional outputs in 1990 is approximately 6 percent. The Mt. Baker-Snoqualmie produces about 15 percent of the logs consumed in the Puget Sound area; forest industry and other private owners are the major producers of logs consumed in the area. Nearly all (97%) of the logs produced on the Forest are processed in the local economic area (Larsen and others 1983). The resulting products are consumed primarily in the Western U.S. market.

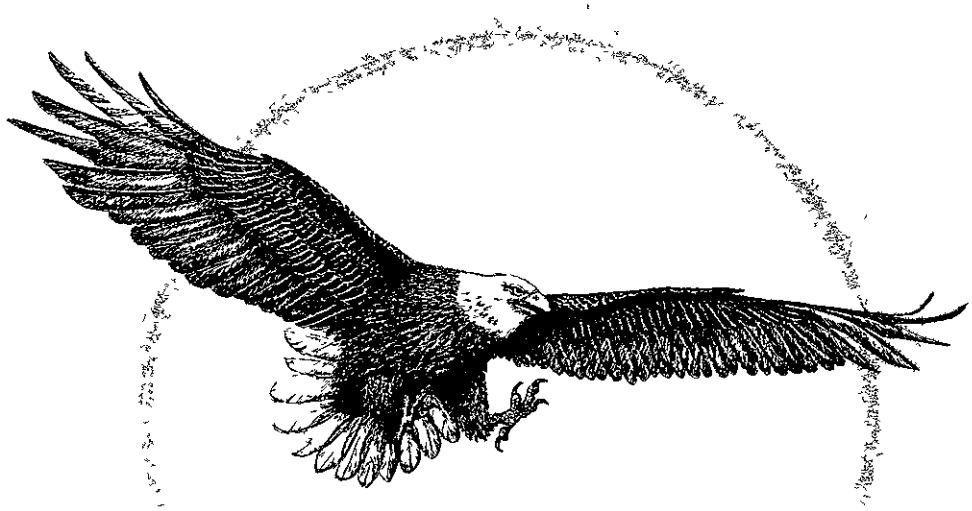
The Forest has extremely low capability to produce economically efficient forage for commercial grazing of domestic livestock.

Demands on the Forest for outdoor recreation uses are more localized than the regional and national demands for timber. Most of the Forest recreation users reside in the major population centers along the Interstate 5 highway corridor.

Recreation use and the demand for recreation of many types is growing, and at a rate faster than the population growth of the Puget Sound area. Total recreation use increased approximately 40 percent on the Forest in the 10 year period from 1975-1984. In a similar time period, the population of the five county area of the Forest increased approximately 20 percent. The fastest growing segment of the recreation spectrum is wilderness use: + 145 percent, compared to an increase of 65 percent in developed recreation use. Wilderness use represents approximately 4.5 percent of the total recreation use on the Forest for the period 1975 to 1984.

The Mt. Baker-Snoqualmie National Forest is a major supplier of National Forest wilderness in the Pacific Northwest and the nation. The Forest contains 16 percent of the National Forest wilderness in the Pacific Northwest Region and 2.2 percent of the total National Forest wilderness system. Available data collected in the late 1970's and early 1980's indicates that 82-94 percent of wilderness use on the Forest originated from Washington State, and 49-65 percent of the users are from the Puget Sound area. Several of the Forest wildernesses are among the most heavily used in the nation.

Salmon, by a large margin, is the most valuable fish or wildlife species, as measured by the market value of the harvest. An estimated 50 percent of the harvest of naturally produced (as opposed to hatchery produced) salmon for the Puget Sound area are produced from Mt. Baker-Snoqualmie National Forest water systems.



2. *Economic Values and Responses to Major ICO's*

The main reason that alternatives differ is that each alternative is designed to respond differently to the major issues, concerns, and opportunities (ICO's) identified for this Forest. The following section and Table II-14 summarize many of those differences in response by defining indicators of those responses that can be quantified. In addition, indicators of central concern to the nation as a whole are discussed. Appendix A fully discusses each of the ICO's; also refer to Chapter I, pages I-10 through I-20. Additional information about the effects and tradeoffs is displayed earlier in this chapter and in Chapter IV. The ICO's and indicators of responsiveness found in Table II-14 include:

- **Development versus Nondevelopment of the Forest Issue:**

  Existing Roadless Areas Allocated to Nondevelopment
  Roadless Areas Assigned to a Roaded Management Prescription, But Not Developed in the Next 15 Years

- **Timber Supply Issue:**

  Timber Harvest Level
  Long-term Sustained Yield Capacity
  Lands Suitable for Timber Production
  Employment: Jobs Supported by the Alternative
  Payments to Counties

- **Old Growth Ecosystems and Fish/Wildlife/Plant Diversity Issue:**

  Total Old Growth Remaining, at the end of Decades 1 and 5
  Old Growth Remaining on Suitable Acres, at the end of Decades 1 and 5
  Anadromous Fish Production
  Low-Elevation Old Growth Habitat for Wildlife
  Suitable Winter Range for Deer and Elk, Decade 1

- **American Indian Religious and Cultural Use Issue:**

  Percent of Inventoried Use Areas with High or Moderate Protection

- **Recreation Opportunities Issue:**

  Demand Satisfied for Wilderness, Primitive and Semi-Primitive Nonmotorized Recreation, Decades 1 and 5
  Roads Open to Public Use, Passenger Car
  Trail Construction, Reconstruction, Decade 1
  Lands Managed for High Visual Quality Level, Meeting a Visual Quality Objective of Retention, Partial Retention

- **Wild and Scenic Rivers Issue:**

  Recommended for Designation as Wild and Scenic River

- **Management of Municipal Watersheds Issue:** (see note below)

  Timber Harvest Level (see note below)

- **Effects of Timber Management and Related Activities Issue:**

  Timber Harvest Level (see note below)
  Old Growth Remaining on Suitable Acres, Decades 1 and 5 (see note below)
  Annual Road Construction, Decade 1
  Sediment Produced from All Sources, Annually, Decade 1

- **Adjacent and Intermingled Lands Issue:** (see note below)

  Timber Harvest Level (see note below)

Note: Two issues - Management of Municipal Watersheds and Adjacent and Intermingled Lands - are not listed separately in the table, but their indicators are included in other ICO's. When an indicator is used to measure responsiveness for more than one ICO, the indicator is displayed only once.

In addition, the indicators of national interest include the following; they are listed in the first three columns of Table II-14:

- **National Concerns:**

  Present Net Value
  Net Receipts
  Noncash Benefits

Table II-14
Response, By Alternative, to Major Issues and National Concerns

	National Concerns			Development Vs Nondevelopment Issue 1/			Timber Supply Issue					
	Average Per Year for Decades 1/5											
Alternatives	Present Net Value	Net Receipts	Noncash Benefits	Existing Roadless Areas Allocated to Nondevelopment		Roadless Areas Assigned to a Roaded Mgt Prescription But Not Devel in Next 15 Yrs.	Decade 1 - Average Annual Timber Sale Program Quantity (TSPQ)		Long Term Sustained Yield Capacity	Lands Suitable for Timber Product	Employment Jobs Supported By the Alts.	Payments to County
	. . .Millions of Dollars. ...			% Total Acres	M Acres	M Acres	MMCF	(MMBF)	MMCF	M Acres	M Jobs	MM Dollars
I	2342 9	5 8/25 6	61.3/85 5	64	256 4	98.2	30.1	(146)	34 0	386	29 1	5 4
B (RPA)	2343.2	5 3/24.8	61.0/86 8	66	266 6	88.0	29 8	(144)	33.4	380	29 1	5.3
H	2260.0	4.8/24 1	60.5/83 8	76	305.0	61 6	27 3	(131)	31.8	359	28.9	4.9
J (Pref.)	2258 8	3 4/23 1	61.2/85.5	77	309.0	61 5	25.5	(122)	30.4	346	28.8	4.6
A (No Act)	2283 5	6 5/29.6	60.9/85 2	70	280 3	2/ 70.2	35.0	(168)	38.6	412	29 3	5 9
G-Modified	1997.0	2.4/11.0	60.6/80.2	91	368.4	18.4	20.4	(99)	23.6	247	28.4	3 8
C	1970.9	-2.1/14.1	60 7/78.8	93	375.8	23.1	15.8	(75)	19.9	256	28.0	2 6
NC 3/	N/A	N/A	N/A	NA	NA	NA	45 0	(220)	N/A	547	30.1	9.5

1/ Roadless Areas refer to the 402,930 acres of remaining RARE II parcels

2/ This is an approximate figure. Alternative A is unique because an unspecified amount of development is permitted in the Upper Forest Resource Zone. See description of Management Area 1E

3/ The TM Plans upon which Alternative NC is based were developed in 1963; they are not integrated resource plans, and consequently did not address all resource uses and outputs. Missing data in this table (NA) cannot be reasonably estimated, since the TM plans were based on yield tables and resource relationships which do not reflect the latest scientific techniques and information, do not reflect standards in the NFMA regulations, or are otherwise inappropriate.

Table II-14
Response, By Alternative, to Major Issues and National Concerns

	Old Growth Ecosystems and Fish, Wildlife, & Plant Diversity Issue					American Indian Religious & Cultural Use Issue	
	Total Old Growth Remaining End of Decade 1/5	Old Growth Remaining on Suitable Acres End of Decade 1/5	Anadromous Fish Production Decade 1	"Effective" Areas Decade 1/5 Habitat for Old Growth Low Elevation Species 4/	Decade 1 Winter Range for Deer & Elk 5/	Inventoried Acres Afforded High/Moderate Protection 6/	
Alternatives	M Acres	M Acres	Thousand Lbs. Fish Per Year	M Acres	M Acres	High Percent	Moderate Percent
I	620 / 516	134 / 30	8,874	308/242	225	43	2
B (RPA)	621 / 513	135 / 27	8,874	309/239	253	43	7
H	623 / 526	125 / 28	8,874	309/246	257	40	17
J (Pref)	625 / 535	122 / 32	8,874	310/250	280	47	11
A (No Act)	618 / 497	137 / 16	7,809	306/220	113	36	3
G-Modified	629 / 571	66 / 8	8,874	313/275	113	42	23
C	632 / 573	91 / 33	8,874	315/275	281	37	27
NC 7/	601 / 432	190 / 21	7,809	N/A	N/A	N/A	N/A

4/ Includes wilderness and non-wilderness acres of old growth located below 3,000 feet elevation. Indicator species for mature and old-growth habitats are Northern spotted owl, pileated woodpecker, and pine marten.

5/ Acres given include deer and elk winter range, management areas with compatible goals and which will incorporate winter range standards and guidelines, and some mountain goat habitat

6/ Protection is afforded by those management areas that preclude or limit ground disturbing activities. Differences between "high" and "moderate" derived from expected frequency of human encounters. See Table II-9o

7/ No management areas assigned in Alternative NC and the above information cannot be reasonably estimated The TM Plans, upon which the No Change Alternative is based, were developed in 1963.

Table II-14
Response by Alternative, to Major Issues and National Concerns

	Recreation Opportunities Issue						*Wild & Scenic Rivers Issue*		*Effects of Timber Management & Related Activities Issue*	
	Demand Satisfied in Wilderness, Primitive, & Semi-Primitive Nonmotorized		Roads Open to Public Use, Passenger Car	Trail Construction/ Reconstruction	Lands Managed for High Visual Quality Level		Recommended for Designation as Wild and Scenic River		Decade 1 Annual Road Construction	Sediment Produced Annually, Decade 1 7/
					Meeting VQO of:					
Alternatives	Decade 1 Percent	Decade 5 Percent	Decade 1 Miles	Decade 1 Constr./Reconst. Miles	Retention M Acres	Partial Retention M Acres	No. Rivers	Total Miles	Miles	M Tons
I	94	45	1032	350 / 120	208	311	0	0	17	97
B (RPA)	76	34	1033	50 / 70	287	285	0	0	16	96
H	67	31	1039	90 / 120	407	181	5	154	14	91
J (Pref.)	79	38	1039	220 / 493	395	204	30	452	13	89
A (No Act.)	75	34	1039	70 / 60	120	342	15	287	19	103
G-Modified	70	35	933	350 / 120	573	56	47	796	8	67
C	64	33	1017	90 / 80	619	148	47	606	10	67
NC	N/A		Similar to A	Similar to A	N/A	N/A	0	0	28	125

7/ From all sources, including timber harvest, new road construction, old roads, and background (which includes sediment from previously disturbed ground and natural sedimentation)

3. Economic Benefit and Issue Response Tradeoffs Among Alternatives

The alternatives were designed to respond to specific major issues, or a combination of issues. In responding to one set of issues, some potential benefits or responses to other issues may be limited or "traded off". This section discusses the incremental changes in indicators of response of the alternatives as economic efficiency (PNV) declines. This is only one systematic way of examining tradeoffs. It should be noted that there are tradeoffs among indicators of response to the issues as well as with economic benefits.

The alternatives are discussed in order of highest PNV to lowest. Following the discussion of the changes in each alternative from the one with the next highest PNV, is a display that shows which indicators increase in value and which decrease, and the magnitude of the change. These indicators of response are also displayed in Table II-14.

Alternative B

The goal of this alternative is to simultaneously produce high levels of timber, anadromous fish, commonly hunted species of big game, and dispersed unroaded recreation as specified in the 1980 RPA Program. With this goal, this alternative results in the highest PNV of all alternatives: $2343.2 million. Net receipts of $5.3 MM in the first decade increase to $24.8 MM by the fifth decade, reflecting the increase in ASQ between the first and fifth decade.

Noncash benefits (primarily dispersed recreation) of $61.0 MM in the first decade increase to $86.8 MM in the fifth decade, as more roaded recreation is valued as a result of increasing demand.

As a result of the emphasis of this alternative, a timber sale program quantity (TSPQ) of 29.8 MMCF is provided on a suitable land base of 380,000 acres. The long-term sustained yield capacity (LTSYC) is approximately 33.4 MMCF. An average of 16 miles of road construction annually is required in the first decade to support the timber harvest level. This high harvest level results in one of the three highest levels of jobs, income, and payments to counties of all the alternatives.

Of the 447,000 acres inventoried for American Indian Religious and Cultural Use, 43% are afforded a high level of protection (no timber harvest or road construction) and 7% are afforded a moderate level of protection (no timber harvest or road construction, but increased probability of human contact). The acres afforded high protection change very little among alternatives; there is more change between alternatives in percent of acres afforded moderate protection.

This alternative would satisfy 76% of the primitive and semi-primitive nonmotorized wilderness and non-wilderness recreation demand anticipated in the first decade and 34% of anticipated demand in the fifth decade, based on currently defined standards for capacity. This decline over time is a result of increasing demand and slower increases in supply, as more of the currently undeveloped areas become developed. There is little change among the alternatives in the Forests ability to meet this demand, due to low per acre yield of this type of recreation. This indicator is not further discussed in the other alternatives.

Alternative B has 287,000 acres assigned to a management prescription that meets the Visual Quality Objectives (VQO) of retention; another 285,000 acres will meet partial retention VQO. The amount of acres managed to meet retention is in the lower part of the range of all alternatives reflecting less emphasis on managing the scenic foreground along travelways. However, the amount of land managed for partial retention is in the higher part of the range for all alternatives reflecting a recognition of the need to maintain a relatively high level of scenic quality forest-wide.

Effective acres of wildlife habitat for mature and old growth management indicator species are reduced by 82,000 acres, or 26% during the first five decades. A total of 225,000 acres of inventoried big game winter range is managed to provide an optimal mix of thermal and forage habitat.

Total old growth remaining at the end of Decade 5 is 513,000 acres, a reduction of approximately 20% over the five decades. This reflects the relatively high level of harvest in this alternative.

Alternative B has a high level of investment in anadromous fish habitat improvements (MA 13C); 8,874 M pounds of fish will be produced.

Alternative I

The PNV for Alternative I is $2342.9 or $0.3 MM lower than PNV for Alternative B. Annual net receipts in Decade 1 are $0.5 MM higher than those in Alternative B, primarily because of the higher timber outputs. Net receipts in Decade 5 are $0.8 MM higher than those of Alternative B, again because of the higher timber outputs.

Alternative I has 6,000 acres more land suitable for timber production than Alternative B, primarily attributable to the emphasis of the alternative on those resources with an established price in the market place. The higher number of suitable acres result in a Decade 1 TSPQ that is 0.3 MMCF above that of Alternative B; LTSYC is 0.8 MMCF higher.

The slightly higher timber harvest levels in Decade 1 in Alternative I also requires a small increase (over Alternative B) in road construction of 1 mile annually. This alternative provides essentially the same levels of jobs, income, and payments to counties.

The acres of American Indian Religious and Cultural Use afforded high levels of protection remain the same in Alternative I while those acres afforded a medium level of protection decrease by 5%. This change reflects an increased probability of human contact as a result of the additional access provided in Alternative I.

Alternative I would satisfy 18% more of the first decade demand for primitive and semi-primitive nonmotorized wilderness and non-wilderness recreation and 11% more of the fifth year demand than Alternative B. This reflects a higher emphasis on dispersed recreation than in Alternative B

Alternative I has 79,000 fewer acres than Alternative B that will meet a VQO of retention, but 26,000 acres more that meet a VQO of partial retention. The shift in VQO is due to the slight increased in acres suitable for timber production.

Alternative I has about the same amount of roadless areas remaining in a roadless condition as Alternative B.

Since there is less emphasis on management of deer and elk habitat in Alternative I, old growth available for indicator species in the fifth decade is 3,000 acres more than in Alternative B; however, there are 28,000 fewer acres managed for big game winter range.

Alternative I has essentially the same amount of old growth included in the land base suitable for timber harvest. The rate of old growth harvest is approximately the same so that at the end of the fifth decade, about the same amount of old growth suitable for timber production will be left in both alternatives.

Alternative I has the same level of investment in anadromous fish habitat improvements and therefore provides the same level of fish production as Alternative B.

Summary of Alternative I

Indicators That Increase From Alternative B

- Decade 1 annual net receipts, +$0.5 MM
- Decade 5 annual net receipts, +$0.8 MM
- Decade 1 annual noncash benefits, +$0.3 MM
- Decade 1 annual TSPQ, +0.3 MMCF
- LTSYC, +0.8 MMCF
- Lands suitable for timber production, +6,000 acres
- Decade 1 annual road construction, +1 miles
- Acres meeting VQO of partial retention, +26,000
- Acres of Old Growth for indicator species in Decade 5, +3,000

Indicators That Decrease From Alternative J (Preferred)

- PNV, -$0.3 MM
- Decade 5 annual noncash benefits, -$1.3 MM
- Acres meeting a VQO of retention, -79,000
- Acres managed for deer/elk winter range, -28,000

Alternative A (No Action)

The PNV for Alternative A is $2283.5 or $59.4 MM lower than PNV for Alternative B. Although Alternative A has a high level of timber outputs, timber harvest prescriptions were selected on the basis of their volume contribution, rather than their contribution to PNV. The high cost of these prescriptions offsets the high timber output contribution to PNV. Annual net receipts in Decade 1 are $0.7 MM higher than those in Alternative I, primarily because of the higher timber outputs. Net receipts in Decade 5 are $4 MM higher than those of Alternative I, again because of the higher timber outputs.

Alternative A has 26,000 acres more land suitable for timber production than Alternative I, primarily attributable to the maximize timber objective function used in the formulation of this alternative. The higher number of suitable

acres plus the higher timber production prescriptions result in a Decade 1 TSPQ that is 4.9 MMCF above that of Alternative I; LTSYC is 4.6 MMCF higher.

The higher timber harvest levels in Decade 1 in Alternative A also require an increase (over Alternative I) in road construction of 2 miles annually.

Compared to Alternative I, Decade 1 jobs are 200 higher, income is $5 MM higher, and payments to counties are $0.5 MM higher in Alternative A, also a result of the higher timber harvest levels.

Alternative A has 88,000 fewer acres than Alternative B that will meet a VQO of retention, but 31,000 acres more that meet a VQO of partial retention. The shift in VQO - from retention to partial retention - is due to the emphasis on visuals in the upper resource management zone of the current multiple use plans, along with the protection of all rivers included in the National Rivers inventory (except Jim Creek), both of which have a VQO of partial retention.

Alternative A has 7% more roadless areas allocated to nondevelopment than Alternative I.

Since there is little emphasis on management of wildlife habitat in Alternative A, old growth available for indicator species in the fifth decade is 22,000 acres less than in Alternative I. There are 112,000 fewer acres managed for big game winter range.

Alternative A has 3,000 acres more old growth remaining in the suitable land base after the first decade. Old growth is harvested at a faster rate than in Alternative I, resulting in Alternative A having 19,000 fewer acres of total old growth in the fifth decade.

Alternative A maintains the current level of investments in anadromous fish habitat improvements (MA 13A), resulting in a production of 1,065 M fewer pounds than Alternative I.

Summary of Alternative A (No Action)

Indicators That Increase From Alternative I

- Decade 1 annual net receipts, +$0.7 MM
- Decade 5 annual net receipts, +$4.0 MM
- Decade 1 annual TSPQ, +4.9 MMCF
- LTSYC, +4.6 MMCF
- Lands suitable for timber production, +26,000 acres
- Decade 1 annual road construction, +2 miles
- Decade 1 annual jobs, +200
- Decade 1 annual income, +5 MM
- Decade 1 annual payments to counties, $0.5 MM
- Acres meeting VQO of partial retention, +31,000
- Acres of old growth in suitable lands end of Decade 1, +3,000

Indicators That Decrease From Alternative I

- PNV, -$59.4 MM
- Decade 1 annual noncash benefits, -$0.4 MM
- Decade 5 annual noncash benefits, -$0.3 MM

- Acres meeting a VQO of retention, -88,000
- Acres of old growth in suitable lands in decade 5, -14,000
- Total acres of old growth in decade 5, -19,000
- Annual anadromous fish production, -1,065 M pounds
- Acres of old growth for indicator species in Decade 5, -22,000
- Acres managed for deer/elk winter range, -112,000

Alternative H

The PNV of Alternative H is $23.5 MM less than Alternative A. While the TSPQ is 7.7 MMCF lower than Alternative A, the timber prescriptions were selected on the basis of their contribution to PNV rather than to volume (as in Alternative A), so the decrease in PNV is not large. In addition fewer miles of road construction in H compared to A result in cost savings that mostly offset the benefits foregone from the reduced timber harvest.

First decade net receipts are $2.3 MM less and fifth decade net receipts are $5.5 MM less than Alternative A primarily as a result of reduced timber sale harvest levels.

Alternative H has 53,000 acres less land suitable for timber production than ALternative A. This reduction in suitable land is the result of increased emphasis on dispersed recreation, Wild and Scenic River recommendations, and more more emphasis on scenery and diversity. The TSPQ in the first decade is 7.7 MMCF lower than Alternative A and the LTSYC is 6.8 MMCF lower. The reduced timber harvest and the emphasis on dispersed recreation results in 5 miles less road construction per year in decade one compared to Alternative A.

Compared to Alternative A, there are 400 fewer jobs, $11 MM less income, and $1 MM less in payments to the counties in this alternative.

Alternative H has 287,000 more acres that will be managed to meet the VQO of retention and 161,000 less acres managed to meet the VQO of partial retention. This shift from partial retention and addition of retention reflect the increased concern of Alternative H for scenic values.

Alternative H has 3,000 more acres of old growth remaining after the first decade, and the total old growth remaining on all lands at the end of the fifth decade is 29,000 acres more than in ALternative A.

Anadromous fish habitat improvement investments are increased with a resultant increase in production of 1,065 thousand pounds per year more than Alternative A.

Summary of Alternative H

Indicators That Increase From Alternative A

- Acres meeting VQO of retention, +287,000
- Total acres of old growth at the end of Decade 1 and 5, +3,000/29,000
- Annual anadromous fish production, +1,065 M Lbs.

Indicators That Decrease From Alternative A

- PNV, -$23.5 MM
- Decade 1 annual net receipts, -$2.3 MM
- Decade 5 annual net receipts, -$5.5 MM
- Decade 1 annual noncash benefits, -$0.4 MM
- Decade 5 annual noncash benefits, -$1.4 MM
- Lands suitable for timber production, -53,000 acres
- Decade 1 TSPQ, -7.7 MMCF
- Decade 1 annual road construction, -5 miles
- Decade 1 annual jobs, -400
- Decade 1 annual income, -$11 MM
- Decade 1 payments to counties, -$1.0 MM

Alternative J (Preferred)

The PNV for Alternative J (Preferred) is $1.2 MM lower than Alternative H. Annual net receipts are $1.4 MM less in the first decade and $1.0 MM less in the second decade. These reductions are all a result of the reduced timber harvest levels of Alternative J (Preferred) compared with Alternative H. The reduced levels of timber harvest also results in a reduction of road construction of 1 mile per year.

Noncash benefits increase in the first decade by $0.7 MM and in the fifth decade by $1.7 MM. These increases reflect the increased emphasis on non market resources from Alternative H.

Alternative J (Preferred) has 13,000 acres less land suitable for timber production than Alternative H. This reduction is primarily the result in increased emphasis on dispersed recreation, Wild and Scenic Rivers, and scenic values.

Compared to Alternative A, there are 400 fewer jobs, $11 MM less income, and $1 MM less in payments to the counties in this alternative.

Alternative J (Preferred) would satisfy 12% more of the first decade demand for primitive and semi-primitive nonmotorized wilderness and non-wilderness recreation and 7% more of the fifth year demand than Alternative H. This reflects a higher emphasis on dispersed recreation than in Alternative H

Alternative J (Preferred) has 10% more roadless areas remaining in a roadless condition than Alternative H. Again this reflect a higher emphasis on dispersed recreation.

Alternative J (Preferred) has 3,000 less acres of old growth included in the suitable land base for timber production and the total old growth remaining on all lands at the end of the fifth decade is 10,000 acres more than in Alternative H.

Summary of Alternative J (Preferred)

Indicators That Increase From Alternative H

- Decade 1 annual noncash benefits, +$0.7 MM
- Decade 5 annual noncash benefits, +$1.7 MM
- Total acres of old growth at the end of Decade 5, +9,000

Indicators That Decrease From Alternative H

- PNV, -$1.2 MM
- Decade 1 annual net receipts, -$1.4 MM
- Decade 5 annual net receipts, -$1.0 MM
- Lands suitable for timber production, -13,000 acres
- Decade 1 TSPQ, -1.8 MMCF
- Decade 1 annual road construction, -1 miles
- Decade 1 annual jobs, -100
- Decade 1 annual income, -$4 MM
- Decade 1 payments to counties, -$0.3 MM
- Acres of old growth on suitable lands, Decade 1, -3,000 acres
- Acres of old growth for indicator species in Decade 5, -0,000 acres

Alternative G-Modified

Alternative G-Modified has a strong emphasis on the maintenance of natural ecosystems and diversity of native flora and fauna. The retention of existing ecosystems reduces the acres suitable for timber production and the TSPQ. Although less road construction is required than in Alternative J (Preferred), PNV is reduced by $261.8 MM.

The reduction in TSPQ of 5.1 MMCF from Alternative J (Preferred) results in net receipts declining by $1.0 MM in the first decade. Fifth decade net receipts decrease by $12.1 MM over Alternative J (Preferred).

Noncash benefits decline by $0.6 MM in the first decade and by $5.3 MM in the fifth decades.

Lands suitable for timber production decline by 99,000 acres from Alternative J (Preferred). Alternative G-Modified has 21% more roadless areas remaining in a roadless condition than Alternative J (Preferred). This reflects the objectives of maintaining natural ecosystems and diversity.

The reduced timber harvest in the first decade of Alternative G-Modified results in 400 fewer jobs than in Alternative J (Preferred), $10 MM less income, and $0.8 MM lower payments to the counties than in Alternative J.

Due to the emphasis on retention of natural ecosystems and the management of larger acres of currently developed lands in an undeveloped condition, the acres meeting a VQO of retention will increase by 178,000 over those in

Alternative J (Preferred). Acres meeting a VQO of partial retention will be 148,000 less than in Alternative J (Preferred).

The emphasis on maintaining the natural diversity on the Forest will result in an increase of 25,000 acres of old growth for management indicator species in Decade 5; 167,000 fewer acres would be managed for big game winter range compared to Alternative J (Preferred).

Alternative G-Modified would have 56,000 acres less old growth in the suitable timber land base and 36,000 acres more total old growth by Decade 5 than would Alternative J (Preferred).

Summary of Alternative G-Modified

Indicators That Increase From Alternative J (Preferred)

- Acres meeting a VQO of retention, +178,000
- Acres of old growth for indicator species, +25,000
- Total acres of old growth at the end of Decade 5, +35,000

Indicators That Decrease From Alternative J (Preferred)

- PNV, -$261.8 MM
- Decade 1 annual net receipts, -$1.0 MM
- Decade 5 annual net receipts, -$12.1 MM
- Decade 1 annual noncash benefits, -$0.6 MM
- Decade 5 annual noncash benefits, -$5.3 MM
- Decade 1 annual TSPQ, -5.1 MMCF
- LTSYC, -6.8 MMCF
- Lands suitable for timber production, -99,000
- Decade 1 annual road construction, -5 miles
- Decade 1 annual jobs, -400
- Decade 1 annual income, -$10 MM
- Decade 1 annual payments to counties, -$0.8 MM
- Acres meeting a VQO of partial retention, -148,000
- Acres of old growth in suitable lands in Decades 1/5, -56,000/-24,000
- Acres managed for deer/elk winter range, -167,000

Alternative C

The emphasis of Alternative C includes the non-market outputs of undeveloped dispersed recreation, visual quality, and fish and wildlife habitat. As a result, it has the lowest PNV of all the alternatives: $26.1 MM below that of Alternative G-Modified.

Alternative C has 9,000 more acres of land suitable for timber production than Alternative G-Modified. However, 62% of the total suitable acres produce timber at less-than-full yield to provide for visual quality and wildlife habitat. In combination, these result in a first decade TSPQ that is 4.6 MMCF lower than Alternative G-Modified.

The low level of timber outputs and the constraints on the rate of harvest of the available old growth result in first decade net receipts that are $0.3 MM less than Alternative G-Modified. A 15% increase in the TSPQ by the fifth

decade, along with a higher percentage of the harvest coming from old growth stands results in an increase in net receipts of $4.1 MM over that of Alternative G-Modified.

The reduced timber harvest level in the first decade results in 400 fewer jobs, $11 MM less income, and $1.2 MM lower payments to the county than Alternative G-Modified.

The strong emphasis on visuals in Alternative C results in 46,000 more acres meeting a VQO of retention and 88,000 more acres meeting a VQO of partial retention than in Alternative G-Modified.

Habitat available for old growth management indicator species is the same in Alternative C as in Alternative G-Modified. There are 168,000 more acres of deer and elk winter range managed in Alternative C.

Alternative C has 25,000 acres more old growth in the suitable land base than Alternative G-Modified. Alternative C will have 2,000 acres more total old growth in Decade 5 than Alternative G-Modified.

Summary of Alternative C

Indicators That Increase From Alternative G-Modified

- Decade 5 annual net receipts, +$4.1 MM
- Decade 1 annual noncash benefits, +$0.1 MM
- Lands suitable for timber production, +9,000 acres
- Decade 1 annual road construction, +2 mile
- Acres meeting a VQO of retention, +46,000
- Acres meeting a VQO of partial retention, +88,000
- Acres of old growth in suitable lands Decade 1 and 5, +25,000 and +25,000
- Total acres of old growth in Decade 5, +2,000
- Acres managed for deer/elk winter range, +168,000

Indicators That Decrease From Alternative G-Modified

- PNV, -$26.1 MM
- Decade 1 annual net receipts, -$0.3 MM
- Decade 5 annual noncash benefits, -$1.4 MM
- Decade 1 annual TSPQ, -4.6 MMCF
- LTSYC, -3.7 MMCF
- Decade 1 annual jobs, -400
- Decade 1 annual income, -$11 MM
- Decade 1 annual payment to counties, -$1.2 MM

Alternative NC (No Change)

Alternative NC is based on the Timber Management Plans developed in 1963. The Plans are not integrated resource plans and consequently do not address all resource uses and outputs. The data applicable to this alternative was not incorporated into a FORPLAN model; therefore, PNV was not calculated.

The No Change Alternative emphasizes the timber resource. As a result, the acres of land suitable for timber harvest and first decade TSPQ are the highest

among the alternatives: an increase of 291,000 acres and 29.2 MMCF per year over that of Alternative C.

The harvest level involves more road construction, increases employment and income, and generates more payments to counties in Decade 1.

Recreation demand satisfied decreases. In addition, the total acres of old growth remaining in Decade 5 decrease from 573,000 in Alternative C, to 432,000 acres in Alternative NC.

Alternative NC continues the current level of investments in anadromous fish habitat capability; production is similar to Alternative A, which is 7,809 M pounds of fish per year, a decrease of 12% from Alternative C.

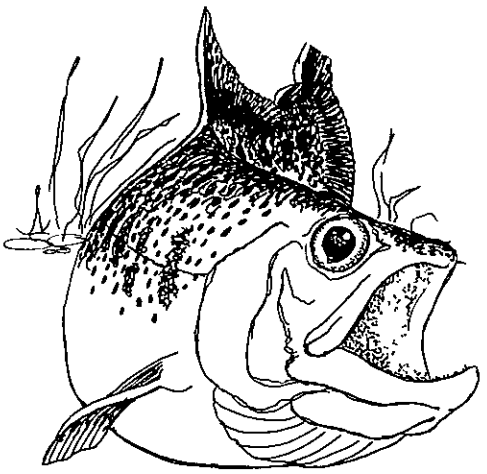
Summary of Alternative NC

Indicators That Increase From Alternative C

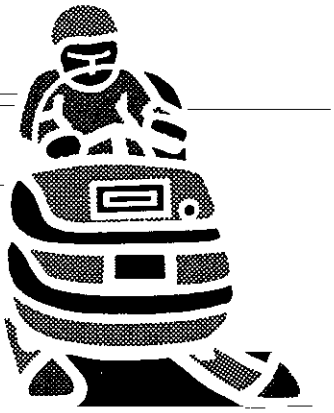
- Decade 1 annual TSPQ, +29.2 MMCF
- Lands suitable for timber production, +290,000 acres
- Decade 1 annual road construction which is +19 miles over Alternative C.
- Acres of old growth in suitable lands in Decade 1, +129,000 acres

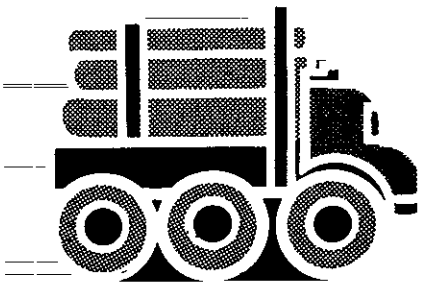
Indicators That Decrease From Alternative C

- Total acres of old growth remaining in Decade 5, -141,000
- Annual anadromous fish production, similar to Alt. A, -1,065 pounds



Chapter II





CHANGES BETWEEN DRAFT AND FINAL - CHAPTER III

Based on public response to the draft EIS and new data and information, there have been a number of changes in Chapter III. Major changes include:

- Additional information on snow-on-rain events, groundwater, and the condition of Forest watersheds has been added to Soil and Water.
- Elements of diversity have been specifically identified and discussed together, including the riparian environment, plant communities, and threatened, endangered, and sensitive plants. In addition, Wildlife and Fish Elements of Diversity have been added.
- New information has been added to the Old Growth section.
- Timber cut and sold information has been updated.
- The Wildlife section has been updated to reflect changes in MR's, the SFEIS Record of Decision, and new information.
- Fish Resources section has have been extensively revised and updated, with revised values and demand and supply section. A discussion of the Forest experience with the cumulative effects in watersheds on fish/fish habitat has been added.
- More discussion of the State Comprehensive Outdoor Recreation Plan has been added, plus additional recreation demand data.
- The Trails discussion has been moved out of "Facilities" and now follows the Recreation section.
- Wilderness capacity coefficients were recalculated.
- The roadless area acres were updated.
- The list of rivers studied for wild and scenic river status was adjusted; also refer to Chapters II, IV, and Appendix E.
- The Cedar River Watershed discussion has been updated.
- More discussion has been added to the Air Quality, Broadcast Burning, and Fire discussions, including cooperation with other agencies.
- Updated data was included in Special Uses, Land Ownership, miles of roads, and elsewhere.

CHAPTER III - AFFECTED ENVIRONMENT

Chapter III describes the area affected by Forest management and addressed in this FEIS and the Forest Plan. The Mt. Baker-Snoqualmie encompasses a number of very complex physical and biological systems. A basic understanding of these ecosystems and their interrelationships is essential to understanding the issues and concerns and the effects on the environment of implementing any of the alternatives.

The Mt. Baker-Snoqualmie National Forest occupies portions of Whatcom, Skagit, Snohomish, King, and Pierce Counties, as shown in Figure III-1. These five counties are considered to be the general zone of influence for forest planning. The National Forest includes land from the Canadian border south, 130 miles, to the northern boundary of Mt. Rainier National Park. The Forest also adjoins the North Cascades National Park Complex and the Wenatchee National Forest. The Forest is located in Congressional Districts 1, 2, and 8.

LAND OWNERSHIP

There are a total of 1,983,774 acres of land within the Mt. Baker-Snoqualmie National Forest boundary. Most - 87 percent - are National Forest land. The remaining 259,545 acres are in private or other public ownership.

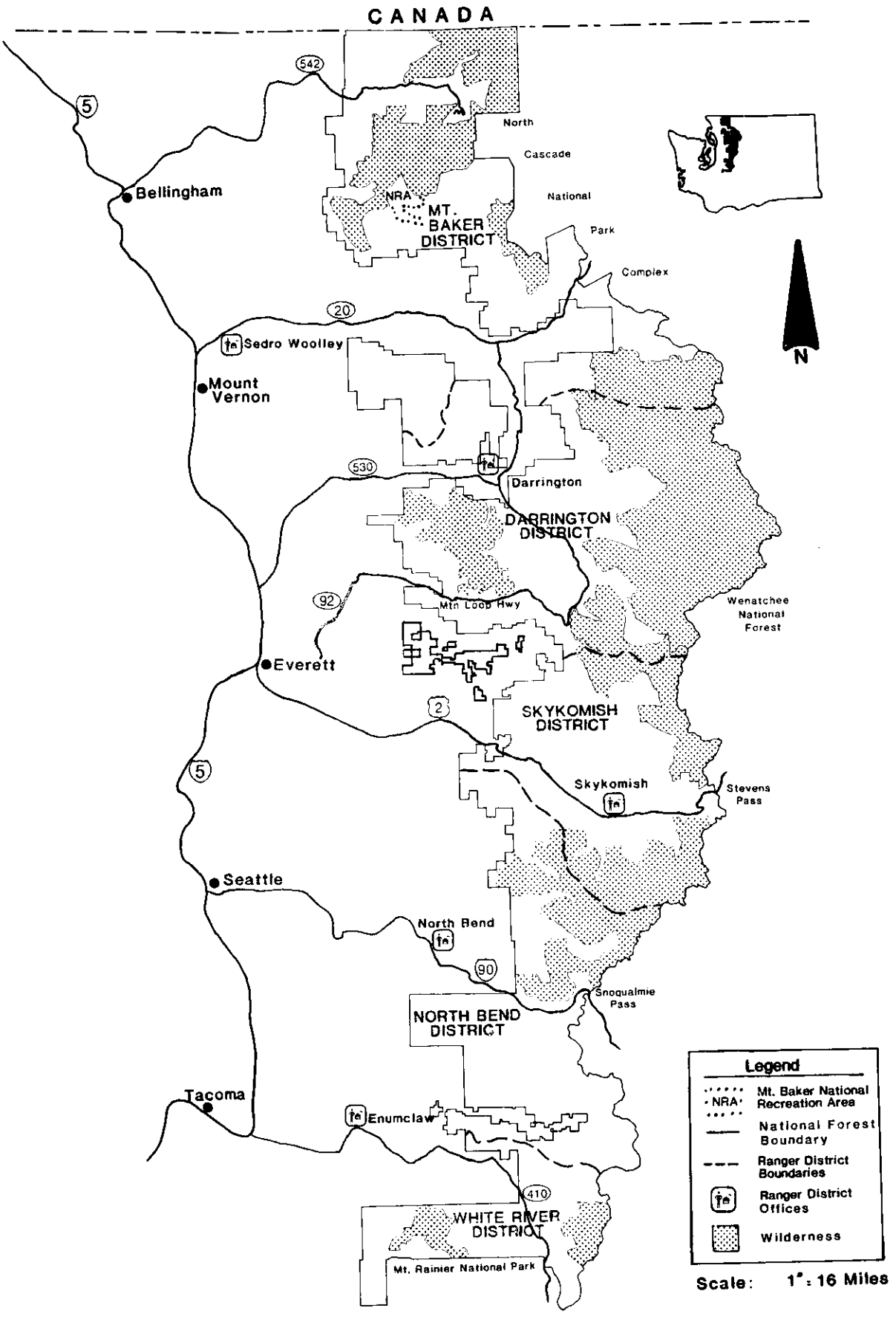
Most of the intermingled lands are located in the southern ranger districts of the Forest. Principle owners of adjacent and intermingled lands are: Weyerhaeuser Company, Plum Creek Timber Company, The City of Seattle, Scott Paper Company, Georgia Pacific Corporation, and Washington State Department of Natural Resources.

The following table shows the legal acres, as of February, 1990. These are the land currently administered by the Mt. Baker-Snoqualmie National Forest and covered in this Plan. The acre figures used for much of this planning effort are generated by a computer mapping system (R2MAP), and they will not necessarily equal the legal national forest acres.

Table III-1
Forest Legal Acres By Ranger District - Includes Water

Ranger District	N.F. Land	Other Ownership	Gross Acres
Mt. Baker	524,719	20,527	545,246
Darrington	562,124	10,099	572,223
Subtotal - North	1,086,843	30,626	1,117,469
Skykomish	319,706	38,699	358,405
North Bend	190,948	146,284	337,232
White River	126,732	43,936	170,668
Subtotal - South	637,386	228,919	866,305
TOTAL	1,724,229	259,545	1,983,774

Figure III-1


CANADA
542
5
Bellingham
North
Cascade
National
Park
Complex
NRA
MT.
BAKER
DISTRICT
20
Sedro Woolley
Mount
Vernon
530
Darrington
DARRINGTON
DISTRICT
92
Mtn Loop Hwy
Wenatchee
National
Forest
Everett
2
SKYKOMISH
DISTRICT
5
Skykomish
Stevens
Pass
Seattle
North Bend
90
Snoqualmie
Pass
NORTH BEND
DISTRICT
Tacoma
Enumclaw
410
WHITE RIVER
DISTRICT
Mt. Rainier National Park
N
Legend
Mt. Baker National Recreation Area
National Forest Boundary
Ranger District Boundaries
Ranger District Offices
Wilderness
Scale: 1" = 16 Miles

CLIMATE

A general description of the climate in the vicinity of the Mt. Baker-Snoqualmie National Forest is included here to give perspective to the effects of management activities on air quality, timber blowdown, naturally occurring fire, etc. and to briefly describe the temperature and precipitation as it affects the vegetation and growing season on the Forest.

Topography has a marked influence on climate in the region. The Cascade and Rocky Mountains shield Western Washington from the cold air masses that travel south across Canada in the winter. The Olympic Mountains and the Coast Range on Vancouver Island effectively protect the Puget Sound area from most intense winter storms from the Pacific Ocean. The Strait of Juan de Fuca and the Strait of Georgia provide passage for maritime air, which has a moderating effect on climate both summer and winter. Winters are wet and mild; summers are cool and relatively dry (Pacific N.W. River Basins Commission 1970). The mountain ranges east and west of the Forest and the low elevation passage through Puget Sound results in unique wind patterns. Generally, the prevailing direction of the wind is from the south or southwest in winter and from the west or northwest in summer. However, during the winter there are periods of low pressure off the coast combined with cold air from Canada, resulting in outbreaks of strong northeasterly winds over the northern part of the Forest. It is not unusual to have strong southeasterly winds over the southern portion of the Forest at the same time.

Extreme wind velocities (30 feet above the ground) can be expected to exceed 55 mph once every two years, 90 mph once in 50 years, and 100 mph once in 100 years (Pacific N.W. River Basins Commission 1970). Some trees are blown down each year; an estimated 100 million board feet of commercial timber was blown down in November, 1977.

A common occurrence from late spring through fall are short periods of warm, dry easterly winds. They are usually associated with very low, relative humidity and high temperatures. The result is an extremely high forest fire danger. About once every 20 years, a catastrophic fire or fires will occur. (See Fire, Chapter III, this document.) During these periods, smoke carries into the populated areas to the west of the Forest.

Precipitation is light in the summer and heaviest from October through March. The annual precipitation ranges from 35 to 50 inches over the lowlands, increasing to 75 inches in the foothills, and from 100 to 200 inches near the crest of the Cascades.

Between 1,500 and 3,500 feet, both rain and snow are common during most winters. Rapid melting of snow during rain-on-snow conditions in this elevation range is the cause of many landslides and road maintenance problems. Above 3,500 feet in elevation, most winter precipitation falls as snow. The total snowfall is 75-100 inches in the foothills and 300 to 500 inches in the high mountains. The precipitation and heavy snowfall affects the growing season of vegetation. The amount of snow in a given year can greatly affect recreation use, especially downhill skiing. Trail and road maintenance and construction is also affected by the weather and amount of snowfall.

The temperatures in the Forest area range from the 60's in the summer at higher elevation to the upper 70's in the foothills. Winter highs range from the

upper 30's to mid-40's in the lowlands; below freezing temperatures occur almost every night in the mountains. Temperature is a very important environmental factor in terms of plant growth. Soils in the upper elevations warm very little until the snowpack is gone and the cool fall rains resume a short time after. This creates a very harsh environment for mountain hemlock and other high elevation vegetation to germinate and grow (Henderson and Peter 1981).

GEOLOGY AND TOPOGRAPHY

The Forest is located along the west side of the crest of the Cascade Mountains. The Cascade Mountains can be separated into two distinct geological regions, with the approximate division occurring at Interstate 90 Highway. The differences, north and south of I-90, in geology, topography, bedrock, and soils are important because many components of the natural environment are influenced by the character of the geologic material.
The mountains north of I-90 consist of metamorphic rocks intruded by granitic batholiths. Uplifting and geologic erosion has produced a very rugged and steep topography. Vertical distances may exceed over 4,000 feet from the valley floor to the adjacent peaks. Many peaks exceed 5,500 feet and contain perennial snow and ice. The volcanic peaks of Mt. Baker and Glacier Peak rise above other rugged peaks and ridges. Common features include long, steep slopes containing timber, intermingled with talus slopes, rock outcrops, and meadows. The high alpine scenery is impressive, with serrated, rocky ridges and numerous meadows and small glacial lakes (Snyder and Wade 1972).

South of I-90, the mountains are primarily of volcanic origin. Although often steep and dissected, these mountains lack the size and are less impressive than those to the north. The mountains on the southern half of the Forest are generally lower in elevation, with only a few peaks exceeding 4,500 feet. They are often completely covered with trees.

Much of the present configuration of the Cascades is a result of glacial activity that began about one million years ago. Continental glaciers are believed to have advanced into and withdrawn from the Puget Sound region at least four times during the Quaternary Period; the last glacier retreated about 10,000 years ago (Pacific N.W.River Basins Commission 1970).

Glacial ice, a powerful agent of erosion, abraded and scoured the topography at an accelerated pace. Valley floors were broadened and deepened and valley walls were over-steepened. Many predominant features of the landscape were caused by glacial activity: jagged peaks, cirque basins, lakes, and hanging valleys. The retreating glaciers left surface deposits of till, outwash, and lacustrine (lake-laid) deposits of varying thickness and composition in the valleys and on many lower sideslopes. Till's compact character favors runoff and does not "hold" water well (River Basins Commission 1970).

The rugged topography resulting from glacial modification is most pronounced north of I-90. Glaciation was more extensive here and the hard bedrock has remained relatively resistant to non-glacial erosion. South of I-90, the less-resistant volcanic rock has been weathered and eroded from stream action, slides, surface erosion, and other natural processes.

For further detail, refer to the minerals section in this chapter.

SOILS

Soil is a basic resource. It absorbs and stores water, releasing it slowly over time; soil supplies the nutrients for vegetation which, in turn, supplies habitat for wildlife and resources for people's use and enjoyment. Soil is essentially a non-renewable resource, because soil formation occurs very slowly over a long period of time. Soil loss or damage (from erosion, compaction, etc.) can have a significant effect on soil productivity, and all the resources that are dependent on the soil. Refer to the Diversity section of this chapter.

The soils of this Forest are complex and varied. An inventory of the Mt. Baker National Forest soils was completed in 1970; the Snoqualmie Soil Resource Inventory was finished in 1972 (Snyder and Wade 1970, 1972). There are over 200 different soil mapping units on the two forests, based on soil type, geologic type, and topographic shape. However, these soils can be categorized into several broad groups that have similarities in texture, depth, parent material. There are also differences in soils in the north half and the south half of the Forest, due to the differences in bedrock and the extent of glaciation and/or volcanism.

North Half of the Forest

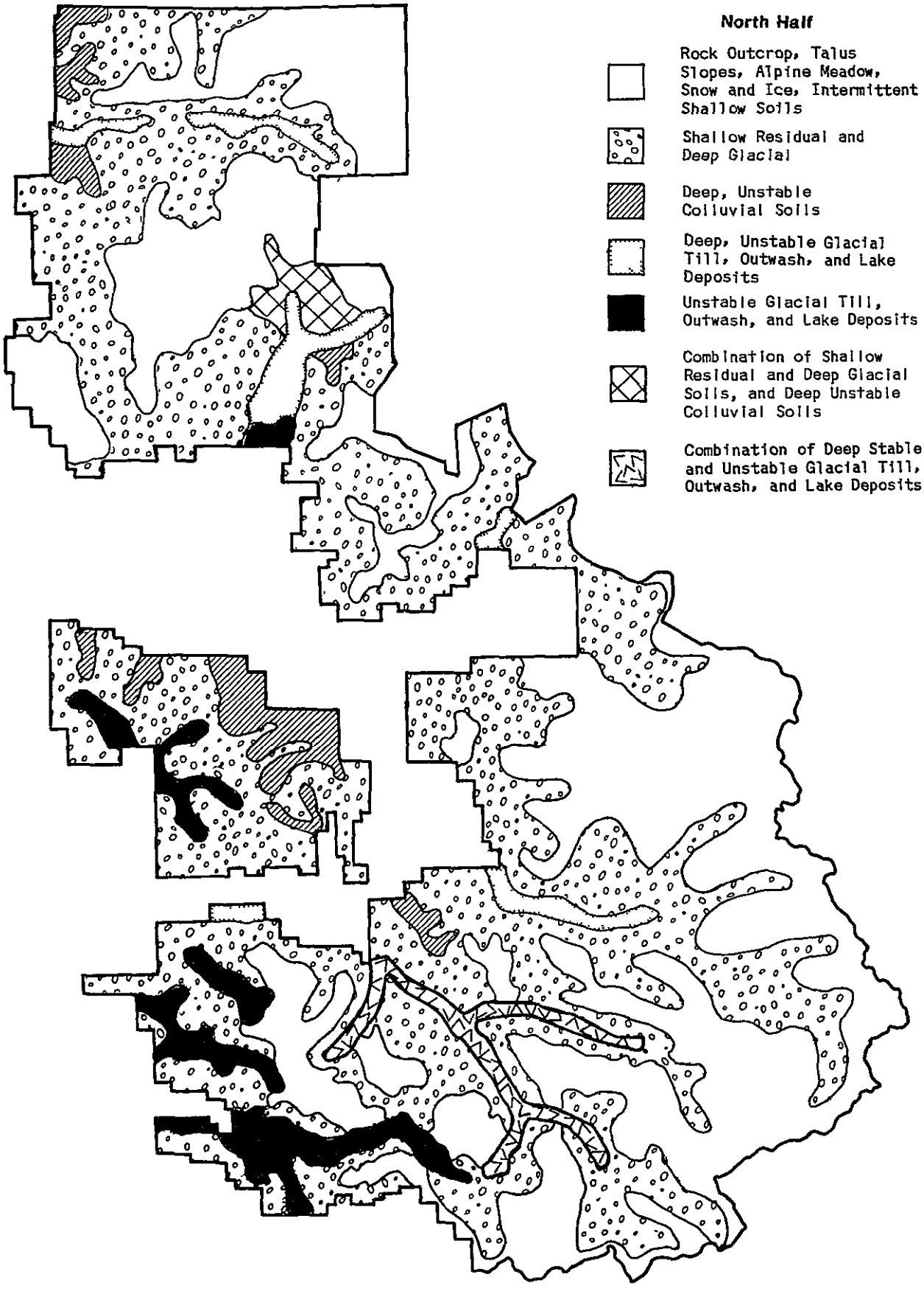
This area is one of the most unstable in the Pacific Northwest, and the soils are quite complex. This is, in part, due to the wide range of geologic rock types and the extensive glaciation on this part of the Forest. Glaciers greatly modified the pre-glacial landscape and deposited till, outwash, and other materials throughout the area. Because of this, it is common to find similar soils occurring on a variety of landscapes (Snyder and Wade 1970). Rocks of one type were frequently deposited over bedrock of another type, resulting in soil that is very different in texture from that which would be expected. Some ridges and sideslopes have been scraped clean of till, from either glacial action or mass wasting. These areas now contain shallow, gravelly soils that were derived from the local bedrock. Other slopes exhibit a mixture of shallow residual soils and deep glacial soils (Snyder and Wade 1970).

The soil types in the soil inventory have been placed into five broad soil areas as shown on the generalized soil map, Figure III-2a, for the north half of the Forest. Within each area are some broad similarities of landforms and soil characteristics. At the highest elevations, rock outcrops, talus slopes, alpine meadow, and permanent snow and ice are common. The soils that are found are shallow and fragile, lacking the soil structure to resist erosion, especially if the vegetation is removed. Much of this area lies above the conifer forest zones; the sedges, grass, and small shrubs found in the high elevations have a low tolerance to resist trampling, and are easily destroyed (Snyder and Wade 1970).

A large portion of the north half of the Forest contains long steep slopes, ridges, and narrow valleys with both shallow residual soils and deep glacial soils. Because of the complex bedrock and glacial geology of the area, soils occur in complex patterns and arrangements. In general, shallow soils are more predominant above 3,000 feet, while deep glacial soils occur more frequently below this elevation (Snyder and Wade 1970). High precipitation and steep

Figure III-2a

Generalized Soil Map



slopes plus weakly structured soils in these areas have resulted in a high potential for surface erosion. Many of the shallow soil types are resistant to water infiltration; rainwater often runs over the surface, rather than infiltrating. The potential for erosion is high. Refer to Snyder and Wade (1970) for further information.

The remaining soil areas occur in more localized portions of the north half. One is comprised of deep, unstable colluvial soils occurring on steep toeslopes and midslope drainages throughout the entire Forest (Snyder and Wade 1970). The soils tend to be gravely or silt and sandy loam with clay, gravel and sand textures in the subsoils. Combined with highly weathered bedrock, steep slopes, and subterraneous water, the soils in these areas are very unstable. Deep-seated mass movement (slumps etc.) occur even on virgin landscape.

Another soil area also contains unstable soils; glacial till, outwash, and glacial lake deposits are found in a number of valleys in the Phinney Block, the South Fork of Canyon Creek, and the North and South Forks of the Sauk River. The 1984 massive slump and failure at Deer Creek occurred in these soils. (See Special Conditions, below.) The natural instability is caused by a combination of steep slopes, fine textured "plastic" subsoils, wet weather, and subterraneous water. Slumps and slope failures with resulting sedimentation to streams (and damage to fisheries and other resources) have occurred in virgin landscapes; the problems are accelerated with roading, logging, or other ground disturbances.

A soil area comprised of stable glacial till and outwash occurs on the bottom and toeslopes of major valleys, including portions of the North Fork Nooksack, Suiattle, Sauk, Whitechuck, and other rivers. Gentle slopes are common and these soils are well suited to most management activities.

Finally, as shown in the north half generalized soil map, there are two areas with combinations of these soil types; both are quite localized.

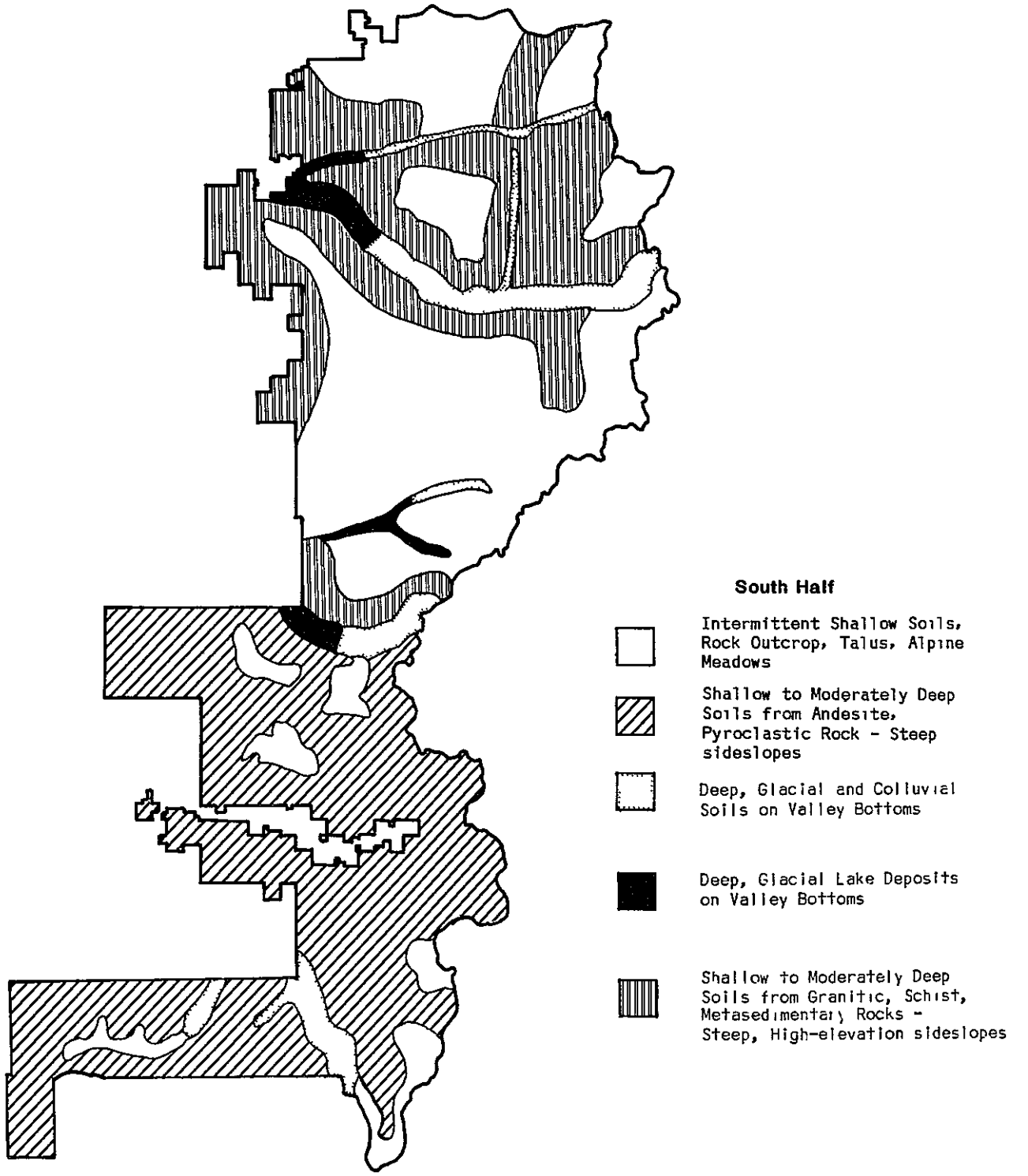
South Half of the Forest

The south half of the Forest, particularly the area south of I-90, is strikingly different. Rather than the numerous bedrock types of the north, the dominant bedrock is volcanic (andesites and pyroclastics). Glaciation was a minor influence and affected only the major valley bottoms and toeslopes. These differences in bedrock and glaciation have produced more subdued topography. Mountains are more ridgelike in nature, and while commonly steep and dissected, they lack the size and grandeur of their northern counterparts.

These differences in bedrock, glacial history, and topography also cause differences in soil types and their amount. The generalized soil area map, Figure III-2b, shows the soil areas which occur in the south half.

Many of the soil areas which occur on the north half also occur on the south half, but they occur to a much lesser extent. A common soil condition on the south half is shown as "shallow to moderately deep soils from andesite, pyroclastic rock." This area most characteristically contains soils that are well drained, moderately coarse textured and occur on steep sideslopes. The underlying bedrock is most commonly volcanic south of I-90 and intrusive or metasedimentary north. These soils are generally stable with the exception of

Figure III-2b
Generalized Soil Map



the areas adjacent to many of the stream channels. These soils can generally absorb the effects of management activities with little or no productivity loss provided that Best Management Practices (BMP's) are done.

Special Conditions

Approximately 39,850 acres of forest land containing commercial tree species, and having a productivity of at least 20 cubic feet of wood fiber, per acre, per year, are considered to be technically unsuitable for timber harvest due to irreversible soil damage. These soils are so unstable that timber removal results in a 75 percent probability of a doubling of mass soil movement (Boyer Memo 1980, Snyder 1981). Even use of technologically advanced logging systems, such as balloon or helicopter logging, cannot reduce the risk. These "irreversible damage" acres represent 2.3 percent of the Forest acres.

An additional 55,626 acres of highly unstable soils contain vegetation other than commercial tree species or produce less than 20 cubic feet of wood per acre per year. The total - 95,476 acres of unstable soils - equals nearly six percent of the Forest. In addition, a number of acres in riparian areas, the number varying by physical condition, will not be harvested because of other watershed, fishery, and wildlife management objectives.

While soils in this extremely unstable category occur forest-wide, they are predominant on the Darrington and Mt. Baker Ranger Districts, in the northern half of the Forest. The unstable soils are either glacial lake-deposited (Lacustrine) found on very steep toe slopes, or deep colluvial soils, deposited on very steeply dissected side drainages. In addition, there are many locations where the underlying bedrock is very weathered and incompetent, adding to the probability of slides and slumps.

Several large drainages on these two Ranger Districts contain highly unstable soils that are particularly sensitive to any management activities, such as cutting trees, road building, etc. Among them are Canyon Creek (Mt. Baker), Canyon Creek (Darrington), and Deer Creek (Mt. Baker.) The Deer Creek drainage contains about 40 percent unstable deep glaciolacustrine and colluvial soils. This drainage is very sensitive to disturbances. In the past years, numerous slumps and slides, both natural and human-caused, have had serious effects on the fisheries, water quality, and scenery of Deer Creek.

The majority of the watersheds on the Mt. Baker-Snoqualmie National Forest are in an acceptable condition and fully meet the requirements of the beneficial uses, which most often is fisheries. However, in recent years there has been an increasing concern among Forest Service professionals and members of the public that a number of the watersheds were showing evidence of deteriorating conditions, resulting from past management activities, and that these watersheds may not be in an acceptable condition. These deteriorated watersheds are more common on the northern half of the Forest, where there are numerous deep, unstable glacial soils. Indicators of watershed deterioration include: unstable stream channels, unstable streambanks, poor pool/riffle ratios, and streams that either lack large woody debris or contain unstable large woody debris.

Refer to Chapter IV, Table IV-4 for a list of watersheds that were evaluated and rated in the hydrologic cumulative effects analysis (which is documented in

Appendix H, FEIS). Appendix H describes the process used on the Forest to evaluate watershed conditions in order to meet the management requirements for water quality and riparian areas.

Watershed Improvement Needs Inventory

A watershed improvement needs inventory was completed for the Mt. Baker-Snoqualmie about six years ago. It is now outdated and has limited use for the Forest Plan. The need for an updated inventory is recognized, but due to budget and personnel restrictions, inventories will be conducted in only a few critical watersheds, such as Deer Creek and Canyon Creek. Work began in 1986; refer to the Watershed Rehabilitation Schedule, Appendix I, Forest Plan.

WATER

Water is one of the most abundant and valuable resources on the Forest. There are over 14,000 miles of streams and rivers on the Mt. Baker-Snoqualmie and over 13,600 surface acres of lakes within the Forest boundary.

Water is a key component of the environment. A complex interplay of the aquatic resources, climate, soils, and topography have created a climate especially favorable to coniferous vegetation (Franklin and Dryness 1973). The numerous lakes, streams, and rivers provide a high quality spawning and rearing habitat for anadromous fish, and habitat for resident fish. Habitat areas adjacent to streams, lakes, ponds, springs, marshes, etc. are the most heavily used by wildlife. The streams and rivers of the Forest provide high-quality water for municipal use by over 1.4 million people in the Puget Sound area, and for agriculture and industrial purposes downstream from the Forest boundary. Water is of primary importance for recreational activities; many are directly or indirectly water-based, such as fishing, boating, camping, and sightseeing. In one way or another, the cultural and natural environment is affected by, and in turn effects, the water resource.

Lakes

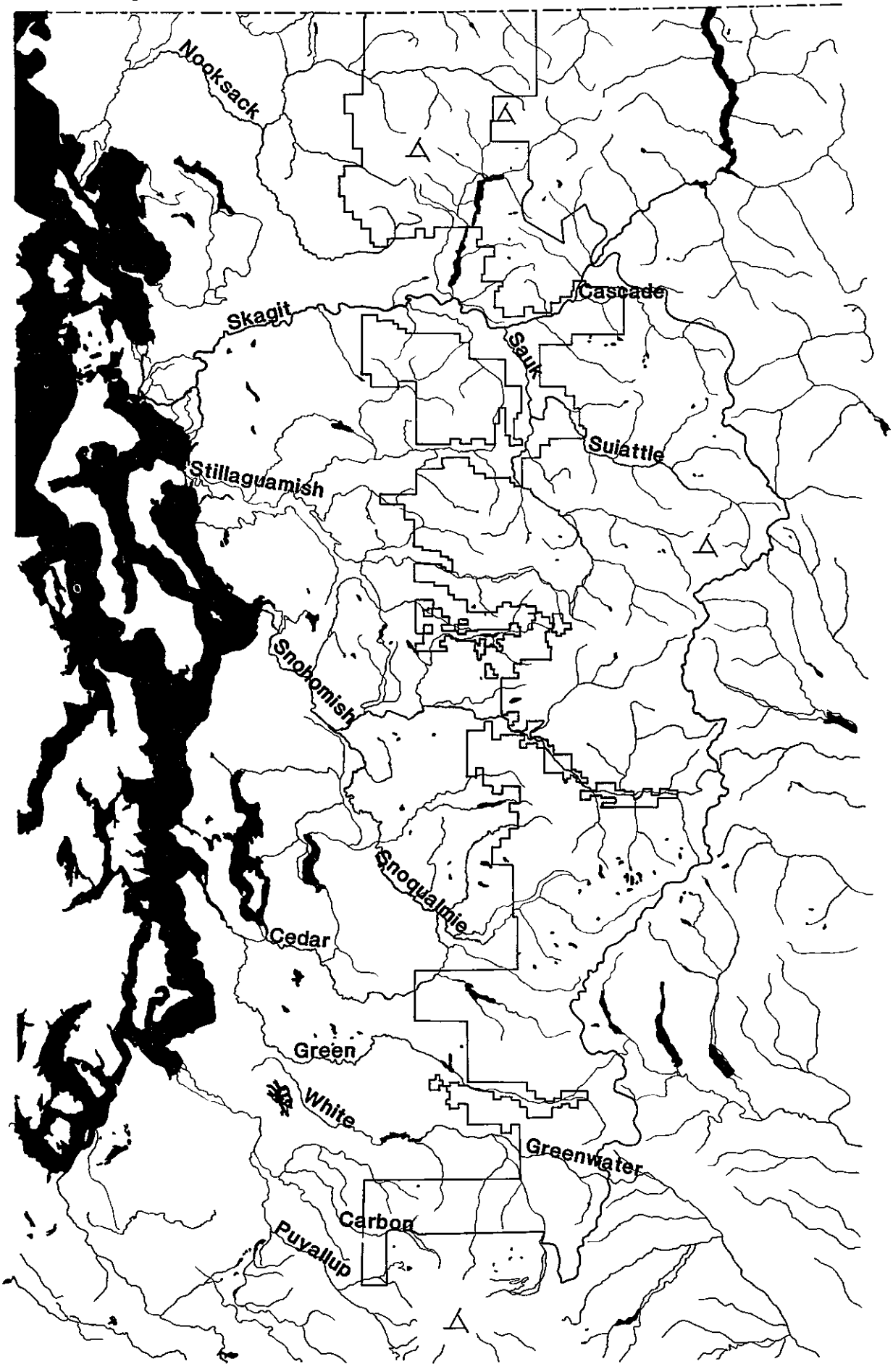
There are over 650 lakes on the Forest, ranging in size from alpine tarns less than one acre in size, to the Upper Baker Lake Reservoir (5,238 acres) and Sultan Basin Reservoir (Spada Lake, 5,300 acres.) Over 60 percent of the lakes are within wilderness. About 120 lakes are 20 acres or larger in size: Snoqualmie Lake is 126 surface acres; Marmot Lake, 135 acres; Blanca Lake is 179 surface acres; and Lake Dorothy is 290 acres. The lakes and reservoirs of the Forest provide habitat for resident fish; their shores contain rich, riparian habitat (refer to the discussion following); and many are important in maintaining stream flow year round. Many of the 650-plus lakes are important recreation resources for camping, fishing, and general sightseeing. Forest recreation trails often have a lake as a destination point. Problems of overuse, soil compaction, and loss of vegetation (from campers and horses) are among the overuse concerns.

River Systems

The streams and rivers of the Mt. Baker-Snoqualmie National Forest contribute to seven of the ten largest river systems (largest annual runoff) draining into Puget Sound. These include: the Nooksack River; the Skagit River system, including the Cascade, Suiattle, and Sauk Rivers; the Stillaguamish River; the Snohomish River, including the Skykomish and Snoqualmie Rivers; the Cedar River; the Green River; and the Puyallup River, including the White, Greenwater, and Carbon Rivers (Pacific N.W. River Basins Commission 1970). These major rivers are shown in Figure III-3, on the next page.

The runoff from these rivers, over the last thirty years, averaged over 30 million acre feet annually (Pacific N.W. River Basins Commission 1970). There are few places in the nation where the runoff is so great. This figure represents about 31 percent of the State's total annual runoff. Over half the water running into Puget Sound comes from just two river systems: the Skagit and the Snohomish.

Figure III-3
River Systems



The Mt. Baker-Snoqualmie National Forest portion of these seven rivers has an annual runoff of 15.5 million acre-feet of water. This equates to approximately 8.96 acre feet of water for each acre of forest land. In comparison, the yield for the Olympic National Forest is 6.3 million acre feet per year, or 9.69 acre feet of water per acre of forest land. The water yield from forests located east of the Cascade Mountains is considerably lower; the Umatilla yields 2.5 million acre-feet or 1.178 acre feet/acre and the Wenatchee, 4.5 million acre-feet per year, or 2.10 acre feet/acre.

Stream Class and Streamside Management Units (SMU's). A stream classification system (see the Glossary) on National Forest lands has been designed to provide graduated management protection of the national forest drainages based on their individual water quality requirements. Class I streams are the direct source for domestic water and/or are used by large numbers of fish. Class I streams are the highest or most protected class. Class II streams generally have moderate fish use and/or contribute to Class I streams. The Forest contains approximately 1,600 miles of Class I and II streams.

Class III streams are divided into "deeply incised" and "lightly incised", depending on streambank slope, soil stability, and other factors. (This is a local refinement of the Pacific Northwest Region stream class criteria). On the Mt. Baker-Snoqualmie, 70 percent of the over 3,500 miles of Class III streams are deeply incised. Deeply incised and lightly incised Class III streams are a Forest refinement of the Pacific Northwest Region stream classification system. Class IV streams include all others not meeting the above criteria.

Streamside Management Units (SMU's) are Forest Service-applied boundaries to that portion of the land lying between the aquatic and terrestrial ecosystem - the riparian zone. Refer to the section on Diversity in this chapter. The width of an SMU varies with the terrain and the management goals for each type of stream.

Streamflow, Flooding

Two distinctive low streamflow periods typically occur in the Western and Northwestern Cascades. The winter period varies, but usually corresponds to clear, cold weather periods in late winter. It is most pronounced in the higher elevation watersheds dominated by heavy snowpack and glacial ice. The summer low flow period is closely related to the summer/early fall low rainfall climatic pattern. Streamflow begins to decline in June and low flows persist into late September and early October. Streamflow from high elevation watersheds remains higher longer into the summer season as the snowpack recedes. Streamflows dominated by glacial icemelt remain at relatively high levels throughout the summer season and are closely associated with warm weather periods, fluctuating widely through daylight and night-time hours.

Larger streams in forested areas maintain at least a minimal flow level throughout the dryer summer season. Adequate water is usually available for all wildlife needs. Extremely low streamflow and accompanying warm temperatures may impact fisheries habitat, however, particularly rearing habitat for both trout and anadromous species.

Coniferous tree growth is well adapted to the usual summer dry period, as tree roots penetrate into ample stored subsurface soil moisture supplies. Shallower

rooted, newly planted trees can suffer for moisture, however, particularly when the dry period begins in early June and persists for weeks without cloudy, cool weather and light rainfall breaks.

History of High Streamflows, Flooding

High streamflows and extreme flood flow events occur during the fall/winter precipitation period especially in November and December. Persistent rain and rain-on-snow events often produce large increases in peak flows, that often pose a threat to downstream lives, property, and aquatic habitat.

There is 20 years of documentation of the occurrence and frequency of these events, especially for the watersheds on the north half of the Forest. In some watersheds, such as Canyon Creek, Finney Creek, and Deer Creek, rain-on-snow events have occurred numerous times over the past 20 years. These events have repeatedly caused major channel damage and adverse fish habitat changes, resulting in degradation of water quality and reduction in fish species numbers or diversity.

On this Forest, these storms are known to cause or trigger mass wasting events, such as debris torrents, debris floods, and earthflows. Such events have occurred at least once a year in three north-end Forest watersheds (Canyon Creek, Deer Creek, Finney Creek) during 1951, 1959, 1962, 1971, 1975, 1977, 1979, 1982, 1983, 1986, and 1989. Heavy timber harvesting and road building activities in these watersheds - over the past 30 years - along with the natural instability and steep slopes, has aggravated the damage and degradation resulting from these peak flow or flood events.

Groundwater

Research studies indicate timber harvesting generally increases annual water yields. This is due primarily to reduced evaportranspiration. Harr (1983) developed a regression equation for use in estimating potential increases in annual water yield, which can be expected from clearcutting in western Oregon and Washington, based on research results in experimental watersheds. Initial on-site increase of up to 20 inches are predicted, though they completely disappear in about 27 years. The equation predicts a smaller annual water yield increase when annual precipitation is less.

Harr estimated that sustained increases in water yield from most large watersheds in western Oregon and Washington subject to sustained forest management are, at best, three to six percent more than flows from an undisturbed forest. Kattelmann et al. (1983) estimated similar maximum potential increases in Sierra Nevada watersheds if minimum standards for all applicable laws were followed. However, they concluded that the typical increase in a large watershed drops to approximately one percent when constraints are imposed to meet other resource demands. A similar scenario is expected in Pacific Northwest Region National Forests due to multiple-use considerations. Flow increases on these Forests have already been realized due to past harvesting, so there is little or no potential for increasing yields in most large watersheds.

This is especially true on the Mt. Baker-Snoqualmie, as timber harvest levels of the past (over 300 million board feet annually) have dropped; refer to Table III-11, Timber Sold and Harvested, later in this chapter. Other factors which

further minimize potentials to effect changes in streamflow are high natural variability, lack of flow measurement accuracy (within five percent, at best, so potential changes are less than what is measurable in large watersheds), and the fact that most of the flow increases occur when they are least needed or useable - during spring runoff on the eastside, and during fall storms on the westside.

Research generally shows increases in summer flow result on site immediately after harvest in western Oregon. However, studies in the Rocky Mountains (Troendle 1983) showed no change in late summer streamflow following timber harvest, despite annual increases. (These increases occurred during spring snowmelt.) In large watersheds subject to sustained yield harvesting, summer flow increases are temporary and not expected to be measurable at downstream locations.

Effects of harvesting timber on groundwater recharge and aquifers are similar to effects on streamflow, except for timing differences; eg., aquifer responses are typically slower and fluctuate less than streamflow.

Water Quality, Temperature, Turbidity

All waters on the Forest are classified by the State of Washington as Class AA Excellent. (WAC 173-201 (12-19-99)) As discussed in Chapter IV, Forest-wide mitigation measures, water quality standards for the State are met through application of Best Management Practices (BMP's); water for domestic use and fish are key resources protected by BMP's.

In terms of natural chemical components, it will usually meet U.S. Public Health Service drinking water standards and provide an excellent medium for aquatic organisms and spawning and rearing resident and anadromous fish.

A periodic exception may be streamflow composed primarily of glacial icemelt. Water in these streams, in addition to being highly turbid, is generally neutral in pH, soft, and dominated by either calcium bicarbonate or acid sulfate. This latter component has been associated with intermittent volcanic steam activity around Mt. Baker. One stream, Boulder Creek, following an increase in volcanic activity in 1975, registered a relatively low pH, high conductivity, and an increase in sulfate concentrations. These components are now essentially back to pre-activity levels.

Stream conductivities, as a measure of mineral salts in solution, will vary seasonally. Low values typically occur during higher flows, particularly during the spring and early summer snowmelt runoff period. Higher concentrations occur during the summer low or base flow period.

Turbidity and Suspended Solids

The majority of headwater streams on the Forest are almost sediment-free in their natural state, with the exception of winter storms when some sediment likely occurs. The glacial-fed streams originating on the slopes of Mt. Baker, Shuksan, and Glacier Peak have a milky appearance and contain suspended sediments derived from melting glaciers (Pacific N.W. River Basins Commission 1970). They tend to be particularly sediment laden during periods of high runoff.

Temperature

Among the water quality attributes that affect water use by fish, temperature can be a concern. Removal of streamside vegetation usually increases summer water temperatures in direct proportion to the amount of increased sunlight on the water surface (Chamberlin 1982). Small canopy openings on some streams can promote aquatic production. Changes in water temperature begin to have a detrimental effect on fish/fish habitat when a threshold amount, or percent, of streamside vegetation that provides shade is removed within a watershed or basin. Mitigation, in the form of limiting removal of vegetation along streams, etc. (discussed fully in Chapter IV) has generally been successful in the past.

Water Uses

Primary uses for the water flowing from Forest lands include municipal water, downstream hydroelectric power generation, fish habitat, and irrigation. There is no direct diversion for irrigation from the Forest and water used by off-Forest fish hatcheries is minimal. However, water for municipal and industrial use is valued at $135 per acre foot, or for the watersheds on the Mt. Baker-Snoqualmie, $25,448,158 per year. Water is also used for generating power. When valued at $8.00 per megawatt hour, water from the Forest used for power generation totals a value of $26,428,160 per year. Total water values from the Forest exceed $51,876,000 - a considerable amount.

Municipal Watersheds

A significant portion of the watersheds supplying the cities of Bellingham, Everett, Seattle, and Tacoma is located within the boundaries of the Forest. A number of smaller municipalities, ski areas, and other recreation sites also obtain their water from the Forest. About 135,600 acres (7.9 percent) of the Forest land base, supply water for municipal watersheds (USDA Forest Service 1982). Table III-2 shows the cities served and their watersheds.

Only one water supply impoundment is located on National Forest land: Spada Reservoir, on the Sultan River. It supplies municipal water for the City of Everett. Chester Morse Lake is located within the Forest boundary but the City of Seattle water supply intake is located downstream, on the Cedar River. Several other large municipal supply reservoirs are located downstream from National Forest lands; Eagle Gorge supplies Tacoma from the Green River and the Tolt Reservoir supplies Seattle from the South Fork Tolt River.

There are a number of issues and concerns regarding the watersheds, including water quality, recreation use, timber harvest, and management of wildlife habitat and old growth ecosystems. These concerns are not limited to the large watersheds supplying Seattle and Tacoma. The issues are discussed in both Chapter I and Appendix A of this FEIS.

Table III-2
Municipal Watersheds on the Mt. Baker-Snoqualmie National Forest

Watershed Name	Service Area or Municipality	Type of Water	Population Served	Daily Consumption -gallons	Acres N F.	Acres Other	Acres Total	Water Treatment: Disinfectant	Water Treatment: Filtration	Water Treatment: None
Sultan River	Everett	Surface	120,000	2,120,000	14,340	35,160	49,500	X	X	X
No Name Creek	Baring (Unincorp)	Surface	50	4,000	170	50	220	X		
Cedar River	City of Seattle	Surface	992,000	93,000,000	16,500	74,000	90,500	X		
Tolt R. S. Fk.	City of Seattle	Surface	1/	15,000 000	3,900	8,300	12,000	X		
Tye River	Stevens Pass	Surface	8,000	100,000	336	0	336	X		
Elizabeth Crk	Crystal Mtn Ski	Surface	8,000	100,000	189	4	193	X		
S. Prairie Crk	Buckley	Surface	3,500	750,000	8,000	16,300	24,000	X		
Scenic Creek	Scenic (Unincorp)	Surface	252	3,500	870	0	870			X
Middle Fork Nooksack River	Bellingham	Surface	45,000	45,700,000	24,640	12,640	37,280	X		X
Anthracite Crk	Unincorporated	Surface	30	4,500	110	320	430			X
Olney Creek	Goldbar & Startup	Surface	800	120,000	0	9,380	9,380	X		
Green River	City of Tacoma	Surface	220,000	55,000,000	50,130	97,870	148,000	X		
Silver Crk Headwaters	Gold Hills Resort & Crystal Mtn	Surface	8,000	100,000	1,499			X		
Buck Creek	Buck C Relig. Camp	Surface	100	2,000	760					X
Evans Creek	Fair Fax	Surface	50	2,500	2,196					X
Deep Creek	Alta Silva Lodge & Deep Crk Sum Home	Surface	50	1,500	2,132			X		X
Snoquera Creek	Camp Sheppard (BSA)	Surface	300	3,500	802			X		X
Slippery Creek	Slippery Cr. Resort	Surface	80	800	1,604			X		
TOTAL			1,406,212	212,012,300	128,178					

1/ The population served by both the Cedar and South Fork of the Tolt Watersheds is 992,000.

The Cedar River Watershed

This large watershed is managed under a 1962 Agreement between the Forest Service and the City of Seattle. The agreement provides for timber harvest on a sustained yield basis (see Glossary) within the watershed. As National Forest lands have been cut, they are exchanged to the City for City lands located elsewhere. In 1989, the City of Seattle established Ordinance 114632, which changes the emphasis for city land management. This Ordinance may, in the future, cause the 1962 Agreement to be amended. Refer to the land ownership and land use sections of this chapter for additional information. Public access on roads on National Forest lands within the watershed is restricted. The Cedar River Watershed is inaccessible to recreation use except for existing peripheral use at some sites (City of Seattle, USDA Forest Service 1979). All National Forest land in the South Fork of the Tolt are open to recreation use, but access from the west is closed to the public. Money Creek road, to the east, provides the only access to National Forest lands in this watershed.

The Green River Watershed

This watershed is managed under a 1984 Memorandum of Understanding between the Forest Service and the City of Tacoma. Timber harvest is permitted. National Forest land in the Green River Drainage is open to public recreation use; however, the intermingled private lands west of the town of Lester are closed to such use by agreements between the City of Tacoma and private landowners. Access into the watershed is from the east, through Stampede and Tacoma Passes.

The Sultan River Watershed

This watershed is managed under a 1963 Memorandum of Understanding between the Forest Service, the City of Everett, and the Snohomish county Public Utility District. The provisions of the Federal Energy Regulatory Commission (FERC) license for Project 2157 - The Sultan Basin Hydroelectric Project - also contain management direction for the watershed. Developed recreation use is permitted along Spada Reservoir, but no water contact activities are allowed. Timber harvest is permitted with a long-range goal of disposal of all National Forest lands within the watershed except those necessary for the FERC project.

Other Watersheds

No formal agreements exist for other municipal watersheds. These watershed vary in size and population served (refer to Table III-2); timber harvest has occurred in the past as well as most recreational activities.

Hydroelectric Power

Because of the mountainous topography of much of the Forest, there are many potential sites for generating hydroelectric power. Table III-3 shows the existing power plants on or near the National Forest. It should be noted that installations downstream from the Forest get much of their water from watersheds on the Mt. Baker-Snoqualmie.

Table III-3
Developed Hydroelectric Power Plants

Plant	Owner1/	River	Location	Initial Operation	Installed Capacity kw	Average Annual Output (MWH) 2/	Usable Storage (ac-ft)	Gross Head (feet)
Nooksack	PSPL	Nooksack	Dnstrm	1906	1,500	5,000	-	195
Lower Baker	PSPL	Baker	Dnstrm	1925	64,000	381,000	142,000	259
Bear Ck #1	LCS	Bear Creek	Dnstrm	1908	1,800	13,000	-	422
Bear Ck #2	LCS	Bear Creek	Dnstrm	1925	200	1,000	-	72
Upper Baker	PSPL	Baker	NF Land	1959	94,400	336,000	221,000	285
Newhalem 3/	S	Newhalem Cr	Upstrm	1921	2,000	8,000	-	507
Gorge	S	Skagit	Upstrm	1924	134,400	915,000	7,000	380
Diablo	S	Skagit	Upstrm	1936	120,000 4/	778,000	61,000	330
Ross	S	Skagit	Upstrm	1952	360,000	688,000	1,023,000	398
Snoq. #2	PSPL	Snoqualmie	Dnstrm	1910	30,100	204,000	-	287
Snoq #1	PSPL	Snoqualmie	Dnstrm	1898	11,600	70,000	-	257 5/
White River	PSPL	White	Dnstrm	1912	70,000	322,000	44,000	489
Sultan River	PUD #1	Sultan	NF Land	1984	111,800	436,400	60,000	1,170
Cedar Falls	S	Cedar	Dnstrm	1904	22,900	97,000	62,000	625
TOTALS	-	-	-	-	1,024,700	4,254,400	1,620,000	-

1/ PSPL = Puget Sound Power & Light Co. LSC = Lone Star Cement Corp. S = Seattle Department of Lighting (Seattle City Light) PUD #1 = Snohomish County
2/ Median month flows - estimated average annual potential with present capacity or amount reported by operator
3/ Damaged by fire in July 1966 Repair is underway
4/ Excluding two 1,200 kw auxiliary units
5/ For units No 's 1-4; 271 feet for unit No 5.

Hydroelectric Power Supply

There is a renewed interest in hydropower on a National scale, due to a combination of factors, including legislation in the mid-1980's. The National Energy Act (NEA), the Energy Security Act, and the five bills composing the NEA (one of which is the Public Utility Regulatory Policy Act of 1978) provided additional economic, regulatory, and tax incentives to developers of hydroelectric power through the end of the year, 1985. This contributed to a substantial increase in the number of filings for preliminary permits and licenses for sites which have the potential for producing not more than 15 megawatts of power. They are generally located on smaller rivers and streams, with no storage potential.

A large number of small hydroelectric power applications have been received, mostly for sites on the Mt. Baker, Darrington, and Skykomish Ranger Districts. The rate at which new applications are received will diminish over time as economically feasible and environmentally sound sites are identified, construction completed, and speculative projects are eliminated.

The Forest Service's present role is as an advisor to The Federal Energy Regulatory Commission (FERC). Through Section 4(e) of the Federal Power Act, the Forest Service makes recommendations on hydropower License applications. These comments, conditions, and stipulations are made a part of the License if the License is issued by FERC. A Licensee constructing a hydroelectric

powerplant, electric transmission line, or related facilities will be authorized to occupy National Forest System land through a special use permit.

These projects have the potential to affect timber harvesting, fish and wildlife habitat, particularly anadromous and resident fisheries, scenery, cultural resources, roadless areas, and recreation setting.

The Sultan Basin Project is the only on-going, major hydroelectric project on the Forest. The project was started in 1961 by the Snohomish County Public Utility District; a dam and storage area were constructed on the Sultan River to provide domestic water for the city of Everett. Construction of the second phase has raised the dam height, increased the water storage area, and will provide Everett 95 megawatts of power annually.

Demand

The demand for energy in the Puget Sound area is expected to grow at an average annual rate of between one and two percent through the early 1990's. Predictions beyond this period show a wide variability, based on the difficulty in forecasting demographics and the economy.

While the area is currently operating with surplus power - Bonneville Power Administration estimates a surplus through 1994 - new energy sources will be needed in the future. The inclusion of the Skagit River in the Wild and Scenic Rivers System and the large number of acres in designated wilderness will affect the location and future construction of potential hydroelectric sites.

Small hydroelectric projects may become more feasible due to possible limitations on the expansion of major dams on the Columbia River (to increase flows for downstream salmon migration and for additional irrigation).

National Surface Water Survey

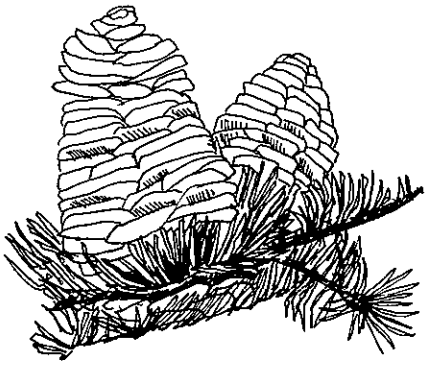
In the fall of 1985, a total of 26 lakes (twenty within designated wilderness) on the Mt. Baker-Snoqualmie National Forest were sampled to assess their sensitivity to acidic deposition (acid rain). The survey is part of the National Surface Water Survey and was mandated by Congress. The Environmental Protection Agency and the Forest Service are jointly conducting the survey.

Acid rain occurs when oxides of nitrogen and sulfur are emitted into the atmosphere. The major man-made source is the combustion of fossil fuels in power plants, automobiles, factories, and smelters. Acid deposition can cause serious environmental problems. When pollutants enter lakes and streams, they may change the chemistry of the ecosystem; they have the potential to destroy small aquatic organisms which support fish and may kill the fishery as well (U.S. Environmental Protection Agency 1985).

Lakes and streams, with their surrounding watersheds, vary in their sensitivity to acidic deposition. Some lakes, naturally, are able to handle more acid deposition without becoming damaged; others have very little "buffering capacity" or ability to withstand the pollutants (Environmental Protection Agency 1985). The national survey will identify how many lakes may already be acidic and how many others are potentially sensitive to deposition. It is not expected that the results of this study will affect the alternatives.

DIVERSITY

Introduction



Diversity, as described in NFMA, refers to the distribution and abundance of plant and animal species and communities on the Forest. Elements of diversity include, but are not limited to:

- viability, distribution, and abundance of wildlife and plant species;
- structure, composition, and distribution of ecosystems;
- the role of perturbations such as fire, wind, and insects;
- long-term productivity; and
- fragmentation and reduction of scarce community types.

The regulations (36 CFR 219.27) require that management prescriptions, where appropriate and to the extent practical, preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species. "Diversity" of these communities and species should be at least as great as those expected in a "natural" Forest. The diversity of tree species should be similar to that existing in the forested planning area. Reduction in diversity may be prescribed only where needed to meet overall multiple-use objectives.

Detailed discussions of individual elements that comprise diversity are included in other sections of this chapter, including soils, wildlife and fish, and fire management. To avoid repetition, discussions of biological diversity elements presented here have been summarized and cross-referenced, where appropriate.

Biological Processes and Long-term Productivity

Ecosystems

Ecosystems are more than their component parts; they are also the processes that link these parts together. These processes include reproduction, growth, energy flow, and succession. One reason diversity is valued so highly is the belief that by preserving the parts (the kinds of plant and animal species and communities), we also preserve the processes, which are essential to the maintenance of the health and productivity of the ecosystem. By ensuring that diversity is maintained, we protect the habitats of animals and plants, and ensure the productivity and viability of future ecosystems.

Soil

Soil is a basic, nonrenewable resource and is the foundation on which diversity is maintained. All plant and animal life on the Forest is either directly or indirectly dependent on maintenance of long-term productivity of soils. By definition, the components of long-term soil productivity include:

- surface litter and topsoil layers;
- soil organic matter and its replacement;
- soil organisms and biological systems and;
- soil porosity, structure, drainage and aeration.

As discussed earlier in this chapter, the soils of the Mt. Baker-Snoqualmie are complex, with over 200 mapped categories (based on soil type, geologic type, and topographic shape). These can be grouped into several broad groups that have similarities in texture, depth and parent material. There are differences in soils in the north half and the south half of the Forest. Unstable soils occur Forest-wide, but are found primarily on the north half of the Forest, where there is a high potential for surface erosion, slides and slumps. (See Soils, this chapter.)

Natural and Human Influences

In addition to soils, long-term productivity can be described as the ability of the forest to withstand impacts from both biotic and abiotic influences. Insects, diseases, wildlife, atmospheric deposition, silvicultural treatments, and harvesting practices are examples of influences that can have both positive and negative effects on the health of the forest, and thereby, on long-term productivity. Fire has played a major role in creating the vegetative conditions found at present on the Forest. The natural ecosystems are characterized by a long-term fire cycle of very infrequent but high-intensity, stand-replacement fires. Livestock grazing has been of very-low intensity. Pollutants in the air may affect vegetation; refer to Air Quality in this chapter. Also, see the section later on this chapter on insects and disease.

From 1983-88, the Forest harvested around 230 MMBF in timber sales annually, with most of this volume removed from clearcut harvest units. About 3,000 acres were precommercially thinned each year. The roadless area issue resulted in the concentration of timber sales in approximately one-half of the Forest land base. Approximately 87 percent of acres harvested are planted, although even these planted sites also have some natural seeding and survival of residual trees. Planted stock is increasingly coming from seed of "genetically superior trees," trees with better resistance to disease, better juvenile survival and improved growth form, from a forest products perspective. A small percentage of the planted acres receive "release" treatment, which involves removal of competing vegetation from young conifer plantations. About 100 acres each year receive intermediate harvest, or commercial thinning. (See Vegetation - Timber, this chapter.)

The Role of Research Natural Areas

Preservation of ecosystems that are substantially undisturbed is one of the objectives of the Research Natural Area program. This is one element of preserving diversity. Three such areas have already been established on the Forest the North Fork Nooksack, Lake Twenty-two, and Long Creek Research

Natural Areas. See Research Natural Areas, this chapter, for a discussion of existing and potential RNA's.

Vegetation and Diversity of Plant Communities

Vegetation is a major resource on the Forest. Grasses and forbs, shrubs, and trees are the source of food and cover for wildlife and livestock. Timber is produced from the trees of the forest. Recreational and aesthetic values come from the forests and meadows of the Mt. Baker-Snoqualmie. Cedar bark and certain plants are important to Native Americans for religious, cultural, and ceremonial purposes. Vegetation also serves to hold the soil mantle in place (Henderson and Peter 1985). Diversity of plant communities forms the base for diversity in animal communities.

Requirements were set in the National Forest Management Act to maintain native and desired introduced plant and animal species and communities. All seral stages of terrestrial and aquatic plant associations are to be provided for, and the long-term integrity and productivity of these communities is to be maintained or enhanced. Because some species and communities are abundant and well-distributed on the Mt. Baker-Snoqualmie (and are likely to continue to be) the emphasis in managing for diversity is place on those plant and animal species and communities which are rare, or less common (or could become so). Of particular concern are those species and communities which are fragile or easily affected by human activity. Species whose habitats are poorly distributed are especially susceptible to genetic risks, which may affect their viability.

Current Vegetation Distribution

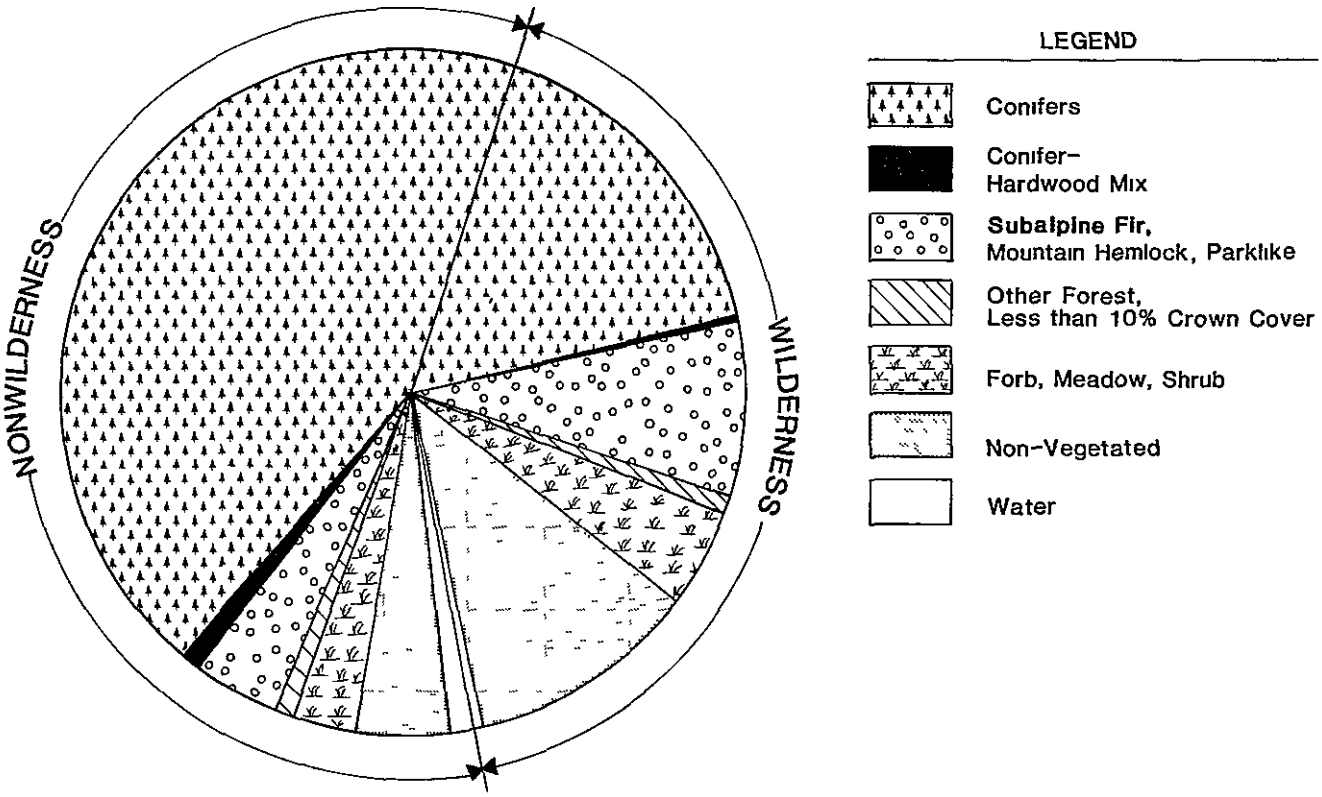
Nearly 85 percent of the lands managed by the Mt. Baker-Snoqualmie National Forest are covered by vegetation; conifers are by far the most prevalent vegetation. Table III-4 and Figure III-4 show the vegetative mix, both for wilderness and nonwilderness lands.

Table III-4
Current Vegetative Distribution - Percent

	Wilderness	Nonwilderness	Total
Forest			
Conifers 1/	16.4	43.6	60.0 %
Conifer-Hardwood Mix 1/	0.1	3.0	3.1
Subalpine Fir, Mountain Hemlock, Park-like 1/	8.2	4.0	12.2
Other Forest 2/	0.9	0.9	1.8
NonForest			
Forb, Meadow, Shrub	4.8	3.0	7.8
Non-vegetation 3/	11.0	3.2	14.2
Water	0.4	0.5	0.9
TOTAL	41.8	58.2	100.0

1/ Productivity is 20 or more cubic feet per acre per year (cf/ac/yr).
2/ Productivity is less than 20 cf/ac/yr.
3/ Rock, snow, ice, talus, developed for administrative sites, roads, etc.

Figure III-4
Current Vegetative Condition



Much of the riparian zone on the Forest contains a mixture of hardwoods and conifers, including red alder, bigleaf maple, vine maple, black cottonwood, Douglas-fir, western redcedar, and western hemlock. Associated plants include Devil's club, swordfern, herbs, and others that require large amounts of free standing water or sites that are more moist than usual (Oakley and others 1985). Refer to the Diversity - Riparian discussion, below.

The largest amount of land that is essentially non-vegetated is located within the the 721,718 acres of designated wilderness. Included are rock, snow and permanent glacier fields, and talus slopes. Outside of wilderness, most of the acres of non-vegetation are roads, administrative sites, and other developed areas on which the vegetation has been removed by human activity.

Forest Series on the Mt. Baker-Snoqualmie National Forest

On this Forest, there are three main forest series: western hemlock, Pacific silver fir, and mountain hemlock. The area of ground where these series occur is called a zone. Franklin and Dryness (1973) also identify a fourth zone, the subalpine meadow zone. It occurs above 6,000 feet in elevation, above timberline, for most of the Forest.

The table below shows, very generally, the major series or zones on the Forest, including some of the more common understory trees, shrubs, and grasses. For a more complete description, refer to the Preliminary Plant Associations and Habitat Types, Henderson and Peter, for each Ranger District.

Where the subalpine fir series occurs, the fourth zone, subalpine fir is the major tree species, with mountain hemlock and Alaska yellowcedar subdominant. In any of these series, stand succession takes place over time, leading to the

climax species. Once reached in the succession - and if no natural catastrophe occurs - the climax species will be in a continuum of replacing itself.

Table III-5
Forest Series and Major Plant Associations on the Forest 1/

Western Hemlock Series

Zone begins in the foothills and extends to about 2,600 feet in elevation.

Major Tree species: western hemlock, Douglas-fir, western redcedar, alder, and some Pacific silver fir.
Common understory vegetation: swordfern, salal, devils club, Alaska huckleberry, Oregon grape, vine maple, foamflower.

Pacific Silver Fir Series

Zone extends from about 2,000 to 4,000 feet in elevation, slightly lower on north aspect slopes and slightly higher on south aspect.

Major Tree species: western hemlock and Pacific silver fir co-dominate, with Douglas-fir, mountain hemlock, some noble fir and western redcedar.
Common understory vegetation: Alaska huckleberry, swordfern, herbs, big huckleberry, salal, devils club, foamflower, vine maple.

Mountain Hemlock Series

Zone is the highest coniferous forest zone, ranging from about 4,000 to 6,000 feet; it extends down to about 3400 feet in wetter areas.

Major Tree species: mountain hemlock co-dominates with Pacific silver fir; Alaska yellowcedar, subalpine fir; some western hemlock, Dougals fir, noble fir.
Common understory vegetation: Alaska huckleberry, big huckleberry, herbs, red heather, blueleaf huckleberry, mountain ash, bear grass.

1/ Henderson and Peter 1981 through 1985.

Diversity and Successional Stages

The diverse vegetative communities of the Mt. Baker-Snoqualmie National Forest are a result of extremes in elevation, aspect, soil depth, and climate. Fire, wind storms, avalanches, insect and disease, and the harvest of timber over the years have also contributed to the character and diversity of vegetation on the Forest. In the pristine forest, not all lands are naturally in an old-growth condition. Grass and forb communities are often the result of recent forest fires and timber cutting. The proportion of young tree stands in drainages reflects the patterns of past forest fires. The amount of moisture on a particular site, in combination with slope, elevation, temperature, and soil nutrients all affect the composition of communities.

Vegetation occurs over the landscape as a complex mosaic of various plant communities at different stages of development (Henderson and Peter 1985). The structure and composition of these communities is constantly changing with time (Odum 1971). Trees grow, plants die, the distribution of trees of various ages changes; the death of a large tree leaves a hole in the "canopy" of the forest that will be filled in with younger individuals, often of a different species. This natural process is known as succession (Golley 1977, Hall and others 1985a).

Diversity and Succession in Natural Stands

Succession generally follows a particular sequence. The time periods are relative; several stages may be spanned in the first 50 years of succession, following a disturbance (such as fire or timber harvest). Vegetation communities in the later stages will change slowly.

A pioneer stage of grass and forbs lasts from 2 to 5 years and occasionally as long as 50 years. An early seral stage of shrubs and saplings often lasts 3 to 10 years but may remain for 20 to 100 years if tree regeneration is delayed, either by natural or man-caused events. At this stage, trees in the area are generally under 10 feet tall. A young forest condition follows, with saplings and poles over 10 feet tall. The forest "canopy" is still fairly open (less than 60 percent closed) and the understory vegetation, commonly, is dominant. This stage may last from 8 to 20 years, depending on tree crown closure (Hall and others 1985a).

In most situations, forest stands have a tendency to be single-layered as they grow through their juvenile or early stages. The stands generally stay in a single canopy layer until a point in time where disease, insects, and weather begin to introduce mortality. With this mortality, holes appear in the crown canopy, allowing new seedlings to become established. Over time, these seedlings will become components of the canopy, providing for a multiple-layered canopy. The most shade-tolerant species in these stands are the likely stand replacement species.

As the tree crown cover closes, understory vegetation becomes sparse. This closed sapling-pole-sawtimber condition may last from 40 to 100 years. Succession continues through old-growth forest and finally to the "climax" stage of succession (Hall and others 1985a).

The size classes of trees in unmanaged stands will vary, depending upon the specific site, and the frequency of interruptions in the sequence. In most situations, older dominant trees in the western hemlock and Pacific silver fir series can be expected to exceed 26 to 30 inches in diameter. Trees at higher elevations will be smaller. When maturity is reached, a broad range of tree sizes will be found in a stand.

If natural succession is not interrupted by fire, changes in climate, timber harvest, or other disturbances, one stage of vegetation succession will be considered the "climax" stage (Henderson and Peter 1985). Technically, the community of plants that would develop within a time period of about 1000 years represents the climax stage (Henderson and Peter 1985). The climax stage, or "series" of vegetation, has one (or more) dominant overstory species, used to identify the series (Henderson and Peter 1985).

Should a catastrophic event occur, it may set the successional sequence back, allowing for subclimax species to replace the climax species and re-starting the successional sequence toward climax conditions. Mortality from disease, insects, windthrow, and wildfire tend to produce uneven edges and a mosaic of affected and unaffected trees or patches of trees. (This is in contrast to the the managed stand, discussed below.) The structural diversity in these natural stands will remain high and will continue to develop as the stands age.

Table III-6 shows the tree species found in each series or zone, in a natural stand. The tree species includes the dominant or major species found, plus other (minor) species; shade-tolerant species will be found in lower canopies.

Table III-6
Tree Species in A Natural Stand, by Series (or Zone)

	.....	.....	Series or Zone.....	
Species	Western Hemlock	Pacific Silver Fir	Mountain Hemlock	Subalpine Fir
Western hemlock	**Major**	**Major**	**Major**	
Douglas-fir	**Major**	Minor	Minor	
Western redcedar	Minor	Minor		
Pacific silver fir		**Major**	**Major**	
Noble fir		Minor	Minor	
Mountain hemlock		Minor	**Major**	Minor
Alaska yellowcedar		Minor	Minor	Minor
Subalpine fir				**Major**

All forested acres on the Mt. Baker-Snoqualmie that are **not** tentatively suitable for timber production will retain a high structural diversity, which will continue to develop as the stands age. Most of these acres are currently in the mature and older age classes. Refer to the Timber section later in this chapter.

Succession and Diversity in Managed Stands

When human activity interrupts the natural succession of vegetation, diversity changes. The harvesting of timber by clearcutting or shelterwood cutting - along with natural catastrophes such as fire or changes in climate - can interrupt the sequence discussed above.

When trees are removed by harvesting, the opened areas tend to be more regular in shape and size (typically, units are 10 to 60 acres); in addition, trees are removed evenly over the unit, as compared to the irregular "look" of a natural stand that has suffered mortality, disease, or fire.

After trees are removed, grasses and forbs invade. These species may differ from the ground vegetation found under a mature stand. This stage of succession in managed stands generally lasts two to five years, and sometimes up to 10 years. During this time, which is shorter for a managed stand than a natural stand, tree seedlings and shrubs become established. In a natural stand, the species of young trees re-establishing themselves after a catastrophic event will depend upon the species of trees left in openings

(residual trees) and/or seed-fall from adjacent trees. Tree replacement in a managed stand is pre-determined by the interdisciplinary planning team, following a particular silvicultural prescription which determines the species and number to be planted.

Replanting a Managed Stand. When the management emphasis for an area is timber production, the species selected by the silviculturalist is generally that with the highest commercial value, found naturally within the area, and that will perform well on a particular site. Often a species mix will be planted. Managed stands are normally artificially planted. Several species will usually regenerate in a cut-over areas, from seeds from residual or adjacent trees; thus, the planted managed stand will have a mixture of tree species. In areas where the management emphasis is other than timber production, the species mix planted may be selected to emulate the natural tree diversity. The resulting mix may or may not be similar to what would regenerate naturally (when a stand would regenerate gradually and continually, a few trees at a time). For example: in the western hemlock series, Douglas-fir is normally found, but it is a relatively shade intolerant species, needing bare soil to establish itself from seed. Western hemlock, on the other hand, is a shade tolerant species which can establish itself on top of the duff layer.

In addition, managed stands may be thinned prior to commercial harvest (to reduce the number of young trees on an acre, benefitting those remaining), which again interrupts the sequence of succession. Pre-commercial thinning usually results in the planted species dominating the stand. The natural fill-in species often comprise just 30 to 40 percent of the stand.

In a managed stand, climax conditions may not be reached. The maximum stand size (diameter of the trees) may be limited by the rotation assigned to the area and there will typically not be as broad a range of tree size classes in the stand, compared to a natural stand. Refer to the discussion later in this chapter for the acres available for timber harvest.

RIPARIAN ZONES

The riparian zone or habitat is that area that lies between the aquatic and terrestrial ecosystems. Riparian areas usually contain high water tables and have vegetation that requires large amounts of free or unbound water or conditions that are more moist than usual. (Brown 1985) Riparian areas occur along rivers, streams, lakes, ponds, reservoirs, and springs. They can occur through an entire drainage, and may extend inland for a considerable distance (Oakley and others 1985). Riparian zones may differ greatly in topography. Those with a broad, shallow profile receive more sunlight and wind and have more diversity of vegetation than those zones with steep slopes and a narrow profile (Oakley and others 1985).

Wetlands are areas that are permanently or intermittently flooded. The water table is normally at or near the surface; the land may be covered with shallow water (Oakley and others 1985). Vegetation needs saturated or seasonally saturated (hydric) soils to survive. Marshes, bogs, seeps, wet meadows, and shallow ponds are examples of wetlands found on this Forest. They occur Forest-wide but are more numerous on the north half of the Forest.

Riparian zones occupy only areas adjacent to approximately 11,641 miles of the rivers and streams on the Forest, but they are a critical source of diversity within the forest ecosystem (Oakley and others 1985). Riparian areas have a greater diversity of plants and trees than do upland areas. Riparian zones and wetlands provide some of the most important wildlife habitat. Wildlife species use riparian areas disproportionately more than any other type of habitat (Carothers and others 1974; Kelley and others 1975; Thomas and others 1977; Brown and others 1977; Riparian Habitat Technical Committee 1985). Most riparian areas contain all the major requirements for life - water, food, and cover (Oakley and others 1985). Many species are dependent on the riparian habitat for feeding and/or reproducing. See Chapter III Wildlife.

Riparian zones are important for many other uses as well. Highly productive timber sites frequently occur along streams and around lakes or wetlands. Riparian zones have often been used for road locations. Mining may have direct or indirect effects on the riparian zone. Recreation use is concentrated in the riparian zone, where scenic values are high. The riparian zone is a preferred location for many types of developed sites, from campgrounds and picnic areas to recreation residences and administrative sites. Because of this great variety of use and the fragile nature of riparian zones, they are recognized as a critical area for planning (Oakley and others 1985).

Riparian Zones and Planning

For the purposes of Forest planning, the width of the riparian areas on the Mt. Baker-Snoqualmie National Forest is at least 100 feet back from the water's edge on both sides of all perennial streams (36 CFR 219.27 (e)). Not included are intermittent streams that do not directly supply domestic water; are not used by fish; or do not contain enough water to be a major contributor to streams that contain these characteristics.

There are a total of 11,641 miles of streams with associated riparian ecosystems on the Forest. This figure is derived from the R2MAP data base (discussed in Chapter I, FEIS) and is slightly less than the total stream miles

on the Forest. Forty-one percent of the stream miles with associated riparian ecosystem are located within designated wilderness. As the width of these riparian ecosystems varies depending on the topography, acres of riparian zones have not been calculated for this level of Forest Planning.

Riparian zones, by nature, are especially susceptible to natural and human-caused disturbances. The long, narrow shape of the zone plus its extensive interface with both the aquatic and terrestrial systems make the riparian zone highly vulnerable to impacts from major upslope events (Oakley and others 1985). Natural erosion and deposition is common and may create additional diversity. Floods accelerate erosion and deposition, inundate streamside vegetation, and uproot and destroy riparian vegetation; but, they may also create new riparian zones or wetlands as stream courses change. Wildlife rarely impact or destroy riparian vegetation.

Many of the 39,850 acres of forested land that are technically unsuited for harvest due to irreversible soil damage are located in riparian zones. These acres are discussed in detail above, in the soils section. (In addition, there are a varying number of acres, depending upon physical conditions, in the riparian areas that will not be harvested because of watershed, fishery, and wildlife management objectives.)

Human-caused alteration of riparian zones include but are not limited to road and trail building, harvesting trees, recreation use, dam construction, and mining activities, especially of salable minerals such as sand and gravel.

Private lands within the National Forest boundary and downstream from the Forest also contain riparian lands. Much of the non-Federal land within the boundary tends to be located along stream and river valleys, in intermingled, "checkerboard" patterns. Disturbances on these lands can impact fragile riparian zones on National Forest land.

Logging by private owners in "checkerboard" lands has often resulted in the accelerated harvesting of entire square-mile sections of land. Harvest standards may also vary. Since these streams also flow through National Forest lands, protection of the watershed values needs to take in to account conditions and management patterns on private areas in order to maintain acceptable watershed conditions.

OLD GROWTH

Introduction

One of the elements of diversity is old growth. Biologically and politically, many people have more interest in old growth than in other successional stages. Old growth is an important value in its own right (W.O. letter October 1989). In addition, old growth provides wildlife habitat, gene pools for plants and animals, opportunities for research on natural systems, aesthetics, recreation, fish habitat, and commercial timber.

Old growth management is a major public issue on the Mt. Baker-Snoqualmie National Forest. Retaining old growth for wildlife habitat, ecosystem diversity, aesthetics, and the use by Native Americans for religious, cultural, and ceremonial purposes are all facets of the issue. From a timber management standpoint, these old-growth trees have a high market value. The net growth of these trees is less than 20 cubic feet per acre per year; if the old growth were cut and young trees replanted, the same sites could potentially produce in excess of 170 cubic feet per acre per year, in an intensive management regime.

The Definition of Old Growth

Old-growth stands can be defined by age, by stand condition, by diameter, by ecological characteristics, or by a combination of some or all of these factors (USDA Forest Service 1988c). The most recent timber inventory completed on the Mt. Baker-Snoqualmie (1976) was based on tree species and size.

Recently, the public and scientific community have focused on a definition of old growth based on the structural components of the stand. Several structural components are believed to be of key importance in an old-growth stand, including: individual, live, large trees; dead and down logs in streams; standing dead trees or snags; large, dead, down logs on the land; and multi-storied canopy of mixed species. These structural features are unique to an old-growth forest ecosystem, setting it apart from young growth and, especially from managed stands. Most of the distinctive compositional and functional features of old-growth forests can be related to these structural features. These structural components make possible much of the uniqueness of the old-growth forest in terms of flora and fauna - including microorganisms and species of fungi - (its composition) and the way in which energy and nutrients are cycled (its function). This complex system is only partially understood at this time.

There are a number of definitions of old growth. Franklin et al. (1986) establishes numerous characteristics to define old growth; the stand characteristics vary by species. The Pacific Northwest Regional Guide (1984) defines old growth, also varying by species. Neither of these definitions could be used on this Forest, when the planning process began; the 1976 inventory did not include enough information about understory and dead and down logs to allow a direct translation into either the definition from the Regional Guide or Franklin et al. (1986).

Old-growth and mature forest inventories are being updated as quickly as possible, to reflect new concepts of older forest values and importance. A landsat inventory is underway, which will give broad mapping capability of old

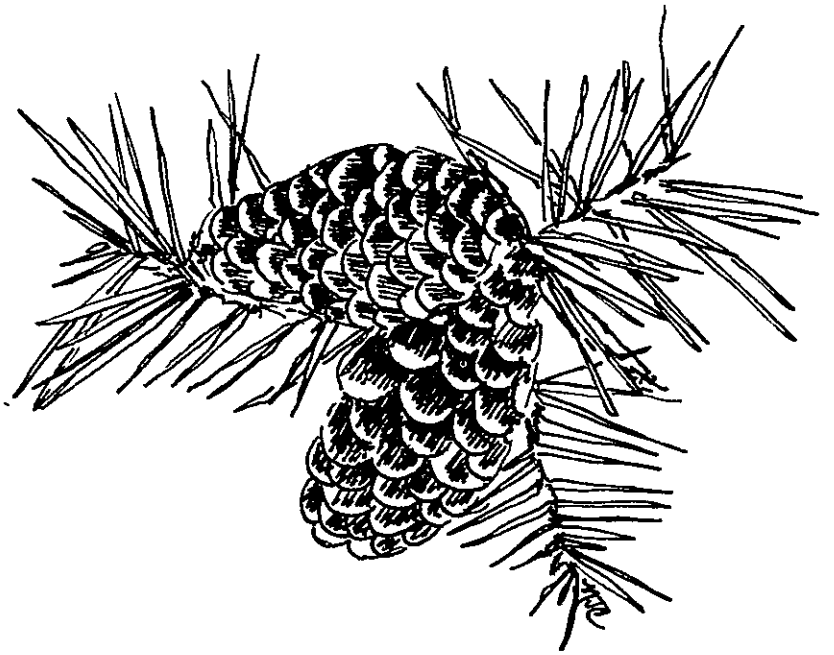
growth. This portion of the new inventory should be completed by 1991. Total Resource Inventories are replacing the older timber inventories; they are based on many more characteristics than tree size and class. With this new inventory, there will be the flexibility to identify and map acres of old growth can be determined and/or mapped, regardless of the definition used.

Existing Situation

At present, old-growth forest covers nearly 37 percent of the National Forest land on the Mt. Baker-Snoqualmie, approximately 643,500 acres. 1/ For the purposes of this plan, old growth is defined as those stands containing mature and large sawtimber, with trees that are at least 21 inches in diameter at breast height (DBH), or 4-1/2 feet from the ground. The mean age for mature, large sawtimber on the northern half of the Forest is 241 years; on the southern half, it averages 257 years. Refer to Appendix B for a discussion on how old growth was handled in the FORPLAN model.

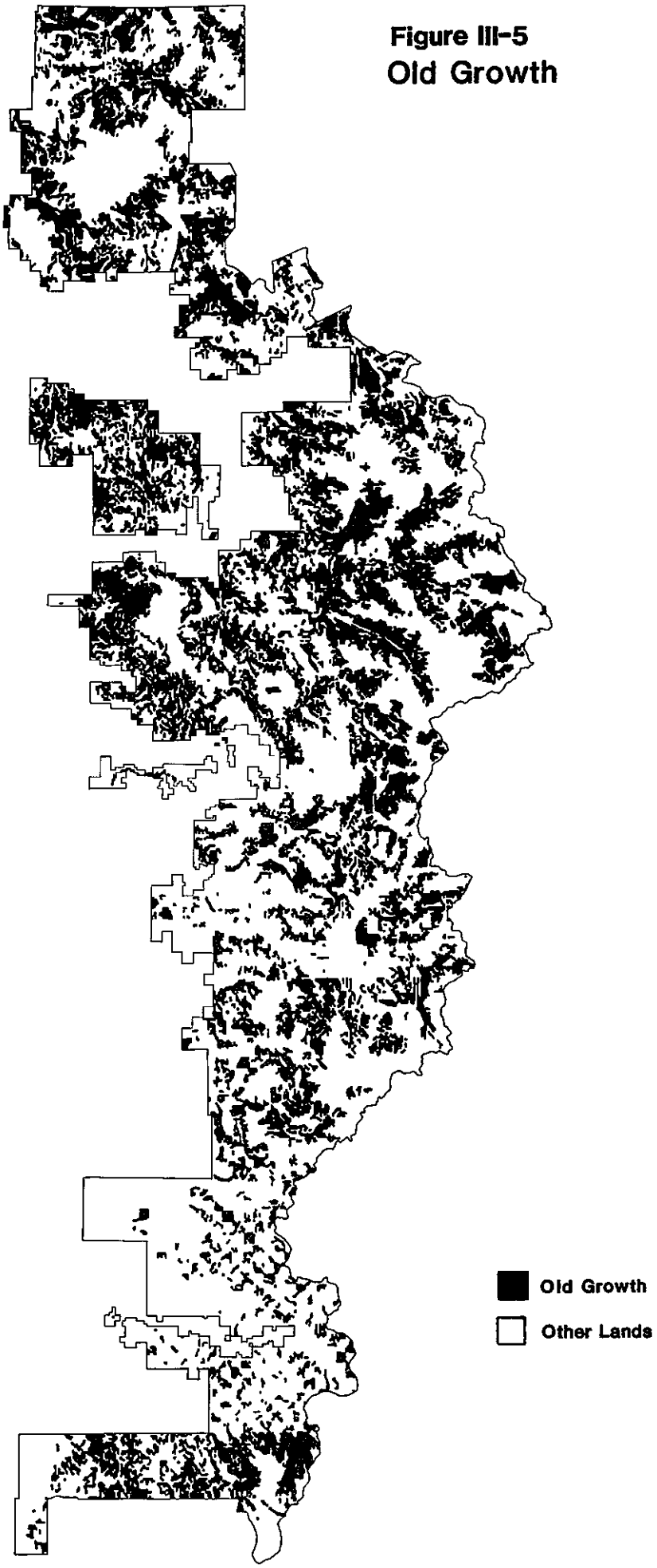
A total of 232,500 acres (36 percent) of the old growth is found in wilderness. An additional 134,400 acres outside of wilderness are considered to be unsuitable for timber harvest. These acres are either withdrawn from timber production (example: Research Natural Areas) or they are unsuitable because of highly unstable soils and difficulty in reforesting the area with trees if the timber is cut. An estimated 276,600 acres of old-growth forest are tentatively suitable for timber harvest (1989).

Figure III-5 shows the general location of acres of all old growth on the Forest, based on the above description.



1/ Currently, there are about 224,000 acres of forested lands which are in the grass-forb and seedling-sapling stages. These are areas which have been harvested (or, in a few cases, burned) and which are undergoing reforestation. Immature tree stands total approximately 222,300 acres on the Forest.

Figure III-5
Old Growth



THREATENED, ENDANGERED, AND SENSITIVE PLANTS

There are no federally-listed threatened or endangered plant species which have been found on the Forest. Twenty-six species from the Pacific Northwest Region Forest Service list of Sensitive Plants are known to occur on the Forest, and another fifteen are suspected to occur; see Table III-7 below. Sensitive species are not protected under the Endangered Species Act. However, Forest Service policy requires that these plants by managed to avoid a need for placing them on the Federal list. Potential impacts to these species must be evaluated prior to a final decision on any specific, proposed project.

Two sensitive plant species, suspected but not known to occur on the Forest, are Category 2 candidates for federal listing. They are Calamagrostis crassiglumis and Castilleja cryptantha.

The list of plant species will continue to change, as inventories produce more information on the occurrence, numbers, and distributions of species. Species may be removed from the list based on additional information which shows that they are not as rare as once thought, or as management plans are developed to ensure their viability. Species may also be added to the list, as they are discovered to occur on the Forest, or if they are more rare than presently thought.

Table III-7
Pacific Northwest Region List - Sensitive Plant Species Known or Suspected to Occur on the Mt. Baker-Snoqualmie National Forest - March 1989

Scientific Name	WA State Category
(known to occur)	
ASTER SIBIRICUS VAR MERITUS	Sensitive
BOTRYCHIUM LANCEOLATUM	Sensitive
BOTRYCHIUM LUNARIA	Sensitive
BOTRYCHIUM MINGANENSE	Sensitive
BOTRYCHIUM MONTANUM	Sensitive
BOTRYCHIUM PINNATUM	Sensitive
CAMPANULA LASIOCARPA	Sensitive
CAREX BUXBAUMII	Sensitive
CAREX PAUCIFLORA	Sensitive
CAREX SCIRPOIDEA VAR SCIRPOIDEA	Sensitive
CAREX STYLOSA	Sensitive
CHAENACTIS THOMPSONII	Sensitive
COPTIS ASPLENIFOLIA	Sensitive
DODECATHEON PULCHELLUM VAR WATSONII	Sensitive
DRYAS DRUMMONDII	Sensitive
FRITILLARIA CAMSCHATCENSIS	Sensitive
GENTIANA DOUGLASIANA	Sensitive
GENTIANA GLAUCA	Sensitive
LYCOPODIUM DENDROIDEUM	Sensitive
PEDICULARIS RAINIERENSIS	Sensitive
PLATANTHERA CHORISIANA	Threatened
PLATANTHERA OBTUSATA	Sensitive
PLEURICOSPORA FIMBRIOLATA	Sensitive
RANUNCULUS COOLEVAE	Sensitive
SAXIFRAGA DEBILIS	Sensitive
SAXIFRAGA INTEGRIFOLIA VAR APETALA	Sensitive
(suspected to occur)	
AGOSERIS ELATA (Nutt) Greene	Sensitive
CALAMAGRSTIS CRASSIGLUMUS Thrub	Threatened
CAREX COMOSA Boott	Sensitive
CAREX MACROCHAETA C.A. Meyer	Sensitive
CAREX SAXATILIS L. Var. Major Olney	Sensitive
CASSIOPE LYCOPODIOIDES (Pall) D. Don SSP. CRISTAPILOSA Calder and Taylor	Sensitive
CASTILLEJA CRYPTANTHA Pennell & G. N. Jones	Threatened
CIMICIFUGA ELATA Nutt in T&G	Sensitive
DRABA AUREA Vahl in Hornem	Sensitive
LOBELLA DORTMANNA L.	Sensitive
LOISELEURIA PROCUMBENS (L.) Desv.	Sensitive
LUZULA ARCUATA (Wahlenb.) WahlenB	Sensitive
MICROSERIS BOREALIS (Bong.) Schultz-Bip.	Sensitive
SAXIFRAGA CERNUA L.	Sensitive

The following table categorizes plant species by general habitat requirements. Many species appear in more than one habitat type; species in parentheses indicate uncommon occurrence in that habitat.

Legend and sources for Table III-8:
Elevation: L - lowlands and valleys; M - moderate elevation; H - high elevation; ? - information unavailable; all elevations should be considered.

Sources: Hitchcock et al. 1969; Washington Natural Heritage Program 1981; Gamon personal communication

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Table III-8
Habitat Requirements of Sensitive Plant Species 1/

HABITATS	Elevation L	M	H		Elevation L	M	H
Streambanks, pond & lake margins:							
(Agoseris elata)	X	X		Carex stylosa	X		
Botrychium lanceolatum		X	X	Cicuta bulbifera	X	X	
Botrychium lunaria		X	X	Dryas drummondii			X
Calamagrostis crassiglumis	X			Gentiana douglasiana	?	?	?
(Carex buxbaumii)	X	X		Lobelia dortmanna	?	?	?
Carex comosa	X	X		Platanthera chorisiana	X		
Carex macrochaeta	X			Platanthera obtusata		X	X
Carex saxatilis		X	X	Poa grayana		X	X
Carex scirpoidea scirpoidea			X				
Springs, seeps:							
(Agoseris elata)	X	X		(Calamagrostis crassiglumis)	X		
Botrychium lanceolatum		X	X	(Carex buxbaumii)	X	X	
Botrychium lunaria		X	X	Carex macrochaeta	X		
Botrychium minganense	?	?	?	(Lycopodium inundatum)	?	?	?
Botrychium pinnatum	?	?	?	Platanthera obtusata		X	X
Bogs:							
(Botrychium minganense)	?	?	?	Coptis asplenifolia	X	X	
(Botrychium pinnatum)	?	?	?	Gentiana douglasiana	?	?	?
Calamagrostis crassiglumis	X			Lycopodium dendroideum	?	?	?
Carex buxbaumii	X	X		Lycopodium inundatum	?	?	?
Carex pauciflora	X			Platanthera chorisiana	X		
Cicuta bulbifera	X	X		Platanthera obtusata		X	X
Marshes:							
(Botrychium minganense)	?	?	?	Carex stylosa	X		
(Botrychium pinnatum)	?	?	?	Cicuta bulbifera	X	X	
Calamagrostis crassiglumis	X			(Lycopodium inundatum)	?	?	?
Carex buxbaumii	X	X		Platanthera obtusata		X	X
Carex comosa	X	X					
Wet forest:							
Botrychium montanum	?	?	?	Platanthera obtusata		X	X
Coptis asplenifolia	X	X		Pleuricospora fimbriolata	?	?	?
Lycopodium dendroideum	?	?	?				

Table III-8 (continued)

HABITATS	Elevation L	M	H		Elevation L	M	H
Damp slopes or cliffs:							
Ranunculus cooleyae		X	X	Saxifraga integrifolia apetala		X	X
Saxifraga debilis	?	?	?				
Moist, grassy, alpine areas:							
(Agoseris elata)	X	X		Dodecatheon pulchellum watsonii	?	?	?
(Botrychium lanceolatum)		X	X	Gentiana glauca			X
(Botrychium lunaria)		X	X	Poa grayana		X	X
(Botrychium minganense)	?	?	?				
Meadows (wet or dry):							
Agoseris elata	X	X		Carex scirpoidea scirpoidea			X
Botrychium lanceolatum		X	X	Cicuta bulbifera	X	X	
Botrychium lunaria		X	X	Dodecatheon pulchellum watsonii	?	?	?
Botrychium minganense	?	?	?	Draba aurea			X
(Botrychium montanum)	?	?	?	Fritillaria camschatcensis	X	X	X
Botrychium pinnatum	?	?	?	Gentiana glauca			X
Calamagrostis crassiglumis	X			(Lycopodium inundatum)	?	?	?
Carex buxbaumii	X	X		Platanthera obtusata		X	X
Carex comosa	X	X		Poa grayana		X	X
Carex macrochaeta	X			Saxifraga integrifolia apetala		X	X
Carex saxatilis		X	X				
Open woods:							
Agoseris elata	X	X		Lycopodium dendroideum	?	?	?
Forested slopes:							
Draba aurea			X				
Alpine slopes:							
Campanula lasiocarpa			X	Loiseleuria procumbens			X
Dodecatheon pulchellum watsonii	?	?	?	Poa grayana		X	X
Draba aurea			X	Saxifraga integrifolia apetala		X	X
(Gentiana glauca)			X				
Open rocky areas:							
Aster sibiricus			X	Dryas drummondi			X
Carex scirpoidea scirpoidea			X	Lycopodium dendroideum	?	?	?
Dodecatheon pulchellum watsonii	?	?	?				
Scree, talus:							
Dryas drummondi			X	Saxifraga debilis	?	?	?
Poa grayana		X	X				
Ridges:							
Dryas drummondi			X	Poa grayana		X	X
High mountain cirques:							
Dryas drummondi			X				
Rock crevices:							
Ranunculus cooleyae		X	X	Saxifraga debilis	?	?	?

COMMERCIAL TIMBER

Commercial timber species on the Mt. Baker-Snoqualmie National Forest include Douglas-fir, western hemlock, Pacific silver fir, noble fir, western white pine, western redcedar, grand fir, Alaska yellowcedar, sitka spruce, red alder, big leaf maple, and cottonwood. The table below shows the distribution of commercial tree species on tentatively suitable lands on the Forest. Suitability is discussed below.

Table III-9
Commercial Tree Species on Tentatively Suitable Forest Lands
1976 Inventory

Species	Percent
Western hemlock	32.8
Douglas-fir	26.1
Pacific silver fir	22.5
Western redcedar	9.4
Other Conifers 1/	7.5
Hardwoods 2/	1.7
TOTAL	100.0

1/ Includes: mountain hemlock, subalpine fir, Alaska yellowcedar, grand fir, noble fir, sitka spruce, and western white pine.
2/ Major species are red alder, bigleaf maple, and black cottonwood.

Timber Suitability

Of the 1,724,229 (legal) acres of National Forest land on the Mt. Baker-Snoqualmie, approximately 597,000 acres, or 35 percent, are tentatively suitable for timber harvest. Tentatively suitable forest land is capable of producing industrial wood and, 1) has not been withdrawn by Congress, the Secretary of Agriculture, or the Chief of the Forest Service (for wilderness etc.); 2) existing technology and knowledge is available to ensure timber production without irreversible damage to soils, productivity, and watersheds; 3) there is reasonable assurance that, given current technology, the lands can be restocked with trees within five years of cutting; and 4) there is adequate information to project the response of the environment to timber management activities (FSH 2409.13). Once forest lands are assigned to a timber production prescription in an alternative, they are identified as suitable, rather than tentatively suitable.

Table III-10, on the following page, shows the process for determining which lands are tentatively suitable for timber harvest. The process is graphically portrayed in Figure III-6. On the following page, Figure III-7 shows the general location of all tentatively suitable acres on the Forest. A more detailed discussion of the determination of timber suitability is included in the planning records, available at the Forest Supervisor's office.

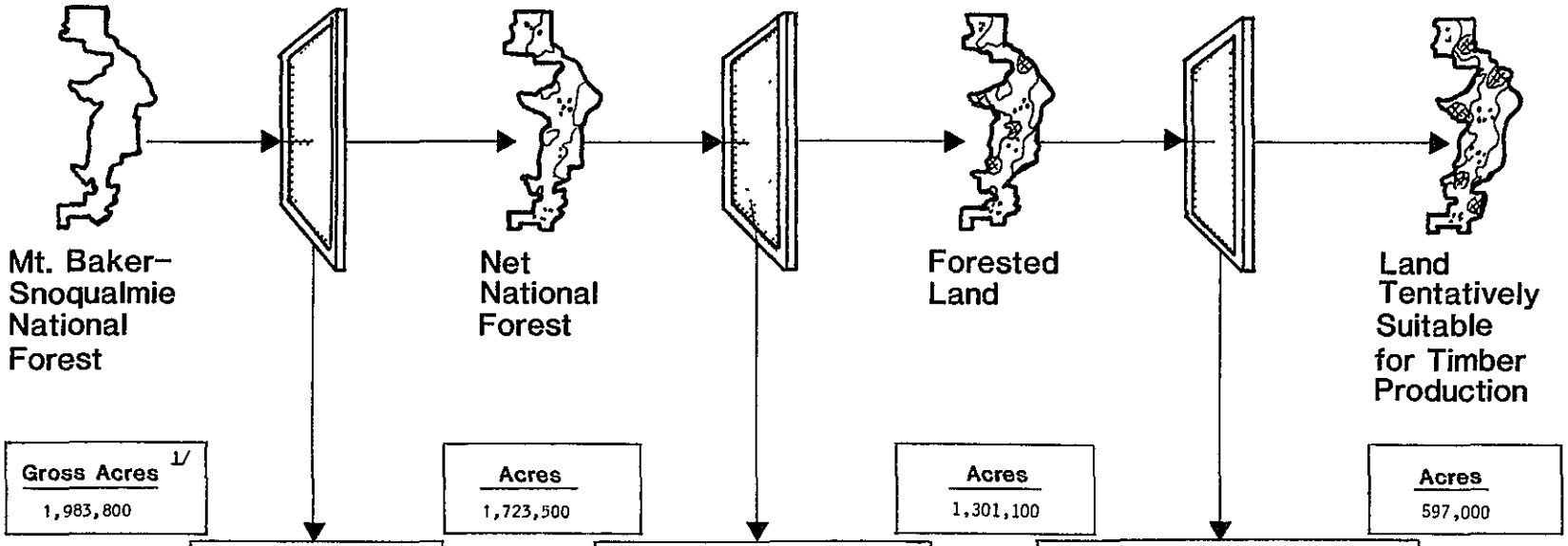
Table III-10
Land Suitability for Timber Production 1/

	Totals	Not Suited for Timber Production	Tentatively Suitable for Timber Production
		Acres	
I. Mt. Baker-Snoqualmie National Forest	1,983,800		
A. Other Ownership		259,800	
II. Net National Forest	1,723,500 2/		
A. Water		17,400	
B. Non-forest		382,200	
C. Forest lands developed for other than timber production purposes (36 CFR 219.3)		22,800	
III. Forested Lands (II - II A , B., and C)	1,301,100		
A Withdrawn from scheduled timber production (36 CFR 214 14)(a)(4))			
1. Wilderness		440,200	
2. Research Natural Areas 3/		1,000	
3. Jim Creek Naval Station		1,000	
B. Growing less than 20 cubic feet per acre per year and not included in III.A., C , or D.			
1 Classified as unsuitable		6,700 4/	
2 Classified as suitable			0
3 Classified as separate suitability component			0
C Irreversible resource damage (36 CFR 219 14(a)(3))		95 500	
D. Regeneration difficulty (36 CFR 219 14(a)3))		159,700	
E Regeneration difficulty lands classified as a separate suitability component			0
IV. Forested lands not suitable for *timber production* (III. A + B.1., + C + D)		704,100	
V. Lands tentatively suitable for timber production (III - IV)			597,000
VI. Land status under current timber management plan		**Non-commercial Forest Land**	**Commercial Forest Land**
		1,142,500	**579,800**

1/ Reference 36 CFR 219.14 and Regional Planning Direction 1920, Nov 10, 1983.
2/ RZMAP Land Management Planning Data Base acres used in II. through V.
3/ Long Creek Research Natural Area is included in Wilderness
4/ Inadequate Response Information There is not adequate information available, based on current research and experience, to project responses (growth or yield) to timber management practices (FSH 2409 13-21).

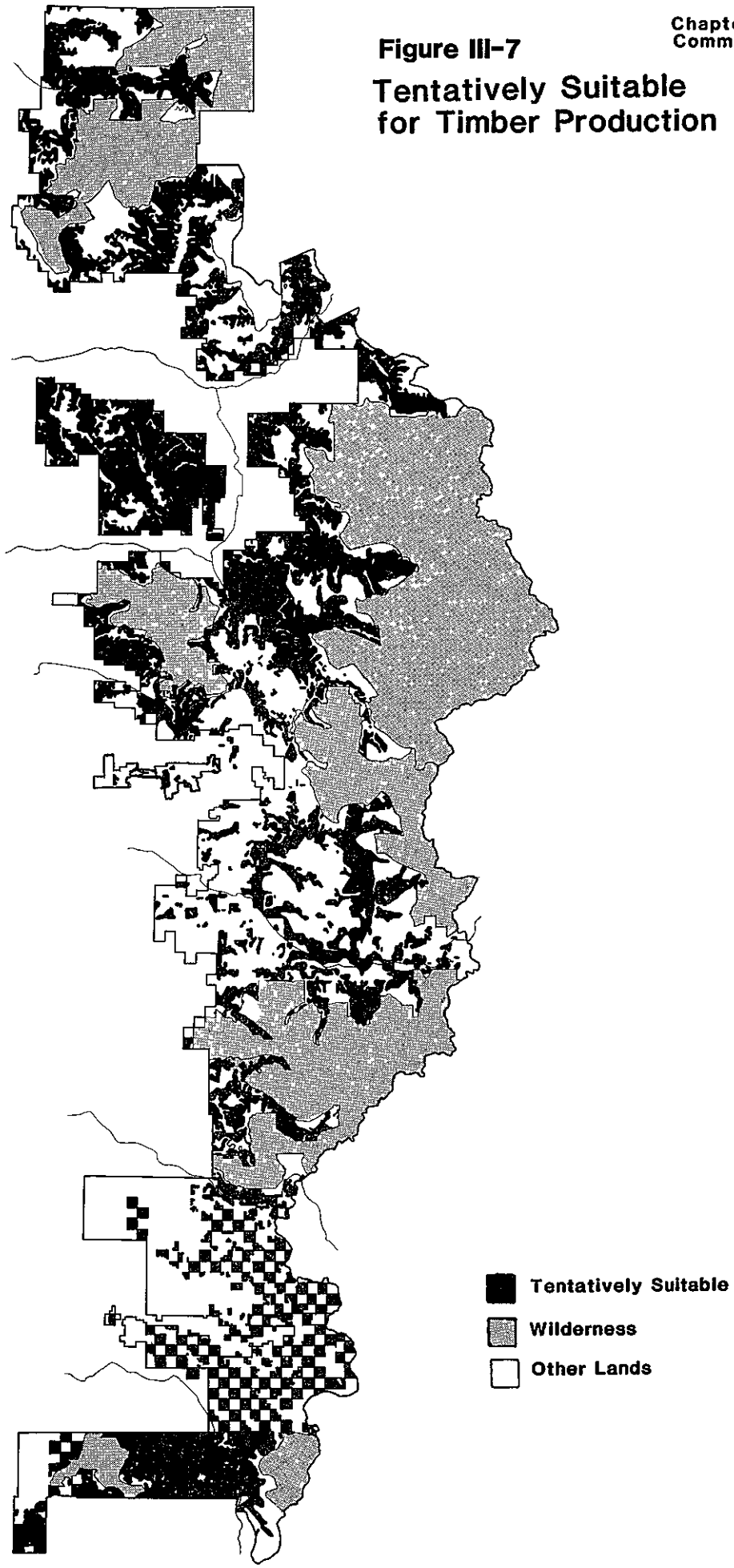
Figure III-6

Determination of Land Suitability for Timber Production



1/ Legal acres, all other acres are R2Map Data Base. To calculate the tentatively suitable acres, subtract from the 1,723,500 Net National Forest acres.

Figure III-7
Tentatively Suitable for Timber Production



Regeneration Difficulty Lands

Approximately 159,700 acres of forest land have been identified as not suitable for timber production because of regeneration difficulty. (Forest land includes acres outside of wilderness and Research Natural Area, at least 10 percent stocked by live trees, or land formerly having such tree cover and not currently developed for non-forest use.) At this time, there is no reasonable assurance that these acres could be reforested within the prescribed time period of five years. Refer to Appendix B for more information.

Slightly over 75,900 of the regeneration difficulty acres contain stands dominated by mountain hemlock. These acres occur at higher elevations - generally above 4,200 feet - in the Mountain Hemlock Zone, and are found in the three northern Districts.

These lands are generally not very productive for growing commercial trees. Growth occurs slowly, over a long period of time - some stands are over 800 years old - a result of high elevation, deep winter snow pack, poorly developed, shallow soils, and especially the temperature regime. Cold soil temperatures in the tree rooting zone for much of the year create a poor environment for plants to germinate and become established. The usual cold soil temperatures are compounded by occasional high soil surface temperatures, adding to the harshness of the environment (Henderson and Peter 1985).

Trees in these mountain hemlock stands are averaging a growth rate (a Mean Annual Increment, MAI) of 35 cubic feet per acre per year. The culmination, or age at which average growth is the greatest (CMAI) for these trees occurs at approximately 240 years. This compares to a Forest-wide average productivity of 115 cubic feet/acre/year and a culmination of MAI of 80 years.

Past timber management activities on these lands, both National Forest and private, has been limited. Although examples of regeneration success can be found, the conditions under which this success occurred cannot be documented because of lack of information on stand make-up, harvest systems, post-harvest activities, and conditions under which regeneration was attempted. Although these lands eventually are reforested, the conditions and timing of reforestation have not been documented. In general, reforestation does not occur within 5 years of harvest, but occurs over an extended time period.

Timber Management Plans

Timber management activities on the Forest are based on the July, 1963 Timber Management Plans for the Mt. Baker and Snoqualmie National Forests. These plans have been amended and updated to reflect major changes in the land base, including the formation of the North Cascades National Park complex, transfer of administrative responsibility to other National Forests, the Alpine Lakes Area Management Act, the Roadless Area Review and Evaluation (RARE I and II), and the Washington State Wilderness Act of 1984. Recent amendments extended the effective date of these plans through Fiscal Year 1990.

As discussed in the Diversity section, the most recent timber inventory of the Forest was completed in 1976. A Timber Resource Management Plan Draft Environmental Impact Statement, based on that inventory, was released in 1979. As the Forest Planning process began, late in 1979, a decision was made to

integrate the timber plan into the Forest Land and Resource Management Plan. A final EIS, Timber Resource Management Plan was never completed.

THE FOREST TIMBER SALE PROGRAM

Historical Perspective

The 1979 Draft EIS and Timber Management Plan proposed a preferred alternative - Intensive Management - and gave an annual potential yield of 422 million board feet (MMBF), including: 40 MMBF of salvable dead timber; 6 MMBF full marginal CFL yield; and 22 MMBF earned harvest yield from intensive management practices, such as precommercial thinning. The preferred alternative had a chargeable average annual programmed harvest level of 330 MMBF. Data from this Plan was used to develop the Forest 1980 RPA Timber Sale Targets. (See the Glossary, FEIS for definitions of these terms.)

The roadless area issue (1972-1984) resulted in a long-term concentration of the forest timber sale program on approximately one-half of the land base. In 1982, the Mt. Baker-Snoqualmie National Forest negotiated with the Regional Forester and an annual programmed harvest level of 265 MMBF was set for fiscal years 1983-1985, or until the Forest Plan is completed. The 265 MMBF programmed harvest level is equivalent to approximately 244 MMBF of chargeable volume and 21 MMBF of nonchargeable volume. At the time of negotiation, the 1963 Plans had been amended to reflect a chargeable volume of 259.4 MMBF.

The programmed harvest level of 265 MMBF is based on a management intensity requiring 5,578 acres of precommercial thinning per year. Precommercial thinning accomplishments in the last seven years have averaged about 2,500 acres per year.

The November 1984 amendment to the 1963 Timber Management Plan (effective October 1984) includes an Annual Potential Yield of 203.8 MMBF, reflecting the impact of the Washington State Wilderness Act. Although terminology has changed and the method of calculation differs, this 203.8 MMBF may be compared to the 1979 annual programmed harvest level of 330 MMBF, reduced to 302 MMBF for marginal CFL yield and earned harvest. These latter yields are not included in the 203.8.

Forest Industry Performance

During the 1979-88 period, the average annual cut on the Forest averaged 229.6 MMBF; 200.6 MMBF of this volume was chargeable to the potential yield. This compares with the "effective adjusted PY sell" of 185.4 MMBF discussed above.

The 15.2 MMBF difference between the actual chargeable cut and adjusted chargeable sell is minor and the adjustment masks the effects of the recession. During the 1979-88 period, average annual timber purchased was 266.8 MMBF, including 235.8 MMBF chargeable to PY. The average annual cut during the period, 229.6 MMBF, was 13.9% below the average volume purchased. The major reasons purchasers did not cut more of the volume sold: market or recession lows and overbidding during 1979-84; and the large backlog of volume under contract not cut due to recession. This backlog volume under contract but not cut had shrunk to 147.7 MMBF by the start of FY 1989.

The effects of the 1981-82 recession - with high interest rates - depressed the housing market, resulted in a general slowdown in the economy, and sent timber prices and demand crashing. Timber harvest in fiscal year 1982 on the Forest declined to 124.5 MMBF, the lowest level since World War II. In fiscal year 1984, the cut increased to slightly above the 1980 cut; a higher percentage of harvesting was done on National Forest and State lands and less on private lands. This reflected an effort by industry to stay competitive by harvesting sales purchased at the lowest rates, especially those purchased in 1982-84. After 1985, harvest increased on all ownerships, with harvest activities (cut volume) out pacing sold volume on national forest lands in 1987 and 1988 by 22.8 MMBF per year. This was a reflection of the high demand for wood products from all ownerships, as the economy recovered from the recession, housing demand increased, and log exports from State and private lands rose dramatically.

The Mill Situation

A direct effect of the 1981-82 recession was a decline in the number of mills (lumber, veneer and plywood, pulp, shake and shingle, and post/pole/piling). From 1972 through 1978, the total number of mills in the State of Washington, excluding the export industry, increased 35.7%. From 1978 to 1982, the number of mills decreased 29.6%. The number of mills in the Puget Sound area (excluding export) dropped 20 % in two years - 1980-82. Part of this is due to increasing mill efficiency: by 1982, mills utilized 97 percent of wood and bark residue.

Mills continued to close: between 1982 and 1984, another 18 percent in the Puget Sound area closed. An additional 11 percent shut their doors by 1986. In all, the recession and restructuring of the wood products industry saw Puget Sound area mills (not including export operations) decrease by almost half.

However, there were major improvements in productivity among the remaining mills. For instance, lumber mills, which had dropped by 23 percent in number by 1986, were producing only 9 percent less lumber than in 1978.

In the Puget Sound area in 1986, 49 of the 87 mills (excluding the 35 export mills) were not dependent on National Forest timber; 11 mills were dependent for 1-33% of their log supply; 6 were dependent on National Forest timber for 34-66% of their supply; and 21 were 67-100% dependent on National Forest log supply. This is discussed further, under "supply" in this section of Chapter III.

Situation as of 1988

The planned Programmed Harvest for fiscal year 1988 was 231 MMBF; this is approximately equivalent to a chargeable volume of 209 MMBF and 22 MMBF of nonchargeable.

Table III-11, on page III-46, shows the history of the amount of timber sold and harvested during the period of the current Timber Management Plan (Fiscal Year 1964-88). The remarks column includes explanations of significant amendments to the plan. Note that forested federal lands remained part of the land base used to calculate potential yield until transferred to other

jurisdictions (National Park) or specially designated (wilderness or research natural area).

For the entire period - 25 years - the cumulative total potential yield was undersold by about 3 percent (7,452.2 MMBF - 7,256.2 MMBF equals 196.0, divided by 7,452.2 x 100). This undersell is somewhat less than actually occurred, because some potential yield volume returned to the Government was resold in Fiscal Year 1986 through 1988, thus sold and counted twice.

The total harvest over the period was just less than 1 percent of the total sold (7,977.1 MMBF - 7,883.4 MMBF equals 93.7, divided by 7,977.1 x 100). It is interesting to note that there was only one fiscal year before 1975 (the year 1972) when total harvest did not exceed total sold. This reflects (1) high demand for timber, (2) that the timber purchasers were heavily involved in harvesting the 1962 blowdown from the Columbus Day Storm, and (3) sell of potential yield was less than planned, due to the priority of salvaging the blowdown or other factors.

From 1975 to 1986, the trend opposed that of preceding years, with more volume sold than harvested. This represents a lower demand for timber off of National Forest lands, combined with the speculative nature of the timber industry during that period. The trend peaked in 1984, when many sales were returned to the Forest under Congressional legislation, or by default. In 1987 and 1988, the amount harvested again exceeded the volume sold, a function of increased demand for wood, the restructuring of the timber industry, reduced programmed sale levels on this Forest, and the harvesting of timber timber contract but not cut from previous years.

Footnotes for Table III-11

1/ Termed annual allowable cut in the 1964 plans. Plan amendment effective 7/1/73 changed the term to potential yield. See discussion in Chapter II.

2/ PY sold is from the Forest Timber Mgt. Control Record-Sell. Exceptions:Naches-Tieton WC, Snoqualmie NF, was estimated for FY 1964, 34.5 MMBF; FY 1965, 96.5 MMBF; and FY 1966, 49.1 MMBF. PY sold for FY's 1967-68 were estimated for the Tieton Ranger District portion of Naches-Tieton WC. This volume is chargeable to the PY.

3/ Total sold is from the Forest TM Control Record-Sell; FY's 1964-66 from R-6 Cut and Sold Report; includes both chargeable and nonchargeable volume.

4/ Total Harvested is from the Forest Timber Management Control Record-Cut. This includes both chargeable and nonchargeable volume.

5/ Changes in TM Plans are made by plan amendment approved by the Regional Forester. Amendments on file: Forest Supervisor's and Regional Offices.

6/ Only those CFL acres used to calculate the regulated PY are included in this table.

Table III-11

Timber Sold and Harvested During the Period of the Current Timber Management Plan

Fiscal Year	Potential Yield 1/	Potential Yield Sold 2/	Total Sold 3/	Total Harvested 4/	Remarks 5/
		MMBF			
1964	392.9	382.1	418.7	436.2	Includes seven working circles in Snoqualmie National Forest with a PY of 228 6 MMBF, and two working circles in Mt. Baker National Forest with a PY of 164.3 MMBF CFL 6/ of the two plans totaled 1,056,663 acres
1965	392.9	428.6	416.3	483.7	PY sold in Naches-Tieton WC, Snoqualmie NF, estimated for PY 1964, 34 5 MMBF; 1965, 96.5 MMBF, and 1966, 49.1 MMBF.
1966	392.9	359.7	385.3	470.1	
1967	413.9	322.3	345.4	362.0	Effective 7/1/66 a new Timber Management Plan for the Naches-Tieton working circle increased the PY 21.0 MMBF, and reduced CFL 31,469 acres The remaining six Snoqualmie National Forest working circles were combined into Snoqualmie working circle
1968	413.9	413.1	426.1	462.3	
1969	377.6	240.9	283.6	410.5	Effective 7/1/68 the two Mt Baker NF working circles were combined into Mt. Baker working circle and the PY was reduced by 36 3 MMBF as a result of The North Cascade National Park and Recreation Act of 1968. The North Cross State Highway Corridor was transferred to administration of Okanogan NF Reduction in CFL was 49,273 acres.
1970	377.6	374.2	446.4	452.8	
1971	342.3	258.0	301.4	308.8	Mineral Ranger District portion of Snoqualmie working circle was transferred to administration of the Gifford Pinchot NF effective 7/1/70. The Snoqualmie working circle PY reduced 35.3 MMBF and CFL reduced 70,613 acres
1972	342.3	305.2	327.4	325.8	
1973	342.3	359.9	380.4	455.2	
1974	342.3	313.0	338.7	412.9	
1975	240.9	268.0	315.7	206 0	Effective 7/1/74, plans amended for Chief's Wilderness Study Area (RARE I study) resulting in reduction in PY of 19 7 and CFL of 49,350 acres The Naches-Tieton working circle was transferred to the administration of the Wenatchee NF resulting in a reduction in PY of 81 7 MMBF and CFL of 253,814
1976	301.1	312.4	346.2	271.4	Fiscal year 1976 includes an additional 60 2 MMBF PY, more sold and more harvest to account for the transition quarter to change the federal fiscal year from 7/1 - 6/30 to 10/1 - 9/30
1977	240.9	289.9	299.9	281 5	
1978	240.9	270.8	277.1	247 7	
1979	240.9	302.5	319 3	267 6	
1980	259.4	262.9	294 1	228.5	Effective 10/1/79 the PY was amended to reflect the results of the RARE II study; PY increasod 18.5 MMBF and CFL 38,557 acres
1981	259.4	271 7	307.3	211.8	
1982	259 4	230.5	266.3	122.5	
1983	259.4	194.6	221.2	216 6	
1984	203.8	218.8	250.9	235 6	Effective 10/1/83, Plans amended to reflect the results of the Washington State Wilderness Act of 1984, PY reduced 55.6 MMBF and CFL reduced 94,201 acres.
1985	203.8	201.3	231.1	210.9	
1986	203.8	245.1	279.9	259.0	Sold includes volume returned to Government under the Federal Timber Contract Payment Modification Act of 1984, and volume from defaulted sales cancelled.
1987	203.8	221.5	266.8	295.9	..... same as 1986.. . . ..
1988	203.8	209.2	231.6	248.1	.....same as 1986, 1987 ....
TOTALS	7,452.2	7,256.2	7977.1	7883.4	

Reforestation

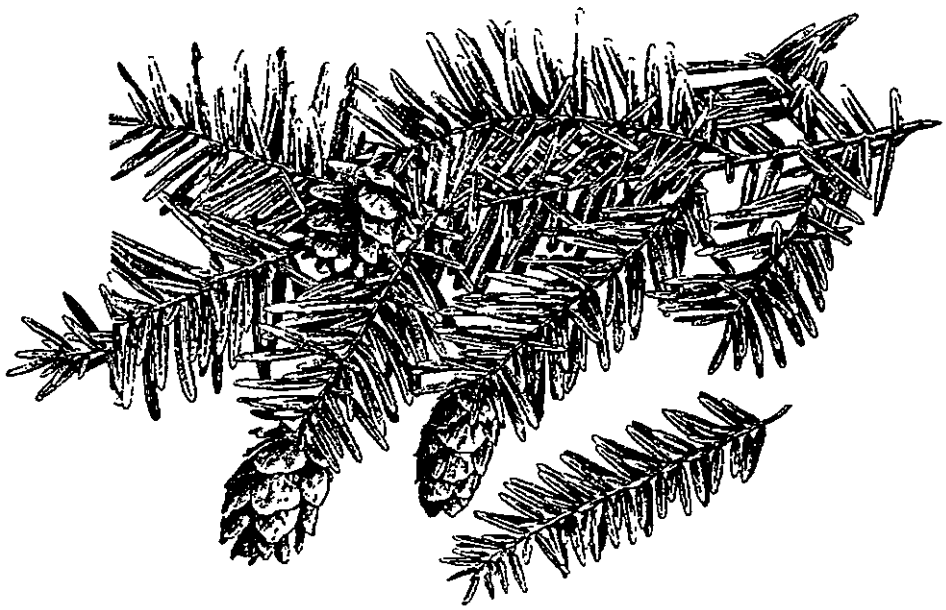
By law, the Forest Service is charged with reforestation of all harvested acres. Based on the history of planting previously harvested areas (areas generally located in the western hemlock and Pacific silver fir zones), reforestation on the Forest has not been difficult. Approximately 87 percent of all acres harvested are planted. An average of 5,122 acres per year were planted between 1978 and 1988. About 93 percent of the planting stock was bare-root; containerized seedlings were used where special reforestation problems existed. The remaining acres (13 percent) are reforested through natural seeding and from residual trees remaining after harvest.

The species planted varies considerably from year to year and from site to site; Table III-12 shows the approximate species composition. The actual stand composition of plantations may vary because of residual trees remaining after harvest and the natural regeneration that occurs.

Table III-12
Species Planted 1/

Noble fir	28%
Douglas-fir	43%
Silver fir	27%
Western redcedar	1%
Grand fir, hemlock, western white pine	1%

1/ Source: File 2490 Records and Reports.



Tree Improvement

The goal of tree improvement is to provide seed for reforestation which will produce trees genetically superior in form, juvenile survival, and growth. An additional trait under selection for western white pine is resistance to white pine blister rust.

Two procedures are presently being used. In the first, tree selections are made throughout the breeding zone, seed or scion is collected, and the trees are planted or grafted into the orchard. This system is being applied to Pacific silver fir, western white pine, and western redcedar. Western white pine trees, in addition, undergo blister rust resistance testing. In the more intensive scheme, tree selection is followed by seed collection and scion collection. Seedlings from the selected trees are tested in evaluation plantations and the scion is grafted into the orchard. Test results are used to select the trees with desirable characteristics. These selections are retained in the orchard and a breeding design is used to produce material for the next generation. Douglas-fir and noble fir are under the intensive program.

Table III-13
Trees Selections by Species - 1987 Data

Species	Number
Pacific silver fir	360
Noble fir	370
Douglas-fir	657
Western white pine	124
TOTAL	1,511

All evaluation plantations will be planted by 1992. There are two centralized seed orchard on the Forest. The Captain Moses Seed Orchard, in Darrington, will produce Pacific silver fir, Douglas-fir, and western redcedar. The R. Nevan McCullough orchard (White River Ranger District) is scheduled to produce nobel fir, Douglas-fir, western white pine, and western redcedar. Completion of these orchards is expected by 1992.

Timber Stand Improvement

Timber stand improvement (TSI) is the removal of unwanted trees to improve the growing conditions for the remaining trees. Foresters can control the number of trees growing on an acre (stocking level), the species of trees grown, and can remove competing brush and weeds to create better growing conditions for commercially grown conifers such as Douglas-fir, which need sunlight.

Thinning can benefit wildlife habitat as well as improve growing conditions for trees (Witmer and others 1985). Several factors affect the forage and habitat quality of an area for various species. Precommercial thinning can extend the grass-forb, shrub, or open sapling-pole condition of the forest, thus adding habitat for species using open conditions for reproduction and foraging. The

amount and disposition of slash can affect the amount of forage that is accessible to animals. The timing of thinning and the condition of adjacent stands of trees all effect the amount of forage, access, hiding cover, and thermal cover available for different animals.

On the Mt. Baker-Snoqualmie National Forest, about 3,300 acres of young conifer plantations receive some type of TSI annually. Approximately 75 percent of this TSI is precommercial thinning, 20 percent is fertilization, and five percent is release (see below).

Precommercial thinning is done when the trees are 10 to 15 years old. There is little slash left after the cutting is completed, as the tree stems are still fairly small. The thinning contractor may choose to sell or utilize the residue. Some thinned material is piled near roads, where it is available for firewood. Some debris is chipped, some is piled and burned, and some is left in place for nutrient recycling and for habitat for those wildlife species that utilize down material. Refer to the wood residue section, below, for further discussion.

Over the last seven years, the Forest has applied fertilizer to an average of 700 acres, annually. Most was applied on timber stands that were 70 percent or more Douglas-fir, on soil types that show a positive response to fertilization.

A small number of acres (estimated 165 acres annually) receive a type of vegetation management called "release." Hardwoods and other competing vegetation are removed from young conifer plantations, thus improving the growing conditions for these small trees. Competing vegetation may be removed by hand, by mechanical means, or through application of herbicides. This Forest has traditionally used only small amounts of herbicides. Over a decade, an annual average of 200 acres were treated with herbicides; treatment is not needed every year. About 300-400 acres total over a ten-year period are released by hand.

The Mt. Baker-Snoqualmie vegetation management program was assessed in a site-specific environmental analysis and documented in an environmental assessment (EA) in May, 1980. Addendums were prepared for each year after 1980 to reflect the existing program. There was considerable public involvement during that decade, regarding vegetation management and herbicides use on this Forest. Various groups and individuals were invited to join the Interdisciplinary Team to develop the 1980 EA. Public meetings were held to gather response and explain the program. There were several active protest groups near Bellingham and Glacier (but none in the south half of the Forest) in the late 1970's; some residual of these groups remain.

A Pacific Northwest Region programmatic EIS was approved in 1981 (Methods of Managing Competing and Unwanted Vegetation, Final Programmative EIS, June 1981); an update of that document has been several years in completion.

In March 1984, the Federal District Court enjoined the Forest Service from the use of all herbicides in National Forests in Oregon and Washington until the requirements of the court order can be met. The injunction is the result of a lawsuit brought by the Northwest Coalition for Alternatives to Pesticides and others. Since then, all removal of brush, weeds, and other unwanted vegetation has been done by hand or mechanical means, or has not been done.

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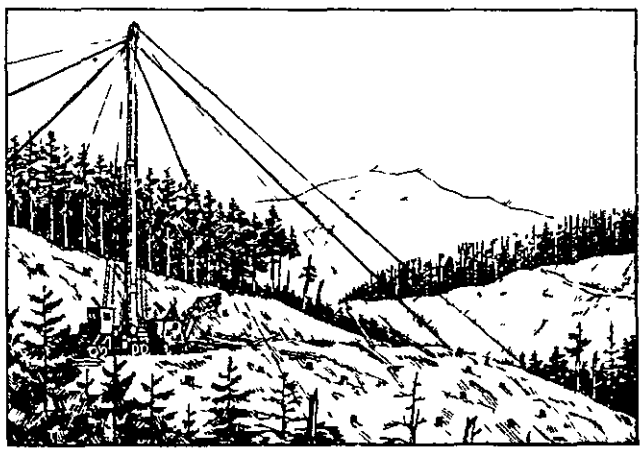
The Regional Forester, Pacific Northwest Region signed the Record of Decision (ROD) for the updated programmatic environmental impact statement on vegetation management: Managing Competing and Unwanted Vegetation, Final Environmental Impact Statement, Pacific Northwest Region, December 1988.

The Federal District Court injunction was removed in May, 1989, except for herbicide use in nurseries. Additionally, a Mediated Agreement was completed. The Forest Service is curently under an administrative stay, imposed by the Chief of the agency, against the use of herbicides. When the stay and the remaining Court injunction are lifted, the Mt. Baker-Snoqualmie will follow the direction in the 1988 FEIS, the Mediated Agreement, and implementation direction. Until such time, herbicides will not be used.

It is assumed, for the purposes of planning (and FORPLAN modeling), that herbicides will be available. (See Forest-wide Standards and Guidelines.) However, because the herbicide program on the Mt. Baker-Snoqualmie is so small, there will be very minor changes in costs or outputs if herbicides are not available. Refer to the Built Environment - Roads section of this chapter, for more information on vegetation management.



Timber Harvest Methods

Intermediate harvest involves cutting some trees from a stand prior to the time the trees reach the age for regeneration harvest. On the Mt. Baker-Snoqualmie, some intermediate sanitation cutting (salvage), is done to remove dead, dying, and defective trees. Intermediate harvest timber may be sold commercially. About 100 acres annually are commercially thinned. Commercial thinning is designed to remove merchantable size trees from a timber stand that has not yet reached final harvest age; it is usually done at 40 to 70 years.

The final harvest of trees is called regeneration harvest, as the trees are cut with the intention of reforesting the area, either through natural seeding or by planting young seedlings. Most timber harvesting on this Forest is done by clearcutting. A miscellaneous amount of shelterwood and/or selection cutting have also occurred. Refer to Appendix F for a discussion of harvest methods.

Four types of logging systems have been used: Tractor (8% of total volume cut is logged by this method); high-lead (58%); skyline (34%); and helicopter (1%). Helicopter and skyline systems completely suspend the cut log, from the woods to the landing. One end of the log drags the ground with the highlead system, and the entire log may drag the ground with tractor logging.

Timber Harvest and Soils

The amount of soil disturbance and its significance varies widely and depends on a number of factors. These include steepness and configuration of the slope, the natural sensitivity of the soil, the thickness of the duff and slash, and the type of harvest equipment used. Disturbance can lead to erosion again, depending on a number of factors. Some disturbance, when erosion is not a factor and the surface soil has not been degraded, is beneficial for tree seed establishment.

Timber harvest causes changes in the nutrient cycling process within soils. These nutrient relationships involved in removing trees for commercial timber are complex and highly interrelated. In the majority of conifer stands on the Forest, growth is limited by insufficient available nitrogen. Most nitrogen on a site is contained in the soil, but is in living organic matter or organic residue. Each year, as organic material decomposes, a fraction of it is mineralized to inorganic nitrogen, which is available to plants and competing micro-organisms. Silvicultural practices affecting nutrient cycling and site productivity vary with the site. Sites with thin or shallow soils and small amounts of organic residue have less tolerance for nutrient and organic matter (and will be less productive for conifers) than do sites with deep soils and large nutrient capitals.

Site Preparation

Prior to planting commercial tree seedlings, "site preparation" is done. Most simply, enough brush and left-over residue from logging is removed to allow planting of the young trees. Ten years ago, on the Mt. Baker-Snoqualmie, nearly every acre of harvested land was broadcast burned prior to planting. Broadcast burning was considered a necessity to meet the old wood debris standards and to maintain low potential fuel levels for wildfires. While this method removes most of the wood residue, a hot fire will volatilize large amounts of nitrogen and other essential elements, transform elements to soluble forms that are lost through leaching, destroy organic matter, alter soil structure, and may affect the ability of the soil to retain water. These effects all combine to cause soil to be more susceptible to erosion and possibly less productive.

Today, with emphasis on utilizing wood residue, very few acres are burned. There is no need to remove every piece of debris, as the fire hazard on the Forest is low. In the Pacific Silver Fir Zone, burning is the exception rather than the rule. In the Western Hemlock Zone, where much of the Douglas-fir seedlings are planted, about 80 percent of the planted acres are "site prepped" by hauling (yarding) residue to the landing. The other 20 percent are broadcast burned. Refer to the discussion on wood residue and fire, in this chapter, for more information.

Chapter III
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TIMBER SUPPLY AND DEMAND

Regional Timber Supply and Projections

The principal projections used in developing long-range plans and programs for management of the National Forests are contained in the Forest and Rangeland Renewable Resources Planning Act (RPA) Assessment, the 1984 Update and the FEIS for the 1985-2030 RPA Program. These projections focus on the long-term picture - 50 years - for the States of Oregon and Washington; they do not necessarily recognize current, short-term regional fluctuations. The following pages summarize those projected RPA trends for timber supplies through the year 2030.

General

The current balance between growth of wood and its removal show that the hardwood forests and eastern softwood forests can support additional timber harvests. This balance is likely to change; future harvest, especially beyond the year 2000, could vary over a wide range. Nonetheless, if commercial timberland owners continue to respond to price and inventory changes and manage much as they have in the recent past, then timber harvest can be increased in most geographic regions during the next few decades.

Hardwoods

Hardwood supplies are projected to almost triple from 3.2 billion cubic feet in 1980 to 9.4 billion in 2030. The largest increases will be in the South (USDA Forest Service 1986). Hardwood markets are changing rapidly as technology evolves. For instance, in recent years use of alder for pulp and for furniture has increased rapidly, creating a growing commercial market for what used to be considered a "weed" tree. This has significant implications for the Pacific Northwest, where alder is abundant. While still accounting for only 3 percent of total Oregon and Washington wood output, harvest tripled during the 1980's (Clark 1990).

Softwoods

By the year 2030, the total projected softwood (roundwood) harvest will rise 24 percent, from 9.6 billion cubic feet in 1980 to 11.9 billion cubic feet in 2030. Although the national outlook calls for increased softwood harvest, there are important differences among the major softwood timber-producing regions.

In the Douglas-fir subregion, the projected annual harvest is 2.3 billion cubic feet from 1980 to 1990. The annual harvest then declines to about 2 billion cubic feet per year, through the rest of the 50-year projection period (USDA Forest Service 1986).

In the South, the other major softwood-producing region, previous forecasts showed an expected increase in production, from about 4.1 billion cubic feet in 1980, to 7.3 billion in 2030. However, most recent forecasts are now showing a downward modification in the rate of supply. The South may be shifting to a slower rate of increase, over present levels, until 2030. Much of the current expansion of hardwood and softwood production in the South is a result of

diversification within the wood-products industry, especially compared to other regions of the country.

Short- and Long-Term Demand Trends

Over the next 10 years, the demand for timber from the Pacific Northwest region will grow, but slowly. Although there is a backlog of unfulfilled housing demand, that backlog is shrinking. The future will depend primarily on the continuing strength in personal income and the availability of affordable housing and financing. An aging population (particularly the "baby boom" cohort) is leading to a slowdown in housing starts. As a result, there will be a declining trend in the construction sector, particularly in single-family residential housing. Structure remodeling and replacement, rather than new construction, will come to characterize the market. The projections for increases in demand may be described as considerably restrained and cautious (Nomura 1981).

Projections of forest product exports to the Pacific Rim countries show a continuing slow economic growth. Log exports have ballooned over the past three years, and have been the major source of growth in the forest products industry in the Northwest over that time. But exports are expected to decline by as much as 20 percent over the next decade or so because of increasing competition from foreign sources, particularly radiata pine (Adams 1989).

The ability to sustain a moderate increase in demand on a long-run basis is linked to the critical issue of cost. For the Pacific Northwest, cost is a limiting factor for increasing market share compared to other producer regions. The Northwest is a higher-cost timber producing region, particularly compared to the Southeast, and will likely remain so because of land ownership patterns, and higher stumpage, transportation and labor costs (Northwest Power Planning Council 1989; Adams 1989).

The short-term demand for timber and wood products appears strong. However, long-term trends in housing demand, the growing popularity of construction methods that use less wood, availability of wood substitutes, increased competition from international producers, and a shift in business management strategies and methods all contribute to a potential shift in longer-term future demand (Haynes and Adams 1985).

Wood supply continues to be an issue in that it is highly dependent on the ability of producers to lower costs to be competitive with wood substitutes (Schallau 1985). Although overall current timber supply levels in the Pacific Northwest region may be capable of meeting future demand, there are some problems within the subregional market areas. There is a shifting of industry within the region, and a shifting emphasis on the types of wood products produced, as well as the ability of the subregion to supply the various kinds of wood needed. The Pacific Northwest wood products industry can regain much of the previous strength, but new vision and a concerted effort by the industry to broaden the economic base are needed. This will still take time.

Approaches to rebuild the industry include development of a more flexible regional basis for stabilizing wood supplies and new wood-fiber management methods. This will allow the Pacific Northwest region to better utilize opportunities to increase exports to international markets. The forest products industry will need to learn the workings of a different market system

and provide more products in the form demanded (Campbell and others 1983). In addition, actions by industry, such as modernizing facilities, adopting state-of-the-art technology, reducing costs, and diversifying into other sectors of production (similar to what the Southern region has done) could help to rebuild and stabilize the wood-based sectors of the regional economy (Schallau 1985).

Private and Public Land Interrelationships

Canada and the southern states of the U.S. are currently supplying part of the timber formerly supplied by the Pacific Northwest region. This situation in Canada is expected to change, with supply dropping off within the next 6 years or at least in 15 years. It is projected that Canada will experience a drop in supply capability of 30 to 50 percent, down from the current high levels.

The South should be able to maintain or slowly increase its harvest because of the remaining inventory plus some substitutions of hardwoods. However, both the economic and physical supply of southern hardwoods may begin to show a decline by the year 2030.

Within this same time-frame, the wood supply on private lands in the Pacific Northwest should once again be at a high. As the supply from Canada and the South falls off, the private lands in the Pacific Northwest could become a major source of softwoods to meet national and international demand. Further, during the interim period - 6 to 15 years ahead - and before private forest lands in the region grow to full potential, the public forests will be looked upon as a major, relatively stable source of wood fiber (Schallau 1985).

Local Timber Supply and Demand Projections

Potential timber supply and demand is difficult to project on a Forest or economic area basis. Adequate data are not available for many significant variables such as exports and imports from outside the area, harvest strategies of other owners, and future interest rates.

In making supply and demand projections, a number of assumptions are made where data are unavailable. The major assumptions used are included throughout the following discussion. This overview is a portion of a general evaluation of the economic base for the Forest influence area. This evaluation provides a basis for anticipating pressures on resource use in the future.

Supply

Supply needs to be discussed from two perspectives: physical/biological, and economic. It is possible to calculate timber inventories by ownership for the Puget Sound area, and potential yield can be estimated given current known levels of output, management intensities, and constraints on the various ownerships. This gives an estimate of the potential physical/biological supply of timber for the area. However, it is almost impossible to translate that physical/biological supply estimate into a meaningful quantitative projection of actual wood that will be harvested and sold into the Puget Sound market, or into the regional market, for the next several years or decades.

The amount of wood actually harvested and sold into the market is the economic supply of timber. The economic supply of roundwood from the Puget Sound area is affected by local, regional, national and international economic trends, demands, markets and prices. Changes in any of these factors may change the amount of wood actually supplied to the market. Higher prices may elicit greater supply response. For instance, in the past several years, a booming export market has encourage the State and private timberland owners to accelerate their rates of harvest. More wood has been supplied as well by the nonindustrial private forest owners, both in absolute terms and as an increasing relative share of the market.

On the other hand, a recession or a slump in the housing construction market can bring down wood products prices. In this case, the economic supply of wood will drop, as owners either cannot recover costs of harvest and reforestation, or because they hold their timber off the market until prices cycle back up. The recession of the early 1980's was an excellent example of economic conditions affecting the regional and local economic supply of timber.

The Puget Sound area is one part of a much broader regional forest products market. The amount of roundwood supplied to and consumed within the area is more a function of the existing and utilized mill capacity (and export levels) at any given time than it is a function of the amount of timber cut within or near the area. Utilization of local mill capacity will vary depending on the broader regional demand for wood products and prices, with little regard to the amount of wood that is, or could be, harvested within the area at that time.

Conversely, the amount of timber cut in the Puget Sound area does not rely solely on the existing mill capacity in the area. The market area is large enough that logs cut in one county may end up several counties away to be processed. And finished wood products move over much larger areas. Therefore,

the regional market situation is much more appropriate for supply and demand analyses than any particular locality.

Economic factors related to characteristics of the timber and its location and markets for wood products determine the economic supply. These economic factors change over time, and lead to changes in economic supply. For example, changes in processing technology may change the limits on size of material used or species suitable for processing. This can cause the economic supply to shift from currently valuable species and size classes to a different mix. This causes both a change in the value of timber stocks held by various owners and shifts between regions. The general effect of technology is to increase supply and reduce scarcity.

Pulp and Paper

Supply of chips to the pulp and paper industry is a portion, though not a major one, of the total wood fiber supply picture in the Puget Sound region. Regionally, pulp and paper manufacturers derive only about 30% of their total fiber input from roundwood. The balance comes from residues generated mostly at primary processing plants. Over the past decade or so, about 5% of the annual harvest from the Mt. Baker-Snoqualmie has gone to Puget Sound area pulp mills, which represented about 7% of the mills' roundwood consumption.

In the past, prices for pulpwood have not escalated in the same manner that stumpage prices have. Available substitutes among sources and types of chips and residue, along with continuing technological innovations, have kept the real prices of pulp relatively constant over the long term. In addition, final prices of paper and board products made from pulp are much less susceptible to changes in wood fiber prices, as compared to finished lumber price sensitivity to changes in stumpage costs. The reason is that wood fiber costs are a much smaller percentage of manufacturing costs for paper and board, with chemicals and energy comprising significant portions of the total costs.

Timber Base

Potential physical supply of timber is a function of several factors. Major factors include the available timberland base, the intensity of management on these lands, harvest scheduling strategies, and institutional and legal constraints imposed.

Major timber producers in the Puget sound economic area can be grouped into four landowner classes: National Forest, State, Forest Industry, and other private. Factors affecting potential timber supply vary considerably by landowner class. Each landowner class is displayed/discussed separately for the factors affecting potential timber supply.

Table III-14, below, shows the timberland base, by ownership class, for the Puget Sound Area, as of 1980. Data for National Forest have been updated to reflect the 1984 Washington Wilderness Act. The inventory is fairly evenly distributed among the four owner classes. Forest Industry and the State and Other Public have generally younger, faster growing stands. The National Forests have the bulk of the old growth and lower net growth. National Forest inventories have the heaviest losses from annual mortality.

Table III-14
Characteristics of the Timber Resource, Puget Sound Area, By Ownership 1/

	National Forest	State/Other Public	Forest Industry	Other Private	Total
Timberland Acres (1000 acres)	19% (605)	19% (629)	31% (998)	31% (1001)	100% (3233)
Volume of Growing Stock (Net) & Sawtimber (Scribner)	29	21	25	25	100
1980 Annual Growth of Growing Stock & Sawtimber (International 1/4-Inch)	4	26	34	36	100
1980 Average Annual Mortality of Sawtimber (Interntl. 1/4-inch)	58	12	15	15	100

1/ Adapted from Timber Resource Statistics for the Puget Sound Area, Washington PNW-96, March 1982.

The available timberland base is not static. It is expected to decline over time due to urban expansion, additional road and utility rights-of-way, and recreation and commercial enterprise uses. Larsen and Wadsworth in their Washington Forest Productivity Study (1982) made some projections about withdrawals from the commercial forest land (CFL) base in Western Washington for the next 50 year time frame (1980-2030). Table III-15 shows that the heaviest withdrawals are likely to occur on the Other Private lands, in both absolute and relative terms. Total withdrawals are projected to be about 6 percent.

Table III-15
Projected Acreage Withdrawals from Commercial Forest Land
by Ownership, Western Washington, 1980-2030 1/ (Thousand Acres)

Ownership Class	CFL Base (1980)	Projected Withdrawals	Percent Withdrawn
National Forest	2,256	67	3.0
State	1,252	0	0
Other Public	423	35	8.3
Forestry Industry	3,544	118	3.3
Other Private	2,328	360	15.5
All Owners	9,803	580	5.9

1/ Adapted from Larsen and Wadsworth, Washington Forest Productivity Study, Phase III, Part II, Department of Natural Resources, 1982.

In Table III-15, the withdrawal projections assumed that only the acres recommended for wilderness by President Carter would be withdrawn from the National Forests. The Washington State Wilderness Act (1984) actually reduced the commercial forest land base on the Mt. Baker-Snoqualmie National Forest alone by 125,000 acres. This is almost double the amount assumed by Larsen and Wadsworth for all of Western Washington National Forest lands.

The productivity of the land and the age class distribution of existing stands are important factors in predicting the supply potential of forest lands. Table III-16 displays how these factors vary between the landowner classes in Western Washington. It is assumed that Western Washington data is representative of the Puget Sound economic area.

Table III-16
Age Class and Site Class Distribution, W. Washington Conifer Lands
By Ownership Class 1/ (Percent)

Owner Class	Cubic foot Site Class 165 and above	Age Class 60 years and younger
National Forest	19 %	34 %
State	20	70
Other Public	25	73
Forest Industry	49	82
Other Private	23	70

1/ Adapted from Larsen and Woodsworth, DNR 1982.
Forest industry lands are generally located at lower elevations than other owner class lands, and are more productive. National Forest lands have a much lower percentage of lands in the younger age classes than any of the other owner classes, due to longer deferral of harvesting and slower rates of harvest.

Management Intensity

The management intensity applied to timber stands can substantially influence future timber supplies. Intensive management regimes (which include planting, pre-commercial thinning, fertilization, and commercial thinning) on site III lands (120-164 cubic feet/acre/year) with a harvest age of 55 years provide a 36 percent increase in yield over a regime that includes only planting (Larsen and Wadsworth, 1982). These estimates reflect just the biological potentials; economic conditions must be favorable to justify these investments in intensive management.

Decisions about management intensities vary by landowner class based on management objectives, capital available for investments, and site class of the available land base. The outlook contained in 1985 RPA (increasing softwood demands and decreasing supplies in the Douglas-fir subregion, resulting in significant increases in price) would establish a favorable climate for intensive timber management. Forest Industry and the State, who have high site lands and a high percentage of land in the younger age classes, have current intensive management programs underway. National Forest lands, which tend to be lower site and older age classes, are likely to be managed less intensively in the near future, as most harvest will come from old-growth stands.

In the Washington Forest Productivity Study, Larsen and Wadsworth made some assumptions about the management intensity most likely to be utilized by landowner class following harvest (Table III-17).

Table III-17
Management Regime Assumed Most Likely to Occur
By Owner Class, Conifer Acres (Percent) 1/

Management Regime	National Forest	State	Other Public	Forest Industry	Other Private
Natural	0%	0%	35%	2 %	35 %
Plant	10	0	20	8	20
Plant & PCT 2/	10	15	10	15	10
Plant & PCT & CT 2/	40	15	10	7	10
Plant & PCT & Fert 2/	10	15	10	33	10
Plant & PCT & Fert & CT	30	55	15	35	15
Total	100	100	100	100	100

1/ Adapted from Larsen and Woodsworth, Washington Forest Productivity Study, DNR, 1982.
2/ PCT = Precommercial thinning, CT = Commercial Thinning, Fert = Fertilization

The assumptions displayed in Table III-17 project that other public and other private landowners will use the more intensive management regimes on many fewer acres than National Forest, State, and Forest Industry managers.

Recent experience has led to some reconsideration of the extent of intensive management practices that are planned for forest lands, both public and private. Questions have been raised, even on industrial lands, whether the experienced gains in yields and returns are matching the expected gains, and if the high level of investments originally planned can continue to be justified.

The expected future supply conditions are very important in terms of making decisions today to invest in intensive management regimes. Projections by Adams (1989) and others indicate a large increase in available timber supply after 2010, both from domestic and international sources. Accompanying that increase will be a leveling off of real stumpage prices. This future pattern makes high levels of current investments in intensive management regimes somewhat more problematic vis a vis expected returns. Shorter rotations on higher-site lands will tend to support more intensive management investments than will longer rotations on lower-site lands. Thus, industry will tend to have a higher proportion of its lands under intensive management than will the National Forests.

Harvest Flow Scheduling

Harvest flow scheduling refers to the scheduling of timber harvest and whether annual or periodic fluctuations are permitted, and if so to what degree.

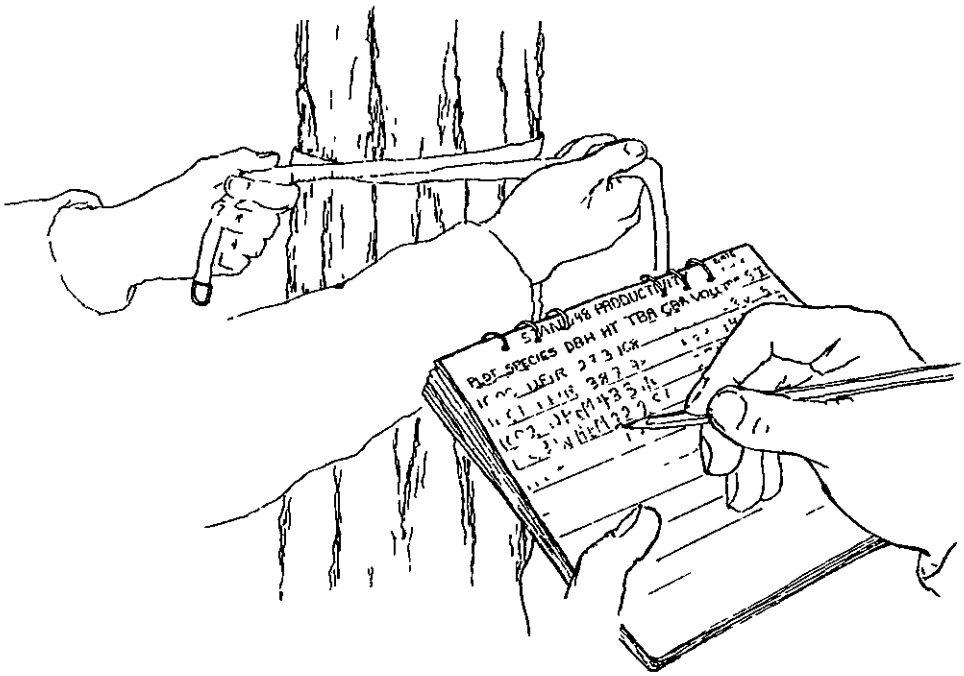
National Forest. Harvest schedules on National Forest lands are generally developed on the basis of a non-declining yield (NDY), although departures from this schedule are permitted by Congress and are examined under certain circumstances provided for in the Secretary of Agriculture Regulations. A departure schedule includes constraints on the amount of variation and/or the length of time departure is permitted. A departure from NDY generally results in increased outputs in the early years with a decrease in subsequent years to Long Term Sustained Yield (LTSY), and sometimes temporarily below LTSY.

State. State lands are managed to provide continuous harvest without major prolonged curtailment or cessation. The policy of nondeclining yield, or evenflow, is not applied, although the amount of variation permitted is restricted. The State manages and schedules its annual timber sales so as to sell more during periods of high prices and less during weaker market conditions. Upper and lower limits of 25 percent deviation from the sustainable harvest level are permitted. Nearly all the remaining old growth on State lands is scheduled for harvest before 1994.

Forest Industry. Forest Industry harvest flow scheduling varies considerably among individual firms. Generally, Industry harvests fluctuate with market conditions to the extent that timber is available. Most Forest Industry managers increase harvest during times of high prices and decrease harvests in periods of low prices. Some Forest Industry landowners have actually made major harvest reductions or even stopped harvesting for a period of time. Nearly all old-growth timber on Forest Industry lands has been harvested or will be within the next few years.

Other Public and Other Private. Harvest flow scheduling in these landowner classes varies so widely that no general characterizations can be made. Some landowners have liquidated their entire inventory and no harvest will be possible for many years. Others have made no harvest cuts; for some owners, current objectives include no explicit plans to harvest in the future. Still

others seem to be scheduling periodic harvests on an intermittent basis. However, the overall share of total harvest in Western Washington and Oregon (the Douglas-fir subregion) has been increasing since the early 1980's (Adams, 1989).



Institutional and Legal Constraints

National Forest. Legal and institutional constraints that affect timber production levels on National Forest lands are primarily Federal laws, Secretary of Agriculture Regulations, and policy statements developed to implement laws and regulations. Two of the most important laws in terms of determining timber production potential from National Forest lands are the Multiple-use Sustained Yield Act (USDA 1960) and NFMA. The Multiple-use Sustained Yield Act directs that the National Forests shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes, so that they will best meet the needs of the American people, without impairment of the productivity of the land, and not necessarily for the combination of uses that will give the greatest dollar return or the greatest unit output.

The National Forest Management Act and the Secretary of Agriculture's implementing regulations, as they effect timber production, include: requirements for determination of lands suitable for timber production; that timber stands will generally have reached the culmination of mean annual increment before harvest; and resource integration requirements for all the resources.

These legal and institutional constraints have the general effect of limiting timber management investments and outputs to levels below the biological

potential of the forest. Economic considerations have the same influence not only on National Forest lands, but on all ownerships.

State. The Washington Department of Natural Resources (DNR) is designated as the manager of State Trust lands. As such, the DNR has certain constitutionally-mandated financial obligations to the beneficiaries of the trusts, primarily schools and other public entities. The basic objective is to generate income for the support of the designated institutions. In addition, the Legislature has directed the Department to employ the concept of Multiple Use Management when compatible with fulfilling the financial obligations of trust management.

The DNR has also been directed to manage State forest lands on a sustained yield basis when compatible with other legislative directives. DNR operates on a policy of relative even-flow, which permits year to year variations from the sustainable harvest level up to ± 25 percent. The State-wide sustainable harvest level for the period 1984-1993 is 777 MMBF a year. However, in 1986, the Board of Natural Resources approved an accelerated harvest level of 880 MMBF a year for the period 1986-2002 to sell a backlog of defaulted sales.

State lands are also subject to several other general Federal and State statutes such as the Clean Water Act, Clean Air Act, Endangered Species Conservation Act, State Environmental Policy Act, State Forest Practices Act, State Hydraulics Act, and the State Shoreline Management Act. Many of these acts establish minimum levels of management performance. The State finds in its own best interest to exceed these minimums.

Forest Industry. Institutional constraints on the Forest Industry vary widely from one company to another, but most practice, at least to a certain degree, a "good neighbor" policy. This policy is exhibited through such things as public access to their private lands, allowing and in some instances facilitating recreational use, support of administrative studies and research, and cooperation with adjacent land owners. The degree to which the timber industry practices this "good neighbor" policy as it affects timber management is made on an individual basis after weighing the perceived benefits against the costs.

Legal constraints that have the greatest effect on timber outputs are the State Statutes, discussed in the last paragraph on State institutions. Many of the Forest Industry land owners exceed the minimum management performance standards established in these statutes and related regulations.

Other Private. Other private forest land owners include farmers, woodlot owners, and other non-forest industry individuals and firms who own forest land for a variety of reasons. Timber management varies widely on these lands, from intensive management to no management other than harvesting and natural regeneration. Some owners of these lands are not interested in the production of commercial forest products. Legal constraints on other private lands are the same as those applicable to Forest Industry lands.

Summary of Timber Supply

Some estimated trends in potential supply by landowner class can be made, considering the timberland base, likely management intensities, harvest flow scheduling, institutional and legal constraints, and historical trends in harvesting. These are summarized, by ownership, below.

National Forest. Future timber supply from suitable lands on the Mt. Baker-Snoqualmie National Forest will be approximately 108 MMBF annually over the next decade, according to the Forest Plan Preferred Alternative. Although the Forest has a large inventory of old growth that could be harvested in the immediate future, institutional and legal constraints will limit rapid liquidation of this inventory.

The upper end of the decision space for allowable sale quantity is the benchmark, Maximum PNV, With Assigned Prices, which includes non-declining yield, rotation at 95 percent culmination of mean annual increment, and management requirements. This benchmark indicates an ASQ of 239 million board feet. This is considered the upper end of the decision space, except for possible temporary departures. Other alternatives considered in the FEIS project varying levels of timber supply below this level.

Between 1970 and 1984, all National Forest lands provided approximately 16 percent of the logs consumed in the Puget Sound area. From 1972 to 1984, the National Forest contribution ranged between a low of 13% (1978) to 18% (1972). Absolute volumes consumed in the Puget Sound area from all National Forest lands were at a high in 1972 with 431 MMBF, and at a low in 1982 with 252 MMBF. In 1986, the volume was midrange, at 367 MMBF, but the percentage of all logs consumed in the Puget Sound region rose to a new high of 21%, as total log consumption in the area declined.

State. The State has a current Forest Land Management Program. The Board of Natural Resources has authorized a sales program above the sustainable harvest through the year 2002. From 1970 to 1984, State Lands contributed approximately 11 percent of the logs consumed in the Puget Sound Economic Area, ranging from a high of 13 percent in 1978 (294 MMBF) to a low of 7 percent in 1974 (171 MMBF). In 1986, State harvest for the area rose to a new high of 371 MMBF and a 21% share.

Other Public. Since 1970, the Other Public owner class has supplied approximately 1 percent of the logs consumed in the Puget Sound Economic Area. The assumption is made that log supply to the Puget Sound Area from their lands will average 18-20 MMBF annually over the next 5 decades. This assumption is based on the current inventory and announced harvest plans of some of the major landowners in this owner class.

Forest Industry and Other Private. These two owner classes together have been the major producers of logs consumed (including export) in the Puget Sound Economic Area since 1970. During the 1970's, forest industry and other private owners produced 74 percent of the logs consumed in the area, and during the early 1980's, 71 percent. However, by 1986, that share had dropped to 56%. This follows a Statewide trend during the 1980's of a declining percentage share of logs consumed being provided by this sector.

These two owner classes have large acreages of young forests that are assumed to reach harvest age in the near future. These lands include some of the best timber growing sites in the Puget Sound area. The landowners are relatively unconstrained by institutional constraints and respond more rapidly to changes in demand than do the public owner classes.

Currently, industrial forest landowners in the Northwest are experiencing an inventory gap in age classes, resulting in about a 10-20 year period during

which harvests from industrial lands are declining 15%-20% from averages of the previous 25 years or so. In about 15-20 years, young stands currently growing will reach merchantable age, and industry harvest will rise again.

Other private (nonindustrial) owners also have a large percentage of inventory in younger classes, but can still support the current, or somewhat increasing, level of harvest over the next 20 years. The current harvest level from these lands is low enough that the existing inventory structure does not leave any gap in merchantable acres (Adams, 1989).

Average volume of logs supplied for consumption in the Puget Sound area by various ownerships between 1970 and 1986 are shown in Table III-18, below; the relative shares are shown in Figure III-8 on the facing page.

As can be seen, the private sector share has dropped over that period relative to other ownerships. In addition, the total roundwood consumed in the area dropped over time. This reflects closing of several mills during the recession of the early 1980's.

Table III-18
Log Consumption by Ownership, Puget Sound Economic Area
Annual Volumes, Million Board Feet

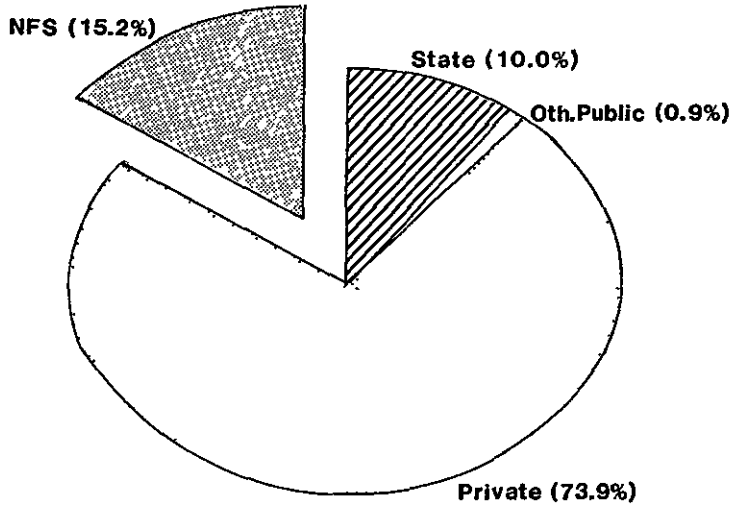
Period	State	Other Public	Timber Industry & Other Private	Total Non-National Forest	National Forest	Total
1970-'78	233	20	1726	1979	356	2335
1980-'84	216	18	1314	1548	292	1840

Without attempting to put numbers on the projected timber supplies over the next several years or decades, one can make some fairly reasonable estimates about harvest trends by ownership categories. These estimated trends would apply to the regional market (e.g., Western Washington) along with the Puget Sound area. They are estimates of trends in economic supply, and are predicated on an economy that continues to grow, but at a moderate pace, with no major recessions similar to that of the early 1980's.

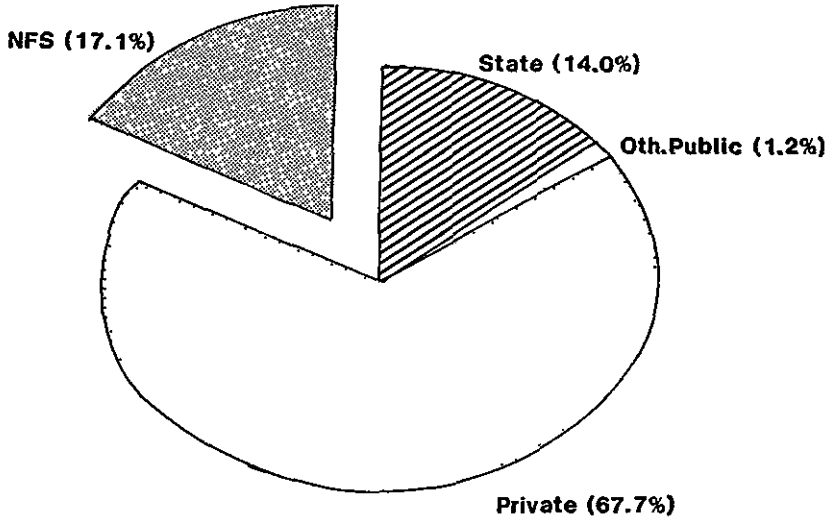
Forest Industry. Timber harvest from private industrial forest lands will fall, perhaps 15%-20%, over the next two decades from the high levels of the 1960's, 1970's, and latter 1980's, partly due to a gap in merchantable age classes in the existing inventory, and to a lesser degree because of flattening demand in the housing markets. By about 2010, as new inventory comes of age, industry will once again begin to increase harvest levels (Adams, 1989).

Figure III-8

**Origin Of Puget Sound Log Consumption
By Ownership (1970-1978)**



**Origin of Puget Sound Log Consumption
By Ownership (1980-1986)**



State. Timber harvest from State lands will decline significantly from current levels over the next two decades as remaining old growth is cut and/or pressures are successful to meter out the old growth harvest, or even protect some stands completely. The State DNR is currently revising its Forest Land Management Program and the associated sustainable harvest calculation. Included is consideration of the recent report and recommendations by the State's Commission on Old Growth Alternatives for Washington's Forest Trust Lands, which recommends protecting old growth in the State's experimental forest on the Olympic Peninsula. The tentative harvest level estimates for the time being show that harvest levels from State lands will probably be in the neighborhood of 200 MMBF annually over the next two decades (Washington DNR, 1990). This is toward the lower end of the harvest range experienced over the past 20 years.

National Forest. National Forest harvest levels will be lower than the highs of the 1970's and late 1980's. Over the past two decades, National Forests have accounted for about 15% of the total harvest in Western Washington. It is expected the absolute amount of timber supplied from National Forests will decline somewhat over the next two to three decades with the adoption of final Forest Plans. However, a report prepared by the Regional Office in Portland (USDA Forest Service, 1989) estimated that, in total, changing harvests from National Forests would have a price effect of only a few percentage points over the next decade or two. These would disappear as markets adjusted and more inventory comes on line in about 20 years.

Other Private. Harvests from nonindustrial private forest lands are less predictable than from other ownerships. These harvests have risen in recent years. If they are responding to price, the declines in harvest over the next two decades from other ownerships could keep those prices up (assuming no major decrease in demand), and continue to elicit more supply from the nonindustrial private lands. This source of supply, then, could serve as a moderating factor to keep prices from rising even more rapidly over the next two decades until inventories and potential supply once again begin to increase on other ownerships.

Demand

Demand for timber stands at the local and regional levels is derived from markets for processed wood products at the regional, national, and international levels. The relationship between supply cost and demand price at the local/regional level is determined by the ability of individual firms to compete in these wider markets. Important factors in this ability to compete are: the cost of raw materials facing the firm; the technology available to it to convert the raw materials to manufactured products; and its ability to compete for markets. Information about these factors for individual firms is not revealed, as it is vital to the firms for both competing for raw materials and for markets.

Demand for lumber and wood products from the Puget Sound Economic Area followed the trends of the Pacific Northwest, with a drastic decline in the early 1980's compared to the highs during the 1970's. Production of wood products in the period 1980-84 was slightly less than 80 percent of that experienced during the 1970's. The structure of the wood products industry in the Puget Sound Area

put it at a competitive disadvantage with imports from Canada and Southern U.S. production.

The pulp and paper industry avoided the deep declines in demand and production of the early 1980's. Strong demand for paper, domestically and abroad, helped pull that sector of the wood products industry through the recession in fairly good shape. Over the past decade, the number of pulp and paper mills in the Puget Sound area has dropped by almost 20%, but the installed capacity of the remaining mills has increased by about 10%. This is similar to the structural changes found in other sectors of the industry. As of 1986, about 5% of the Forest's annual harvest went to Puget Sound area pulp mills, which represented about 7% of the mills' roundwood consumption. Regionally, roundwood consumption represents only about 30% of the total fiber input for pulp production.

The restructuring of the timber industry in the Northwest during the early 1980's was a response to the declining market share and an attempt to regain market share. The projected future decline in production from Canada and a continuing growth in exports to the Pacific Rim Countries are likely to result in a shift in demand for Puget Sound Economic Area logs. The timing and magnitude of this shift in demand, however, are speculative. Increased production from Puget Sound Area mills during the past three years is an indication that the industry is improving the efficiency of its wood processing and thus improving its ability to compete for market share nationally and internationally.

The supply/demand situation in other economic areas around the state also influences the availability of timber in the Puget Sound area. The Puget Sound area mills (including export facilities) consume more logs than are harvested in the area. During the 1980's, approximately 66 percent of the logs consumed in Puget Sound originated from Puget Sound; approximately 26 percent came from the Olympic Peninsula; 5 percent from Central Washington; and 3 percent from other areas, including out of State. A similar pattern of imports into the area occurred during the 1970's.

While the Puget Sound area has historically imported approximately 35% of the logs needed for its mills, it has used about 95% of the wood harvested in the are within the region. Only about 5% of the harvest from the Puget Sound area is going to processing elsewhere. (Exporting logs overseas is considered part of the local processing industry.) So the Puget Sound area is a net importer of logs, which come from other parts of Western Washington, along with a minor amount from the east side of the Cascades.

Depending on markets, mill capacity, price and local harvest level fluctuations, one part of the State may have a greater demand for logs at any given time than another. The relative demand for logs among processing areas may change seasonally, or from year to year. Prices in the areas with a greater need for logs will tend to float upward, drawing more supply to that area. As that need is met and prices stabilize, a shift may occur to another region. Prices serve as the leveling agent to direct the log supply to the areas with greatest demand. In extreme cases, prices may not be able to go high enough to bring in the needed lumber and a structural shortage of logs may develop for an area. If that continues for any length of time, mills in that area will be faced with closure. Competitive mills will tend to survive such periods, but marginally efficient mills may drop out. The changing of prices

to moderate log flows have to operate within limits, which are set primarily by the prices of finished wood products in the regional market.

Because of the local and regional interactions in the roundwood markets, it is difficult to make quantitative estimates of future demand for logs from the Puget Sound area. One can not really assume that the consumption by the Puget Sound mills is a measure of the demand for Puget Sound logs, when other regions may assert a need (as reflected through relative prices) for those logs as well. However, estimates of relative levels and trends in demand for timber can be made, given what is known about current consumption patterns, expected changes in regional, national and international demand for wood products, and projected physical/biological supply.

Demand Over the Next 20 Years

For the next 20 years, demand for wood products is expected to grow, but slowly. This is based on a continuing, though not rapidly expanding, need for wood for new construction and for remodeling and repair. Export markets will decline somewhat over that time period, but will still remain very active. Canadian wood imports will continue to decline from the high levels they held in the early 1980's because of decreased competitiveness and increasing restrictions on logging in Canada. In all, given no economic shocks, the demand for roundwood will stay at least at current, to somewhat higher, levels.

In the face of this demand, available inventory from private industrial forest lands will be declining, as will harvests from National Forest lands, particularly in Northwestern Washington. Other private land harvests may come up somewhat, but probably not enough to offset the declines in these two ownerships. And after the mid-1990's, almost all old growth timber that is still harvested will come from National Forest lands. Therefore, it appears the next 20 years will find fairly tight physical/biological supplies juxtaposed with demand that stays at least at current levels. The expected result will be fairly rapidly rising prices in the range of 1.5 to 4 percent per year (Adams, 1989), but no timber supply "crisis," as prices play a moderating effect - eliciting more supply from the private nonindustrial forest lands, and dampening final demand for wood products by consumers because of increased cost.

The declining inventory of sawtimber of harvestable age in the next two decades will have less effect on the pulp and paper sector than on the lumber and plywood sectors. Pulp mills can use much smaller material, chipped either in the woods or at the mill, than can sawmills. Thus, the age-class gap in the inventory will not be as limiting for pulpwood supply. Other economic factors, though, may combine to place an increasing squeeze on pulp prices. Better log utilization and on-site use of residues by the primary manufacturers leaves less low-cost residue available for pulp. Declining harvests regionwide and in western Canada will also reduce residues available. If the export demand for chips remains strong, additional pressure will be placed on prices.

Over the next decade or two, these supply and demand factors may put the Northwest pulp producers at a greater cost disadvantage than East Coast or Southeast producers, who already produce the major portion of pulp and paper products in the country. Mitigating factors for the industry are likely to be continued technological changes, allowing more use of species little utilized to date, and greater use of recycled paper as feedstock. Supply changes from

the Mt. Baker-Snoqualmie National Forest are expected to have little effect on the local area or regional pulp and paper sectors.

Bidding History

Table III-19, on the following page, summarizes data for 863 timber sales sold on the Mt. Baker-Snoqualmie National Forest between January 1, 1979 and September 30, 1988.

During the timber sale auction process, timber purchasers may increase the cash received from a sale by bidding more than the appraised value. The analysis of the 1979-88 bidding history for the Forest, shown in Table III-17, reveals that on a Forest-wide basis, purchasers bid over twice the appraised value for timber in the first five years of this comparison. In 1984 the average bid was only 1.2 times the appraised price, and in 1985 the bid ratio dropped to just 1.15. However, as the economy began to recover from the recession, bid values began once again to climb relative to appraised values. By 1988, purchasers were again bidding almost twice the appraised values for timber.

It is interesting to note that the changes in bidding procedures and requirements implemented in the early 1980's, after the speculative bidding problems of the late 1970's and subsequent "buy back" of default volume, have apparently had some effect. Even with the rapid increase in stumpage prices in 1988 (and 1989), the bid ratio has stayed just under 2.0, compare to ratios running 2.4 to 2.8 under similar economic conditions a decade ago.

The total volume sold during this period was 2,651.39 MMBF, having an appraised value of $193,794,016. The weighted average overbid was $78.95 per MBF with a total overbid of $209,316,760.

Demand was such that bidders were willing to bid the price for wood up to an average of 2.08 times the appraised price (weighted average bid) during that time period. There was also competition for the timber sales being offered, with an average of six bidders per sale.

Table III-19
Summary of Timber Volumes Sold - Advertised and Bid Values, 1979-1988

Fiscal Year	Total Bid $	Total Appraised $	Total Overbid $	No. of Sales	Total Volume MBF 1/	Average Bid $/MBF	Average Appraised $/MBF	Average Overbid $/MBF	Bid Ratio 2/
1979 3/	$76,653,432	$34,017,956	$42,635,476	123	298,426	$256.86	$113.99	$142.87	2 25
1980 4/	75,464 766	30,221,678	45,243,088	102	287,862	262 16	104 99	167 17	2.50
1981	72,242,869	25,546,982	46,695,887	103	311,210	232.14	82.09	150 05	2.83
1982	21,913,199	9,112,698	12,800,501	88	270,199	81 10	33.73	47.37	2 40
1983	23,087,618	8,781,539	14,306,079	74	229,614	100 55	38.25	62.30	2 63
1984	25,715,322	21,180,669	4,534,653	106	309,051	83.21	68 53	14.67	1 21
1985	12,667,552	11,062,436	1,605,116	58	194 875	65.00	56.77	8 24	1 15
1986	22,726,478	13,733,475	8,993,003	67	275,636	82.45	49.82	32 63	1 65
1987	29,810,235	17,907,042	11,903,193	68	262,154	113 71	68.31	45 41	1 66
1988	42,829,305	22,229,541	20,599,764	74	212 365	201 68	104 68	97 00	1 93
TOTAL	$403,110,776	$193,794 016	$209,316,760	863	2,651,392	$152 04	$ 73 09	$78 95	2 08

1/ Includes resale of default volume not counted under fiscal year sell target.
2/ Total Bid $/Total Appraised $.
3/ Includes total calendar year 1979, from Jan 1, 1979 to Dec 31, 1979
4/ Includes period of calendar year 1980 from Jan 1, 1980 to Sept 30, 1980 only

Timber Sale Costs and Returns

A recently highlighted national issue is popularly called below cost timber sales. The issue involves whether or not the Forest Service should offer timber sales in which the revenues generated are below the costs of selling the timber.

Differences exist as to what costs and what benefits should be included in such a determination. There appears to be general agreement that below cost sales are, by and large, undesirable. However, Schuster and Jones (1985) build a case that individual timber sales should not be evaluated on their own, and that below cost sales may be necessary and desirable in maximizing net public benefits. They also argue that below cost sales cannot be evaluated apart from the managerial context within which the Forest Service operates.

This managerial context is spelled out in the policy and procedures associated with the National Forest Management Act of 1976 (NFMA). NFMA calls for

integrated land management. Timber sales should be evaluated as to how they fit into a comprehensive program of management for an entire National Forest, and not solely on whether or not they are below cost.

Harvesting trees may, in some cases, be the best, most efficient way to achieve other objectives. For example, on some portions of the Forest, land at the optimal elevation for deer and elk winter range is covered with young, second growth stands. These dense stands, unlike old growth or shrubs and saplings, have almost no forage for deer. By cutting timber, open areas are created. Grasses dominate for the first five years after harvest, but as forbs, shrubs, and replanted conifers come in (years 6 to 30 after harvest), the land can provide forage (though limited cover) for deer winter range. Costs related to these sales may exceed receipts, but the timber sale is the most efficient way to produce the desired winter range.

Timber Sale Cost Accounting

The Forest Service does not have an accounting system that permits tracking the costs of an individual timber sale. Costs related to timber sales are accounted for on the basis of expenditures made during a particular fiscal year, and include costs incurred for all timber sales that were in any stage of preparation or administration during that year. Receipts from a timber sale are rarely received in the same year that all of the costs were incurred.

Timber sale costs are commonly incurred for several years prior to the time that receipts are generated. Costs such as sale planning, road survey and design, volume estimation, and appraisal all occur prior to the time a sale is offered. After the sale is sold, the successful bidder begins harvest operations and makes payments for the timber as it is cut. During the harvest operation, costs are incurred for contract administration. After all the timber has been harvested, costs are also incurred for post sale activities, such as reforestation and timber stand improvement.

Timber Sale Program Information Reporting System (TSPIRS). In 1984, Congress responded to popular concern about below cost sales and the lack of an accounting system to track timber sale costs and benefits. The Forest Service was directed to design a new accounting system to report all costs and benefits of the timber sale program. After two years of cooperative effort between the Forest Service and the General Accounting Office (GAO), TSPIRS was developed. Prior to formal adoption, the system was tested nationwide for two years (fiscal years 1987 and 1988) with changes and fine tuning made as necessary. The first official reporting year was FY 1989.

The TSPIRS produces three major reports:

- "Statement of Timber Sale Revenues and Expenses" which displays an annual financial record of timber sale revenue and expenses for the current fiscal year;
- "The Economic Account" which provides an economic, as opposed to a strictly financial, long-term view of all resource costs and benefits associated with timber sale areas harvested in that fiscal year;
- "The Employment, Income and Program Level Account" which displays estimates of employment and income in the local economy supported by

the timber sale program, as well as timber-related program accomplishments for the current fiscal year.

The first report is similar to a corporate annual report. It reflects the cash flow position of the Forest, with longer-term investment costs pooled and distributed on an annual acres harvested basis. This is similar to the amortization of costs done by corporations in their financial reports, and was developed in accordance with generally accepted accounting principles. (For more detail on TSPIRS see the annual TSPIRS report for the Forest for fiscal years 1989 or following, or see the Final Instruction Package for FY 89 or following years, as released by the Washington Office.)

Timber sale cash flows are comprised of the dollars the government receives from a timber purchaser minus the costs the government incurs, such as sale planning, appraisal, contract administration, reforestation, etc., to carry out the timber sale and associated timber management. TSPIRS does not measure the costs and benefits of individual sales, but rather of a Forest's sale program in the course of one year. There is still no accounting system to track costs of individual sales. Also, since sale costs occur over several years, and sale revenues may also be received over a different period of years, an annual cash flow statement related to individual sales would not have any real meaning.

The value of the timber on a particular sale is primarily determined by the species present and the size of the logs. Species such as Douglas-fir and western redcedar have more value than species such as alpine fir and red alder. Larger trees are more valuable than smaller trees because they produce a higher percentage of clear wood (free from defects, such as knots).

The costs related to a particular timber sale can vary widely. Factors that affect costs include roading, logging systems required, harvest unit size and shape, volume per acre, distance from a manufacturing facility, environmental constraints included, and mitigation work necessary. All these factors, combined, determine the appraised value, or the minimum that the Government will accept for the sale when it is sold.

Summary cash flow statements for the Mt. Baker-Snoqualmie from TSPIRS are shown in Table III-20 for fiscal years 1987-89. Although the first two years were test years, the figures are comparable for all three years in the financial statement.

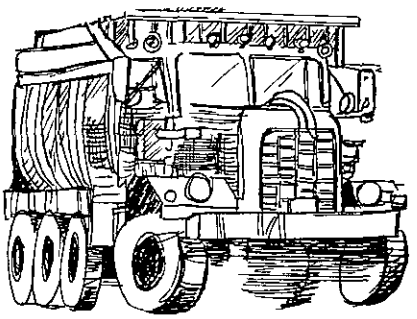


Table III-20
Timber Sale Financial Statement Summaries - MBS TSPIRS Reports

	FY87 (M$)	FY88 (M$)	FY89 (M$)
Total Revenues 1/	29,378	36,245	35,060
Total Operating Expenses 2/	16,989	13,422	14,462
Gain/Loss Before Payments to States	12,389	22,823	20,598
Payments to States	7,021	8,014	8,293
Net Gain/Loss from Timber Sales	5,368	14,809	12,305
Volume Harvested (MBF)	295,953	248,127	188,742

1/ Includes purchaser road credits established.
2/ Includes prorated annual share of long-term investment costs.

All fiscal years compared show a positive cash flow from the timber sale program for the Forest. In fiscal year 1989, net cash flow stayed up (and higher than in fiscal year 1987) even with a significant drop in volume harvested. This was because of a rapid rise in revenue per MBF as prices rose during 1989. Timber prices, which had dropped to low levels during the early 1980's, have risen as the economy has recovered, with prices rapidly increasing in the past two years as demand has remained high and log supplies have begun to tighten. Even during the recession years of the early 1980's, the Forest still showed a positive cash flow from timber sales, although the numbers are not exactly comparable to those developed through the TSPIRS process.

The positive cash flows from the timber program on this Forest are not surprising because of the predominance of high value old growth timber in the harvest mix. It is for this reason that below cost timber sales have not been a major issue on the Forest.

Road Costs Related to Timber Sales. Road construction costs for permanent roads related to timber sales, whether from appropriated or purchaser credit funds, are included in the total costs reported under TSPIRS, but they are prorated over time. (Costs for temporary roads that serve only the timber sale and will be obliterated at the end of the sale are included without proration in the annual timber sale expenses.) It is a generally accepted principle of accounting that long-term investments are prorated or amortized over some extended time period, and only one year's prorated or amortized value is counted in cash flow financial reports for that year.

Under TSPIRS rules, these permanent road costs, along with other long-term investment costs such as for backlog reforestation from appropriated funds, timber stand improvement, and genetic tree improvement, are accumulated in a

"growth activity allowance" pool from year to year. The costs are expensed to the current year timber sale program in the same proportion that volume harvested in that year is to the total volume available to be harvested in one "average" rotation on all suitable lands on the Forest.

Purchaser road credits established are included as part of the gross income calculations for the TSPIRS financial report. The prorated portion of the accumulated road costs are included in the current year expenses, as described above. Essentially, road costs are included on both sides of the cash flow equation, resulting in an appropriate accounting in the cash flow calculation.

Road costs related to timber sales have declined nearly 50 percent over the past decade. This reduction is due primarily to two factors. The first is the reduction, in the latter part of the period, in the number of sales located in roadless portions of the Forest. Since most of the sales were located in areas of the Forest that were already developed, less construction of arterial and collector roads took place. The second factor was a concentrated effort to reduce road costs through changes in design, location, and road standards.

FIREWOOD

Prior to 1974, free-use firewood was an incidental program on the Forest, considered by most managers to be a low priority. Demand was primarily limited to citizens in more rural areas who had traditionally burned wood for home space heating. The 1974 oil crisis caused many Washingtonians to view wood as an insurance policy for use in conventional fireplaces.

Demand declined after the 1974-75 oil crisis and by 1977 had approached the pre-1977 level. By 1979, energy prices for home heating began to increase rapidly and demand for firewood again increased through 1982. A decline in 1983 was observed. Part of this decline was due to the greater availability of commercial firewood from sources other than the National Forest. The more recent declines in firewood sales from the Mt. Baker-Snoqualmie have followed publicity from local air-pollution jurisdictions, regarding the the contribution wood smoke was making to the overall particulate levels in urban areas. Stricter regulations have affected the number of days wood stoves and fireplaces can be used. This has diminished their appeal, and firewood demand has dropped accordingly. The combined total of personal use and commercially cut firewood removed from the Forest appears to have leveled off, or may be declining.

Table III-21
Firewood Permits and Volumes 1/ - 1975 to 1983

Year	Number of Permits	Cords	MCF	MBF
1975	10,514	21,028	1,998	9,769
1976	5,374	10,748	1,021	4,993
1977	3,249	6,498	617	3,019
1978	3,375	6,750	641	3,136
1979	8,550	17,100	1,625	7,944
1980	10,733	21,466	2,039	9,971
1981	10,826	21,652	2,057	10,059
1982	10,253	20,506	1,948	9,525
1983	4,561	9,122	867	4,240
1984	3,658	10,300	1,057	5,171

1/ Assumes 2 cords removed per permit issued; 95 cubic feet solid wood per cord (USDA 1982, Methods for Evaluating Energy Effects of Forest Management Alternatives); 4.89 board feet per cubic foot.

Table III-22
Personal Use and Commercial Cutting, Firewood - 1984 to 1988

Year	Personal Use Number of Permits	Personal Use Volume MBF	Personal Use Volume MCF 1/	Commercial Cutting Volume MBF	Commercial Cutting Volume MCF 1/
1984	3658	5171	1057	944	193
1985	2368	2458	503	1357	278
1986	3426	3779	773	2268	463
1987	2457	2971	608	836	171
1988	1535	1584	324	1206	247

1/ Source Quarterly Cut and Sold Reports.
2/ Conversion ratio is 4.89 board feet per cubic feet.

Historically, most firewood on the Forest came from cull material that had been yarded to a landing to meet fuel treatment and silvicultural objectives. On more gentle terrain, firewood on these landings was completely cleaned up. However, firewood seekers were reluctant to harvest material that had to be moved uphill.

Recently with innovative approaches toward increasing the firewood supply, firewood gathering habits have changed. Firewood gatherers are willing to cut and remove small material from pre-commercial thinnings as well as remove undesirable species from regenerated stands. Techniques such as spreading material on the landing following logging and hauling firewood to central locations where it can be safely utilized have been effective in maintaining the supply of firewood.

The demand for firewood is expected to fluctuate as prices of other energy sources change. There may be a slight increase in overall demand that will follow the increase in population in the Puget Sound area, but the concerns over air quality and the cost of efficient clean burning stoves will moderate increases in firewood demand due to population growth. The Mt. Baker-Snoqualmie will continue to supply the firewood demand of the rural communities, but other commercial sources - mostly private landowners - will supply the urban areas for the immediate and foreseeable future.

Supply

As discussed below (wood residue section), each acre of old-growth forest contains about 12,500 cubic feet of wood fiber. Of the material unsuited for marketing, about 1500 cubic feet, per acre, can be yarded to a landing and used as firewood. Currently, between 3,500 and 4,000 acres of mature timber are harvested annually. Assuming 1,500 cubic feet per acre of residue suitable for firewood or fiber, the Forest has the potential to supply between 5 and 6 million cubic feet of fiber per year for the next 20 to 30 years. This is considerably more that the current demand.

Increasing utilization efficiency and resource requirements to leave some of the woody material on the harvested site, to maintain long-term site productivity and wildlife habitat will increase the competition for material suitable for firewood. The future of firewood availability for the public depends largely on: competition for small-sized material from pulpwood manufacturers; the rate of development of commercial firewood markets; and the rate at which harvest activities move from old-growth stands to managed stands - which contain much less wood residue.

WOOD RESIDUE

Dead and down woody material, whether the result of the natural tree mortality or the wood debris left after logging, clearing for campgrounds, and other activities, is an important resource. The stumps, root wads, bark, limbs, and logs play an important role in nutrient cycling within the forest ecosystem (Bartels and others 1985). Large portions of some nutrients are stored in branches and foliage; larger logs and branches serve as sites for nitrogen fixation. Logs may protect a site from the loss of nutrients through surface erosion (Bartels and others 1985).

The effect of nearly total residue removal on long term nutrient availability is complex and only partially understood. Soil nutrient supply and productivity change relatively slowly; therefore, harvesting practices can be selected from rotation to rotation without serious risk of decline in soil productivity (Wells and Jorgensen, 1979). Most researchers generally agree that normal harvest of most of the stem will not deplete the soil of nutrients, but that short rotations and whole tree harvests have the potential to remove nutrients and accelerate other outputs to a rate that will decrease the systems supply of nitrogen, potassium, phosphorus, calcium, and possibly other elements. The quantitative aspects of the biological, chemical, and physical processes in the soil are not sufficiently known to predict the long term effect of intensive harvest on the soil or on soil productivity.

Wood debris creates a structure and diversity of habitats that are valuable to a great many wildlife species (Maser and others 1979, Bartels and others 1985). Dead and down material is used by 149 terrestrial wildlife species in the western Cascades, as a primary or secondary component of their habitat requirements (Bartels and others 1985). Logs and root wads can be placed in streams to channel water or create pools for spawning and rearing fish.

Logs may serve as favorable sites for regeneration of some species of trees; western hemlock is especially tolerant and will grow on and over downed logs. Wood residue can also be utilized for firewood or sold for pulp chips for a growing variety of new products.

An average acre of old-growth forest on the Mt. Baker-Snoqualmie contains approximately 12,500 cubic feet of wood fiber. If the trees on this acre are harvested, about 60 percent of the wood is removed as merchantable logs; another 15 percent is removed as cull or under-sized material. Of the remaining 3,000 cubic feet, about half is left on the site to meet nutrient cycling, erosion protection, and wildlife needs. There is an estimated 1,500 cubic feet that is excess to these resource management needs, that is disposed of through a variety of techniques.

In the past, the need for wood residue for nutrient recycling and wildlife habitat was recognized, but generally, this material was viewed as fuels that created a fire hazard and debris that hampered planting seedlings. (Douglas-fir, often the selected reforestation species, is very intolerant and requires a "clean" site and lots of sunlight to grow.) Nearly all logging debris was burned, either in place or in piles near the landing.

In the past five years on this Forest, more and more of this resource is being used rather than burned. This is a result of more aggressive marketing of small-sized wood residue, better silvicultural practices, increased use of wood for home heating, a growing international market for innovative wood and paper products, and the cost savings in utilization versus burning. The cost to "clean" yard after timber harvest, and make the material available for sale, is approximately $300 per acre. Burning this residue (either broadcast burn in place or piled and burned) averages about $400 per acre.

Table III-23 shows the trend in acres broadcasted burned, over the past ten years.

Table III-23
Acres Broadcast Burned, Tons of Material Burned

Year	Acres Burned	Tons Consumed
1980	3,411	129,600
1981	3,010	105,400
1982	1,295	41,000
1983	422	14,900
1984	598	14,200
1985	626	22,000
1986	453	11,700
1987	193	7,400
1988	167	4,800
1989	252	8,300

More commercial firewood operators are operating today than ever before. This new business provides an option for the home wood-gatherer: firewood that is cheaper than that available in the urban area yet is more accessible than wood offered by cutting permit from the Forest Service. Refer to the subsection on firewood.

The demand for pulp chips for both domestic use and export is increasing as the market demand for paper products and structural panel increases. There are a number of new products that can be manufactured from residue material, ranging from various types of fuels to a type of interply plywood.

The Mt. Baker-Snoqualmie is one of several forests in the Pacific Northwest with an aggressive program to promote the utilization of wood residue. Major objectives of the program include: inventory of available and potential wood fiber residues; development of new markets, including international markets; coordination with local manufacturing firms in developing potential new markets, and resolution of Forest Service internal barriers and other external barriers to increased utilization.

A key question is determining the proper balance between cost-effective utilization of wood residue and retaining downed woody material to benefit soils, fish, and wildlife habitat.

FOREST INSECTS AND DISEASE

Insect damage on the Forest is calculated only for any losses to commercial timber species. Estimated loss has been relatively minor; for 1981, wood lost to insect damage totaled 431,000 board feet, a small percent of the forest-wide timber volume. The annual loss in the State of Washington is approximately 108.7 million board feet (USDA 1981). Table III-24 shows estimated loss for 1981.

Table III-24
Estimated Loss From Insects - 1981

Insect Species	Acres Affected	Board Feet
Mountain Pine Beetle		
Western white pine	2,120	287,000
Lodge pole pine	60	6,000
Douglas-fir beetle	380	99,000
Douglas-fir engraver	1,320	21,000
Fir engraver	230	18,000
Balsam woolly aphid	280	minor - not estimated
TOTAL	-	431,000

Commonly found root rots are: laminated root rot, Phellinus weirii, Armillaria root disease, Armillaria ostoyae, and Annosus root and butt rot, Fomes annosus. No precise root disease losses have been compiled for the Mt. Baker-Snoqualmie National Forest. However, in Douglas-fir forests in western Oregon and Washington, laminated root rot has caused an estimated annual loss of 32 million cubic feet of timber. It is present on at least five percent of the Douglas-fir forest type. It is believed that root rots may cause significant losses in commercial timber species. Early harvest of infected trees and planting less-susceptible tree species on infected sites are the most common approaches used to reduce loss (Hadfield and Johnson 1977).

Bole rots, especially in Pacific silver fir, western hemlock, and mountain hemlock, are a problem on the Mt. Baker-Snoqualmie. Most of the rots are associated with damage or wounds to trees. Damage from bole rots is reduced by minimizing wounding trees during harvesting, removing trees with large wounds and/or existing decay, and establishing rotation ages of less than 150 years. Old-growth stands of Pacific silver fir and western hemlock have a high incident of bole rots. Because the disease spreads through root grafts and external wounds, intermediate commercial thinning in these stands will be prescribed only when external wounding of remaining trees can be minimized.

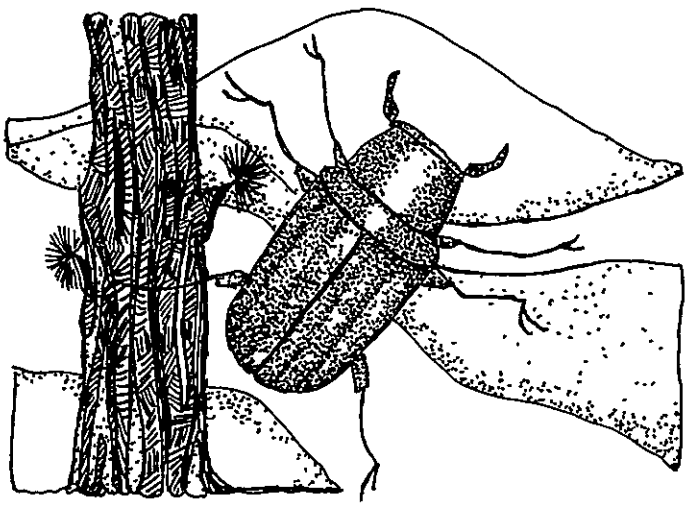
Dwarf mistletoe is a parasite which stunts tree growth and may, eventually kill the tree. Only three species are of any significance on the Forest. Hemlock dwarf mistletoe (Arceuthobium tsugense) is the most common. Douglas-fir dwarf

mistletoe (A. Douglasii) is also found, but to a much lesser extent. There is some dwarf mistletoe found on Pacific silver fir. Precommercial and commercial thinning present opportunities to reduce the level of dwarf mistletoe infection by removing selected, infested trees.

Animal Damage to Commercial Trees

The most serious animal damage occurs from bears stripping bark from young trees in regenerated stands. The bears' favorite species is Douglas-fir, at 7 to 9 inches diameter (measured at 4'6" from the ground, or diameter at breast height - dbh). Damage is heaviest in localized drainages in the Darrington area, although some damage is found Forest-wide. In the areas most impacted, as much as 80 percent of the stands has been lost. A co-operative control project was initiated with the Washington State Department of Wildlife. Some form of bear control may be required in future years.

There is some damage to commercial tree plantations from mountain beaver and lesser amounts of damage from deer, elk and small rodents. Tree mortality is rare.



FORAGE VEGETATION - LIVESTOCK MANAGEMENT

Forage for grazing animals is available, to some degree, throughout the Mt. Baker-Snoqualmie National Forest as a component of all vegetation types. As discussed above, approximately 85 percent of the Forest is covered with vegetation. Each stage of vegetation growth, or stand condition, provides different habitat and forage for animals (Hall and others 1985).

The demand for grazing range for domestic livestock has been very low on the Mt. Baker-Snoqualmie National Forest. Portions of two sheep grazing allotments are located on the Forest. Both are located primarily on the east side of the Cascade Mountains and have historically been administered by the Wenatchee National Forest. The Mt. Baker-Snoqualmie portion contains 10,000 acres, of which 4,000 are suitable for grazing. The two permits have an estimated carrying capacity of 950 animal unit months. (See the glossary in this document for a definition of these terms.) Neither permit has been used in the past five years.

There is a small amount of free grazing by recreation livestock, plus a few paid temporary permits for commercial packing. Most of this use occurs along the Pacific Crest National Scenic Trail.

In 1978, a temporary permit was issued to graze a band of sheep on transitory range in clearcut timber harvest units. The animals lost weight and the damage to planted tree seedlings in the clearcuts was unacceptable. Since this 1978 trial, the demand for transitory range has been low to nonexistent.

The supply of transitory range has not been inventoried. After a timber harvest unit is cut, the grass-forb condition lasts 2 to 5 years and occasionally as long as ten years (Hall and others 1985). Thus, it is assumed that a clearcut unit could provide range for approximately five years. If it is assumed 4,000 acres are clearcut annually, a total of 20,000 acres of transitory range could be available at all times.

WILDLIFE ELEMENTS OF DIVERSITY

Management of vegetation for the production of goods and services, other human uses of the Forest, and natural succession result in constant changes in the abundance and distribution of plants and animals on the Forest (Odum 1971). Maintenance of diversity of wildlife and their habitats is essential to the long-term goals of the Forest. The diversity of habitats on the Forest has changed from historic times to current conditions, and will continue to change. Wildlife community diversity is affected both by the amount and kinds of habitats on the Forest, and by the amount and distribution of successional stages. Wildlife-related diversity elements include:

- viability, distribution, and abundance of animal populations - this includes maintaining viable populations of all threatened, endangered, and sensitive wildlife and fish and not eliminating any species from an area;
- structure and composition of forested habitats, including diversity of tree species, and numbers of horizontal layers of vegetation at the ground, shrub, understory tree, and overstory tree levels;
- maintaining long-term productivity of habitats, including the factors which form the basis for these habitats, such as maintaining soil productivity, dead and down trees, and a duff layer; and
- fragmentation and reduction of scarce or fragile habitat types, such as old growth, riparian communities, cliff, cave, and talus habitats, and hardwood communities.

(Also refer to the previous discussions on Soil, Diversity of Vegetation, Diversity - Old Growth, the above text on wood residue, and the Fire section later in this chapter.)

WILDLIFE

The abundance and distribution of animal species is a key element of diversity. Typically, animals are dependent upon or frequently use certain vegetation types or successional stages that have been previously discussed. Consequently, managing for the maintenance of diversity of vegetation is the foundation for maintaining diversity of wildlife. This is the general means of ensuring the continued existence of healthy populations of species. However, some wildlife species are, for a variety of reasons, low enough in numbers that special management emphasis and protection are necessary to maintain or recover their populations. These are species which are on the Federal list of threatened and endangered species, or which are on the Forest Service's sensitive list for the Pacific Northwest Region. These are discussed below.

Significant differences in elevation and climate create a natural and diverse mosaic of habitats within the Forest boundary. These habitats provide for approximately 276 wildlife species. Some are residents, others migrate through the Forest. There are 29 species of reptiles and amphibians, about 174 bird species, and 73 species of mammals (Guenther and Kucera 1978).

One Federally designated threatened species, the bald eagle, and three Federally designated endangered species, American peregrine falcon, grizzly bear, and gray wolf, occur on the Forest.

Big game species include black-tailed deer, Roosevelt elk, black bear, cougar, and mountain goat. Upland game species include blue and ruffed grouse, cottontail rabbit, and band-tailed pigeon. Predators on the Forest are bobcat, coyote, and raccoon. Nongame species include reptiles, amphibians, birds of prey (raptors), other birds, and small mammals.

Wildlife habitat is directly related to the vegetative condition and species mix occurring in a particular habitat. The natural process by which one plant community or stand condition changes into another is known as succession (Hall and others 1985a). Edges are places where plant communities or geomorphic features (water, cliffs, etc.) meet or where successional stages within plant communities come together. Induced edges result from disturbance factors and tend to be relatively short-lived (e.g. wildfire, flooding and erosion, disease and insect outbreaks, timber harvest, planting) (Logan and others 1985). These areas are usually richer in number of species of wildlife than adjoining plant communities or stand conditions.

Habitat For Management Indicator Species

To help determine the effects of management activities on wildlife, several species and groups of species were chosen as management indicators. One type of indicator species represents a number of other wildlife species that depend on or prefer similar habitats. Species selected generally require the largest amount of a habitat type, so that managing the larger habitats should provide for those species that require smaller amounts of the same habitat or certain components of that habitat.

Management indicator species (MIS) are designated and monitored as one way of assessing the effects of management activities (timber harvest, road construction, etc.) on the viability of all vertebrate wildlife populations on

the Forest. If the MIS populations remain viable under planned activities, it is a good indication that all other species' populations are also remaining viable.

Environmental factors that influence wildlife use of a specific habitat type include species composition of the plant community, the successional stage of the surrounding stand, elevation, the condition of the habitat type, the proximity to water, and the wildlife species present.

Management indicator species were selected for three habitat types with special management concerns: 1) old-growth and mature forest; 2) snags and dead and defective standing and down tree habitat; and 3) big game winter range. In addition, all threatened and endangered species are indicator species. Monitoring the effects of forest management activities on these species is critical to ensuring their protection. Threatened, Endangered and Sensitive Species are discussed in detail, below. Table III-25 displays the habitats and their associated indicator species. (Each MIS species is then discussed, in order.)

Table III-25
Wildlife Management Indicator Species
Ecological Indications Species

Habitat Type	Indicator Species
Threatened and Endangered Species Habitat	Bald Eagle, American Peregrine Falcon, Grizzly Bear, Gray Wolf
Old-Growth and Mature Forest	Northern Spotted Owl, Pine Marten, Pileated Woodpecker
Snags and Downed Logs	Primary Cavity Excavators
Big Game Winter Range	Black-Tailed Deer, Roosevelt Elk, Mountain Goat

Threatened and Endangered Habitat and Occurrence

Threatened and Endangered animals occurring on the Mt.Baker-Snoqualmie are the bald eagle, American peregrine falcon, grizzly bear, and gray wolf. There are no known federally-listed plants on the Forest.

Bald Eagle

Washington State has the largest population of wintering bald eagles in the lower 48 states, over 2370 birds in 1988, with 267 occupied nesting territories and a total of 322 territories (occupied or not) with one or more nests (Washington Natural Heritage Data Base 1988). Most of the birds are found in forested areas west of the Cascade Mountains. The 1988 Washington Midwinter Bald Eagle Survey (coordinated by the Washington Department of Wildlife) shows an increasing trend in bald eagles wintering in Washington, with a consistent percentage of immature eagles.

Much of the bald eagle activity takes place on lands outside the National Forest boundary. Several communal night roosts occur on state and private lands. Within the Forest boundary, the most significant bald eagle activity occurs near the town of Skykomish; this includes feeding, nesting, a staging area and communal night roosts. Each of the five Ranger Districts has several identified or suspected roost and perch tree areas that receive use during some years.

The habitat needs of the bald eagle vary with the birds' activities and behaviors. Individual eagles exhibit variable patterns of use yearly, by area and season. Eagles may be absent from a certain area one year and then return, in variable numbers, in successive years (Steenhof 1978). Apparently, eagle distribution at any one time is determined largely by availability of food over several entire river basins. Consequently, foraging, perching and roosting habitat may be properly identified only after several years of investigation. Nesting, roosting and perching habitats are more apt to be adversely affected by human activities than are foraging habitats (Stalmaster and others 1985).

Bald eagles spend a large portion of the day perching (Stalmaster and others 1985). Eagles usually perch on the tallest tree on the edge of stands; snags are ofter preferred. Foraging habitat is almost always associated with water and preferably is in large areas with a wide visual field.

The following subsections describe bald eagle wintering and nesting habitats on the Forest.

Bald Eagle Wintering Habitat. During the winter, bald eagles often roost in large groups; non-breeding eagles may roost together in the spring and summer (Stalmaster and others 1985). Roosting areas are usually used only at night, although some eagles may remain there throughout the day. The eagles may congregate in specific trees, or staging areas, before flying to the roost area (Stalmaster and others 1985). Winter roost sites may be located in coniferous forests, which offer the most protection from the weather, or in deciduous forests, especially in riparian habitat (Stalmaster and others 1985). Roost trees are usually larger than other trees in the stand and are mature or old growth. Selected trees may be Douglas-fir, black cottonwood, western redcedar, big leaf maple, or snags (Stalmaster and others 1985).

The largest concentration of wintering eagles in the State occurs on the Nooksack River system; bald eagles also gather along the Skagit, Sauk, Suiattle, and Skykomish Rivers (Stalmaster 1983). Feeding along these rivers is related to the salmon spawning in the lower reaches of the rivers and the availability of salmon carcasses. As many as several hundred bald eagles winter on the forest, approximately 15 percent of the State total.

Disturbances, including vehicular traffic, aircraft, and winter recreation (mostly winter river boating), may affect the large winter concentrations of bald eagles on the Forest. Avoidance flights caused by human disturbances alter eagles' behavioral patterns, restricting habitat use and wasting energy in flight (Stalmaster 1981). Vegetative buffers between eagles and humans usually reduce the effect of minor noise disturbances (Stalmaster and others 1985). The USDA Forest Service, Pacific Northwest Research Station is currently conducting a study to determine the significance of the effects of recreation activities on wintering bald eagles on the Skagit River.

Bald Eagle Nesting Habitat. Bald eagles prefer old growth or mature second growth for nesting (Stalmaster and others, 1985). Bald eagle nests are usually built in trees that dominate the surrounding forest and have large horizontal branches. Trees selected for nesting are usually near water, for easy access to food. Osprey nesting habitat is similar, except that nest trees are usually snags or broken top trees, often interspersed in bald eagle habitat.

Bald eagle productivity during nesting may be adversely affected by human presence. Even temporary abandonment of a nest, due to disturbance, may result in chilling or overheating of, or predation on eggs or young. However, the eagles' responses to disruption are inconsistent among pairs (Stalmasters and others 1985). Guidelines for acceptable activities around, and minimal distances of project activities from, active nests sites provide protection for nesting eagles. There is one known active bald eagle nest site which has been observed for the past two seasons and three potential (not active) nest sites (two of the nest sites are in one pair territory). An interagency management plan, the Final Pacific States Bald Eagle Recovery Plan, was approved in 1986. It calls for a buffer of at least 660 feet around the nest tree(s) of these sites; the eniter buffered area is to receive protection and special management.

A study of bald eagles on the Skykomish District was conducted during the winter of 1977-78. The study objectives were to determine the population dynamics and habitat requirements of bald eagles wintering along the Skykomish River and to determine the compatibility of bald eagles with Forest Service activities. The Mt. Baker, Darrington, and Skykomish Ranger Districts, in conjunction with the USDI Fish and Wildlife Service, the Washington State Department of Wildlife, the Nature Conservancy, and citizen volunteers, are conducting multi-year surveys of eagle winter feeding and roost areas in the Skagit, Sauk and upper Cascade River drainages.

American Peregrine Falcon

The American peregrine falcon, an endangered species, is currently showing a low reproductive rate in the Pacific Northwest (Larrison 1981). Peregrine falcons are most numerous along the Washington coast and less common in interior Washington (Larrison and Sonnenberg 1968). They prey on nesting colonies of water birds, migrating waterfowl and shorebirds, songbirds, and other birds. Peregrines usually nest on ledges or in small caves on high vertical cliffs overlooking plains or bodies of water (Welty 1975). They forage over adjacent tideflats and beaches in coastal areas and over marshes and prairies in interior areas (Larrison 1981). Peregrine falcons are mainly found in open country at other times of the year (Larrison 1981).

The peregrine falcon is an infrequent visitor to the Forest during spring and fall migration. At present, there is one historical and one potential nest site on the Forest. There are no known active nest sites at present. The "Pacific Coast Recovery Plan for the American Peregrine Falcon" (1982) is currently being revised.

Grizzly Bear

Grizzly bear occurring on the Forest are part of the North Cascade Grizzly Bear Ecosystem (NCGBE) as described in the "Grizzly Bear Recovery Plan" (1982).

The grizzly bear is omnivorous and is a very mobile and secretive animal. The habitat types and conditions selected by grizzlies is highly variable, influenced primarily by their search for food. Data indicates that the grizzly bear prefers small interspersed openings and meadows for feeding, in close association with forest cover for resting and hiding (Ruediger and Mealey 1978). These preferred habitat types include lower elevations, riparian areas, drainage bottoms, avalanche chutes, and big game winter ranges during early spring. As the seasons progress to late spring, summer, and fall, grizzly bears follow the receding snows to higher elevations to feed on succulent herbaceous materials in wet meadows and openings. Grizzlies will also feed on berries, small mammals, and carrion if available (US Department of the Interior, Fish and Wildlife Service 1982).

Presently, the USDI Fish and Wildlife Service, USDI Park Service, the Washington State Department of Wildlife, and the Forest Service are working together to evaluate habitat suitability and capability, habitat use information and population estimates for the North Cascades Ecosystem, which includes portions of the Mt. Baker-Snoqualmie National Forest. This is a five-year project which includes public information, education and input. The Department of Wildlife's portion of this is an attempt to validate whether there is a resident population of grizzly bears in the North Cascades. These projects are due to be completed in December 1990.

The number of bears utilizing the NCGBE or the number using Forest lands is not known. The Forest has documented 36 grizzly bear observations from the mid 1850's to 1983. Thirty-three of these 36 observations, 92 percent, were on lands currently designated as wilderness; 2 of the remaining 3 were in unroaded areas and 1 sighting was in roaded lands. In 1989, grizzly bear signs were confirmed at two sites by Department of Wildlife biologist Jon Almack: one on the Wenatchee National Forest, and one in the Ross Lake National Recreation Area. Most sightings on the Forest have been in the Glacier Peak Wilderness.

Grizzly bear occurrence on the Forest probably does not represent an established population, but wandering single bears in search of food.

The combination of diverse plant communities, inaccessible topography, and remote locations have facilitated the maintenance of habitat characteristics attractive to the grizzly bear.

Gray Wolf

The gray wolf (Canus lupis) once roamed over most of North America. It is now found only in limited areas of Alaska, Canada the northern portions of Washington, Idaho and Montana. The gray wolf is an extremely adaptable animal, but its numbers are greatly diminished due to human predation, loss of habitat to development and loss of suitable prey - especially deer and elk - due to reductions in big game habitats.

The gray wolf is a social animal; it lives in packs of 2 to 15 animals, formed primarily of family members and relatives (Whitney 1942). The wolf mates for life. Unlike many mammals, wolves do not make regular use of shelters. A den is constructed or occupied only for the birth and care of the young, a period of about two months. Dens are usually located on slopes, ridges, or other high ground, and near a source of water.

There have been 16 probable and possible wolf sightings reported on or near the Forest, dating as recently as 1988 (Laufer and Jenkins 1989). Geographical concentrations of the reports are found near Baker Lake on the northern part of the Forest, and near Mount Rainier, the southern-most portion of the Forest. Sightings have also been reported on Darrington District. Laufer and Jenkins (1989) report a total of 83 wolf sightings in the North Cascades since 1946; 49 since 1973. Of the reports since 1973, they classified nineteen of them as probable wolf sightings. Another concentration of sites is near Ross Lake, east of the Forest. Many other portions of the Forest are also likely to be good habitat for the gray wolf.

There is no formal recovery plan for the species in the Pacific Northwest. The Washington Wolf Project acts as a clearinghouse for information on gray wolves. The land managing agencies in the area are considering a study to determine whether or not reintroduction or recovery of the species is feasible in the North Cascades.

Candidates for Federal Listing

Five Pacific Northwest Region Sensitive animal species are candidates for federal listing. Category 2 candidate species are the bull trout, the marbled murrelet, Townsend's big-eared bat, the California wolverine, and the North American lynx.

Proposed for Federal Listing

The northern spotted owl is a classified Pacific Northwest Region Sensitive species and is proposed for Federal Threatened and Endangered listing. A decision on listing is expected from U.S. Fish and Wildlife Service in 1990. The northern spotted owl is discussed in more detail in the next sub-section.

Old-Growth and Mature Forest

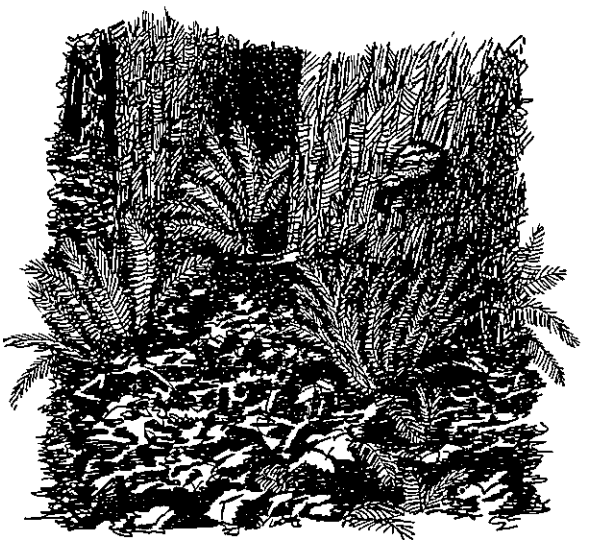
As discussed in Diversity - Old Growth, earlier in this chapter, the old-growth coniferous forest is a habitat ecosystem of particular concern. Depending on the site, 175 to 250 years are needed for a natural old-growth coniferous forest to develop. The loss of old-growth forest or changes in use patterns of the remaining old growth have significant effects on the wildlife that use it.

It is necessary to define old growth forests in terms of multiple criteria, rather than a single characteristic, such as size as age of trees (Franklin et al 1986). Old-growth stands have the following characteristics: mature and overmature trees in the overstory that are well into the mature-growth stage; a multi-layered canopy and trees of several age classes; standing dead trees and down materials are present; and evidence of human activities may be present but do not significantly alter the other characteristics (USDA Forest Service 1984b). (For more information, see Franklin 1981.)

The size of an old-growth stand affects its function as an ecological unit. Patches of smaller sizes may be dominated by edge effects - effects of being close to younger stands or disturbed areas - and they are vulnerable to major disturbances such as windthrow (Franklin et al 1986).

At present, there are about 643,500 acres of old growth on the Mt. Baker-Snoqualmie; these acres contain mature and large sawtimber, 21 inches and larger in diameter (see discussion on Diversity - Old Growth, this chapter). Of the total, 232,500 acres are located within designated wilderness. A total of 276,600 acres (43 percent) are tentatively suitable for commercial timber harvest.

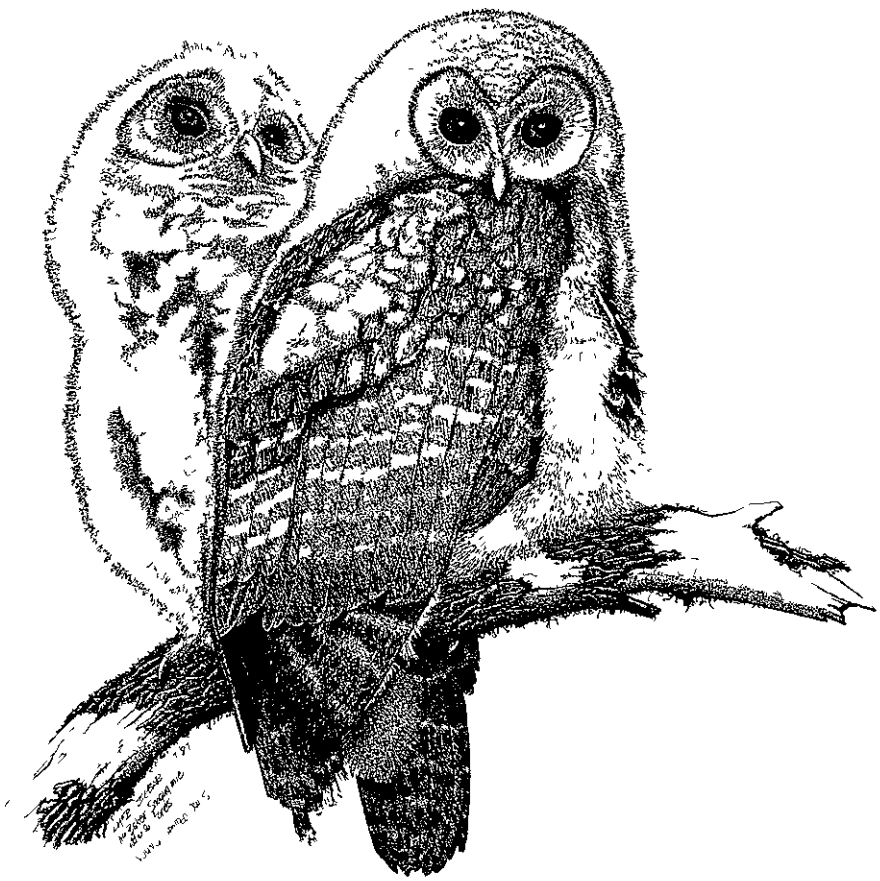
Though few plant and animal species are totally dependent on coniferous old-growth ecosystems, many find optimal habitat in old growth and mature forests; these include species such as great blue blue heron, osprey, goshawk, and numerous species of woodpeckers. The northern spotted owl is a species closely related to old-growth habitat, generally under 4,000 feet in elevation. The spotted owl is a Washington State-listed endangered species, a Pacific Northwest Region Sensitive species, and is proposed for federal listing. (See Current Situation, below.)



Northern Spotted Owl

The spotted owl is a medium-sized, nocturnal bird which inhabits mountainous, forested regions of the West. Three subspecies have been described. One, the northern spotted owl, was once common in the extensive old-growth coniferous forests of Washington, Oregon and northern California. Northern spotted owls live primarily in dense, mature and old-growth forests, commonly dominated by Douglas-fir, although other forest types and occasionally, younger age stands are used. Mature and old-growth forests contain the structural characteristics and type of vegetation that best provide spotted owls with food, cover, nest sites, and protection from weather and predation. Northern spotted owls usually nest in cavities created by broken tops of large, old trees, and forages in older stands in the winter (USDA 1988a).

Radio-telemetry studies of a small sample of spotted owls indicate that the average size of an individual spotted owl's home range in Washington is 7,300 acres. The average amount of mature and old-growth forest within this home range is 4,200 acres. There is some overlap in areas used by some adjacent pairs of owls (USDA 1988a). Extensive reviews of existing information on the spotted owl can be found in U.S. Fish and Wildlife Service (1989) and USDA (1988).



Habitat. The older forest habitat used by spotted owls is characterized by the presence of multi-layered stand structure, dense tree canopy closure, large trees with cavities or broken tops, and abundant standing and down dead trees (U.S. Fish and Wildlife Service 1988). In different portions of the owl's

range, the forest stands which provide these characteristics may vary. The suitable habitat definition used in this Forest Plan is displayed in Table III-26.

Table III-26
Definition of Spotted Owl Suitable Habitat, Mt. Baker-Snoqualmie NF

Physical Attributes		
	Elevation	less than 4,200 feet (Darr/Sky/N. Bend RD) 1/ less than 5,000 feet (White R. RD) 2/ less than 4,000 feet (Mt. Baker RD)
	Patch (or block) Size	greater than 21 acres
Vegetation Attributes		
	Overstory Characteristics	
	Dominant Tree Species	Douglas-fir Western hemlock Western redcedar
	Age and Condition	Old Growth and Mature, older than 230 years
	Understory Characteristics	Multi-layered, Uneven Aged
Structural Attributes		
	Live Trees	
	Tree Size	greater than 21 inches DBH 3/; 17 to 20 inches DBH but contains trees over 21 inches DBH 2/
	Tree Density	more than 15 trees per acre
	Canopy Closure	greater than 70% closed
	Dead and Down	
	Snag Size	greater than 21 inches DBH
	Snag Density	more than 3 per acre
	Down Logs	high density of down logs

1/ Darrington, Skykomish, and North Bend Ranger Districts
2/ Mt. Baker-Snoqualmie habitat that did not meet all of the characteristics but in which northern spotted owls were found more than a single time during daylight hours.
3/ Diameter at breast height (4'6" from ground).

This definition is very similar to that used on the Gifford Pinchot National Forest. The Mt. Baker-Snoqualmie has included elevational adjustments for different parts of the Forest, based on the area's stands structure and type, and records of adult spotted owl occurrence. Spotted owl habitat on the Wenatchee National Forest, adjacent to this Forest and east of the Cascade Mountain crest, has somewhat different attributes. There are differences between the two Forests in primary overstory tree species, typical minimum age for stands, and diameter of overstory trees; there also appear to be differences in primary prey species. On the Wenatchee National Forest, spotted

owls sometimes nest on mistletoe platforms in trees of smaller diameter than the nest trees on the Mt. Baker-Snoqualmie N.F. (USDA 1989; USFWS 1988).

Current Situation. There are currently about 499,200 acres of suitable spotted owl habitat on the Mt. Baker-Snoqualmie; refer to the wildlife resource map, in the packet of maps accompanying this FEIS. Some of these suitable habitat acres are so fragmented that their primary contribution to spotted owl habitat may be as islands of dispersal habitat between reproductive pair habitat areas.

Tools used to define suitable spotted owl habitat for this plan and for identifying a network of spotted owl habitat areas were:

- vegetation information from the Total Resources Information System;
- aerial photography;
- ground-checking of potentially suitable habitat areas;
- stand examination information;
- personal knowledge of district personnel of characteristics of areas.

As Landsat information on vegetation and a Geographics Information System become available to the Forest, and as further vegetation surveys are collected - which include more detailed structural information on forest stands - the definition and mapping of suitable habitat will be refined.

The Final Supplement to the EIS for an Amendment to the Pacific Northwest Regional Guide (FSEIS) (USDA 1988a) - that addressed northern spotted owls - estimated present spotted owl habitat capability on the Forest at 121 pairs.

As mentioned above, a decision from USDI Fish and Wildlife Service on federal Threatened and Endangered listing for the northern spotted owl is expected in 1990. An Interagency Scientific Committee was established, under the authority of an interagency agreement (August 1988) between USDI National Park Service, USDA Forest Service, USDI Bureau of Land Management, and UDSI Fish and Wildlife Service to address the conservation of the northern spotted owl. This Committee recommended a conservation strategy in April, 1990. Section 318 of the 1990 Interior Appropriations Act directs the Forest Service to consider the recommendations of the Committee in reviewing and revising the 1988 FSEIS decision regarding the species. A new decision on management direction for the spotted owl decision is expected in 1990.

Northern Spotted Owl Sightings. Between 1980 and 1989, there have been sightings of 55 pairs of spotted owls and 177 individuals on the Forest. It is difficult to establish an exact number, since it is often not possible to know whether pairs in subsequent years or in adjacent areas are the same owls. During a fairly intensive surveying and monitoring effort in 1989, a total of 100 spotted owls were detected: 15 pairs with a total of 28 young, 12 pairs with no young, and 46 individuals which were not paired or not known to be paired. Fifty-four of these individuals (18 of the pairs) are believed to be owls not located in previous years. The remainder are likely to be repeat sightings of spotted owls from previous years, or pairs or individuals which replaced owls located in previous years.

Management Requirement. Also refer to Chapter II, development of management requirements, Appendix B and Appendix H of this document. Under FSEIS direction, a network of spotted owl sites was established to meet management requirement for spotted owls. This MR network consists of 76 habitat areas;

about half are located on lands tentatively suitable for timber harvest (the actual number on lands suitable for timber harvest varies by alternative). The remaining half are on reserved lands, not available for timber harvest.

Within 20 designated habitat areas (MR habitats on lands suitable for timber harvest) that were monitored in 1989, 85 percent had one or more owls present; 50 percent had pairs of owls, and 88 percent of those pairs produced young which fledged from the nest. A total of 39 percent of the network sites monitored fledged spotted owls. Spotted owls evidently do not breed every year (USDA 1989; USDI 1988) and reproduction appears to occur at a lower rate on this Forest than on many others.

Within the current 39 designated habitat areas, 94 percent have had spotted owl presence at some time in the last decade; 62 percent are known to have had pairs and 43 percent are known to have fledged young. Ninety-four percent of these areas have been checked for owl presence at this time. Of the total known pairs on the Forest in the last decade, 63 percent are within the spotted owl MR network, and 73 percent of the reproductive pairs are in the network. Some of the spotted owls outside of the network are older sightings which have not been confirmed recently.

SOHA Size. Standards and guidelines from the FEIS set spotted owl habitat areas (SOHA) size at 2200 acres, with SOHA's to be smaller only where fewer acres of habitat remained and the site was needed to maintain the species' distribution on the Forest or to provide connections between network sites. All habitat areas within reserved areas are at least 2200 acres in size. Of the designated network sites on the Forest, 78 percent have 2200 or more acres of suitable habitat within a 2.1 mile radius of the center of the soha; 89 percent have at least 2000 acres; 95 percent have over 1,650 acres and 97 percent have at least 1000 acres of suitable habitat.

Relationship Between Spotted Owls, Other Owls. Barred owls have been found in some of the spotted owl network sites, and great horned owls have been located in a few. Barred owls began to extend their range into the forested areas west of the Cascade Crest in the early 1980's. The relationship between the two species is not well understood, although behaviors have been observed which indicate that barred owls may sometimes be able to displace spotted owls from higher-quality habitat, and great horned owls may prey upon young spotted owls (USDA 1989). Barred owls can use a relatively wide range of habitats, including spotted owl habitat. A better understanding of these relationships may result from studies which are part of the USDA Forest Service Pacific Northwest Research Station's Old Growth Research project, and the Region 6 Forest Service monitoring of spotted owl habitat areas.

Pine Marten and Pileated Woodpecker

Habitat needs for the pine marten and the pileated woodpecker can be met in mature and old-growth forest. However, the optimum habitat for these species is probably old growth. These species were selected as indicators for mature and old-growth habitat.

Pine martens primarily inhabit dense coniferous forests where soil conditions support the understory vegetation required by voles, the pine marten's preferred prey species (Koehler and others 1975). Stands of mature to overmature coniferous forest comprised of at least 40 percent fir, having a canopy closure greater than 50 percent, with 20 to 50 percent of the ground surface covered with dead and down woody material, provide near optimal pine marten habitat during the winter months. The pine marten relies on uncut and partially cut coniferous stands in winter but is able to tolerate and make use of extensive areas of re-generating clearcuts (Stevenson 1982). During summer months, pine martens sometimes forage in open rock slides, brush fields, and meadows (Marshall 1951).

The pileated woodpecker is dependent on snag habitat for nesting, roosting, and feeding. Generally, large snags, 25 inches DBH on the west side of Washington, are used for nesting (Neitro and others 1985). The foraging habitats of this predator of forest insects results in a need for dead wood in snags, logs, and naturally created stumps. As the woodpecker preys on insects, it also creates holes for a variety of other cavity-dwelling wildlife. As a result, lack of adequate habitat for the pileated woodpecker seriously effects the diversity and stability of the ecosystem (Bull and Meslow 1977).

The present habitat capability for pine marten, in 634,500 acres of habitat, is about 3,688 females and 922 males - a total of 4,610 pine marten. The same area provides habitat to support 922 pileated woodpecker pairs. It is unlikely that all potential habitats are occupied at any one time, so the actual number, though unknown, is likely to be slightly lower.

Snags and Downed Logs

Large standing dead and/or defective trees (snags) and downed logs are important to the total makeup of the coniferous old-growth ecosystem (Franklin and others 1981). Snags in the forests of western Oregon and Washington are used by nearly 100 species of wildlife, of which at least 53 species (39 birds and 14 mammals) are cavity-dependent (Neitro and others 1985). Snags are used for nesting, roosting, foraging, and other functions, such as protection from adverse weather (Neitro and others 1985). A number of woodpeckers, owls, sapsuckers, and others are dependent on snags. Snags distributed over a larger area is important (Mannan 1983); isolated snags are not utilized as much as clumps of snags for nesting and feeding (Raphael and White 1984).

Dead and down woody material, in the form of stumps, root wads, bark, limbs, and logs not only are important in mineral cycling, nutrient mobilization, and natural forest regeneration but, also, create structure and diversity of habitats that are valuable to a great many wildlife species (Maser and others 1979, Bartels and others 1985). Dead and down material is used by 149 terrestrial wildlife species in the western Cascade forest, including the pine marten (Bartels and others 1985). Past silvicultural treatments involving

clearcutting have depleted many acres of old growth and eliminated most dead and defective trees. Since 1979, the Forest has actively planned for retention of standing and down wildlife trees as a part of timber harvest activities.

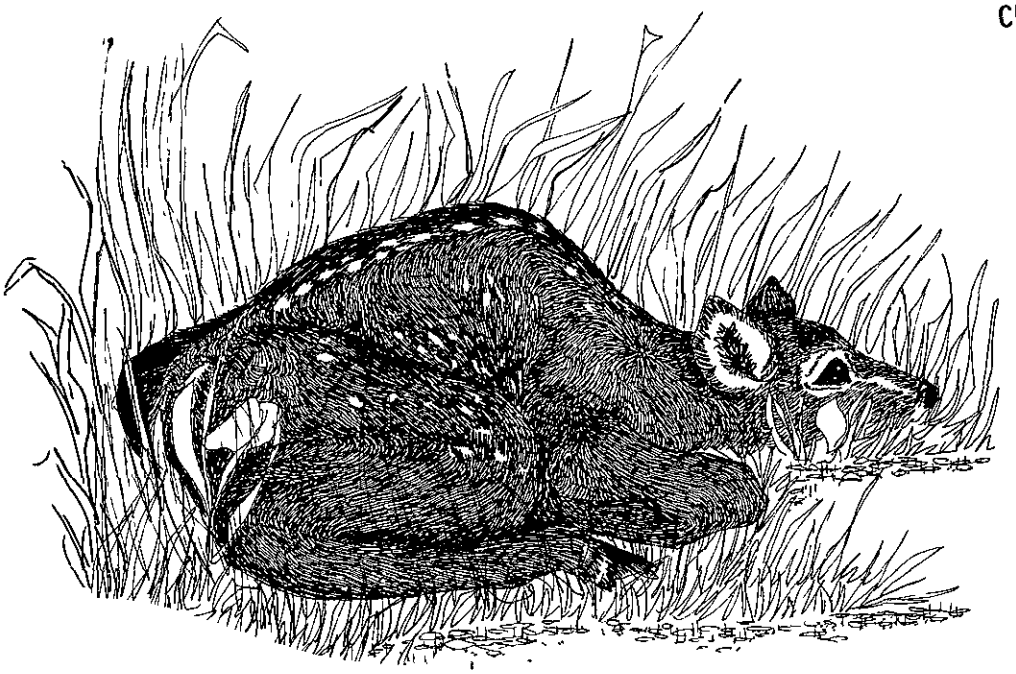
Research documented in The Seen and Unseen World of the Fallen Tree, Maser, C and J.M. Trappe, Gen. Tech. Rep. PNW-164, indicates that large woody material plays and important role in soil productivity. Subsequent research (Coarse Woody Debris in Douglas-fir Forests of Western Oregon and Washington, Spies, T.A. and J.F. Franklin, Ecology, June 1988) determined the amount of dead and down logs typically present in the forests of western Washington and Oregon. Large woody material was lowest on dry sites where fire was more common, and highest on moist sites where fire played less of a role in the history of the stand. It also varied from north to south and from the Cascades to the coast. It averaged 4500 cu ft (55 tons) per acre in both old growth forests and young natural stands. Mature stands (second growth) had approximately half the volume of dead and down logs as old growth stands or young stands. Much of the large wood from the previous stand had decayed but the current stand had not yet begun to break up so no new logs had fallen to replace them.

Franklin and Spies concluded that "Forest management activities greatly reduce coarse woody debris below minimums typically encountered under natural ecosystem dynamics... Our research suggests that if managers plan to maintain even moderate amounts of coarse woody debris in managed forests, substantial changes are required in current harvesting and silvicultural practices, and management guidelines will need to take into account successional, site, and geographic variation." The best available model for maintaining long term productivity is the natural forest ecosystem.

Dead and defective trees, standing and downed (logs) are present over the 77 percent of the Mt. Baker-Snoqualmie that is forested. The conifer and conifer-hardwood mix portions (66%) have a high level of snags - enough to support 80-100 percent of the potential populations of cavity excavators, except for those acres of the Forest which have been harvested in the past. Fourteen percent of the Forest is in high-elevation or low-productivity sites, with a more open, park-like canopy and, consequently, with fewer dead trees and downed logs. Habitat remains for high densities of cavity excavators and species dependent on dead and down logs on 65 percent of the Forest.

Big Game Winter Range

Black-tailed deer and mountain goat are found throughout the Forest. Roosevelt elk are concentrated primarily in three distinct groups. The White River group near Mt. Rainier National Park, the Snoqualmie group on the south end of the Forest, and the Nooksack group on the northern portion of the Forest. These indicator species are important as hunted and viewed wildlife, and they represent other species, like cougar and blackbear, which use a mixture of optimal cover, openings, and other stages which are affected by human activities.



Winter range areas are essential to maintaining deer, elk, and mountain goat populations. During mild to average winters, these animals find forage and cover up to 3,000 feet in elevation. Important winter range, which generally occurs below 2,200 feet, provides needed food and cover to maintain big game herds during severe winters. Figure III-9, on the next page, shows the general locations of deer, elk, and mountain goat winter ranges on the Forest.

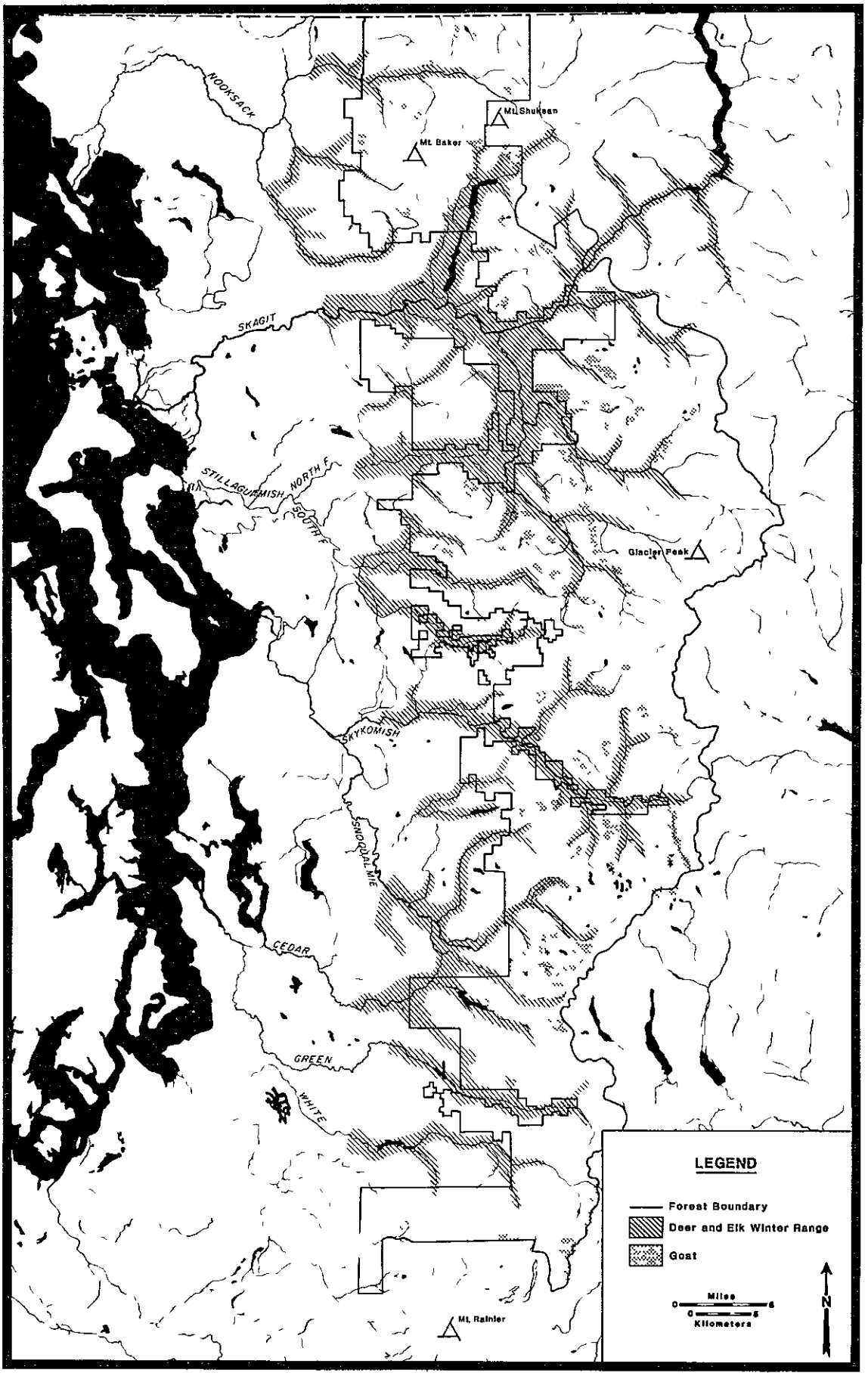
Thermal cover is considered to be the most critical component of big game winter ranges. Old growth is optimal thermal cover, providing cover along with maintenance forage (Jones 1974, Taber and Hanley 1979).

Approximately 173,300 acres of suitable deer and elk winter range occur on the Forest. Based on the habitat capability model used by this Forest, this would support about 13,330 deer and 682 elk. Deer and elk winter ranges on the Forest are generally associated with drainages and their adjacent riparian areas which provide necessary cover and forage at the lower elevations. The relationship of the Forest to private and State-owned lands is such that, in winters of heavy snowpacks, elk and deer winter on a greater portion of the range off the Forest. Development for recreation, agricultural, residential, and commercial uses on public lands is decreasing the quality and quantity of wintering areas. As off-Forest winter ranges decrease, more emphasis will be placed on improved management of the Forest winter ranges.

Mountain goat winter ranges are generally steep, rocky slopes of 40 degrees or more, adjacent to forage and cover. During periods of heavy snowfall, mountain goats are forced to migrate to lower elevational winter ranges with mature and old-growth timber. These areas modify the harsh environmental factors by intercepting wind, rain, and snow, in conjunction with providing tree lichens, mosses, grasses, and shrubs used as forage. There are about 113,800 acres of land identified as mountain goat habitat on the Forest, estimated to currently support about 1,300 mountain goats.

The habitat capability for goats, based only on vegetation condition, is currently estimated to be 1,450 goats; however, the current population is estimated to be about 1,300. Parasites, over-hunting, and human disturbance have been suggested as possible causes of this difference (Welch and Raedeke 1990).

Figure III-9 Deer and Elk Winter Range / Mountain Goat Habitat On or Adjacent to the Forest



Sensitive Animal Species

It is Forest Service policy to protect the habitat of federally listed threatened and endangered species, and Forest Service sensitive species from adverse modification or destruction, as well as to protect individual organisms from harm or harassment as appropriate (FSM 2670.32). All Forest Service projects, programs, and activities are reviewed for possible effects on threatened, endangered, and sensitive (TE&S) species. Should any of these species be added to the Federal Threatened and Endangered Species list, they would be managed according to the provisions of the Endangered Species Act.

Table III-27
Pacific Northwest Region Sensitive Species

	Scientific Name	Common Name	Classification
	Salvelinus confluentus	bull trout	Candidate 1/
*	Gavia immer	common loon	Sensitive
*	Strix occidentalis caurina	northern spotted owl	Candidate 2/
*	Brachyramphus marmoratus	marbled murrelet	Candidate 1/
*	Plecotus townsendii townsendii	Townsend's big-eared bat	Candidate 1/
	Gulo gulo luteus	California wolverine	Candidate 1/
*	Felis lynx canadensis	North American lynx	Candidate 1/

1/ Candidate for Federal listing; further information needed
2/ Proposed for Federal listing; decision due June, 1990.

Bull trout: Habitat consists of large rivers and their tributaries both above and below anadromous barriers. Bull trout tend to be more resident than anadromous. They seem to prefer very cold and still water, especially for spawning. According to the Washington Department of Wildlife (Johnston pers. comm.), this species is expected to occur in many of the rivers and streams on the Forest. Due to their similarity to Dolly Varden (Salvelinus malma), this species is difficult to identify.

Common loon: Common loons have been observed during non-winter months. They typically winter along the coast and in coastal estuaries. Nesting habitat consists of bodies of water large enough for take-offs, deep enough for escape-diving, and relatively free of human disturbance. They prefer to nest on islands. There have been 19 reports of common loons (totalling 55 animals) on the Mt. Baker District since 1984. (Habitat requirement information sources: McIntyre 1975; Terres 1980.)

Marbled murrelet: Marbled murrelets are robin-sized seabirds which are distributed along the Pacific Coast from the Aleutian Islands south to central California. They feed on the ocean and nest on land. The breeding ecology and habitat requirements of this species are poorly understood. In northern Alaska, they nest on the ground, but from southeast Alaska to central California, they have been found nesting in large trees that are part of old-growth or mature forest stands. They have been observed 35 miles (56 km) inland. Little is known of their habitat requirements but marbled murrelets are reported to use large trees with moss or lichen covered branches for nesting. (Pacific Northwest Region, Forest Service 1989).

Fewer than 15 nests have been identified for this species within its range (Marshall 1988). Washington's breeding population is estimated at 1900 - 3500 pairs (Speich and Wahl 1987). There have been reports of marbled murrelets on Mt. Baker and Darrington Districts, including the finding of a dead murrelet chick on Darrington District in 1989. The Department of Wildlife coordinated volunteer surveys of a limited amount of inland murrelet habitat in 1988 and 1989. At this time, an estimate of the murrelet population on the Forest is not possible. An intensive study of murrelet habitat and use on portions of Darrington District, funded by the the Forest Service, the Department of Wildlife, and also supported by volunteer individuals and organizations, will begin in 1990. The objective of this project is to identify marbled murrelet inland habitat requirements.

Townsend's big-eared bat: These bats characteristically utilize caves or cave-like structures as hibernacula during the winter. They are highly susceptible to human disturbance during those months. During non-winter months, they also use caves or cave-like structures as nursery sites and as day-roosting habitat. They have also been observed to roost under bridges on the District. As with many bats, they utilize open areas of standing water along streams for feeding on insects. A Forest Service survey by Perkins (1988) found only two occurrences of this species on the Forest, both on Mt. Baker District. Suitable wintering and nursery habitat is limited on the Forest.

Wolverine: The usual habitat of the wolverine is remote timbered areas (Hornocker and Hash 1981; Wilson 1982). According to Hornocker and Hash (1981) radio-telemetry relocation data from Montana showed that dense, young timber stands were least used and that burned-over areas and wet meadows were rarely used. Preliminary results from Oregon (Utzinger unpublished data) indicate that wolverines would most commonly be found above approximately 3500 feet elevation in northern Washington. They may utilize lower elevations during winter months to feed on ungulate carrion. Little is known about the habitat requirements of this secretive animal; but wet areas, freedom from regular human disturbance, and areas that normally have winter snow appear to be important elements (Hornocker and Hash 1981; Wilson 1982). The Forest does not have the information at this time to determine the size of its wolverine population.

North American lynx: Lynxes are typically associated with extensive tracts of dense boreal forest interspersed with rocky outcrops, bogs, and thickets. They are also dependent on the availability of suitable prey. Their primary prey species is snowshoe hare but they also consume small rodents and ground-dwelling birds. (Habitat requirement information sources: McCord and Cardoza 1982.) The Forest does not yet have an estimate of its lynx population.

Other Wildlife Habitats

Overall Deer, Elk, and Mountain Goat Habitat

The current wintering habitat capability of the Forest is 682 elk and 13,330 deer. There is a higher summer habitat capability of 1,233 elk and 19,600 deer. Herd sizes are probably limited by wintering capability. The Forest currently has habitat capability capable of supporting 1,450 mountain goats.

Forage and cover are the main habitat components for big game animals. Grasses and shrubs are important forage for deer, elk, and mountain goats. Thermal cover is forest vegetation with at least 70-percent crown closure. If any part of a created opening is greater than 600 feet from cover, elk, deer, and mountain goats may not fully utilize the newly developed forage or may abandon the area altogether (Barteleme 1981, Witmer and others 1985).

There are two broad habitat types of primary importance to elk, deer, and mountain goats: winter range and summer range. A third habitat type, transitional range, joins the winter and summer ranges together. Within each of the three ranges, specialized habitat may occur. These include riparian zones, natural openings, old growth, and reproductive habitat. Over most parts of the Forest, the abundance and quality of wintering habitat is more limiting to herd sizes than summer range.

A balance of habitat components within each of the three ranges must be maintained so overuse does not occur on any single range. For example, if emphasis is given to optimizing winter range without maintaining usable cover and forage on summer range, animals that normally migrate to summer range will stay on or return to the winter range during the summer. Animals may then use forage during the summer months that is needed for winter survival. Overuse and a lack of forage during the winter causes animals to starve or become too weak to successfully reproduce (Taber 1973).

Migration routes, and fawning, calving, and kidding areas are specialized habitat areas. Fawning and calving areas, which generally are near quality forage and water, do not receive full use if adequate cover is not maintained. Large down logs are often used as cover during birth of the young (Maser and others 1979a, Thomas and others 1979a).

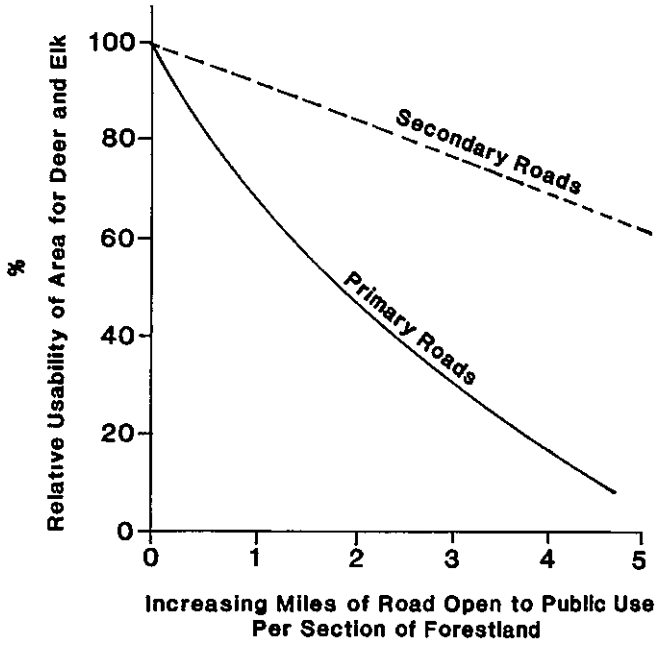
Near-optimal habitat arrangements and conditions for deer and elk contain: 10 to 15 percent forage; 40 to 45 percent thermal/hiding cover; and 37 to 45 percent optimal thermal cover.

A number of studies document the effect of roads and associated traffic on deer and elk habitat use. Generally, increased road density and traffic volume results in decreased usability of adjacent deer and elk habitat (Witmer and others 1985). Decreases in habitat use occur within the 1/4- to 1/2-mile zone on either side of roads with constant traffic (Thomas and others 1979a). Current road density on the Forest is approximately 3.0 miles of road per square mile (640 acres), which results in up to a 30-45 percent reduction in potential carrying capacity for deer and elk (discussed above). Winter range closures of roads in certain areas are used to decrease this impact.

As new roads are constructed for timber and other resource management, habitat effectiveness decreases. Road closures, however, significantly reduce disturbances to deer and elk, and may benefit the species as travel corridors and forage areas. Figure III-10 illustrates the influence of open roads on deer and elk habitat use (Witmer and others 1985). In response to Washington State Department of Wildlife requests, the Forest has cooperated in implementing road closures, reducing adverse effects on important deer and elk habitat.

Figure III-10

Generalized Influence of Increasing Open Road Density on Otherwise Usable Deer and Elk Habitat



The Washington State Department of Wildlife has established statewide big game population objectives, for 1989, as follows:

1. Black-tailed Deer - 230,000 (a 5 percent increase from the Statewide population mean 1970-79 of 218,500).

2. Roosevelt Elk - 36,000 (11 percent increase from the Statewide population mean 1970-79 of 32,000).

3. Mountain Goat - 7,700 (9 percent increase from the Statewide population mean 1970-79 of 7,000).

Department of Wildlife objectives have not been broken down to determine the Mt. Baker-Snoqualmie's share.

Special or Unique Habitats

Many species find adequate breeding and foraging habitat in a variety of habitat types found in abundance on the Forest and outside the National Forest boundary. Some species find optimal habitat in special or unique habitat types. Table III-28 shows the species that find optimal breeding and/or feeding habitat in four unique habitat types found on the Forest: 1) old growth; 2) caves, cliffs, and talus; 3) snags and downed logs; and 4) riparian.

Table III-28
Wildlife Use of Special and Unique Optimal Habitats 1/

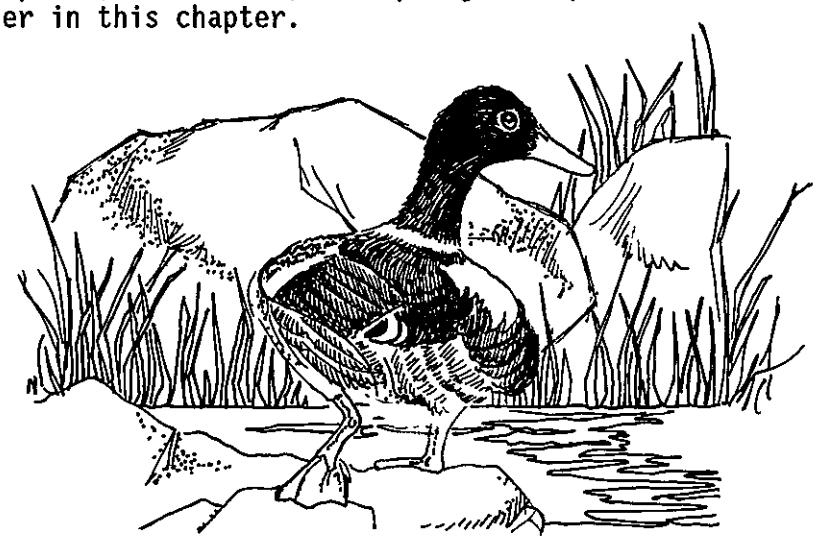
Habitat Type	Number of Wildlife Species 2/					
	Reptiles/Amphibians		Mammals		Birds	
	Breed	Forage	Breed	Forage	Breed	Forage
Old Growth	3	8	22	12	46	37
Caves, Cliffs, Talus	3	3	26	5	19	5
Snags and Downed Logs	6	11 3/	18	4	39	6
Riparian Zones	17	19	26	39	37	69

1/ Adapted from Brown 1985.
2/ There is overlap between the number of species that breed and/or forage.
3/ Data extrapolated from Nussbaum and others 1983.

Riparian Zones and Wetlands

Riparian zones and freshwater wetlands are among the most heavily used wildlife habitats occurring in forest lands of western Oregon and Washington (Oakley and others 1985). Numerous mammals, birds, and amphibians inhabit the diverse, water-influenced riparian zones and wetlands.

Riparian habitat lies between the aquatic and terrestrial ecosystems. These areas usually contain high water tables and have vegetation that requires large amounts of free or unbound water or conditions that are more moist than usual (Oakley and others 1985). Riparian zones occur along rivers, streams, creeks, sloughs, lakes, ponds, reservoirs, and springs. Riparian zones are further described earlier in this chapter.



Riparian zones generally are the most varied, abundant, and productive of any habitat type, providing water, food, and cover. The density and diversity of vegetation combine with a variety of landforms, and create edges and microclimates that provide an almost infinite number of habitat "niches" for wildlife. Wildlife use riparian zones disproportionately more than any other habitat type (Brown and others 1977, Carothers and others 1974, Kelley and others 1975, Riparian Habitat Technical Committee 1985, Thomas and others 1979b).

The Riparian Habitat Technical Committee (1985) estimates that 68 species of mammals, birds, amphibians, and reptiles require riparian areas to satisfy a vital habitat need during all or part of a year. They contain natural migration routes/travel corridors for many wildlife species. Riparian areas are important for ruffed grouse, beaver, muskrat, mink, river otter, wood duck, bald eagle, osprey, songbirds, small snag birds, several amphibians such as the Pacific giant salamander and Cascade's frog, and other species.

Wetlands are covered by shallow water or are periodically saturated with the water table at, near, or above the soil surface (Oakley and others 1985). These areas include ponds, marshes, swamps, bogs, seeps, and wet meadows.

Caves, Cliffs, and Talus

Some geological features create habitats in which the primary elements are nonvegetative. These are "unique" habitats found in the Cascade Mountain range that provide refuge for many wildlife species (see Table III-25), some of which are so dependent on these geomorphic features that they are found nowhere else. Ordinarily, caves, cliffs, and talus slopes are more resistant to change than plant communities. Though their structure may not change, human activities regularly alter the ecosystems within which these unique habitats occur (Maser and others 1979, Scharpf and others 1985).

Caves. Caves provide a more stable environment of temperature and moisture than do most terrestrial habitats (Barr 1964, 1967; Nichols 1955). Many animals inhabiting caves, such as bats, are extremely dependent upon this stability to maintain their body functions. The Townsend's big-eared bat is on the Forest Service Pacific Northwest Region Sensitive species list and on the State of Washington Threatened List. It roosts and locates its nursery colonies in caves, and is very sensitive to human disturbances. These tunnels, abandoned mine adits, and buildings sometimes replicate cave-like habitat for some species. In 1987 and 1988, a survey for bats on the Mt. Baker-Snoqualmie included investigating two caves, one tunnel, and nine mine sites (some with several adits) for bat use. Bridges with under-structures providing roost habitat were also examined. Bats were found at a number of bridges, including two bridges, each with one Townsend's big-eared bat. There are few naturally-occurring caves on this Forest; most of the cave-like habitat is provided by abandoned mine adits.

Other species that use caves simply as a matter of preference or convenience, such as the bobcat, depend on this stability to a lesser degree, but it is still an important habitat element. Raptorial birds like owls use shallow caves for roosting and sometimes nesting.

Small changes in the transport of biological material into or out of the cave, could lead to drastic changes in resident species (Wilson 1978). Even

alterations in wind currents around a cave entrance can affect the delicate balance of the micro-environment within the cave. Changes in forest structure and productivity around a cave may influence wildlife that use caves (McAlpine and Reynolds 1977).

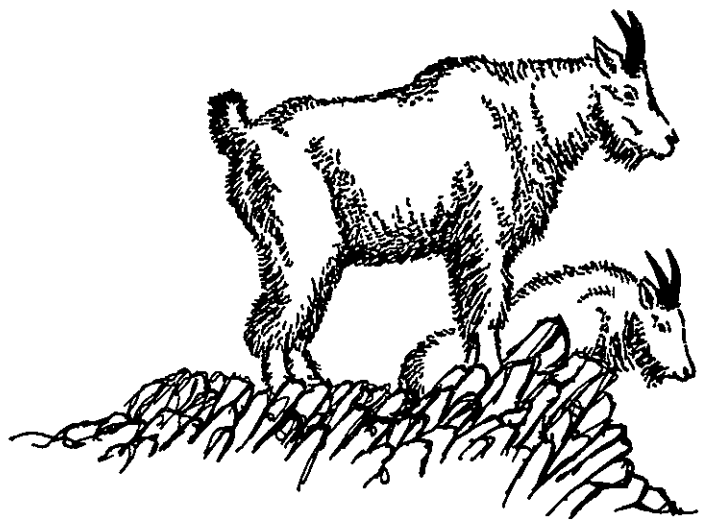
Cliffs. A cliff is a steep vertical or overhanging face of rock. Many animals utilize the features of cliffs and use the security found in cracks and ledges of the cliff face to escape from predators. Birds build their nests and small mammals make dens along rocky ledges. Many raptors prefer cliffs for nesting and roosting.

Talus. Talus is a sloping mass of dislodged rock fragments that accumulate on slopes or at the base of cliffs. Talus areas occupy a relatively small portion of the land base yet concentrate wildlife species, including birds and small mammals.

Caves, cliffs, and/or talus are important habitat for such animals as mountain goat, marmot, pika, bats, golden eagle, American peregrine falcon, and small birds such as cliff swallows and black swifts. There are only a few known caves on the Forest and the other areas occur incidentally throughout the Forest. This habitat type represents acreage that has been identified as not suitable for timber production. However, the available and suitable acres of forest that form the edge for these openings are very important as cover for species such as the mountain goat.

Habitat Connections

Connections of habitat areas by travel or dispersal corridors are important linkages in maintaining viable populations of animal species. This avoids the isolation of habitat into geographic isolation. Connecting habitat provides species access across drainages and elevation gradients (ridgeline to valley floor and over passes). Requirements for connecting habitat vary among wildlife species, but are for areas of some to full suitable habitat. The higher the suitability of the habitat for a species, the less risk it incurs in moving through an area. Usually, connecting habitat is made up of mid-and-later seral stages.



Chapter III
Fish

FISH ELEMENTS OF DIVERSITY

The abundance and distribution of fish species on the Forest is another important element of diversity. As is true for wildlife, some fish species are - for a variety of reasons - low enough in numbers that special management emphasis or protection is necessary. These species are on the Pacific Northwest Region , Forest Service Sensitive Species list, or are under review for federal listing. Refer to the discussion on threatened, endangered, and sensitive species later in this section.

Overview - Historical Perspective

As discussed in the Forest Overview in Chapter I, the Puget Sound region contains approximately 13,355 square miles. Dominant physical features of the region include the North Cascade Mountains, and the waters of Puget Sound, with its many islands, bays, channels, and tributaries. The principal river systems draining into Puget Sound from the North Cascade Range are the Nooksack, Skagit, Stillaguamish, Snohomish, Cedar, Green, and the Puyallup-White Rivers. Some of these systems are fed by glacier melt water and are discolored during the summer months.

Ownership along these seven river basins includes private, county, state, and federal holdings. The Forest encompasses most of the land mass at the higher elevations of the seven river basins.

Each of these basins supports more than two species of anadromous fish populations, fish populations that migrate upstream to make use of National Forest land.

The abundance of fish and wildlife resources, plus the maritime climate of Puget Sound historically has supported various tribes of Native American Indians. The 1800's marked the arrival of the first white settlers; by 1877, over 45 canneries were established. Exploitation of the anadromous fish resource continued until the 1930's, by which time some of these fish populations were over-harvested to the point of being depleted. Agricultural use and timber harvesting in the river basins displaced or destroyed some of the habitat used by fish populations. The two factors (agriculture and timber) forced local and federal resource managers to develop and implement anadromous fish regulations and management strategies to insure the viability of these economically, culturally, and biologically important species. Fish hatcheries were developed in the 1950's and 1960's to mitigate and/or augment the natural production of anadromous fish.

Today, a multitude of land and water uses occurs along and in each of the Puget Sound river basins: timber harvesting, land development, recreation development, small hydro development, agriculture, etc. Anadromous fish production has and continues to be impacted by each of these activities.

The Forest Contribution

The waters of the Mt. Baker-Snoqualmie National Forest provide a significant contribution to the freshwater fishery and aquatic resources in the Puget Sound region. Commercial and sport fisheries depend upon the Forest ecosystem to provide spawning and rearing habitat, as well as a source of high quality water

for downstream fishery resource uses. Puget Sound Treaty Tribes (Medicine Creek, Point Elliott, and Point-No-Point Treaties) continue to rely heavily upon this natural production and high water quality to support and maintain their subsistence and commercial fisheries. Maintenance, protection, and the improvement of this habitat and related water quality is a very significant issue and management concern of the public, State and Federal resource managers, and with the Tribes.

Over 1,500 miles of fish-bearing streams and over 12,000 acres of fish-bearing lakes serve as both seasonal and year-round habitat for five species of salmon, three species of sea-run trout, and numerous other cold, freshwater species. These streams and lakes drain into seven major Puget Sound river basins.

The actual portion of Puget Sound anadromous fish naturally produced on the Forest is unknown. However, using river miles of habitat accessible to anadromous fish as a rough approximation, 16 to 58 percent of the total anadromous habitat of five of these river basins lie within the Forest boundary. Of the estimated 1100 miles of anadromous fish habitat found within the Nooksack, Skagit, Stillaguamish, Snohomish, Green, and White River systems, roughly 315 miles are located within the Forest boundary. In addition, approximately 278 miles of anadromous habitat lie directly outside or adjacent to the Forest boundary and are directly influenced by Forest management activities.

The Forest's aquatic systems also support high quality, resident fish habitat. Many of these stream systems are lake-fed and support one or more species of resident trout, whitefish, and two or more cottid species.

Table III-29 displays anadromous and resident fish miles by major river basin. Table III-30 shows the fish, by species, found on the Mt. Baker-Snoqualmie.

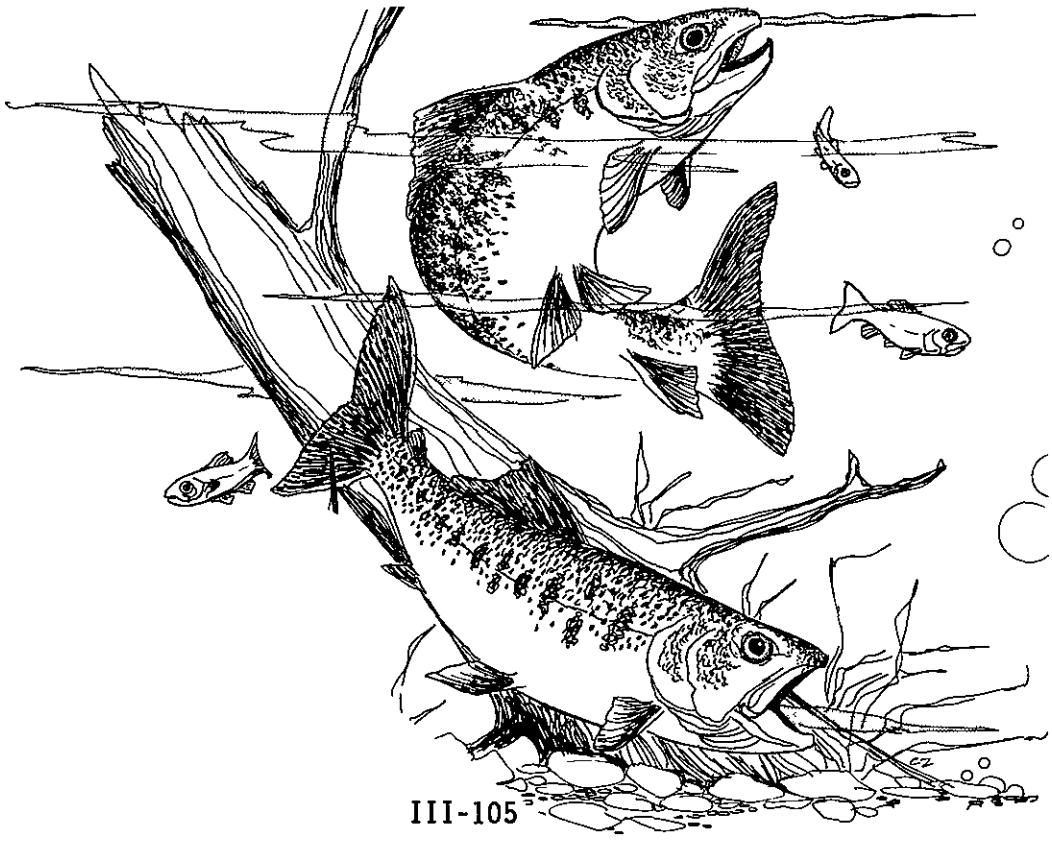


Table III-29
Anadromous and Resident Fish Miles by River Basin 1/

River Basin	Anadrom. Fish Habitat Total Miles	On-Forest Anadrom. Fish Habitat Miles	Anadrom. Fish Habitat Forest Influenced	On-Forest Resident Fish
Nooksack	236.0	17.0	59.0	103.0
Skagit	470.0	135.0	66.5	487.0
Stillaguamish	295.0	45.0	135.0	295.0
Skykomish	246.0	78.0	3.0	311.0
Snoqualmie	152.0	0.0	0.0	135.0
Green	61.0	5.0	8.0	100.0
White	142.0	40.0	14.0	75.0
TOTAL	1,602.0	320.0	285.0	1,506.0

1/ Stream mileage derived from the WDF Catalog of Fish Streams supplemented by District data and information. Stream mileage within the Forest boundary derived as described above and from stream surveys completed over the past 8-10 years. On-Forest habitat includes aquatic systems where hatchery-spawned fry are planted back out in fresh waters habitats to imprint and rear.

Miles of off-Forest habitat influenced by Forest management are estimated from known, recorded, or observed data/information on each river basin. Major influences on the spawning and rearing habitats of anadromous fish populations within these river basins.

Table III-30
Fish Species Found Within the Forest Boundaries

Anadromous	Resident	
Chinook Salmon	Rainbow Trout	Cutthroat Trout
Coho Salmon	Eastern Brook Trout	Golden Trout
Pink Salmon	Artic Grayling	White Fish (spp)
Chum Salmon	Bull Trout	Kokanee
Sockeye Salmon	Sculpin (Coast Range, Shortland, Torrent and Mottled)	
Steelhead	Largescale Sucker	
Sea-Run Cutthroat Trout	Dace (sp)	
Sea-Run Dolly Varden		

Management Indicator Species

Chinook, coho, pink, chum, and sockeye salmon, along with steelhead and resident trout, were selected as the Forest's aquatic habitat Management Indicator Species (MIS) for inclusion in the Forest Plan. These species, and their viability, are sensitive to environmental change.

Threatened, Endangered, and Sensitive Species

There are, at the present, no federally-listed threatened or endangered salmon species known to utilize aquatic habitat located within the Forest boundary.

Bull trout is currently listed as a Pacific Northwest Region, Forest Service Sensitive species. This species may be uniquely adapted to cold, relatively unproductive waters. As a result of specific adaptation, the bull trout could probably provide production from a niche that cannot be effectively used by any other species. Loss of individual stocks could represent a net loss that cannot be mitigated. Loss in some cold rivers may represent loss of the only "large fish" production possible.

The bull trout is known to have adfluvial, fluvial, and resident life history patterns. The nature and variation in life histories among Forest drainages is unknown. Some stocks appear to have very specific adaptations in timing of migrations. Such migrations may result in movements past seasonal barriers and use of otherwise empty habitat. They use habitat differently from other fish, particularly cutthroat trout which are present throughout most of the range. Bull trout are typically associated with the bottom rather than the water column or three-dimensional cover. The degree to which angling, habitat loss, and other factors control bull trout populations are not well known. Habitat loss is probably important in population declines, but bull trout - like other long-live species - are much less resilient to exploitation than other fish (Kramer 1984; Fraley and Shepard 1989).

Preliminary inventory and data collection on the Mt. Baker-Snoqualmie indicates that bull trout is widely distributed across the majority of the Forest watersheds, especially on the north end.

Value of Species

The value of the fish species found within the Mt. Baker-Snoqualmie National Forest boundary to the various commercial, sportfishing, and Tribal subsistence uses in and around the Puget Sound region is significant. Salmon and sea-run trout produced or influenced by aquatic systems within the boundaries of the Mt. Baker-Snoqualmie contribute to Puget Sound as well as West Coast commercial fisheries. 2/ Substantial numbers of steelhead and sea-run trout along with chinook, coho, pink, and chum salmon produced from Forest waters are also caught in the ever-growing and highly popular Puget Sound and Washington coast sport fisheries. Another important value and use of these anadromous species is the commercial and subsistence harvest by the Puget Sound Treaty Indian Tribes. Each of the seven Puget Sound river basins originating and flowing across the Forest falls within one or more of the Tribes' Treaty ceded areas.

The Forest's rich and diversified resident fish habitat offers another significant sportfish value. The 1,500 plus miles of stream and 12,000 acres of lake produce cutthroat, rainbows, eastern brook trout, dolly varden char, whitefish, and grayling. These species are sought after by a million-plus Forest visitors and users each year.

2/ Note that natural production of anadromous fish within the Forest boundaries include fish that migrate beyond the boundary to spawn and rear, as well as hatchery fry that are outplanted to these areas to imprint and rear.

For biological and ecological reasons, the Forest's fishery resource values are also very important. Within and adjacent to the Forest boundary exist some of the last remaining miles of optimum anadromous fish habitat, capable of producing and sustaining wild populations of spring chinook, coho, pink, and chum salmon, as well as summer and winter-run steelhead. This kind and quality of habitat is in short supply in Washington State and in even shorter supply along the West Coast. Pure, wild runs of salmon and sea-run trout are almost lost, or have been lost, in this country as well as in other parts of the world.

Trends

The following trends will play an increasing part in Forest fish management over the next few years on each of the seven Puget Sound river basins:

1. Demand (commercial plus sport) will dramatically increase for anadromous fish (salmon and sea-run trout) produced from each river basin over the next five to ten years.

2. The U.S.-Canada Salmon Treaty will help fuel this demand, but it should also play a much larger role by influencing the supply of anadromous fish.

3. With limited dollars available for increasing anadromous fish production, restoring/enhancing fish habitat (through natural production methods) will be given primary funding consideration over artificial operation.

4. Puget Sound Treaty Indian Tribes will continue to become more directly involved in our land management activities, including our fish habitat management programs and planning.

5. Over the next 5 to 10 years, there exists as much opportunity in habitat restoration or rehabilitation as there is in habitat enhancement.

6. With limited funding and personnel resources to carry out a complete anadromous fish improvement or enhancement program by any one agency, coordinated and integrated planning and implementation of such programs by all concerned parties (agencies, public citizens, groups) will become more and more common.

7. State and/or Tribal existing, on-going fishery management plans or programs within the seven river basins need to be either incorporated in, or coordinated with, the Forest's fishery habitat management program. An example of this includes the on-going Watershed Planning-Proposed Enhancement Plan between the Tribes and the Washington Department of Fisheries.

8. The demand for recreational sport fishing experiences on the Forest will dramatically increase over the next 5 to 10 years, due to current and projected growth and development in the Tacoma-Seattle-Everett region.

Supply (Production)

Assessing the current or existing supply (or production) of anadromous fish and the resident fish which can be attributed to the aquatic systems within and adjacent to the Mt. Baker-Snoqualmie boundaries is difficult. To make these assessments, a number of assumptions are made for each species group. As more fish and fish habitat inventory data and research results become available, these Forest assessments will be updated and become more reliable.

There is only a very small sockeye salmon run that originates on the Forest, coming from Baker Lake. This run is too small for significant commercial or sport opportunities, and adequate data are not available on either harvest or production to carry forward into production and value estimates. Sea-run cutthroat trout are included in Table III-37, Values; however, there is not sufficient data to include quantified production estimates in the other tables (Washington Department of Wildlife 1989).

The Forest Watersheds

The Forest is divided into 88 allocation zones (defined by watershed boundaries, in most cases) for forest planning purposes. Some watersheds are located completely within the Forest boundary, others are only partially located within the forest boundary. Estimates of fish supply or production are keyed to these 88 watersheds. All of these watersheds fall within the seven major river basins. (See FEIS, page III-12.) Both anadromous and resident fish production occurs in all of these river basins.

Most of the anadromous and resident fish produced within the Forest's watersheds is natural production. This means a portion or the entire life cycle of these species occurs within the watersheds. Natural production of a rich diversity of salmonids requires substantial areas of high quality habitat and high water quality.

The amount and quality of habitat and water in the Forest's watersheds is affected by the geologic and climate conditions inherent for each watershed. In addition, habitat and water quality are influenced by the amount and type of any timber harvesting and road construction activities occurring within the watersheds. Forest fish habitat conditions that are affected or impacted by management are: stream channel stability; streambank stability; pool condition; and large woody debris (its presence or absence).

On the Mt. Baker-Snoqualmie, there is documentation and evidence that watersheds with moderate to heavy amounts of timber harvesting and road construction - combined with the presence of unstable soils and steep slopes - have a history of major and minor peak-flow events (floods or rain-on-snow events). Debris torrents, avalanches, or earth flows have led to stream channel instability, streambank erosion, scouring-out or filling-in of pools, and the loss of large woody debris. Fish habitat has been lost or degraded. These habitat conditions have resulted in the degradation of water quality and/or the reduction in fish species numbers or diversity.

Forest watersheds that have experienced this degradation and resulting habitat/fish reductions include: Canyon Creek (North Fork Nooksack), Deer Creek (North Fork Stillaguamish River) and Canyon Creek (South Fork Stillaguamish River). In total, 19 watersheds on the Forest are currently in

an unacceptable condition. For further discussion, refer to Chapter IV, FEIS, effects of implementing the alternatives on soils and water. Also, see Appendix H, FEIS.

Supply - Anadromous Fish

Determining the amount of anadromous fish produced within the National Forest boundary is complicated by the location of the Forest in relation to the river systems of Puget Sound, and the reliability of existing sub-regional or basin fishery data. Estimating production figures for those river systems outside of the Forest boundaries but influenced by upstream Forest management activities is even more difficult. In most of these basins, only the upper portions are within Forest boundaries; in some cases, the entire main stream corridors are managed by the state or privately owned. Because of these factors, it is difficult to determine the contribution of the Forest's waters to overall production of various species of anadromous fish in the seven river systems.

Two types of anadromous fish production presently occur within or immediately downstream of the Forest boundary: hatchery and natural. All hatchery production occurs off Forest, usually downstream from the Forest boundary. Most of these are State or Tribal hatchery facilities and are used to spawn adult fish and incubate eggs. But, in some river basins (Nooksak, Stillaquamish, Green, and White), the hatcheries require the use of Forest aquatic environments (side channels, beaver ponds, rearing ponds) for the imprinting and rearing of chinook, coho salmon, and steelhead trout.

Natural anadromous fish production also occurs within or adjacent to the Forest boundary. Natural production presently occurs in all the major river basins, except the Snoqualmie. Anadromous fish production estimates for this FEIS are displayed by adult production and smolt production.

Smolt production has been selected as the indicator of anadromous fish spawning and rearing capabilities of the Forest portion of these river basins. The Forest has defined three broad categories of smolt production, either occurring presently or having the potential to occur within the Forest boundary:

Smolt Production Level I - The estimated amount of smolt currently produced (by species) within the Forest boundaries. This estimate reflects the past and current condition of habitat on the Forest, plus the past and existing escapement of adult spawners to the Forest.

Smolt Production Level II - The potential smolt production with habitat restoration (both spawning and rearing habitat), and assuming that there is adequate adult escapement to the Forest.

Smolt Production Level III - The potential smolt production within the Forest with full habitat restoration in place and full implementation of all natural fish enhancement opportunities. This level also assumes full escapement to the Forest.

The assumption regarding spawning escapement (from Forest streams out to the ocean) in Levels II and III was made to address the external management problems of over-harvesting and migration barriers (both natural and human-caused). The Forest cannot manage non-National Forest lands, therefore only the capabilities of the Forest are displayed. Level I production does not

assume adequate spawning escapement; production at this level is based on actual, existing escapement.

Existing Production - Level I. In order to estimate the current or existing anadromous smolt production attributed to Forest's aquatic systems, current adult production occurring on the Forest was examined. By estimating adult production, it is then possible to calculate the various survival rates from adult to fry stages to obtain smolt production figures. This is currently the only method of obtaining these figures, as information and data on smolt production by species and river basin does not exist for this Forest.

Table III-31 shows recent Washington Department of Fisheries and Washington Department of Wildlife estimates of fish production (harvest plus escapement) from Forest waters in the major Puget Sound river basins. From this table of existing, estimated production of adult salmon and steelhead attributed to on-Forest production, an estimate can be made of the existing smolt production attributed to the Forest. Table III-32, on the next page, shows the estimated existing anadromous smolt production by species and major river basins.

Table III-31
Anadromous Fish Production (Escapement and Harvest) from Within MBS Boundary 1/
Production Level I - In Numbers of Fish

River Basin	Chinook	Pink	Coho	Chum	Steelhead	Remarks
Nooksack	26,460	60,660	10,270	27,000	1,260	Natural production. Chinook & Coho augmented by the straying of hatchery fish. Recent estimates for chum are much higher. Steelhead escapement is not documented.
Skagit	5,417	469,225	35,100	34,100	8,580	
N.F. Stillaguamish	4,430	55,160	22,930	5,840		
S.F. Stillaguamish	5,000	69,000	25,475	6,640	9,040	This production est. includes steelhead produced in the Snohomish R. system: NF & SF Stillaguamish, Skykomish, & Snoqualmie
Skykomish	5,550	75,440	48,560	2,790		
White	2,290	13,830	10,070	1,220	190	These est. may be high given current condition of the river.
Snoqualmie & Green	No Natural Salmon Production on NF				2,790	Green River only.
TOTAL	97,900	743,315	152,400	77,590	21,850	TOTAL = 1,093,000

1/ Salmon estimates from WDF, Olympia office, April 1989.
Steelhead estimates from WDW, in response to DEIS, April 1989.

Table III-32
Estimated Existing Anadromous Smolt Production from Forest Portion of Major Puget Sound River Basins, in Numbers of Fish - Production Level I 1/

River Basin	Chinook	Pink	Coho	Chum	Steelhead	Remarks
Nooksack	69,200	844,000	32,500	940,000	8,000	
Skagit	123,400	7,345,000	405,000	855,000	59,600	
N.F. Stillaguamish	8,600	1,000,000	196,500	107,000		
S.F. Stillaguamish	10,000	1,470,000	223,750	122,000	45,790	This product. est. includes entire Snohomish R system: NF, SF Stillag. Skykomish, and Snoqualmie R.
Skykomish	11,000	1,580,000	428,000	39,500		
Snoqualmie	No Natural Salmon Production on Forest					
Green	No Natural Salmon Production on Forest				8,400	
White	9,700	212,700	3,500	11,000	3,720	Est. may be high given the present condit.
TOTAL	231,800	12,450,000	1,290,000	2,000,000	125,510	

OVERALL TOTAL = about 16,000,000 smolt

1/ Smolt production for each species obtained by converting existing adult escapement to smolt production using the following smolt to adult survival coefficients: for North Puget Sound - Chinook .05, pink .018, coho .02, chum ,.02, steelhead .08. For South Puget Sound - Chinook .03, pink .015, coho .02, chum .018, steelhead .05. Data from WDF, 1980.

Potential Production - Levels II and III. The potential exists for producing more anadromous fish from the Forest's aquatic systems. During the past ten years, the Forest has directed much time and effort to either restoring degraded habitat or improving existing habitat conditions. The quantity and/or quality of both spawning and rearing habitats, and improving access to these habitats has been the focus of Forest work, in an effort to protect, maintain, or increase natural anadromous fish production.

Over the next 10 to 15 years, there is great potential for the Forest to raise the natural production of chinook, pink, coho, and chum salmon and steelhead trout in the major Puget Sound river basins by protecting and maintaining existing optimum habitats, and by continuing to rehabilitate, restore, or improve habitats that have been destroyed or degraded due to either natural or management-related events.

Maintaining, protecting, and increasing the natural anadromous fish populations in the major Puget Sound river basins is a significant management goal of both the State of Washington and the Puget Sound Treaty Tribes. The Forest is a significant contributor to this goal because a sizable portion of the natural production in these rivers occurs within the Forest boundaries or is influenced by Forest activities (refer back to Table III-29). For the Mt. Baker-Snoqualmie, there are various approaches to maintaining, protecting, or improving the anadromous fish habitat capability in these river basins. Included are a mix of land allocations, use of management standards and guidelines, application of management requirements, development of site-specific Best Management Practices (project level), and capital investments in specific areas.

Maintaining and protecting existing anadromous fish habitat capability (Level I) is the first priority. This can be accomplished both through land allocations and application of measurable standards and guidelines.

Increasing the Forest's anadromous fish habitat capability above the existing level requires a sizable capital investment in fish habitat restoration and/or watershed rehabilitation. This Level II production potential assumes adequate escapement to the Forest. Level II production potential - measured as smolt production - is shown in Table III-33; it covers a potential production after a 10-year investment period.

The Forest has additional potential to increase natural production of salmon and steelhead in those river systems where there are opportunities to improve or enhance the existing habitat. This is production Level III. These opportunities are usually limited to only a few of the river systems; the majority of the habitat work in all rivers is to restore or rehabilitate degraded or destroyed spawning/rearing areas.

Table III-34 displays increases smolt production that is possible at a Level III over a ten year period.

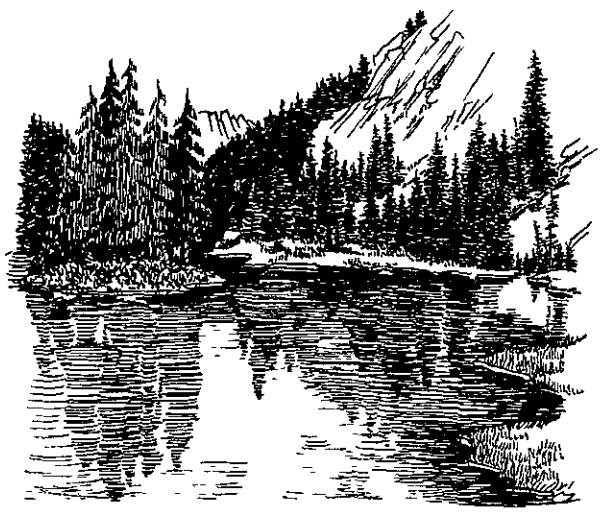


Table III-33
Potential Anadromous Fish Production (Smolts) From Forest Ownership of Each River Basin Over Next 10 Years, with Habitat Restoration, In Numbers of Fish - Production Level II 1/

River Basin	Chinook	Pink	Coho	Chum	Steelhead	Remarks
Nooksack	89,960	1,000,000	35,750	1,081,000	9,200	
Skagit	135,740	8,000,000	449,000	940,500	66,480	
N.F. Stillaguamish	14,430	1,500,000	255,450	112,350		
S.F. Stillaguamish	15,000	1,540,000	319,590	128,100	48,080	Increase in smolt product. for entire Snohomish Basin: NF, SF Stillag. Skykomish, and Snoqualmie R.
Skykomish	11,550	1,730,000	449,400	41,470		
Snoqualmie	No Natural Salmon Production on Forest					
Green	No Natural Salmon Production on Forest				9,240	
White	12,000	223,000	4,375	11,550	4,090	
TOTAL	278,680	13,540,000	1,513,560	2,314,970	137,100	

OVERALL TOTAL = 17,784,300

1/ Increases in smolt production from existing (Table III-32) due to potential habitat restoration and/or watershed rehabilitation in various river basins. Estimates derived from known or suspected habitat degraded areas. Increase in smolt production estimates are made after a 10-year investment period.

Table III-34
Potential Anadromous Fish Production (Smolts) From Forest Ownership of Each River Basin Over Next 10 Years By Habitat Improvement, In Numbers of Fish - Production Level III

River Basin	Chinook	Pink	Coho	Chum	Steelhead	Remarks
Nooksack	* 89,960	* 1,000,000	* 35,750	* 1,081,000	9,660	
Skagit	149,310	8,814,900	493,900	1,083,900	73,130	
N.F. Stillaguamish	* 14,430	* 1,500,000	* 255,450	* 112,350	50,480	Increase in smolt product. for entire Snohomish R System
S.F. Stillaguamish	* 15,000	* 1,540,000	* 319,590	* 128,100		
Skykomish	12,130	1,817,100	471,870	43,540		
Snoqualmie	No Natural Salmon Production on Forest					
Green	No Natural Salmon Production on Forest					
White	* 12,000	* 223,000	4,560	* 11,550	4,960	
TOTAL	292,830	13,543,000	1,581,120	2,460,190	138,230	

OVERALL TOTAL = 18,015,370

* denotes no increase from Production Level II, Table III-33.

Supply - Resident Fish

All of the 88 watersheds on the Forest contain resident salmonid habitat, as shown by the amount of known resident fish stream miles; refer back to Table III-29.

Information and data on species presence, utilization, and population density for the 1,500 stream miles and 12,000 acres of fish-bearing lake habitat is very spotty and in some cases unreliable. The Forest data base for resident fish habitat and existing populations is almost non-existent. This gap has been identified as a major information inventory need; refer to Chapter 2, Forest Plan.

Resident trout species are either known or suspected to occur in almost all of the Forest's watersheds. These species include rainbow and cutthroat trout; trout populations are found both in streams and lake systems. The larger stream and river systems contain small populations of whitefish and one or two species of cottids. Almost all of these populations are native, wild, naturally-produced fish. A few isolated Forest lakes contain native runs of Artic grayling.

Hatchery-produced trout populations are found in fewer watersheds across the Forest. These species include Eastern brook trout, Kokanee, and brown trout. Most of these introduced species are found in lowland and high lakes, in both wilderness and non-wilderness areas.

Most of the larger Forest watersheds are suspected of containing the habitat to support unknown populations of Dolly Varden/bull trout or the hybrid of these two species. The bull trout is a species of management concern; it is presently on the USDA Forest Service, Pacific Northwest Region's sensitive species list and is being considered for listing on the State of Washington's threatened and endangered species list. New information and data suggests that both bull trout and Dolly Varden char utilize overlapping habitat areas within the Forest in all river basins.

Demand (Harvest)

The existing demand or harvest of anadromous and resident fish produced within the Forest boundaries, or the off-Forest production which is influenced by Forest management activities, cannot be estimated directly.

Estimates can only be made in general terms because reliable harvest data and information does not currently exist. The Forest's contribution to the following fisheries is not well known: anadromous commercial fishery (Washington coast), anadromous coast and Puget Sound sport fishery, Puget Sound stream and lake recreational sport fishery, and the Indian Treaty Tribes subsistence fishery. This information need is noted in Chapter 2, Forest Plan. The Forest's contribution to each of these harvests or demands is suspected to be significant due to the known or suspected production attributed to Forest aquatic systems.

Demand - Anadromous Fish

The existing natural production of anadromous fish from the Forest's aquatic systems contribute to three fish harvesting sectors. Salmon and steelhead produced from on- and off-Forest rivers and streams are harvested by the Washington coast commercial fishery, the Puget Sound sport fishery, and by the Puget Sound Treaty Tribes subsistence fishery.

Table III-35 shows this estimated commercial and sport fishery demand - that is the estimated salmon and steelhead commercial harvest that is attributed to production occurring within or adjacent to the Forest.

The salmon harvest estimates include both treaty and non-treaty harvests. No attempt is made to separate the two distinct demands because both the State and the Treaty Tribes have not yet agreed upon a method for allocating harvests.

The major points of disagreement are: 1) the applicability of all-citizen fish; 2) net "dropout"; 3) sport fish bias; 4) stock compensation in mixed-stock areas; and, 5) lack of information on the true past-season catches (Washington Department of Fisheries memo to Forest, 4/13/89).

The steelhead harvest figures include both sport-fish catch and Treaty Tribes' subsistence harvest: average, annual harvest values for 1984 to 1989. In total, the annual estimated harvest of salmon and steelhead produced from Forest aquatic systems is approximately 780,890 fish. In addition, there are other anadromous fish produced in Forest rivers and streams that are caught in smaller sport fisheries. Sea-run cutthroat trout and Dolly Varden char production occurs within the Forest; the actual production and the demand or catch are both unknown.

Table III-35
Estimated Anadromous Fish Harvest That is Attributed to Escapement and Production Occurring within the MBS, By River Basin of Origin, In Numbers of Fish 1/

River Basin	Chinook	Pink	Coho	Chum	Steelhead	Remarks
Nooksack	23,000	46,000	9,620	8,200	620	
Skagit	48,000	337,000	27,000	17,000	3,810	
N.F. Stillaguamish	4,000	37,000	19,000	3,700		
S.F. Stillaguamish	4,500	42,500	21,000	4,200	5,377	This harvest est. for all steelhead produced from NF land in Snohomish R. system
Skykomish	5,000	47,000	40,000	2,000		
Snoqualmie	No Natural Salmon Production on Forest					Snoqualmie R.
Green	No Natural Salmon Production on Forest				2,360	
White	2,000	10,000	10,000	1,000	4	
TOTAL	86,500	519,500	126,620	36,100	12,171	
OVERALL TOTAL =	780,891					

1/ Salmon harvest estimates from WDF, Olympia office, April 1989. No attempt was made to separate Indian treaty and non-treaty harvest. See text. Steelhead sport fishing harvest from WDW, in response to DEIS April, 1989. Harvest also includes treaty harvest.

Anadromous Fish - Future Demand

The local, regional, and national demand for commercially-caught salmon, and sport-caught steelhead will continue to increase. There will be increasing management pressure from the State, Tribes, and concerned environmental groups to protect, maintain, and actually increase the natural production of these anadromous fish populations from the river basins of Puget Sound. This matches the short- and long-term goals for the U.S.-Canada Salmon Treaty. In addition, the Puget Sound Treaty Tribes subsistence fishery will continue to rely heavily upon natural production methods in order to meet their harvest requirements.

Meeting this increasing future demand will depend heavily on the protection, maintenance, and, when possible, the improvement of the natural production capabilities of anadromous habitat on the Forest over the next ten years.

Demand - Resident Fish

The existing demand or the recreational sport fishing pressure on resident fish produced in the Forest's lakes and streams is not known. Some estimates of this current demand were developed using recent data and information gathered by the Washington Department of Wildlife for their management area Region 4 (Puget Sound).

A 1986 study by the Department on the resident sport fishery in the State of Washington shows that there were 243,800 licensed anglers residing in the WDW's Region 4 (which encompasses all of the Puget Sound area, including the Mt. Baker-Snoqualmie National Forest.) These licensed anglers spent over 5 million days fishing for trout and/or salmon in 1986.

The statewide sport fish demand includes seven different fishing interest areas: lowland lake-trout, warmwater, steelhead, resident streams and beaver ponds, high lakes, sea-run cutthroat/Dolly Varden streams, and sea-run cutthroat/Dolly Varden marine. For the Mt. Baker-Snoqualmie, there is a demand for and opportunities provided for all of these except warm-water fishing, and marine fishing for sea-run cutthroat/Dolly Varden. The most popular type of sport fishing for Puget Sound anglers is lowland, lake trout, as shown in Table III-36, below. Note that the table includes juvenile, non-licensed anglers as well as adult anglers; juveniles comprise 20-30% of the anglers in each of the different fishing interest areas. In 1986, it is estimated that anglers spent over 1.3 million days on the Forest fishing for resident game fish, or about 16% of the angler days in WDW's Region 4 and 1% of the Statewide angler days.

Table III-36
Estimated Angler Use (in Angler-Days) in Various Sport fish Interest Areas
Statewide, Puget Sound Region 4, and on Forest - 1986 1/

Sport Fish Interest Area	Statewide Total Angler Days	WDW Region 4 Total Angler Days	Estimated for MBS Total Angler Days 2/
Lowland Lakes Trout	4,689,300	2,588,400	258,840 (.10) 2/
Warmwater	3,438,900	1,658,300	no opportunities
Steelhead	2,895,900	1,332,100	266,400 (.20)
Resident Streams and Ponds	1,690,500	933,000	373,200 (.40)
High Lakes	793,800	438,200	140,200 (.32)
Sea-run Trout/Dolly Varden Streams	779,800	358,400	107,520 (.30)
Sea-run Trout/Dolly Varden Marine	352,800	162,300	no opportunities
TOTAL	14,640,000	7,985,000	1,146,100

1/ Includes all anglers: licensed and non-licensed juveniles. Source: Washington Department of Wildlife Report, June, 1988.
2/ Estimated demand for each interest area calculated using a percent, shown in ( ), of that area in WDW Region 4.

Additional information from the 1986 survey shows that 95.8% of the anglers surveyed preferred to fish for trout and steelhead. A majority indicated that hatchery fish were very important to the lowland trout-lake fishery, while wild fish were more important to the trout-stream, high lake, and steelhead fisheries. Over 70% said that their reasons for going fishing were not related

to actually catching fish; more important were the social and aesthetic aspects of the sport. As the Mt. Baker-Snoqualmie is located in some of the nation's most scenic mountains and contains over 1,500 miles of fish-bearing streams and 13,600 acres of lakes, the Forest provides a setting to meet this existing demand.

Resident Fish - Future Demand

Given the current and projected population growth and development in the Puget Sound area, the demand for a quality resident fishing experience will increase. Outdoor recreational experiences in the Cascades will continue to be a key part of the "Northwest Lifestyle." The Mt. Baker-Snoqualmie, along with the State Department of Wildlife, will need to develop comprehensive management plans for high use areas, especially in high lakes and resident trout stream and pond systems. This will become a high priority management item for the Forest over the next ten years, and will be implemented under the Forest's Rise to the Future Action Plan. Rise to the Future is a nationwide initiative, developed by the Forest Service in 1986. This bold new program was created to promote public awareness and to direct future management of the fishery resources on National Forest lands. In meeting the first step of this initiative, each Forest prepared a multi-year Fish Action Plan; refer to the Forest Plan, Chapter 4, Resource Summaries for additional information.

Fish Values

The existing value of the Forest's production of anadromous and resident game fish is not well established. Estimates have been made to establish the current annual value of this production to the local and regional commercial and recreational fishing economies. Based upon these gross estimates, the existing annual value of the fish resources produced on the Mt. Baker-Snoqualmie is approximately $23 million, annually. Refer to Table III-37.

This annual value is the sum of commercial salmon (treaty and non-treaty) harvest ($4,332,000), the salmon sport fish value ($8,177,000), the resident game fish value ($4,256,800), and sea-run trout and steelhead values ($6,533,500).

Maintenance and protection of the fish habitat on the Forest will be needed to realize these annual values. Through capital investment opportunities, such as watershed rehabilitation and/or fish habitat restoration, the Forest has the potential to increase these annual values. Increases of 10 -15 percent over the existing values could be realized over a 10-year period with capital investment. Ongoing watershed rehabilitation and fish habitat restoration activities will be needed in some of the more sensitive watersheds to maintain the current production and to eventually increase production of salmon and steelhead. Opportunities exist throughout the Forest to increase resident trout production (sea-run and Dolly Varden) through habitat improvement and access management. With capital investment in habitat restoration and improvement, plus watershed rehabilitation, the Mt. Baker-Snoqualmie could increase the annual Forest fishery value by $2.4 to 3.0 million over the next ten years.

Table III-37
Current, Annual Estimated Non-Treaty Commercially Caught and Sport Caught
Values for Salmon and Steelhead Attributed to Production on the Forest

Species	Estimated Existing Harvest (CF/SF) 1/	CF/SF 2/ Catch Ratio	Commercial Value 3/ Value/Fish	Commercial Value 3/ Total Value	Sport Fish Value 4/ # of Angler Trips of Days	Sport Fish Value 4/ Value of Angler Day	Sport Fish Value 4/ Total Value	Total Value by Species 5/
Chinook	54,495/32,005	63/ 37	$47 00	$2,561,265	74,172	56.55	$4,194,400	$ 6,755,600
Pink	514,305/5,195	99/.1	$ 1.82	$ 936,035	Negligible	Negligible		$ 936,000
Coho	96,231/30,389	.76/ 24	$ 2 82	$ 271,371	70,427 (WFUD)	56 55	$3,982,600	$ 4,254,000
Chum	36,100/0	100% CF	$12.00	$ 433,200				$ 433,200
Steelhead	0/12,171	100% SF	N/A		75,217	56.55		$ 4,253,500
Trout: Lowland Lakes					97,065 (WFUD)	14.70		$ 1,426,800
Trout· Streams & Ponds					139,950 (WFUD)	14.70		$ 2,057,200
Trout: High Lakes					52,575 (WFUD)	14.70		$ 772,800
Sea-Run Trout & Char					40,320 (WFUD)	56 55		$ 2,280,000
			Total	$4,332,000				$23,169,100

1/ Estimated Existing Harvest (Commercial fish/Sport fish harvest. this figure obtained from Table III-37. Harvest then divided between CF/SF by ratio in column 2

2/ CF/SF Ratio is determined by WDF 4/89.

3/ Commercial Value: Value/fish is retail value of each species (WDF 4/89), Total value = Value/fish x number of fish caught commercially.

4/ Sportfish value # of angler trips or days is the effort required to catch /fish and measured in wildlife/ fish user days (WFUD) and various according to type of sport fishery. WDW and WDF angler day use data converted to USFS's WFUD's Value of a Angler Day or WFUD is the RPA (1980) value assigned to that type of use; for anadromous fish = $56 55 per day, resident fish = $14.70 per day.

5/ Total Value by Species = Combined commercial and sportfish value for a particular species

HUMAN COMMUNITY

The Puget Sound region is one of the faster growing areas in the United States. The population, though far from uniform, tends to be young and well-educated, with incomes above the national average. The economy is highly diversified. Manufacturing is led by the aerospace industry. While that industry does not dominate the region quite so much as it has in the past, a recent study showed that one out of six jobs in the State of Washington is still dependent, directly or indirectly, on spending by the aerospace industry (Pascall and others 1989). With most of the direct employment in aerospace manufacturing found in the five-county area, the relative health of that sector is felt throughout the area.

Linkages with the Pacific Rim countries make wholesale and retail trade important employers. Exporting services outside of the region is an emerging facet of that sector (Beyers and others 1985). Trade and the broadly-based service industry are the fastest growing segments of the region's economy. Financial services have also grown as the area becomes an increasingly important regional finance center. Other major sources of employment include agriculture (especially in Skagit County), the forest products industry, and tourism.

For the purposes of Forest Planning, a five-county zone of influence has been defined. This zone includes Whatcom, Skagit, Snohomish, King, and Pierce Counties. British Columbia, Canada is a secondary zone of influence, as the Forest is an important recreation resource for the residents of Vancouver, B.C.

Population

Over one-half of Washington State's population resides in the five-county area. The 1988 population for the zone was almost 2.6 million; an addition 3.0 million people reside in British Columbia, Canada (Washington State OFM 1988). The entire area has experienced significant population growth, averaging almost 1.5% per year since 1970. Snohomish County has in recent years experienced one of the highest growth rates of any county in the country. Skagit County population has also been growing at over 2% per year since 1970.

Table III-38
Population

County	1960	1970	1980	1988	Percent Change 1970-88
King	935,014	1,159,375	1,269,898	1,413,900	22.0%
Pierce	321,590	412,344	485,667	547,700	32.8%
Skagit	51,350	52,381	64,138	70,800	35.2%
Snohomish	172,199	265,236	337,720	409,500	54.4%
Whatcom	70,317	81,983	106,701	119,100	45.3%
Zone of Influence	1,550,470	1,971,319	2,264,124	2,561,000	29.9%
Washington State	2,853,214	3,413,250	4,132,353	4,565,000	33.7%
Zone as Percent of State	54.3%	57.8%	54.8%	56.1%	---

	1970	1979	1988	Percent Change 1970 - 88
B.C. Canada	2,128,000	2,566,900	2,983,800	40.2%

Population Composition

King, Pierce, and Snohomish Counties are more urbanized and have younger populations, with fewer people in the over-65 age group than the State average. In fact, Snohomish County has the second lowest percentage of over-65 population of all counties in the State. Skagit and Whatcom Counties have larger numbers of residents over 65 years of age, reflecting the in-migration of retirees and the declining population of a number of rural communities, particularly as younger people move away to take jobs in more metropolitan areas. Projections made for Snohomish, King, and Pierce Counties indicate that some shifts in population composition can be expected, including an expansion of the youngest age group and more people in the 35-65 group, as the "baby-boom" group has children and ages (OFM 1986).

Minority Populations

The population of the Forest's zone of influence is predominately white; in 1980, 12 percent of the 5-county area's population was non-white. However, the majority of the State's Black and Asian populations live within the Seattle-Tacoma metropolitan area. Just under half of the State-wide Hispanic population lives in the metropolitan area. Slightly less than half of the State's Native American people live within the five counties. The area's non-white population increased from 7.8% to 12% between 1970 and 1980. That percentage is expected to show another increase after the 1990 census is completed, and will likely continue to increase over at least the next decade.

Table III-39
Selected Ethnic Population - 1980

County	Spanish Surname	Black	Indian	Asian	Other
King	27,080	55,275	13,353	62,744	9,669
Pierce	13,242	30,026	5,611	16,158	5,943
Skagit	2,010	99	1,217	399	1,524
Snohomish	5,500	2,523	5,089	5,518	1,976
Whatcom	1,957	244	3,071	846	779
TOTAL Study Area	49,789	88,167	28,341	85,665	19,891
Washington State	121,286	105,604	63,808	111,607	60,147
Study Area as Percent of State	41.0	83.5	44.4	76.8	33.1

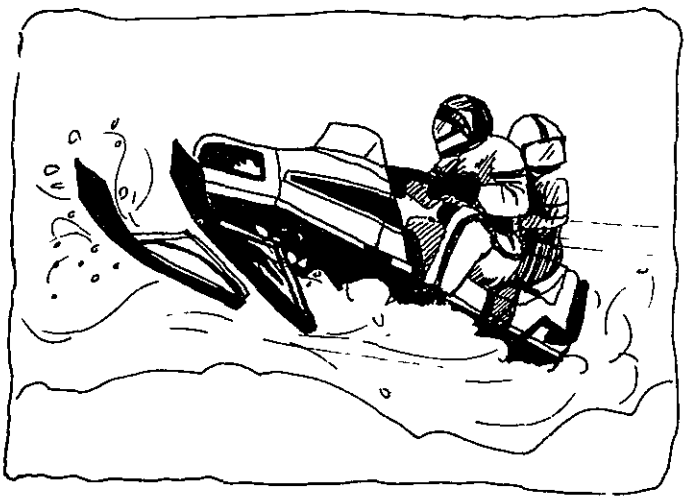
Total Minority Population - Five County Area

	1970	Percent of Total	1980	Percent of Total
Study Area	152,930	7.8%	271,853	12.0%

Projected Population Growth

Projections for future population in the Puget Sound area vary considerably. Two different projections were considered in the planning process, covering a range of population growth that may likely be expected, given the economic and demographic history of the region: Washington State Office of Financial Management (OFM) 1989; and Puget Sound Council of Governments (PSCOG) 1988.

The PSCOG projections are only available for three of the five counties. Both forecasts take into account the recession of the early 1980's, the subsequent economic recovery and growth since 1984, and the slowing of growth expected into the 1990's.



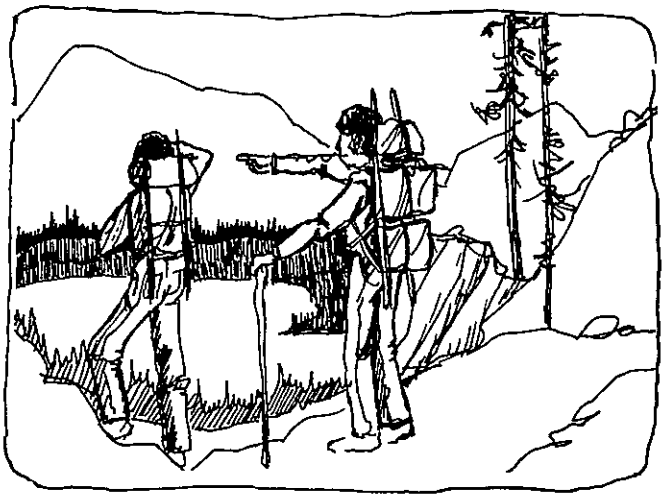


Table III-40
Projected Population 1/
1980 - 2000

County	1980		1990	% Change	2000	% Change
King	1,269,898	(OFM)	1,474,947	16.2	1,693,787	14.8
		(PSCOG)	1,461,000	15.3	1,697,500	16.2
Pierce	485,667	(OFM)	570,066	17.4	656,079	15.1
		(PSCOG)	565,700	16.5	672,100	18.8
Skagit	64,138	(OFM)	73,692	14.9	82,694	12.2
Snohomish	337,720	(OFM)	444,748	31.7	563,106	26.6
		(PSCOG)	429,000	27.0	555,900	29.6
Whatcom	106,701	(OFM)	123,822	16.1	137.389	11.1
Five-Co. Area	2,264,124	(OFM)	2,687,275	18.7	3,133,055	16.6
State	4,132,353	(OFM)	4,738,833	14.7	5,367.202	13.3

1/ Washington State OFM 1989; U.S. Department of Energy 1979; PSCOG 1988.

Although the State grew faster than the five-county area during the 1970's, that relationship reversed during the 1980's. Through the year 2000, growth in the five-county area should be faster overall than for the State as a whole. Forecasts for the area's population gains range about 18% percent from 1980 to 1990, and somewhat less than that in the decade 1990 to 2000. In spite of the recession of the early 1980's, King, Pierce and Snohomish Counties recovered and went on to experience a faster growth rate during the 1980's than in the 1970's. Skagit and Whatcom Counties, on the other hand, grew more slowly than in the 1970's. That pattern is projected to continue during the 1990's.

The central cities and older suburban areas in the five counties should remain relatively stable. Population growth has been, and will likely continue to be concentrated in several subareas, such as the towns and suburbs east of Bellevue, southeast King County, and south Snohomish County.

Income

When adjusted for inflation, real per capita personal income increased about 29 percent in the five-county area between 1970 and 1978. The increase in real per capita income dropped to about 10% from 1978-1987, following national and state trends. The recession of the early 1980's had a negative effect on relative income growth during that period. Income in the area is expected to increase within this range of rates through the year 2000, averaging 1.7 percent increase per year, as compared to 2.7 percent from 1960 to 1980 (PSCOG 1984).

Table III-41
Per Capita Personal Income
1970-1987

	1970 (1970 $)	1978 (1978 $)	1987 (1987 $)	Nominal % Change 1970-78	Real % Change 1970-78	Nominal % Change 1978-87	Real % Change 1978-87 1/
King	$4,601	$10,064	$19,511	118.7	31.0	93.9	15.9
Pierce	3,923	7,881	14,008	100.9	20.4	77.7	6.2
Skagit	3,653	8,269	14,301	126.4	35.6	72.9	3.4
Snohomish	3,649	7,625	15,511	109.0	25.2	103.4	21.6
Whatcom	3,599	7,773	13,595	115.4	29.4	74.9	4.5
Washington State	3,997	8,494	15,642	112.5	27.3	84.2	10.1

1/ Income deflated by implicit price deflator for personal consumption expenditures. Inflation by this measure was 66.9% from 1970-1978, and 67.3% from 1978-1987.

Employment

The five-county area accounts for over 60% of all wage and salary employment in the State of Washington and over 65% of all wages paid in the State. The Seattle-Tacoma-Everett metropolitan area is the dominant commercial center in the State and in the Pacific Northwest. It is a major center for finance, trade - especially to the Pacific Rim countries - transportation, administration, and government. Seattle is the regional headquarters for many Federal agencies.

As shown in Table III-42 and Figure III-11, wholesale and retail trade, manufacturing, services and government are the largest components of the area's economy. While the percentage of workers employed by the manufacturing sector has declined in recent years, manufacturing is still a major employer in the area. Transportation equipment manufacturing, primarily related to aerospace, employs about seven percent of the area's work force. Resource-based industries, including forest products, food products, fisheries and mining, have a long-standing prominent historical role in the economies of the Puget Sound area and of the State. These sectors currently employ about four percent of the five-county work force.

The forest products industry is the second largest manufacturing sector, both Statewide as well as in the regional economy, though it is still a small portion of the overall employment picture. Because of the manufacturing related to metals and to machinery manufacturing in the metropolitan area, lumber and wood products employment in the five-county area is just about on a par with these other sectors. Lumber production has the greatest local significance in Skagit County, where it provided over four percent of the wage and salary jobs in 1988. In Whatcom, Pierce and Snohomish Counties the figures

were between two percent and three percent in 1988, while it was less than one percent in King County.

Other industries which have major significance throughout the study area include agriculture (especially in Skagit County), trade, and the service sector. Jobs supported by tourism are somewhat hidden in the data for trade, services, and other sectors. Tourism and travel may be the third-largest industry in terms of sales and employment.

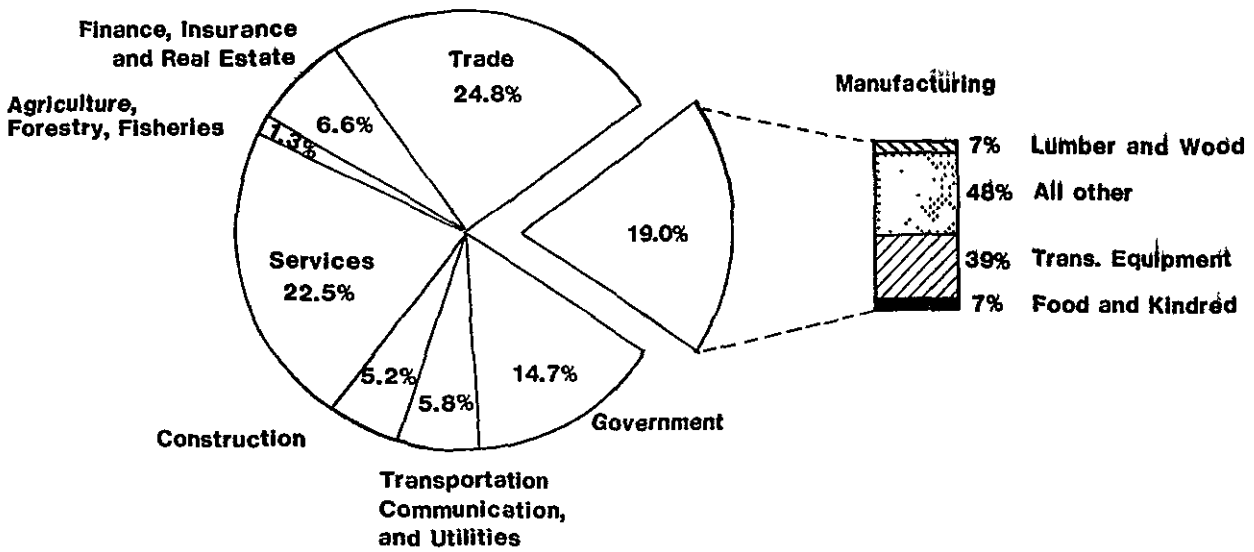
Table III-42
Wage and Salary Employment By Sector - Five-County Area 1/

Sector	Persons Employed 1979	1984	1988
Agriculture, Forestry, Fisheries 2/	9,475	12,488	16,142
Mining	694	634	804
Construction	56,686	47,682	63,001
Manufacturing	196,436	184,055	228,421
Food and Kindred Products	15,556	14,546	15,171
Lumber and Wood Products	18,850	15,644	16,116
Transportation Equipment	87,110	78,502	88,316
All Other Manufacturing	74,920	75,363	108,818
Transportation, Communication, Utilities	54,576	60,525	69,783
Trade (Wholesale and Retail)	228,298	249,780	298,660
Finance, Insurance, and Real Estate	61,380	67,942	79,799
Services	165,865	206,699	270,319
Government	148,981	156,401	177,464
TOTAL	922,391	986,206	1,204,393

1/ Employment covered by Washington Employment Security Act, which covers in excess of 85% of total employment in the State. Does not include self-employed.

2/ Fewer than 5% of jobs in this sector are in the Forestry Services SIC Group.

Figure III-11
Employment by Sector



Note: Mining employment is 0.1% and does not show in the figure.

Wages Paid

In 1988, more than 1.2 million persons were employed in the five-county area. (Not included are self-employed persons, as well as workers not covered by the Washington Employment Security Act - another 10 to 15 percent of the total.) Almost $27 billion dollars in covered wages were paid in that year.

Table III-43 shows the total wages paid in several economic sectors. It also shows the average wage per job. Figures were calculated based on covered wages and employment for 1988 and do not include self-employed. While these figures are only averages, it can be seen that the average salary per job in some of the growing segments of the economy - retail trade, services, etc. - are substantially lower than wages paid in manufacturing.

Table III-43
Employment and Payrolls for 1988 - Five-County Area 1/

Economic Sector	Wages Paid (In Million $)	Jobs	Annual Wages per Job ($)
Agriculture, Forestry & Fisheries 2/	316.8	16,142	$ 19,627
Mining	23.3	804	28,970
Construction	1,488.5	63,001	23,627
Manufacturing	7,004.0	228,421	30,663
Food & Kindred Products	363.9	15,171	23,985
Lumber & Wood Products	414.9	16,116	25,744
Transportation Equipment	3,224.2	88,316	36,507
All Other Manufacturing	3,001.1	108,818	27,579
Transportation, Communications & Utilities	2,087.7	69,783	29,918
Wholesale Trade	2,039.6	75,718	26,936
Retail Trade	2,819.5	222,942	12,647
Finance, Insurance, & Real Estate	2,028.5	79,799	25,420
Services	4,828.4	270,319	17,862
Government (All Levels)	4,273.1	177,464	24,079
TOTAL/AVERAGE	26,909.4	1,204,393	$ 22,343

1/ Employment covered by Washington Employment Security Act, which covers over 85% of total employment in the State. Does not include self-employed.

2/ Fewer than 5% of jobs in this sector are in the Forestry Services SIC Group.

Forest Payments to Counties

By law, twenty-five percent of the revenues collected by the Forest Service from timber sales, recreation, mineral, and other land-use charges are returned to the counties within which those national forest lands are located. Also included are collections for reforestation and amounts allowed to timber purchasers for road construction. Timber sales generate most of the revenues.

The funds are used for public schools and roads. Each state establishes a distribution formula. In Washington, fifty percent of the total receipts are forwarded directly to the counties for use on public schools or roads; the remaining dollars are distributed to the General Fund. The 50 percent given to the counties is split equally between roads and schools.

For the period 1980 to 1989, the Mt. Baker-Snoqualmie annually returned between $4.3 million and $8.9 million to the five counties. In 1989, the payment to counties per acre of National Forest land was about $2.45 for the Mt. Baker portion; for the Snoqualmie, it was $6.91. As a comparison, two other west-side forests in the state returned $4.94 and $12.78 per acre in 1989 (USDA

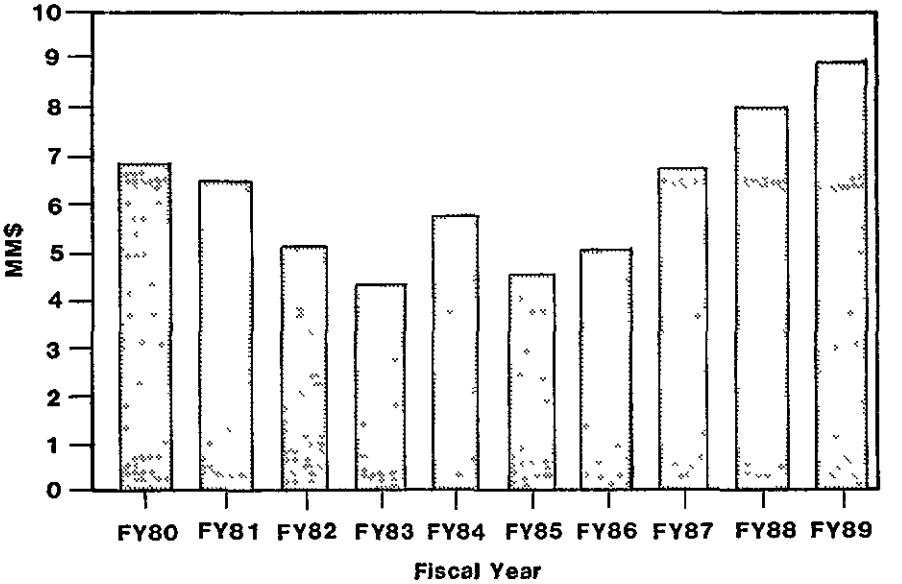
Forest Service 1989). The monies returned to counties are higher in Oregon, with several individual counties receiving over $10 million in 1989. State-wide, the federal payments to counties supply approximately 15 percent of the state funds for roads and streets. In comparison, one county in Oregon (Lane) depends on receipts for 75 percent of the county's road construction and maintenance. Table III-44 shows the returns to counties, by county, for the past ten fiscal years (a fiscal year is October 1 through September 30). The figure below shows the total returns from all five counties.

Table III-44
Returns To Counties

County	FY80	FY81	FY82	FY83	FY84
King	$1,437,231	$1,419,189	$ 851,310	$ 988,049	$1,068,133
Pierce	558,142	551,134	330,554	383,636	414,762
Skagit	1,140,871	1,053,328	974,277	691,636	1,033,620
Snohomish	1,746,191	1,659,040	1,300,661	1,118,111	1,463,418
Whatcom	1,842,167	1,700,812	1,573,286	1,116,871	1,668,556
Total	**6,724,602**	**6,383,502**	**5,030,087**	**4,298,303**	**5,648,489**

County	FY85	FY86	FY87	FY88	FY89
King	$ 826,239	$1,245,880	$1,643,427	$1,762,914	$2,394,581
Pierce	320,838	448,335	590,863	633,820	860,789
Skagit	821,666	768,290	1,042,655	1,352,249	1,271,552
Snohomish	1,151,755	1,307,590	1,749,770	2,085,419	2,328,524
Whatcom	1,326,402	1,240,238	1,681,677	2,181,015	2,050,861
Total	**4,446,901**	**5,010,334**	**6,708,393**	**8,015,417**	**8,906,307**

Figure III-12
Returns To Counties



Employment Growth

The Puget Sound area economy is quite diverse today, although it is still relatively dependent on aerospace employment and spending (Pascall and others 1990). National economic trends have and will continue to affect the area. Housing starts are now up from the slump of the early 1980's, but are expected to stay fairly level over the next decade. The trade and services sectors are expected to continue growing. The forest products industry has already experienced major changes over the last decade. A shakeout of marginal mills and more extensive modernization, coupled with new products and expanding markets, have led to high levels of wood products outputs in the past three years, but with about 25 percent fewer employees than required for similar output levels in the late 1970's.

Future manufacturing growth will likely be in the high-technology industries. Aerospace employment has begun to stabilize and is expected to stay slightly below its historic high for the next several years. Basic industries - food products, lumber and wood products, etc. - and government are projected to grow relatively little through the year 2000. In fact, forest products employment is expected to continue to decline over time as modernization and productivity gains continue to be made (NWPPC 1989). Non-manufacturing jobs should increase about 2.5 percent per year, compared to manufacturing, with projected annual employment growth of about 1.3 percent. However, the output of the manufacturing sector will continue to grow due to greater labor productivity and new technology (PSCOG 1984).

The areas location, lifestyle amenities, educated work force, and the many land and water resources should provide the base for continued economic growth in the future, though likely at a more modest rate than in the late 1980's, which has been a period of fairly rapid economic expansion.

Future Trends - Lifestyle

While most of the five-county areas population is concentrated in the low-lands along Interstate Highway 5, growth in the entire area reflects the national trends. Migration into the area is expected to continue. Most residents will live in urban-suburban areas, although growth in smaller towns and "bedroom" communities - reverse migration - is occurring. People regularly commute to jobs in Everett-Seattle-Tacoma from Carnation, Duvall, North Bend, and Enumclaw. Rural population centers like North Bend and Enumclaw - those within commuting distance of the Everett-Seattle-Tacoma metro area - are growing at a faster rate than the area as a whole.

The spread of knowledge, technology, and new values has shifted the metropolitan part of the Puget Sound area from an economy based on resource extraction to one based more on diversified manufacturing, trade, finance, tourism, and government. This same shift is now beginning to take place in the more rural portions of the area. The shift from resource extraction to services tends to place increasing emphasis on public goods such as developed and undeveloped recreation, clean air and water, and preservation of scenery.

Darrington and Granite Falls, plus Concrete, Skykomish, Sedro Woolley, and a few others are the remaining towns close to the Forest with residents who place

more value on resources than amenities, though the environment and lifestyle of the area are important to them. But, with mass communication and migration, the up-river areas are exposed to modern technology, knowledge, and values. Many new residents of the smaller, less urban communities have had little direct experience with the resource extractive uses of the Forest.

In the future, the decline of the traditional rural community is expected to continue, though overall population will increase. The changing local population composition, including greater numbers of people over age 65, a diverse regional economic base, and growth of regional industrial areas is likely to change the occupational patterns and value structures of many smaller towns. The rate of change can be expected to be faster in towns closer to the metropolitan area, including Sedro Woolley, North Bend, and Enumclaw. Those towns further away, including Darrington, will experience this change more slowly.

AMERICAN INDIAN RELIGIOUS AND CULTURAL USES

The resources of the Mt. Baker-Snoqualmie National Forest are significant to the Native American people who live in the Puget Sound area. The First Amendment to the Constitution and the American Indian Religious Freedom Act of 1978 (USDA 1978) protect their right to practice traditional religions by providing for access to religious sites, and use and possession of sacred objects, and the protection of areas important to these practices. Other uses, such as the right to collect roots and berries, are guaranteed by the Medicine Creek and Point Elliott treaties.

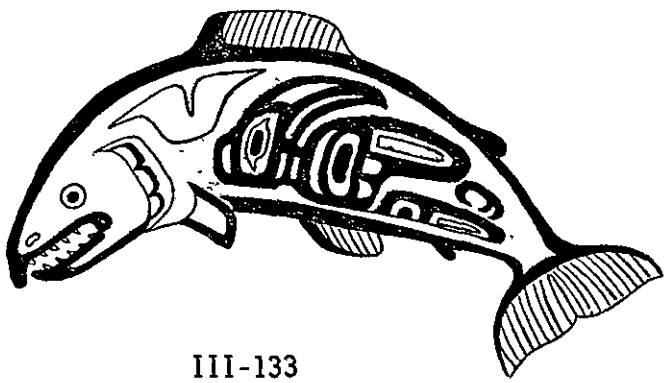
At least fifteen tribal groups currently use the Forest for traditional religious uses: Lummi, Nooksak, Swinomish, Samish, Upper Skagit, Sauk-Suiattle, Stillaguamish, Snoqualmie, Tulalip, Duwamish, Puyallup, Muckleshoot, Nisqually, and Cowlitz. This represents a potential user group of approximately 25,000 Indians (Department of Commerce 1980). This figure is slightly under one percent of the total population for the five-county area of influence, but for many of the Indian people, the National Forest has been, and remains, a vital resource for the continuous practice of their traditional religion.

Traditional religion is a significant component of the social and community structure of Puget Sound tribes. The religion teaches good and correct character and behavior, contributing to the smooth functioning of personal and group relationships. Further, proper religious practice ensures success in life. Those who are successful become role models and authority figures within the community. Disruption of religion can therefore destroy personal sense of worth, interpersonal relations, and tribal leadership.

The Inventory

The Mt. Baker-Snoqualmie is currently one of the few National Forests with an inventory of Indian religious sites. A growing concern among the tribes for present and future availability of resources and access to important sites and areas resulted in the 1981, The Inventory of Native American Religious Use, Practices, Localities and Resources (Blukis Onat and Hollenbeck 1981).

Five categories of use areas and sites were mapped and described in the Inventory: cedar areas, ceremonial flora areas, spirit quest sites, legend sites, and cemeteries and archaeological sites. Some sites cover less than one acre; others average between 3,000 and 15,000 acres. A total of approximately 450,000 acres were identified as sites and areas important for religious and cultural practices. Identified use areas and sites are located throughout the Forest, but are concentrated in the northern half, between the Snoqualmie River and the Upper Skagit River. There is some use in the Nooksack River drainage.



Environmental and Religious - Cultural Relationships

For certain uses, the condition of the area and the integrity of the relationship of vegetation, water, wildlife, and fish is important. Any area of the forest containing old-growth cedar and/or clean streams and/or plants used for medicinal or ceremonial purposes is a potential religious use area. Areas where these resources co-occur are especially important (Blukis Onat and Hollenbeck 1981).

About 34 percent of the inventoried acres are located within designated wilderness - close to 139,084 acres. One-third of the use sites and areas within wilderness contain old-growth trees. Over half of the inventoried sites and areas outside of wilderness contain stands of old growth; 75 percent of these stands are tentatively suitable for commercial timber harvest. Refer to the discussion on tentatively suitable land in Vegetation, Chapter III. At this time, data showing the acres of old growth overlapping with clean streams and/or important plants is not available.

Anadromous fish have been a traditional and principal means of income for many Native Americans living in the planning area. Protection and enhancement of the habitat for anadromous fish is a major issue.

Indian religious practitioners prefer privacy for rituals, without intrusion of visual or audible disturbances. Some religious use may require isolation, privacy, and purity of environment. The degree and nature of uses or management activities (such as recreation use or the harvest of timber) that are compatible with Native American religious use depends on the kind of use, and the condition of the environment. Semi-primitive and primitive recreation may be compatible. Timber harvest, road construction, and hydropower development can damage the value of a site for ceremonial use.

Spirit quest and legend sites are the most sensitive areas of religious use and practice. The sounds of cars, trucks, and voices can disturb religious practice. Sudden intrusions from hikers, cross-country skiers, kayakers, etc. can be disturbing to practitioners. Timber harvesting, small hydroelectric power developments, and other evidence of secular activities can detract from the isolation, privacy, and purity of these areas.

Cedar is used for a variety of purposes, and is an important component of the environmental setting for religious practices. A variety of age classes are used. Old-growth cedar is valued for use in canoes and long houses. When cedar is of "saw log" size, its bark is most suitable for gathering for use in baskets and other items. Through the consultation process (discussed below), it appears that the need for isolation, privacy, and purity is somewhat less than in spirit quest sites.

Over 75 species of medicinal and ceremonial plants have been identified in the 1981 inventory. The rights to gather some of these plants are provided for in the American Indian Religious Freedom Act and in the Treaties of Point Elliott and Medicine Creek. Like cedar, the extent to which isolation, privacy, and purity are important to the setting from which plants are gathered is not been known.

Historic and currently used cemeteries will be protected in all alternatives. Archaeological sites are discussed in the following section.

The Consultation Process

During the scoping phase of project environmental analyses, Inventory data are reviewed by the Forest Service project leader and the Forest Archaeologist. When a project overlaps inventoried use areas, officials and known religious leaders of the affected Tribe(s) are notified, and their comments sought. If adverse effects are identified, meetings may be held to identify potential avoidance or mitigation measures. These are incorporated into the environmental document and considered in the selection of a preferred alternative and its mitigation measures.

In 1987, the Forest contracted for the development of an improved consultation process. The results of this contract will be used as a starting point for an update of the Inventory, scheduled for 1991 (Forest Plan, Appendix D, Cultural Resource Implementation Schedule). The update will identify changes in religious use since 1980, and specify consultation procedures appropriate for specific tribes.

The Future

Native American religious and ceremonial use of the Forest and its resources is likely to increase. Numerous investigators predict increased involvement in traditional rituals and ceremonies. There are an estimated 3,000 active "Spirit Dancers" in the Native American community. The traditional religion continues to satisfy needs that often go unmet by non-Indian society (Suttles In: Blukis Onat 1981).

The Forest will offer the majority of the remaining unmodified natural environments in the Puget Sound area, increasing the demand beyond that attributable solely to growth in the number of practicioners.

ARCHAEOLOGICAL AND HISTORIC PROPERTIES

There are a wide range of archaeological and historic properties on the Mt. Baker-Snoqualmie National Forest. Almost 1000 have been reported on or near the Forest. To date, only about 200 have been adequately investigated and reported, because of the difficulty of survey and site location in the rugged terrain and dense vegetation of the Cascades. Also, the focus of survey efforts - proposed project areas - has limited opportunities to record many sites.

Properties include prehistoric or archaeological sites containing a diverse range of artifacts and historic buildings and groups of buildings. They also include extensive linear features, such as historic trails, wagon roads, and railroad grades. Properties may also include a large "district", like the Stevens Pass Historic District, which contains a network of rail lines, tunnels, trestles, switchbacks and snowsheds, linking townsites and remains of railroad construction camps.

Cultural resources represent tangible evidence of human history. Some also contain irreplaceable scientific data. As land development outside of the Forest boundary continues and more cultural resources are destroyed, the proportion of cultural resources in the Puget Sound area that are located on Federal land will increase. As time goes on, the value of the cultural resources on the Mt. Baker-Snoqualmie is expected to increase. Concurrently, there may be increased conflicts with other, more consumptive uses, such as timber harvesting, road building, recreation developments, and others.

The Forest Service is charged with the responsibility to identify, evaluate, protect, interpret, and enhance archaeological and historic properties. In accordance with the National Historic Preservation Act of 1966 (USDA 1966), amended in 1980, the effects of management activities on significant cultural resources must be considered. The Forest is directed to complete an inventory of all cultural resources and evaluate them for possible inclusion on the National Register of Historic Places.

On the Mt. Baker-Snoqualmie National Forest, inventories have generally been conducted on those acres where projects are planned, such as timber sales, road or trail construction, campground construction, or on acres which are proposed for transfer from Federal ownership. As of 1985, about 170,000 acres or 10 percent of the Forest have been inventoried.

Cultural and historic properties will be discussed in three sections: archaeological sites, including cemeteries, historic buildings and structural remains, and linear cultural features.

Archaeological Sites

Archaeological evidence indicates that Native Americans have occupied western Washington for at least 10,000 years (Gustafson and others 1979). The earliest evidence for occupation and use of upland areas dates to 6,000 years (Hedlund 1979). At this time, there are 20 known prehistoric sites on the Forest; only one of these sites has been investigated and, as yet, none have been dated.

Archaeological sites on the Forest often escape early detection. The difficulties of reliably identifying potential buried archaeological sites in the dense, forested environment of the western Cascades is widely acknowledged (Aikens 1976, Connolly and Baxter 1983, Darsie and others 1985, Pettigrew 1985, Wessen 1985). The thick understory vegetation, layers of decaying plant litter on the forest floor, and fallens trees obscure the ground surface. Even surface sites can be disguised under the dense vegetation; they are often only exposed in a few localized places, such as cut banks or upturned trees (Carter 1978).

The wet, cool climate of the Forest is very destructive to artifacts. In prehistoric sites, organic artifacts (baskets, wooden tools, clothing, etc.) deteriorate rapidly (Baenen 1981, Blukis Onat 1981, Gordon and Buikstra 1981, White and Hannua 1983). Usually only stone tools are durable enough to withstand the climate through the years.

Other factors related to the difficulty of identifying archaeological sites include the techniques used to explore in this area and the subtlety of the deposits, especially compared to other parts of the country. Subsurface "shovel-testing" has not been used to search for sites on this Forest, though it is a technique used elsewhere (Chartkoff and Chartkoff 1980). This is likely due to the large size of proposed projects (timber sales, campgrounds, road and trail construction, etc.), the labor involved, and the low rate of site discovery in proportion to the labor.

Additionally, deposits are likely to be of a more subtle type than found in other parts of the nation. Prehistoric occupation of the Forest might result in limited campsites or use areas with the remains consisting of a scatter of chipped stone tools, a buried fire hearth, or soil stains to reflect the presence of structural remains. These are much harder to detect than the extensive shell midden sites on the Olympic Peninsula or cliff dwellings in the southwestern portion of the United States.

The value of archaeological sites lies in their contribution to our knowledge of prehistory and history, insights not available in any other form. The "context" of artifacts is important. This is the exact location of artifacts in the soil profile, their spatial relationship to other artifacts or features in the site, associated "ecofacts" like food remains, and more. If the soil has not been disturbed and an artifact is located "in situ" or in its original place, it may be possible to determine the age and use of the artifact, and describe and explain the behavior which it represents.

Archaeological resources are not limited to prehistoric sites; some historic sites physically remain in archaeological context only. These sites are valued for the information they contain about our history.

Archaeological sites may also be of value to contemporary communities (for example, Indian Tribes) as documentation of that community's role in history.

Historic Buildings and Structural Remains

The earliest recorded explorations of the Forest by Euro-Americans occurred in the early 1800's. Explorers and fur trappers were soon followed by miners, the military, lumbermen, and homesteaders. These early residents found the forest

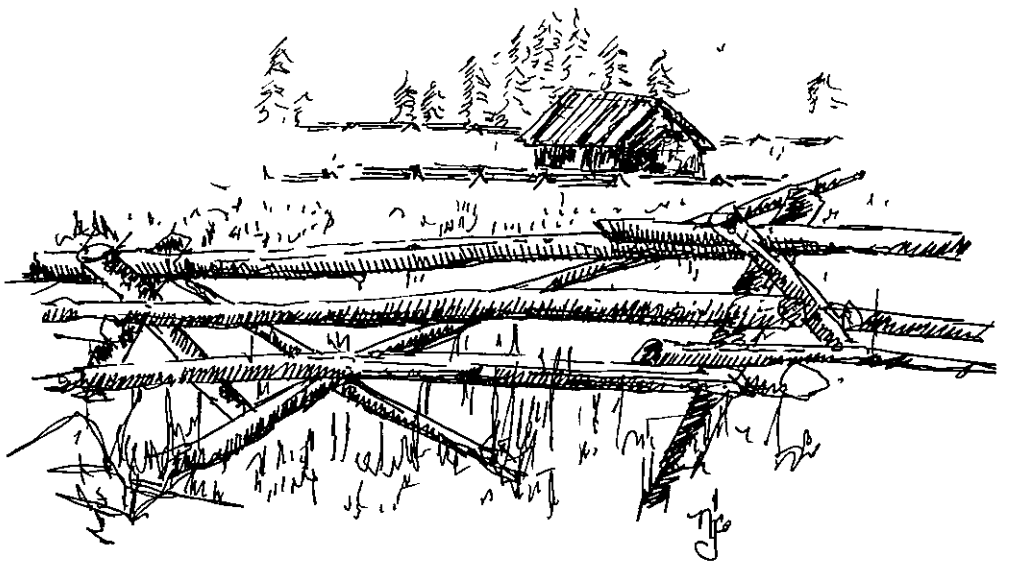
environment less desirable than the flatlands, river valleys, and shorelines of Puget Sound. The forest resources in the Cascades were reached by Indian trail and later by mine- and timber-to-market roads and railroads. As access improved and exploitation of forest resources was easier, settlers moved closer to the mountains.

Several major historic themes, important in the history of the Pacific Northwest, are represented on the Mt. Baker-Snoqualmie National Forest. These include, but are not limited to: exploration and settlement, early mining, historic logging, development of trans-Cascadian and trans-continental transportation and communication, and Forest Service administrative history.

Sites and features representative of the historic period include old townsites, homesteads, isolated cabins, campsites, and associated domestic remains; mining camps and equipment, mill sites, tramlines, and mine shafts; logging camps, skid roads, sawmills, chutes, dams, and early logging machinery; tunnels; and trestles. Early Forest Service history is represented by guard stations, fire lookouts, recreation developments, trails, and Depression-era administrative compounds.

Historic buildings rarely occur in isolation but are usually part of larger patterns of development, including roads and trails, railroads, camps and towns (see below). These networks of cultural features can cover a considerably larger area than the structure itself. Cultural features are often found in currently used recreation sites, simply because places that attracted human use and occupation in the past also attract contemporary use.

Historic buildings and structural remains tend to be more visible and recognizable than archaeological sites. Also, archival information can be used to locate them. Because of these factors, there is a greater chance that historic buildings and remains will be discovered prior to any ground disturbing activity. However, dense vegetation can disguise or cover them.



Historic buildings and remains are especially vulnerable to weathering and deterioration from wind and rain, insects, falling trees, fire, and trampling by wildlife. On the Forest, most of the inventoried wood frame or log structures (aside from administrative sites still under use) have experienced substantial deterioration. Besides the natural elements of destruction, man can cause damage or collapse of old buildings and structural remains. Refer to Chapter IV for more specific effects.

The principal value of historical resources are their associations with the past - with broad patterns in history, with historic persons, or with characteristic modes of technology and construction. These are also the same values that make linear features important.

Linear Cultural Features

Linear cultural features are the remains of historic routes of communication and/or transportation. They include trails, wagon and military roads, mine-to-market roads, railroad lines and grades, early corduroy logging roads, ditch lines, and early Forest Service trails and telephone lines. On the Mt. Baker-Snoqualmie National Forest, specific linear features include the Naches Trail, the 6,649 acre Stevens Pass Historic District, Snoqualmie Pass Wagon Road, Yakima Pass, and the Huckleberry Mountain Indian Trails.
Current travel and communication routes often follow the historic routes; Interstate 90 or the North Cascades Highway over Washington Pass are examples. Ridges have been travelways for both man and animals; river corridors (and associated riparian areas) have long been used for access by both.

Because linear cultural features can extend for miles or cover a large area, complete avoidance by current users of the forest is impossible. As segments of the linear cultural feature are damaged, the integrity of the whole feature is diminished. There may be conflicting demands placed on historic trails by different user groups, from hikers to ORV users to horseback riders. However, because of their size and accessibility, linear cultural features can provide great opportunities for aesthetic and educational experiences for visitors.

The Future

The historic preservation community has demonstrated continued interest in management of cultural and historic properties. Many of the Forest's cultural properties were first recognized by these organizations, who in turn nominated them to the National Register. Some groups and individuals have taken on the responsibility of protecting and maintaining historic fire lookouts; others have been active in protecting the Naches Pass Trail.

Archaeological research, in the past, has concentrated on the coastal areas of Western Washington (Archaeological Research Services, Inc. 1981, Blukis Onat 1981, Geo-Recon International 1981) and upland forest areas have received little attention (Hedlund 1979, Hedlund and others 1978, Moura and Kennedy 1981). At this time, the academic community is becoming more aware of the exceptional value of the cultural and historic properties located on National Forest land. Many sites on the Mt. Baker-Snoqualmie have escaped human disturbance and they represent some of the most pristine examples of archaeological sites in the region. Their research value in reconstruction of

prehistoric and historic lifeways is recognized (Blukis Onat and others 1980, Carter 1978). There will also be an increased level of protection and preservation of these properties.

Management decisions concerning cultural resources will be made in a context of increasing public interest and involvement, with growing public appreciation of these resources contribution to community economies and identity. In response to these concerns, the amount of inventory not tied to specific development projects will increase, to equal or surpass the amount of inventory for development projects.

SCENERY

The Mt. Baker-Snoqualmie National Forest contains some of the nations most scenic forest landscapes. The Forest contains a broad spectrum of landforms and a wide variety of visual settings or scenes.

Lush, low-elevation forests contrast sharply with the glaciated peaks and ridges of the North Cascade Mountains. Major mountain peaks located within the Forest boundary, or visible from the Forest include Mt. Baker, Glacier Peak, Monte Cristo Peak, Mt. Index, and Mt. Rainier. These are dominant focal points for the forest visitor. Adding to the visual variety are the eight major river drainages that dissect the Cascades, and the broad Puget Sound Basin visible to the west of the Forest.

Contrasting with this natural landscape are human modifications, including roads, rockpits, utility corridors, ski areas, and the activities associated with timber harvesting. The linear road corridors and geometrically-shaped clearcut patterns resulting from past timber harvest are the most visually evident. However, natural appearing environments exist on much of the Forest, even where extensive timber harvest and other activities are occurring.

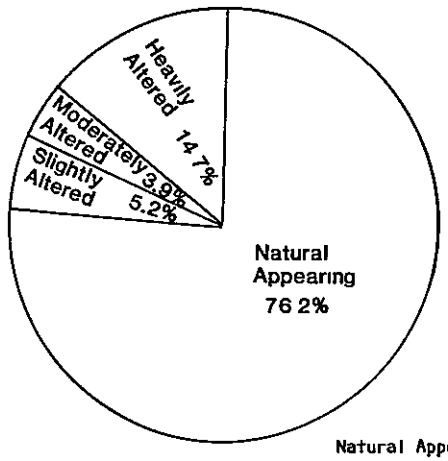
Classifying Visual Conditions

The visual resources of the Forest have been inventoried using the Visual Management System (USDA Forest Service 1974). The Existing Visual Condition of the Forest, including wilderness, was inventoried and mapped in 1979. This inventory is a survey of the actual visual condition of various forest landscapes at a point in time. As shown in Figure III-13, on the next page, most of the Forest is natural in appearance. Approximately 15 percent has been heavily altered by activities such as cutting commercial timber, road construction, and other projects.

This current condition is a result, in part, of the Roadless Area Review and Evaluation (RARE) process. From 1972 until the RARE Final Environmental Impact Statement was issued in 1979, up to 45 percent of the Forest was essentially unavailable for timber harvesting or roaded activities. Timber harvest and reforestation was concentrated in accessible, low-elevation areas. The schedule between "entries" to harvest timber in an area was also shortened. Designated wilderness and the roadless areas remained natural appearing.

The large amount of heavily altered land is also attributable to the intermingled land ownership pattern on some parts of the Forest. When viewed in the context of the visible landscape, roads and timber harvesting on private land adjacent to the Forest have influenced the visual condition on National Forest lands.

Figure III-13
Forest-Wide Existing Visual Condition
1979



Natural Appearing Area appears untouched by man; changes not visually evident.

Slightly Altered Changes may be noticed by the average visitor but do not attract attention. Natural appearance dominates minor disturbances.

Moderately Altered - Changes are easily noticed by the average visitor and may attract attention Disturbances are apparent.

Heavily Altered - Changes are strong and obvious to the average visitor. Changes dominate the landscape but may resemble natural patterns when viewed from a distance of 3 to 5 miles. Disturbances are major.

Viewsheds

Recreation experiences are a combination of activity at the use area and the visual perceptions of the landscape as viewed during travel on the Forest and at the recreation site. One of the largest recreation activities is driving through the Forest, for pleasure. Most forest visitors travel through or recreate on only a small portion of the Forest. The "seen" landscape visible to most visitors are those acres seen from roads, trails, rivers, and recreation areas. These "viewshed" corridors have been inventoried and mapped, using the current recreation and transportation patterns.

To establish a framework for planning emphasis, the Forest had been divided into 56 viewsheds. A viewshed is the portion of the landscape "seen" by most visitors from roads, trails, rivers, or recreation areas. Most are corridors one-quarter mile to 2 miles wide on either side of a road, trail, or river. The viewsheds are further subdivided into 25 highly sensitive, or Primary Viewsheds, that are viewed from primary travel routes, and 31 moderately sensitive, or Secondary Viewsheds.

The Existing Visual Condition of the 56 viewsheds is shown in Table III-45. This visual condition is a summary rating of the overall impression a visitor would have of each viewshed, at the present time. It should be noted that a higher percentage of acres (29 percent) within viewsheds is heavily altered, than in the acres outside of the viewsheds (13 percent).

Table III-45
Existing Visual Conditions Within Viewsheds, 1983 1/

Condition	Acres	Percent of Total Viewsheds
Natural Appearing	96,591	46.3%
Slightly Altered	53,047	25.4
Moderately Altered	11,765	5.6
Heavily Altered	47,316	22.7
TOTAL	208,719	100.0 %

1/ Recently acquired lands have not been inventoried for EVC, thus the acres shown here are less than the total viewshed acres shown in Table III-46.

Figures III-14a and 14b - maps of the viewshed corridors for the north half and south half of the Forest - show the approximate location of the individual viewsheds. Table III-46, on page III-146 and 147, shows the name, acres, and existing condition of the viewsheds.

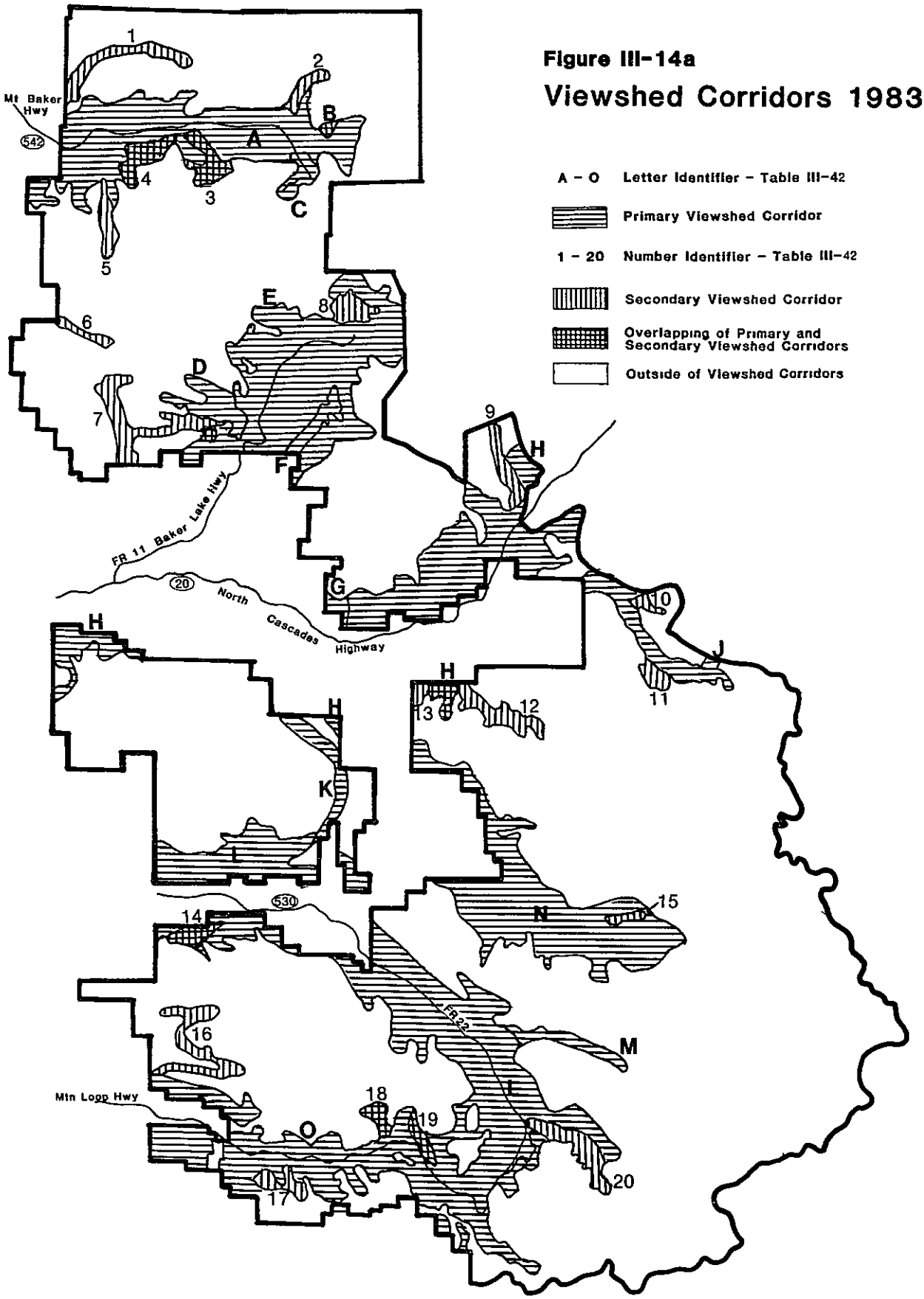


Figure III-14a
Viewshed Corridors 1983
A - O Letter Identifier - Table III-42
Primary Viewshed Corridor
1 - 20 Number Identifier - Table III-42
Secondary Viewshed Corridor
Overlapping of Primary and Secondary Viewshed Corridors
Outside of Viewshed Corridors
Mt Baker Hwy
542
FR 11 Baker Lake Hwy
20
North Cascades Highway
530
FR 22
Mtn Loop Hwy
A
B
C
D
E
F
G
H
J
K
M
N
O
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Figure III-14b

Viewshed Corridors 1983

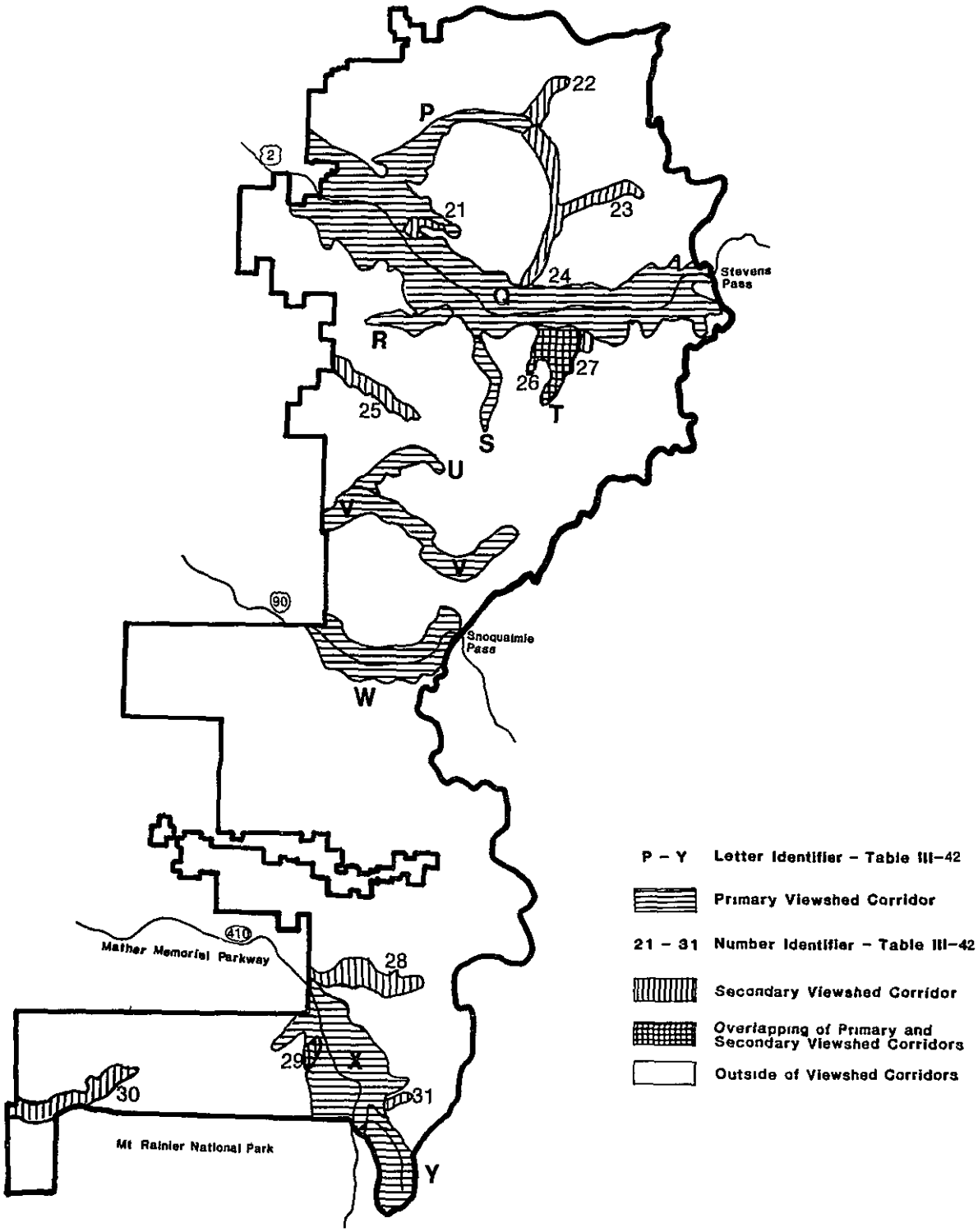


Table III-46 - Viewshed Corridors - 1983

Viewshed		Road Name/Number		Acres	Existing Visual Condition
Primary					
A	North Fork Nooksack River	Mt. Baker Hwy	WA 542	10 707	Slightly Altered
B	Ruth Creek		FR 32	1,035	Natural Appearing
C	Galena Creek	Mt Baker Hwy	WA 542	1,858	Moderately Altered
Secondary					
1	Canyon Creek		FR 31	4,076	Heavily Altered
2	Swamp Creek		FR 3065	1,521	Moderately Altered
3	Wells Creek		FR 33	3,527	Heavily Altered
4	Deadhorse/Cascade Creeks		FR 37	1,288	Heavily Altered
5	Glacier Creek		FR 39	2,935	Natural Appearing
Primary					
D	Sulphur Creek		FR 13	4,414	Heavily Altered
E	Baker Lake	Baker Lake Hwy	FR 11	19,851	Slightly Altered
F	Anderson Creek		FR 1106	1,837	Heavily Altered
Secondary					
6	Middle Fork Nooksack River		FR 38	1,330	Heavily Altered
7	Loomis Mountain		FR 12	5,026	Heavily Altered
8	Shannon Creek		FR 1152	1,858	Moderately Altered
Primary					
G	Sauk Mountain		FR 1030	465	Heavily Altered
H	Skagit River	North Cascades Hwy	WA 20	802	Moderately Altered
Secondary					
9	Bacon Creek		FR 1060	2,386	Heavily Altered
Primary					
I	Cascade River		FR 15	4,878	Slightly Altered
J	North Fork Cascade River		FR 15	253	Natural Appearing
Secondary					
10	Sibley Creek		FR 1540	676	Moderately Altered
11	Vee Creek		FR 1570	718	Heavily Altered
12	Illabot Creek		FR 16	4 794	Heavily Altered
13	Hilt Creek		FR 16	443	Heavily Altered
Primary					
K	North Fork Stillaguamish R		FR 28	1,943	Slightly Altered
L	Sauk River		FR 22	12,967	Slightly Altered
M	Whitechuck River		FR 23	3 780	Moderately Altered
N	Suiattle River		FR 26	8,025	Moderately Altered
Secondary					
14	French Creek		FR 2010	443	Natural Appearing
15	Green Mountain Pasture		FR 2680	1,056	Heavily Altered
Primary					
O	South Fork Stillaguamish R	Mt. Loop Hwy		9,672	Moderately Altered
Secondary					
16	Green Mountain		FR 41	10,749	Heavily Altered
17	Bear Lake		FR 4021	1 457	Heavily Altered
18	Deer Creek		FR 4052	1,035	Moderately Altered
19	Beaver Creek		FR 4060	1,183	Heavily Altered
20	North Fork Sauk River		FR 49	2,386	Natural Appearing

Table III-46 (continued)

Viewshed		Road Name/Number		Acres	Existing Visual Condition
Primary					
P	North Fork Skykomish River		FR 63	6,167	Heavily Altered
Q	Skykomish River	Stevens Pass	US 2	25,616	Moderately Altered
Secondary					
21	Barclay Creek		FR 6024	739	Heavily Altered
22	Upper North Fork Skykomish R		FR 63	2,893	Moderately Altered
23	Rapid River		FR 6530	2,851	Heavily Altered
24	Beckler River		FR 65	7,117	Heavily Altered
Primary					
R	Money Creek		FR 6420	2,661	Moderately Altered
S	East Fork Miller River		FR 6410	2,788	Moderately Altered
T	Foss River		FR 68	2,344	Slightly Altered
Secondary					
25	Lennox Creek		FR 57	2,745	Moderately Altered
26	Maloney/Evans Creek		FR 6840	781	Heavily Altered
27	Tonga Ridge		FR 68 6830	1,837	Heavily Altered
Primary					
U	Taylor River		FR 5630	2,893	Natural Appearing
V	Middle Fork Snoqualmie R		FR 56, 5620	8,701	Moderately Altered
Primary					
W	South Fork Snoqualmie River	Snoqualmie Pass	I90	8,468	Moderately Altered
Primary					
X	White River	Mather Memorial Pkwy	WA 410	5,660	Moderately Altered
Y	Crystal Mountain		FR 7166	3,104	Moderately Altered
Secondary					
28	Greenwater River		FR 70	2,576	Moderately Altered
29	Suntop		FR 7315	1,077	Heavily Altered
30	Cayada Creek		FR 7810	1,732	Moderately Altered
31	Corral Pass		FR 7174	887	Moderately Altered
TOTAL IN VIEWSHEDS				225,011	

Visual Quality Levels

Visual Quality Levels have also been mapped for the entire Forest, by viewsheds. Visual quality is classified according to the scenic variety of an area and how often it is seen by the viewing public. The levels are defined in Table III-47.

Table III-47
Existing Visual Quality Levels
1984

Visual Quality Level	Description	Acres	% of Forest
Preservation (P) 1/	Areas in which only ecological change has taken place, except for trails needed for access. Land appears to be untouched by human activities.	729,507	42.3 %
Retention (R)	Areas in which changes in the landscape are not visually evident to the average person unless pointed out. Land appears to be natural.	261,744	15.1
Partial Retention (PR)	Areas in which changes in the landscape may be noticed by the average forest visitor but they do not attract attention. The natural appearance of the landscape still remains dominant. Changes appear to be minor disturbances.	422,345	24.5
Modification (M)	Areas in which changes in the landscape are easily noticed by the average forest visitor, and may attract some attention. Changes appear to be disturbances but resemble natural patterns.	307,016	17.8
Maximum Modification (MM)	Areas in which changes in the landscape are strong and would be obvious to the average forest visitor. These changes stand out as dominant, yet they may resemble natural patterns when viewed from 3-5 miles or more distant. They appear to be major disturbances viewed at closer distances.	4,729	0.3

1/ Preservation is generally reserved for areas that have been Congressionally or administratively established, such as wilderness.

Visual Quality Levels (VQL) vary by alternative in this FEIS. The existing VQL provides a basis for measuring the effects of each alternative on the scenery. Visual Quality Levels are Visual Quality Objectives in the Forest Plan.

Supply and Demand

The Existing Visual Condition, indicating the current degree of alteration from a strictly natural condition, constitutes the supply of visual resources. The 293,901 acres of land in a heavily altered condition will require long-term special designs and scheduling of projects to decrease the effects of past activities and to "move" these acres to a less altered Visual Quality Level.

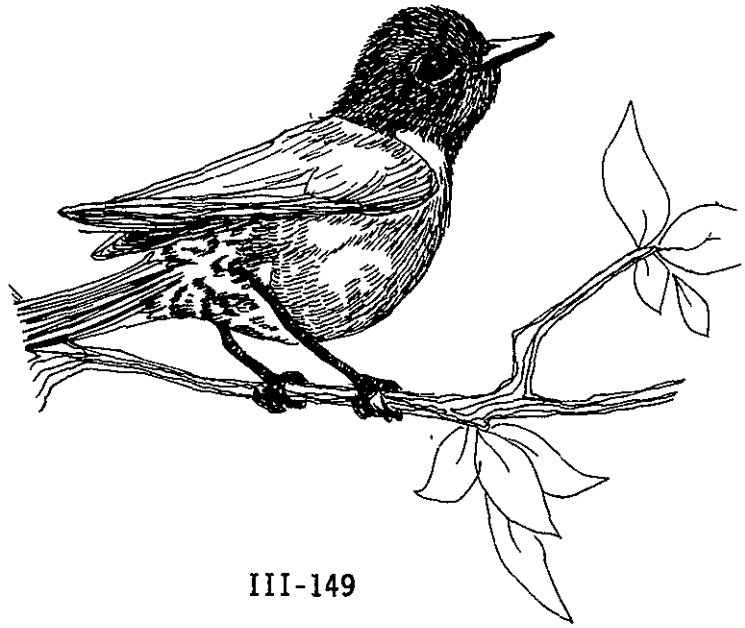
Regardless of the alternative selected in the Forest Plan, the visual pattern currently existing within the heavily altered areas will be evident for fifty to eighty years, assuming no additional management activity occurs. As shrubs and trees "green up" old harvested areas, the linear patterns of roads become less evident and disturbances begin to blend into the natural environment. In addition, special designing of future timber harvest can soften the hard edges of older clearcut units.

The demand for landscape management or scenic beauty comes from several sources. Nationally, concerns were vocalized in the late 1960's and early 1970's, primarily over clearcutting practices in the Monongahela, Bitterroot, Bridger-Teton, and Tongass National Forests. Several major pieces of legislation resulted. Scenic quality is also closely associated with recreation opportunities; the Recreation Opportunity Spectrum classes are tied to and reflect the appearance of the landscape.

Scenic Byways

The National Forest Scenic Byway designation acknowledges scenic drives where the combination of forest setting, recreation, and interpretive opportunities provide a quality pleasure driving activity.

The Mt. Baker Highway was designated a Scenic Byway in 1988. It includes over 24 miles along State Road 542. The Mountain Loop Highway and Stevens Pass Highway will be nominated in 1990.



RECREATION

Introduction

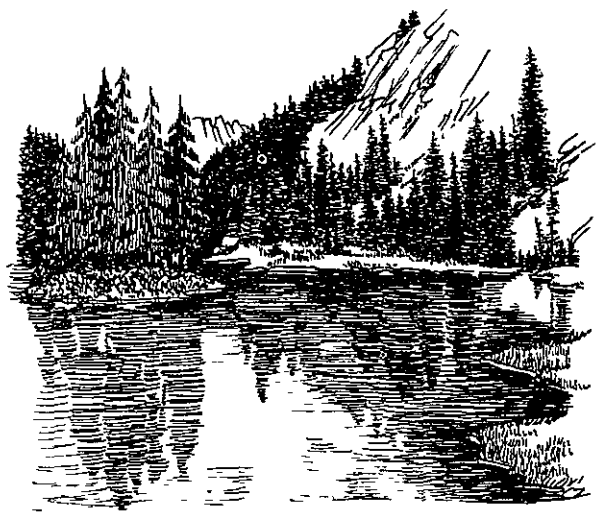
The Puget Sound area is rich in recreation opportunities, from National Parks (the Olympic, North Cascades, and Mt. Rainier) to urban, county, and state facilities. The Mt. Baker-Snoqualmie National Forest is a key component, complementing available recreation use on other public and private lands.

The Forest is located within a one-half days drive for over 2.5 million people in the five-county area of influence. An additional 3.0 million persons live in the Vancouver, British Columbia metropolitan area. No other Forest in Oregon or Washington is closer to such a large recreation market. The Forest contains some of the nations most scenic and primitive country; also available are opportunities to enjoy many types of developed and dispersed recreation.

The importance of the recreation resource of the Forest has been recognized in several acts of Congress in recent years. The Alpine Lakes Area Management Act of 1976 (PL 94-357) found the area to have "...opportunities for great diversity of recreational use and enjoyment during all seasons of the year" (USDA 1976). The Wild and Scenic Rivers Act of 1968 (PL 90-542) declared the Skagit River to "...possess outstandingly remarkable scenic, recreational values...to be preserved and protected for the benefit and enjoyment of present and future generations" (USDA 1968).

The Washington State Wilderness Act of 1984 (PL 98-339) found that "...many areas of undeveloped National Forest System lands possess outstanding natural characteristics which give them high values as wilderness" (US 1984). Finally, the National Park Act (PL 90-544), which designated the North Cascades National Park recognized the establishment of a vast, contiguous recreation complex in the State of Washington and provides a clear, legislative mandate for the management of "...National Forests adjacent to the park" (US 1916).

Between four and five million recreation users visit the Mt. Baker-Snoqualmie each year, making it one of the most heavily visited National Forests in the country. This figure includes a number of Canadian visitors. Table III-50 shows the recreation use of three Washington State National Forests, including the Mt. Baker-Snoqualmie, and the three National Parks in the State.



National Forests received 78 percent of the total recreation use, compared to 22 percent in the three Parks; the Mt. Baker-Snoqualmie received 37 percent of the total use. The Mt. Baker Snoqualmie National Forest provides 30.5 percent of the backcountry recreation use in northwest Washington.

Table III-48
1988 Recreation Use On Federal Lands - Northwest Washington - RVD's

	Total Recreation	Wilderness/Backcountry (USFS) - (NPS)
National Forests		
Mt. Baker-Snoqualmie	5,196,300	455,500
Olympic	1,526,110	89,500
Wenatchee	4,409,800	485,500
Subtotal	11,132,210	1,030,500
National Parks		
Mt. Rainier	1,409,500	98,100 1/
North Cascades	419,800	84,300
Olympic	1,246,900	278,300
Subtotal	3,076,200	460,700
TOTAL	14,208,410	1,491,200

1/ The National Park Service reports backcountry use by overnight visits; for the purpose of this table it was assumed that the average stay was approximately 40 hours. Refer to the Glossary for other definitions.

Recreation use is heaviest in the summer months, but occurs in all seasons of the year. In the early spring, hikers, horse users and mountain bikers flock to low elevation trails. These recreationists follow the melting snows upward during the summer until fall storms begin to push users back down into the valleys. Scenic highways and forest roads are equally attractive to visitors, and driving for pleasure is a popular public recreation use of the Forest. Although a majority of this use occurs of federal and state highways crossing the National Forest, such as I-90 over Snoqualmie Pass. In 1989, there were 45 campgrounds and 11 picnic sites offering visitors an outdoor experience for a few hours or for several days.

Water is one of the focal points for recreation on the Forest. Dozens of rivers and creeks begin in melting snows and glaciers and flow down through forested valleys to Puget Sound. Hundreds of lakes and tarns dot the alpine highcountry; several large lakes offer recreation opportunities in the mid- to lower elevations of the Forest. Water-oriented recreation includes fishing, swimming, boating, and river rafting.

Upland birds and deer hunting season mark the beginning of hunting season and ends with deer and elk seasons in late fall and early winter. Since some of the state's largest herds of deer, elk and goat populations are found within the Forest, thousand of hunters take to the woods each fall.

Downhill skiing is the major focus of winter use, and continues to increase steadily in popularity at seven ski areas. Snowmobiling use grew in the 1960's and leveled off in popularity in the late 1970's. However, snowbound forest roads, groomed snowmobile trails, and areas of open terrain continue to attract hundreds of snowmobilers on winter weekends. Cross-country skiing has exploded in popularity in recent years; skiers take advantage of Forest roads as well as

several ski trails developed through scenic forest terrain with volunteer labor. Parking is provided by state snowplowing at seven "sno-park" sites located throughout the Forest.

National Recreation Strategy

The National Recreation Strategy emphasizes strengthening and rounding out multiple-use management on the National Forest System lands. An aim of the National Recreation Strategy is to find creative and innovative ways to take advantage of outdoor recreation opportunities on the Forest by working with individuals, organizations and associations. The ultimate goal is customer satisfaction with high quality recreation services and facilities.

Applicable Existing Plans

Several approved plans provide existing management direction for recreation on the Forest:

Plan	Year Approved	In Forest Plan
Glacier Peak Wilderness Plan	1976	Superceded by Plan
Off-Road Vehicle Management Plan	1977	Updated in the Plan
Trail Management Plan (Interim)	1979	Updated in the Plan
Alpine Lakes Area Management Plan	1981	Incorporated in Plan
Skagit Wild and Scenic River Final River Management Analysis and Plan	1984	Incorporated in Plan

Recreation Opportunity Spectrum

The Forest provides recreational settings that range from Congressionally designated wilderness to intensively managed forest lands. Any recreational setting actually consists of three kinds of settings - physical, social, and managerial:

- The physical recreational setting of an area is defined by its size, the presence and extent of environmental changes caused by human activity, and the presence or absence of human sights or sounds.
- The amount and type of contact occurring between individuals and groups using an area constitutes it social setting.
- An area's managerial setting refers to the number and kind of regulations used by the Forest Service to manage use in that area.

Different combinations of these three settings provide recreationists with different kinds of recreational experiences. Such combinations range from extremely isolated, pristine natural surroundings with very few visitors and management regulations, to intensively developed surroundings like ski resorts used by large numbers of people, who are highly regulated. To assist in the inventory and management of recreational resources, the Forest Service developed the Recreational Opportunity Spectrum (ROS), which classifies recreational surroundings in terms of their physical, social, and managerial settings.

Mt. Baker-Snoqualmie National Forest lands have been evaluated for the recreational settings they currently provide, using six Recreation Opportunity Spectrum (ROS - see the glossary) classes. These classes are: Primitive (P), Semi-Primitive Nonmotorized (SPNM), Semi-Primitive Motorized (SPM), Roaded Modified (RM), Roaded Natural (RN), and Rural (R).

The acres of wilderness on the Forest have been inventoried using a different ROS scheme; wilderness ROS is discussed later in this chapter. Each Forest acre has been assigned to one of the ROS classes. A more complete definition of the Recreation Opportunity Spectrum may be found in the 1986 ROS Book (USDA, Forest Service 1986).

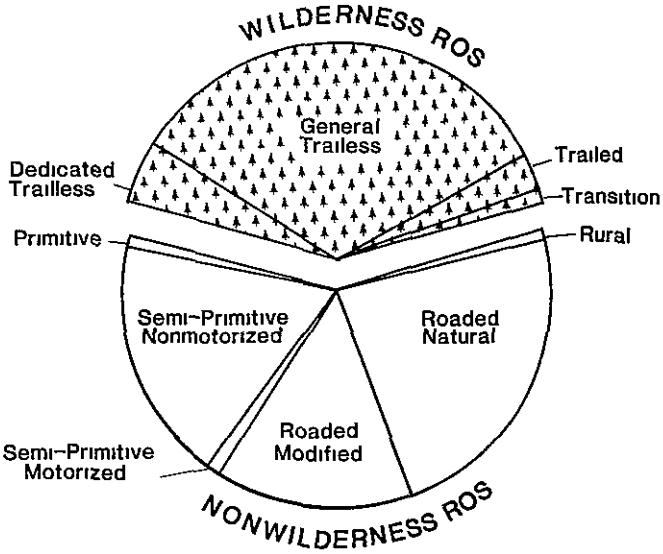
The table and figure below show the distribution of the acres of the Mt. Baker-Snoqualmie National Forest by ROS class, for the current situation.

Table III-49
ROS Acres - Nonwilderness and Wilderness - Current Situation

Nonwilderness ROS	Acres 1/	% of Nonwild.	% of Total Acres
Rural	4,540	0.5%	0.3%
Roaded Natural	399,326	39.7	23.2
Roaded Modified	248,077	24.7	14.4
Semi-Primitive Motorized	9,714	1.0	0.6
Semi-Primitive Nonmotorized	327,334	32.5	18.9
Primitive	16,683	1.6	0.9
Subtotal Nonwilderness	1,005,674	100.0	58.3
Wilderness ROS		**% of Wild.**	**% of Total Acres**
Transition	12,067	1.7%	0.7%
Trailed	44,356	6.1	2.6
General Trailless	585,326	81.1	33.9
Dedicated Trailless	80,000	11.1	4.6
Subtotal Wilderness	721,749	100.0	41.8
TOTAL	1,727,423	100.0	

1/ R2MAP acres may vary from other totals elsewhere in this document.

Figure III-15
ROS Acres
Wilderness and Nonwilderness Current Situation



The lands surrounding the Mt. Baker-Snoqualmie National Forest offer recreation opportunities ranging from urban to primitive. To the west of the Forest lie thousands of acres of rural and roaded natural opportunities. Land east of the Forest, in the 684,000 acre North Cascade National Park Complex, and to the south, in Mt. Rainier National Park, generally offer primitive opportunities. Wenatchee National Forest lands to the east offer opportunities ranging from primitive to developed.

Current General Recreation Use and Past Trends

Recreation use on the Mt. Baker-Snoqualmie increased from 3,100,500 Recreation Visitor Days (RVD's) in 1975 to 5,181,800 RVD's in 1989, an increase of about 67 percent. These trends are similar to recreation use trends reported by other public recreation agencies throughout the Pacific Northwest. For instance, visits to Park Service managed sites increased by 24 percent between 1983 and 1988, surpassing the national visitation increase of 16 percent. Additionally, while "backcountry" overnight stays declined nationally 37 percent during those years, overnight use of this regions' National Parks increased 17 percent (WS ICOR 1990).

Figure III-16, opposite, shows the general trends from 1975 to 1989. Despite a couple of low-use years, the surge in popularity of outdoor recreation (which began in the 1960's) has continued. The growth in recreation use is considerably greater than the 19.8 percent rate of population growth in the Puget Sound area (1970 to 1983). Table III-50 shows the actual RVD's.

Figure III-16
Recreation Use 1975 - 1989

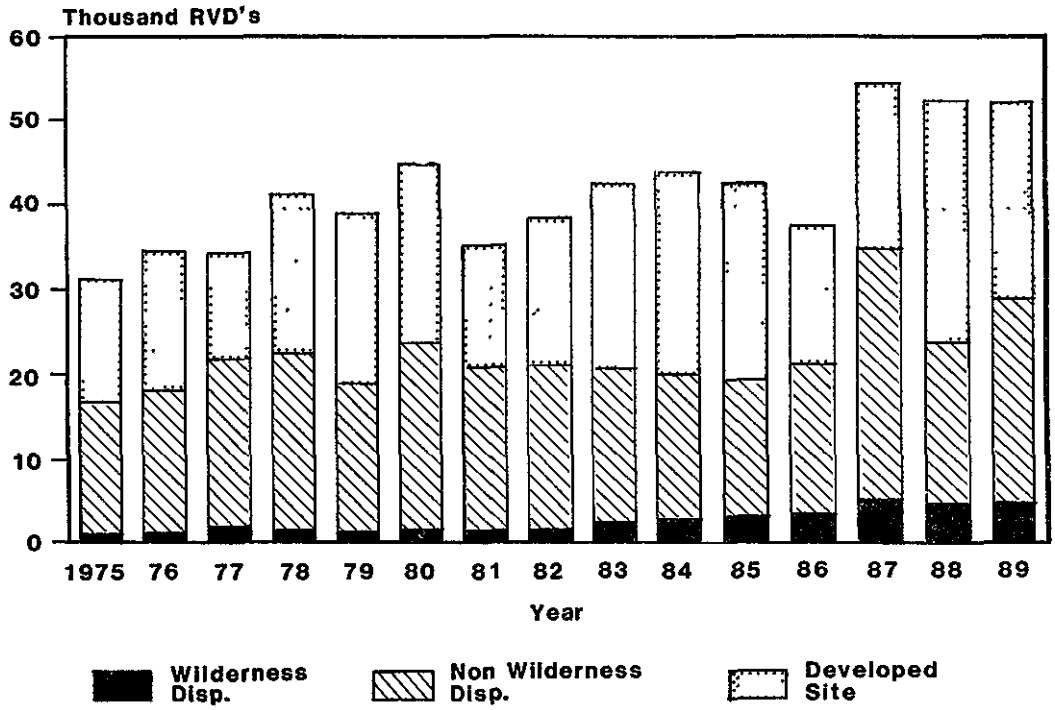


Table III-50
Recreation Use 1975-1989 1/

Year	Wilderness Dispersed	Nonwilderness Dispersed	Developed Site	Total
1975	111,800	1,554,600	1,434,100	3,100,500
1976	116,800	1,672,500	1,660,300	3,449,600
1977	192,000	1,966,100	1,261 600	3,419,700
1978	156,100	2,047,900	1,903,000	4,107,000
1979	140,500	1,730,600	2,014,300	3,885,400
1980	170,200	2,190,700	2,109,500	4,470,400
1981	153,200	1,896,600	1,457,100	3,506,900
1982	147,600	1,958,200	1,716,500	3,822,300
1983	163,000	1,867,700	2,183,600	4,214,300
1983 adj	245,700	1,785,000	2,183,600	4,214,300
1984 adj	274,500	1,702,000	2,372,800	4,349,300
1985	313,200	1,631,500	2,313,300	4,021,400
1986	337,800	1,738,900	1,644,300	3,721,000
1987	497,500	2,944,100	1,961,000	5,399,500
1988	455,500	1,869,000	2,872,000	5,196,000
1989	459,000	2,399,000	2,324,000	5,182,000

1/ 1983 and 1984 figures adjusted for comparative purposes, to show RVD's for all eight wildernesses.

Chapter III
Recreation

Recreation use depends on a number of factors. Key among them are real personal income, resource attractiveness, regional population growth, and weather patterns. Several factors moderated the rate of recreation growth from 1975 to 1989. Slight decreases in use may be due to regional and national economic factors, such as rising gasoline prices in the middle 1970's. Also, recreation use in the Pacific Northwest is very responsive to weather conditions, especially for certain activities, such as alpine skiing. In 1977 and 1981, the Pacific Northwest received very little snow. The dry winters and, consequently, limited alpine skiing (the largest component of developed use), are reflected in the low RVD's for developed site use in 1977 and 1981. Increased dispersed use for those two years is a reflection of the exceptionally clear, dry summers.

Visitor use data for 1975 and 1983 for various recreation activities is shown in Table III-51, on the next page. During the nine year period, use in various activities changed at different rates. Automobile travel (much of it travel over the cross-Cascade highways) and viewing scenery remains one of the largest recreation activities on the Forest. Alpine skiing, dispersed and developed camping, and hiking and walking continue to receive large amounts of use.

Other activities are growing, including off-road bicycling, nordic skiing (which, with snowshoeing, has increased 471 percent since 1975) and river rafting (a component of Other Boating). Some activities are decreasing in use: trailbiking, swimming, and horseback riding.

Recreation Demand - All Activities

Recreation demand, as used here, is expressed demand - use that is manifested by participation in an activity. Projected demand is subject to uncertainties of supply of the opportunity, costs of participation, and availability of time to participate.

There are other uncertainties: changes in recreation use due to new technology, change in the regional or national economy, or new legislation. The forecaster's resources are records of past use, population and other social projections, and indicators of the future supply of opportunities. The further into the future these extend, the more tenuous they become.

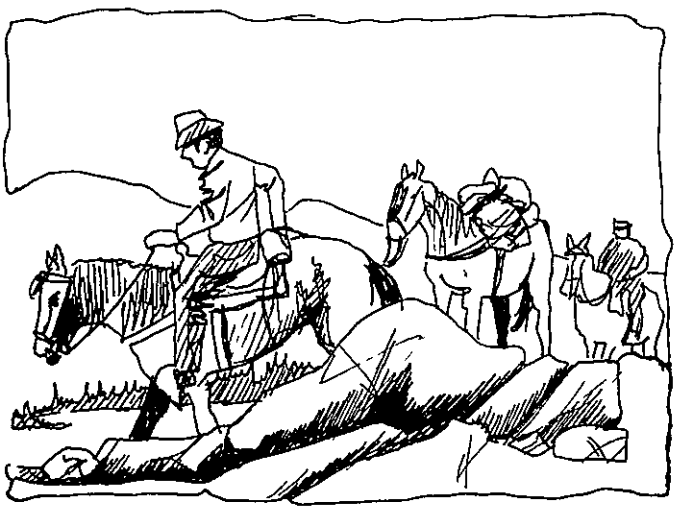


Table III-51
Recreation Use, Selected Activities 1/ - Thousand RVD's

Recreation Activity	1975	1983		Percent Change
Alpine Skiing	514.9	649.6	2/	+26
Nordic Skiing, Snowshoeing	7.0	40.0		+471
Snowplay	33.0	44.0		+33
Riding Lifts	18.2	125.0		+587
Snowmobiling	14.0	17.0		+21
Four-wheel Driving	3.6	-		-
Trail Bikes	38.9	25.0		-36
Developed Camping (All Types)	406.7	405.0		-0.4
Picnicking	78.3	100.0		+28
Boating (Power)	3.2	13.0		+306
Boating (Other)	9.3	26.0		+180
Swimming, Other Water Sports	11.9	9.0		-24
Hiking, Walking	209.0	252.0		+21
Dispersed Camping	227.5	246.1	3/	+8
Mountain Climbing	20.3	28.0		+38
Bicycling	4.6	2.0		-57
Horseback Riding	43.4	27.0		-38
Fishing	116.9	127.0		+9
Hunting	111.2	200.0		+80
Gathering Forest Products	49.1	96.0		+96
Nature Study	18.7	33.0		+76
Auto Travel, Viewing Scenery	767.3	903.0		+18
Visitor Information Activities	38.0	84.0		+121

1/ USDA Forest Service, Recreation Information Management System (RIM).
2/ Lift ticket purchases, which are assumed to closely represent actual number of skiers. This figure is lower than ski area use, shown in Table III-56.
3/ 1984 figure.

Recreation demand may be projected by activities or by ROS classes. Many activities require specific conditions - topography, vegetation, facilities, special natural features, etc. - so that demand is strongly related to land, resource, and budgetary allocations. Demand is also very strongly related to weather conditions, especially for developed camping and alpine skiing.

Underlying the demand for recreation in the Puget Sound area is one assumption: demand will increase with a growing population and a growing awareness and appreciation of recreation values. The population in the Puget Sound area is expected to grow at a faster rate than the overall State population, with increases of 16 to 26 percent from 1980 to 1990 and increase another 15 percent by the year 2000. Population growth will be

disproportionate, that is some counties will grow faster than 15 percent; Snohomish County is expected to grow by 26 percent between 1989-2000 (OFM, 1989). The area's expected population in 2000 is 2.8 to 3.3 million. The demand for recreation is expected to grow at a rapid rate through the end of the century, based on past correlations between population growth and increased recreation demand.

Figure III-17 shows actual and projected total recreation use for the Forest to the year 2030. A regression analysis was used to develop recreation projections, considering past recreation use and population data. Figure III-18 shows projected recreation use by ROS class. The ability of the Forest to meet this demand, in the ROS classes, is discussed in the Recreation Supply section of this chapter.

Figure III-17
Total Recreation Use - Wilderness and Nonwilderness
Actual and Projected

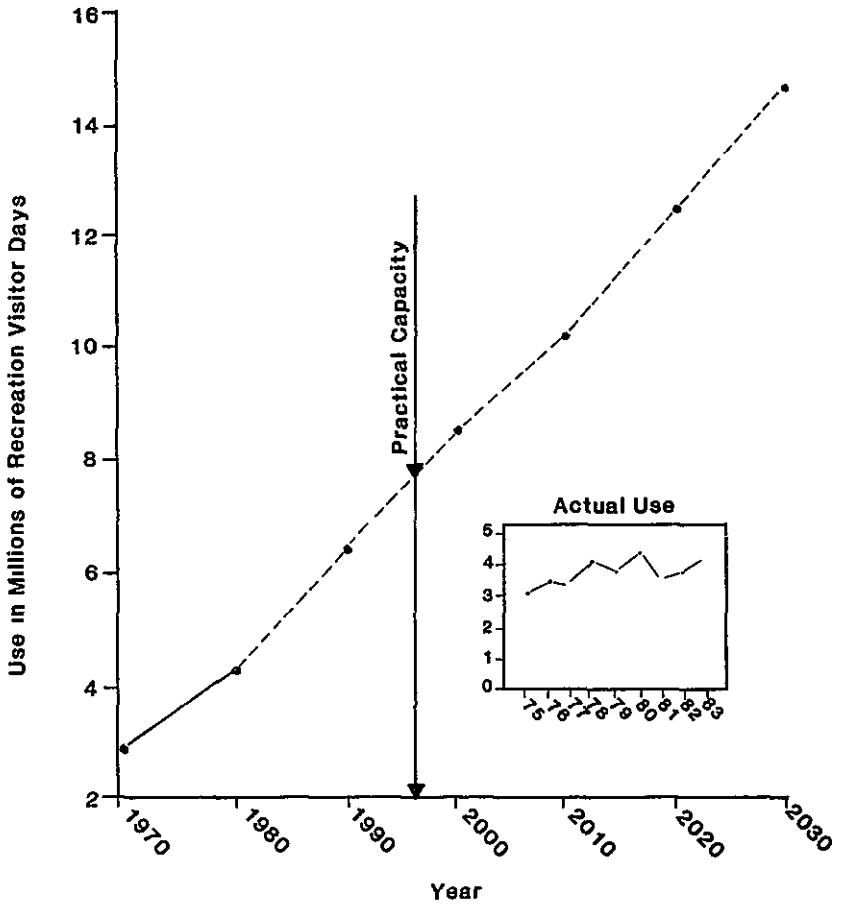
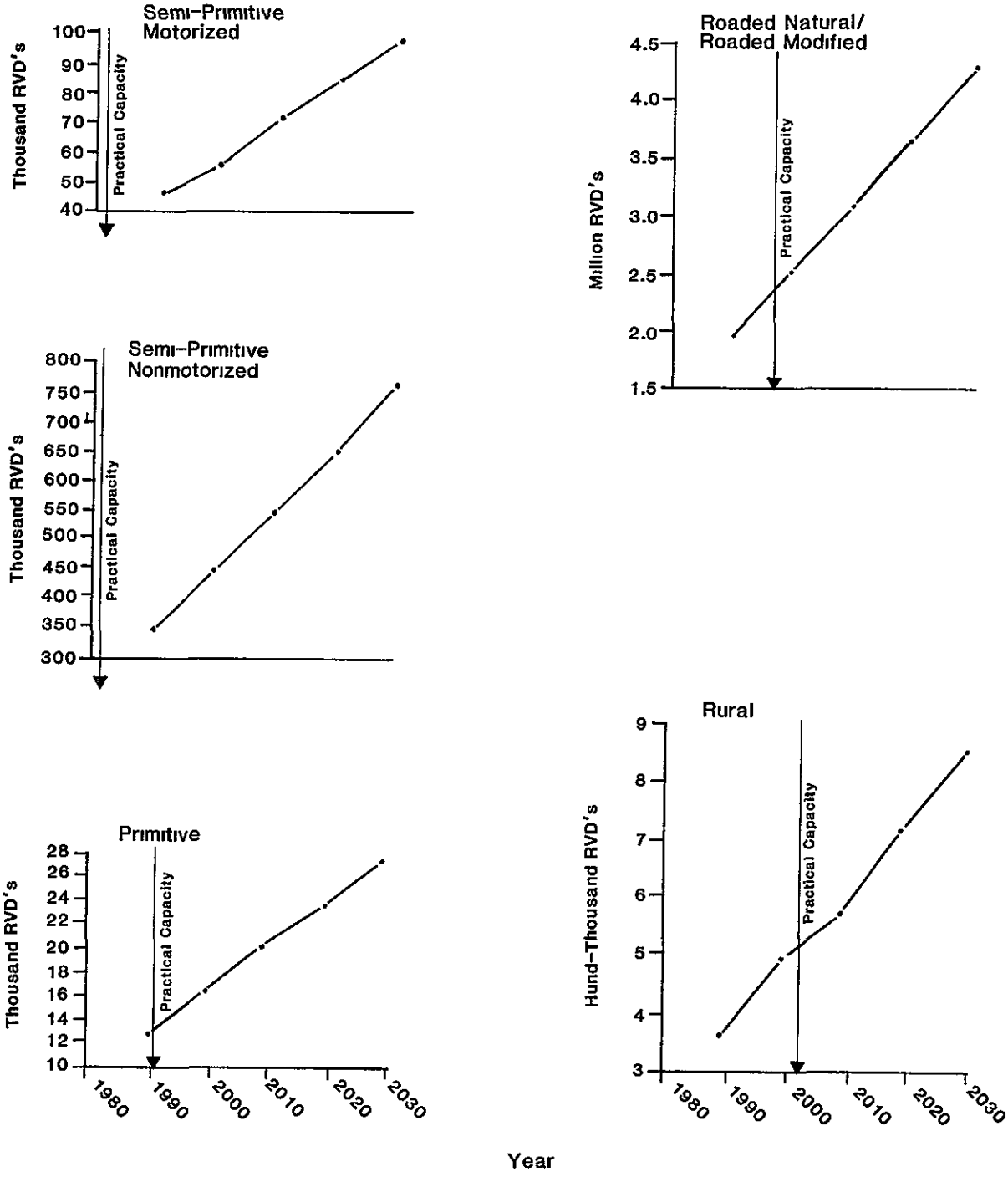


Figure III-18
Projected Forest Wide Recreation Use by ROS Class
(Does Not Include Wilderness)



Capacity

The capacity of the Forest to provide recreation can be measured in two ways. The "maximum theoretical capacity" assumes every acre of the Forest is full of a maximum number of people, throughout a maximum season - weekdays, weekends, rain or shine. While this maximum theoretical capacity provides an upper limit to the physical and/or social capacity of the Forest, it seldom represents a realistic or "practical" maximum. Practical capacity recognizes physical and social limitations on user density as well as weather and weekend/weekday patterns of use. "Practical" capacity is the effective upper limit because it recognizes factors that are always present and that significantly affect recreation participation patterns. Practical maximum capacity provides values that can be used in most planning analyses; this approach was used in the FEIS.

Pacific Northwest Regional Recreation Committee Recreation Demand Study

Outdoor recreation demand, as expressed by the behavior and preferences of Washington residents, was measured in a study conducted by the Pacific Northwest Regional Recreation Committee (PNRRC). This study examined outdoor recreation participation in four geographic regions around the state. Each district is composed of planning districts grouped according to bio-physical and social criteria.

Estimates of 1987 recreation participation and projections of participation in 2000 were made for many recreation activities. Activity participation is expressed in terms of household trips. A household trip can include one or all members of a household. Some activities last longer than others. Other activities, such as boating, are broken down into specific settings or styles.

At this time, it is difficult to apply the information from this study specifically to the Mt. Baker-Snoqualmie, since the Forest is located in two planning districts. It is difficult to determine the amount of these activities occurring on the Forest. It is valuable, however, to look at the trends for these two planning districts for those activities which can be supplied by this Forest.

Table III-52 shows the 1987 household trips and projected trips for the year 2000 for those activities provided by the Forest. It is interesting to note that many of those activities which the Forest has historically been managed for appear high on this list.

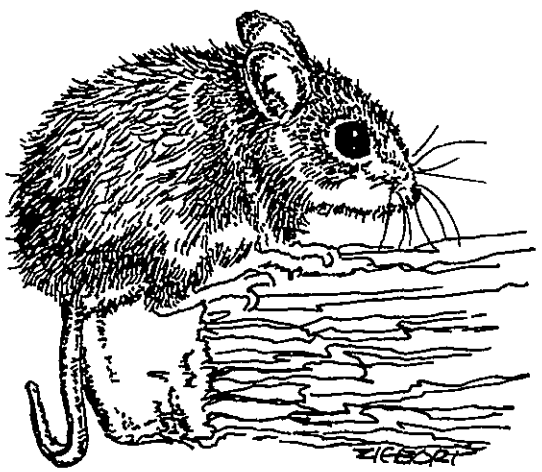


Table III-52

Household Trips for 1987 and
Projected Growth to 2000 For Assorted Recreation Activities - Thousand RVD's

Activity	1987	2000	% growth
Day Hiking	2376	3156	41%
Wildlife Observation	2262	3156	40%
Freshwater Fish (Bank)	2101	2583	23%
Visit Interpret. Area	1355	2011	48%
Freshwater Fish (Boat)	1234	1544	25%
RV Camping	1028	1412	37%
Backpacking- Trails	982	1295	32%
Downhill Skiing	931	1332	43%
Bicycling (Off-road)	873	1214	40%
Tent Camping (Car)	667	909	36%
River Boating (Power)	509	633	24%
Four Wheel Drive	445	619	39%
Horseback Riding	418	526	25%
Motorbikes (Off-road)	417	574	37%
River Boating (Nonpower)	376	505	34%
Big Game Hunting	371	449	21%
Small Game/Bird Hunting	278	308	11%
Cross Country Skiing	204	280	37%
Mountaineering	191	263	38%
Backpacking (Off-trail)	142	198	28%
Bow Hunting	53	61	15%
Snowmobiling	39	49	25%
Horse Camping	13	17	30%

Source: Interagency Committee for Outdoor Recreation, Draft SCORP 1990.

Recreation Supply

An important step in the Forest Planning process is estimating recreation supply, or capacity. These estimates, expressed in annual visitor days of use by ROS Class, are important in later stages of the planning process, particularly in measuring outputs and effects of the alternatives.

Table III-53, on the following page, shows existing nonwilderness recreation use and practical capacity by ROS. Acres of water are not included, therefore the totals may vary from other R2MAP acres used elsewhere in this document.

Table III-53
1983 Nonwilderness Recreation 1/
Existing Use and Practical Capacity by ROS (Water Excluded)

ROS Class	Acres	.....RVD's..... Existing Use	Practical Capacity	...RVD's Per Acre.... Existing Use	Capacity
Rural	4,450	2,086,855	4,632,100	460.0	1,020.0
Roaded Natural & Roaded Modified	638,617	1,577,342	2,504,563	2.46	3.92
SP-Motorized	9,714	80,395	33,554	8.3	3.45
SP-Nonmotorized	326,447	306,263	188,126	.93	.58
Primitive	16,683	0 2/	1,340	0 2/	.08
TOTAL	995,911 3/	4,050,855	7,358,343	-	-

1/ Source: Recreation Information Management System (RIM).
2/ Only five miles of trail exist in the Primitive Class; no new construction is planned (1979 Interim Trail Management Plan).
3/ Differences between numbers in this table and Table III-49 are due to R2MAP rounding and the inclusion of water acres in Table III-49.

Demand/Supply Discussion by ROS Class

Rural. The 4,450 acres of Rural ROS are less than one percent of the Forest acres. Included in Rural are developed sites and some small communities along highways. The demand for rural recreation opportunities will continue to increase in the future. Currently, the Forest has the capacity to handle twice the existing use in the Rural class, easily meeting future demand until after the year 2000. By expanding developed sites and increasing the capacity of the ski areas, the capacity of this class can be greatly expanded.

Roaded Natural - Roaded Modified. Roaded Natural and Roaded Modified contain over 64 percent of the nonwilderness acres on the Forest. There were 1,577,342 RVD's in RN and RM in 1983; practical capacity is 2,504,563 RVD's. Driving for pleasure and dispersed camping are the largest activities in RN/RM. Demand for opportunities in these ROS Classes is expected to continue to grow. Under the current management situation, practical capacity will be reached by the early 1990's. This situation is very distorted by the number of driving for pleasure and viewing RVD's which occur on the Interstate and State Highways across Stevens and Snoqualmie Pass. Discounting this use, there is enough capacity in the RN and RM classes to last into the fourth decade. If more of the Forest is converted from an unroaded to a roaded condition, the supply of Roaded Natural/Roaded Modified opportunities will increase. Intensive management will convert more acres to Roaded Modified; currently, over 60 percent of the RN/RM acres are in Roaded Natural.

Semi-Primitive Motorized. The Mt. Baker-Snoqualmie National Forest has very few acres of this ROS Class. The current supply for off-road motorized use is only 9,714 acres, less than one percent of the nonwilderness land base. Demand has already exceeded capacity by 141 percent. Current practical capacity is about 33,600 RVD's; the 1983 SPM use was over 80,000 RVD's.

While the current use of trailbikes, 4 x 4, three-wheeled ORV's, and snowmobiles is less than other dispersed activities (such as hiking, fishing, and hunting), use of all types of off-road vehicles is growing. If more nonwilderness acres are converted to a roaded condition, overuse in this ROS Class will be worse in the future. There is no substitute for Semi-Primitive Motorized acres on the Forest. Users will be forced to recreate in the Roaded Natural Class (not a Semi-Primitive experience) or go elsewhere.

Semi-Primitive Nonmotorized. About 32 percent of the nonwilderness acres on the Forest are Semi-Primitive Nonmotorized. Demand far exceeds supply in this ROS Class; 1983 use in SPNM was about 306,300 RVD's and current capacity is only 188,000 RVD's. Activities occurring on Semi-Primitive Nonmotorized lands include hiking, fishing, hunting, dispersed camping, viewing scenery, and non-consumptive wildlife use.

Many acres originally in this class have become wilderness. The SPNM class will be reduced in size if more acres of the Forest are roaded, converting presently unroaded land to Roaded Natural or Roaded Modified. Conversely, the acres of SPNM can be increased by road closures in Roaded Natural areas. Capacity could be increased in this zone with the construction of new trails on the acres remaining unroaded.

Primitive. The 1984 Washington Wilderness Act substantially decreased the amount of Primitive land outside of wilderness. There are only 16,600 acres of Primitive ROS on the Forest. Most of the original acres in this class are now inside the wilderness. Recreation use in nonwilderness Primitive is almost non-existent, as these areas contain few attractions. Forest use is over practical capacity in this class due to the very few acres available.

Winter Dispersed Recreation - Supply and Demand

Winter recreation capacities and use were calculated separately. Table III-54 shows the total capacity on the Forest for winter dispersed recreation: approximately 249,000 RVD's. Practical capacity could be increased by adding more plowed parking or developing more snowplay areas.

Table III-54
Winter Dispersed Recreation - Existing Use and Capacity - 1983

Activity	Opportunities	Existing Use in RVD's	Practical Capacity In RVD's
Nordic Skiing	386 miles	39,600	139,423
Snowmobiling	285 miles	16,900	88,494
Snowplay (Winter Sports Sites)	10 sites	5,000	23,779
TOTAL	-	61,500	248,987

Developed Recreation

A wide variety of developed recreation opportunities are available on the Forest. The majority of these sites are located within the current Rural and Roaded Natural ROS class. Nearly half of the 4.2 million RVD's in 1983 occurred in developed recreation areas. The largest developed recreation activity is alpine skiing. With seven ski areas and a total of 51 lifts, ski areas contributed over 852,000 RVD's in 1983, or 20 percent of all recreation use on the Forest. After alpine skiing, camping in developed sites (both group and family campgrounds) is the largest developed site activity. Table III-55 shows 1983 developed site use, along with the annual practical capacity for various activities (RIM 1983 data).

Table III-55
Selected Developed Recreation Sites - Use and Capacity - 1983

Type	No. Sites	1983 Use RVD's	Annual Practical Capacity 1/
Observation	10	12,100	6,800
Interpretive 2/	16	34,700	6,700
Information	3	5,700	1,000
Boating	6	13,000	2,700
Swimming	1	500	900
Picnic	12	35,700	17,600
Family & Group Campgrounds	74 3/	420,900 4/	615,700
Organization Camps (Pvt.)	24	187,500	455,600
Hotels, Lodges, and Resorts	4	376,600	348,900
Recreation Residences	7	221,800	213,100
Winter Sports Sites 5/	4	5,000	15,200
Alpine Skiing	7	852,300	3,436,300 6/

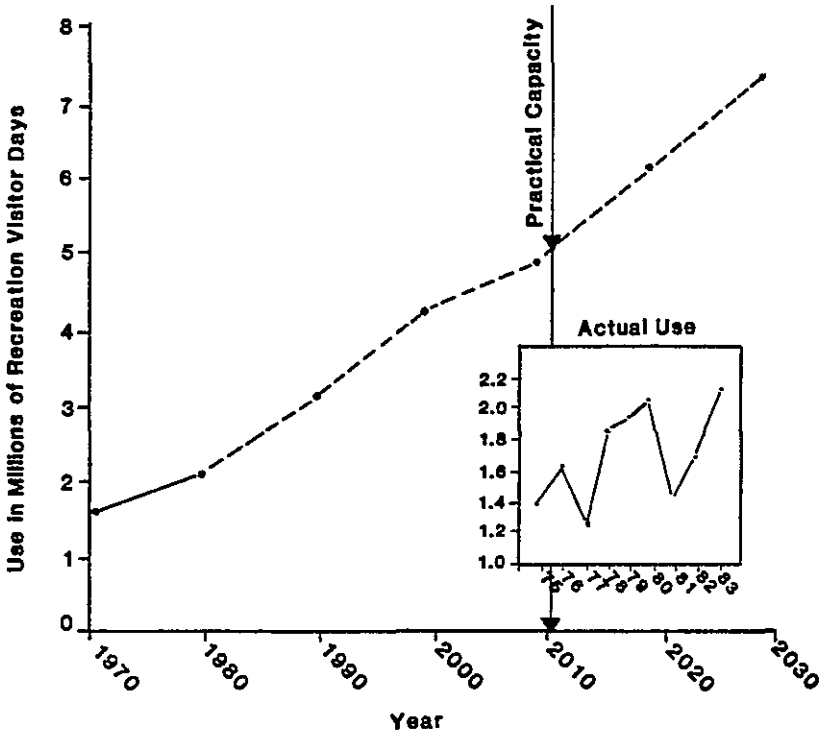
1/ Refer to discussion on previous pages regarding capacity.
2/ Includes minor and administrative sites.
3/ 74 available sites (1983 figure) are used to calculate capacity. Refer to the discussion on campgrounds on page III-170, below.
4/ This figure includes all use occurring at developed campsites; some may be day use, thus this figure is higher than that reported in Table III-52.
5/ These are snow play areas.
6/ Alpine skiing capacity calculated only on existing facilities and permit acreage. Increased capacity exists at some areas; see following discussion.

Based on Table III-55, the following developed site activities exceeded capacity in 1983: observation, interpretive, and information sites, boating sites, and picnic areas.

Some caution must be exercised in interpreting these use figures, especially boating and picnic activities. These facilities are often built next to a campground complex. During high use periods, recreationists disperse to adjacent areas; the total use is counted, but overnight use may be occurring on day-use sites. Use in these developed sites is over capacity, but the exact numbers may not be accurate. Hotels, lodges, and resorts and recreation residences were slightly over capacity in 1983.

Figure III-19, on the next page, shows actual and projected developed site recreation for all activities. Practical capacity will be exceeded by the year 2010.

Figure III-19
Actual and Projected Developed Site Use



Alpine Skiing

Downhill skiing is the largest developed use on the Mt. Baker-Snoqualmie. Table III-56 shows skier visits for recent years. Table III-57 shows the skier visits for the 1988-89 ski season broken down by ski area on the Forest.

Table III-56
Skier Visits - 1975-1983

Year	Skier Visits - RVD's	Year	Skier Visits - RVD's
1975	514,900	1982	1,031,500
1976	553,800	1983	1,123,000
1977	370,400	1984	1,089,500
1978	928,700	1985	1,259,500
1979	1,008,000	1986	1,115,000
1980	1,087,000	1987	1,395,000
1981	465,000	1988	1,481,000

Table III-57
1988-89 Skier Visits by Area

Mt. Baker	137,738
Stevens Pass	393,409
Crystal Mountain	375,000
Ski Lifts	536,005
Pacific West	39,000
Total	1,481,152

The growth rate of skiing is slower than in the early 1970's. As the ski industry matured during the 1970's, overall growth tapered off to ten percent. Participation has now leveled off at a steady rate of incremental growth of approximately three per cent per year. While this growth appears to be small, the ski industry has proven to be largely recession-proof over time. Recent improvements in snowmaking capabilities have also helped to insure reliable snow cover, thereby reducing the effects of poor weather conditions and contributing to continued steady growth in use. The transition from explosive growth in the eighties is the result of many forces, including an aging population, longer work weeks, and decreasing leisure time.

Two overriding trends become apparent when viewing current recreation patterns. First, changing demographic patterns in the United States are steadily leading to a decline in the number of younger skiers, who have traditionally represented the bulk of frequent skiers. At the same time, the numbers of middle-aged and older Americans are increasing. Despite their numbers, these age groups are typically less-frequent skiers than teenagers and young adults.

A second important trend is related to the frequency and durations of vacations. The two week "family vacation" is fast becoming a thing of the past; many people are taking shorter, more frequent trips. As an example, the 1987 study, The Contribution of Skiing to the Colorado Economy, published by Colorado Ski Country USA, indicates that the average length of stay at a Colorado resort is now four to five nights, compared to six or seven nights a decade ago (Frick 1987). With the increase in three to five day vacations, more emphasis is being placed on destinations closer to home and on convenient air travel to more distant locations.

Successful ski areas have catered to the changing demands of the skier population by providing a greater service orientation, and a more refined ski experience through the use of faster and more comfortable ski lifts, the provision of machine made snow, increased slope grooming, and more pleasurable day lodges. These developments have led to an overall improvement of standards and a higher level of expectations among the skiing public.

Ski Area Capacity. While skiing capacity is defined by the downhill capacity of each area (skiable acres x skier density by level of skiing ability), the uphill or lift capacity is usually the limiting factor.

The maximum annual capacity of the existing ski facilities is 3,400,000 RVD's. This assumes all areas operating at capacity, daily, for the entire use season. However, ski area use is not even throughout the week and at the present time, not all seven ski areas operate every day. Overuse occurs primarily on peak days: weekends and holidays. To meet demand, ski areas on the Forest have the capability to increase practical capacity by an additional 1,600,000 RVD's, an increase of 47 percent. It should be noted that since the Forest ski areas are operated by the private sector, excess or uneconomic capacity will likely be avoided.

All of the areas on the Forest except Snoqualmie Summit have the potential to expand, though expansion is not currently needed to meet demand. Ski areas are now proposing expansion to disperse skiers more evenly and access new terrain (to attract new skiers to the area). Also, improvements in technology, especially improved slope grooming equipment, can increase capacity without expanding the permit area. Development of overnight facilities at the base may spread out use - increasing mid-week use - and attract more skiers.

Table III-58 shows the seven alpine ski areas on the Forest, plus current and potential capacity.

It is realistic to expect an increase in demand of between 1.2 and 1.6 million RVD's by the year 2000. The terrain is available in all areas on the Forest, except Snoqualmie Summit, to meet almost any amount of future demand.

Table III-58
Ski Area Capacity - Existing and Potential

Area	No. Lifts Existing	Existing Uphill Capacity SAOT 1/	Existing Downhill Capacity SAOT	No. Potential New Lifts	Additional Potential Downhill Capacity SAOT 3/	Total Downhill Capacity (Existing plus Potential) SAOT
Mt Baker	6	5,196	5,200	3	2,000	8,400
Stevens Pass	8	9,750	11,000	12	11,000	5,400
Snoqualmie Summit	8	5,125	5,400	1	0	5,400
Ski Acres	7	NA	7,200	1	2,100	9,300
Pacific West	3	4,800	3,800	5	NA	NA
Alpental	4	4,300	4,140	1	2,000	6,140
Crystal Mountain	9	12,000 2/	5,800	2	2,950	8,750

1/ Skiers at one time
2/ Persons per hour.
3/ Potential capacity within the existing permit area

Ski Areas - Future Trends

Skier visits to the ski areas on the Forest are comparable to other day use areas in the nation. However, while most upslope terrain nation-wide is under permit from the Forest Service, their base facilities are located on private land, thus allowing a wider range of overnight accommodations, condominiums, etc.. The Northwest Ski Area Association estimates approximately 500,000 skier visits are lost each year to destination ski resorts in the Rocky Mountain Region.

There is evidence that the Cascade Ski Areas suffer some amount of competitive disadvantage without the ability to offer overnight accommodations. There is a market for local ski area vacationing, not as a substitute for the preferable weather of the Rockies, but to serve the skiers who might otherwise vacation in Oregon, Idaho, and British Columbia. Forest Service policy does not oppose overnight accommodations in ski areas, but it does oppose financial arrangements that compromise the concept of full public access to such accommodations (Deaver Memo 1985).

Developed Camping

During the 1983 season, recreation use in 61 developed campgrounds was approximately 420,900 RVD's. This figure is slightly lower than the average for the period 1975-1983, during which 74 sites were operated. Developed campground use has remained fairly constant over this period, with use fluctuating between 414,000 and 514,000 RVD's. In 1977, campground use reached 558,000 RVD's. The weather that year was particularly dry, which may explain the increase in use.

Table III-59
Visitor Use in Developed Campgrounds - RVD's
Family and Group Campgrounds

Year	RVD's
1975	464,100
1976	514,400
1977	557,800
1978	502,000
1979	460,900
1980	509,500
1981	414,000
1982	420,300
1983 (61 sites operated)	420,900

Location and Capacity. In 1983, there were 74 available developed campgrounds with a practical capacity of 615,716 RVD's; 61 campgrounds were operated that year. In 1986, as a result of reduced budgets and supply greatly exceeding demand, 38 campgrounds were available, but only 28 were operated. The capacity of these sites is 546,243 RVD's. Eleven other campgrounds may be rented by groups, but are not generally available.

These reductions in the number of campgrounds available were the result of a detailed study made in 1984. The goal of this study was to better utilize available budgets during a time when the use of developed campgrounds was well below capacity. The CHUNK Study identified opportunities for improving campground management and fee collection. The Forest was divided into major geographic areas or corridors ("chunks") and the developed site opportunities within each "chunk" were analyzed.

The study recommended altering 43 percent of the sites, to realize a 30 percent increase in efficiency: 7 sites would be converted to fee sites, bringing the total fee sites to 13; 8 sites would be reduced in service level; and a total of 21 sites would be converted to dispersed use sites where most comfort facilities are removed and the site restored to a natural setting. Most of the converted sites had fewer than 10 camping units, thus the overall campground capacity of the Forest was not greatly impacted.

Demand. Demand for developed site camping has remained fairly stable over the last decade; this trend is expected to continue. The Forest is currently operating at 75 percent of maximum practical capacity of the 38 available sites. Developed site camping is one of the largest recreation activities on the Forest, second only to alpine skiing. Whether this level of use will be sustained will depend partly upon public reaction to increased fees, but more importantly on their preference for camping facilities that are predominately in the more primitive end of the development spectrum. Users now choose between the more highly developed sites in State, County, or National Parks and the more rustic sites available in the National Forests. Additionally, the Forest can affect demand by altering prices.

Supply. Generally, developed site use, both current and historic, has remained well below capacity. Developed use occurs mainly on weekends, while developed

capacity is calculated over an average use season, including low-use weekdays. If capacity were to be calculated based only on weekend use, the Forest would constantly utilize most of the capacity, with some days approaching 100 percent. This trend is present on most forests, but is greatly accentuated on those near large urban areas. These forests must plan for future peak-day use instead of average use.

The supply of developed camping will likely meet future demand; however, as stated, most campgrounds may reach capacity on sunny weekends. A dozen potential campsites have been located; some are new sites, others are extensions of existing campgrounds. It is questionable that these potential sites would ever be developed, due to the high construction costs incurred vs. the returns. Most investments will be made in those sites needing reconstruction (most sites were built prior to 1950 and the facilities have deteriorated).

Potential Developed Sites

The National Forest Recreation Site survey (completed in 1964) identified potential sites for developed recreation. Many of these sites are still available for development as recreation sites, based on current land-use. In total, the potential developed sites equal approximately 350 acres. The Forest has the potential to increase its total developed site capacity by 3,365 persons at one time (PAOT's).

Table III-60 displays 19 of these potential developed sites that appear be viable for future construction. Note that at Stoney Flat, there are three potential sites - a campground, swimming site, and boating site. However, the capacity figure of 850 PAOT's includes all three sites. This is also true for the two sites at Sandy Creek.

Table III-60
Potential Developed Sites

District	Name	Site Kind	PAOT
Mt. Baker	Stoney Flat	Campground	850
	Stoney Flat	Swimming	incl.
	Stoney Flat	Boating	incl.
	Sandy Creek	Campground	700
	Sandy Creek	Swimming	incl.
Darrington	Gold Basin	Campground Exp.	108
	Sunnyside	Campground	125
	Big Four	Picnic Exp.	144
Skykomish	Chicago Flat	Campground	125
	Gravel Flat	Campground	108
	East Creek	Campground	108
North Bend	Mountain View	Campground	250
White River	Evans Creek	Campground Exp.	150
	Lonesome Lake	Campground	25
	Coplay Lake	Campground	25
	Corral Pass	Campground Exp.	30
	Ranger Creek	Campground	200
	Huckleberry Creek	Campground	380
	Skookum Falls	Picnic/Observation	15
	Silver Creek	Snowplay	100
	Silver Creek Gd. Stat.	Information	30

Dispersed Recreation - Nonwilderness and Forest-wide

Over the last decade, use of dispersed recreation areas has averaged over half of the total recreational use. In wilderness and nonwilderness, undeveloped areas, there has traditionally been a plentiful supply of dispersed recreation opportunities. This supply has facilitated rapid growth of such activities as hiking and walking, climbing, nordic skiing, and snowmobiling during the last 20 years.

Competing and often conflicting uses on the land base now pose a serious threat to the recreation resources of the Forest which depend on natural settings. Activities like resource extraction and its associated road building displace existing and potential recreation uses. Natural places to recreate are becoming more and more scarce, both on and off the Forest. This trend makes the dispersed recreation lands of the National Forest more valuable.

Forested lands used for timber production cannot at the same time supply semi-primitive or roadless settings. As this continues, roaded acreage will

increase. In the long run, this conversion means that access will also increase, facilitating popular activities such as visiting interpretative sites, outdoor photography, picnicking and sightseeing. At the same time, however, popular roadless area activities like backpacking, hiking, and motorcycling will suffer.

There is enough capacity to satisfy projected demand for roaded dispersed recreation through the fourth decade of this plan. Unroaded dispersed recreation is already over-capacity with resulting reduction in recreational experience for those choosing to use these lands.

The State of Washington has recognized that the demand for primitive recreation is exceeding capacity in National Park and Forests. The Draft 1990 SCORP for the state recommends that there should be no net loss of acres currently providing semi-primitive recreation opportunities.

The 1990 SCORP also claims that recreation needs on Forest Service lands in roaded modified settings are often not given equal consideration in integrated resource management decisions. The State encourages a balance of recreation with commodity extraction in these settings

Nonmotorized Dispersed Recreation

This form of recreation includes hiking for long trips, or day hikes and afternoon strolls. Recreationists may spend time utilizing a well built and maintained trail or they may travel cross-country following their own inclination. This category also includes hunting and fishing and all the variations of those activities. In addition, dispersed recreation includes such varied activities as berry picking, photography, mountain climbing, and simply relaxing.

Hiking and Horse Use. Hiking is the principle use of the forest trail system, accounting for about 252,000 RVD's of use in 1983. This activity has shown steady growth in the past, and the demand should continue. A significant portion of all hiking and walking is day-use; this has created overuse in some areas, especially during peak use periods.

Horse use has also grown steadily over the past decade. Use dropped sharply in 1983 to 27,300 RVD's, down from 55,300 RVD's the previous year. This may be a reporting error, as dispersed horse use was 34,000 RVD's in 1984.

Hiking and walking are strongly correlated to the trail system; approximately one-third to one-half of the horse use occurs on trails. During the 1970's, the demand for trails for hiking and horse use was met by a plentiful supply of trails on the Forest. There are currently (1989-90) a total of 1,384 miles of system trails; 42% are located in wilderness. The location of most of these trails (higher elevation) means that many miles are usable only in the summer and early fall.

Meeting the demand for dispersed trail use will be a challenge in the next few decades. Wilderness capacity will be reached early in the 1990's. If more of the Forest becomes roaded, the size of the trail system in the Semi-Primitive zone will diminish unless special efforts are made to retain existing trails. The Roaded Natural portion of the Forest is still available for new trails,

though the user experience, physical and social, will differ from more primitive settings. See the Trails discussion later in this chapter.

Nordic Skiing. Nordic skiing is one of the fastest growing recreational activities. In 1983, there were nearly 40,000 RVD's of use, an increase of 22 percent in three years. Use occurs on 13 miles of wilderness trails and on 136 miles of nonwilderness trails; use also occurs on over 200 miles of Forest Service roads.

Although the potential supply of nordic skiing opportunities is immense, avalanche hazard and a lack of maintained access points, plowed parking, and maintained trails limits the readily available supply. Practical capacity for this sport has been calculated at 139,500 RVD's. This figure is probably high, given the current limitations of parking, access, and maintained trails. Demand should continue to grow, although many local skiers travel to eastern Washington to find better facilities, as well as better skiing conditions.

Motorized Dispersed Recreation

Motorized, dispersed recreation ranges from pleasure driving on forest roads, off-road vehicle (ORV) use of Forest roads and trails, to motorized river tours. ORV use includes motorcycles, four-wheel drive jeeps and trucks, and three and four-wheeled all terrain vehicles. In addition to summer use, motorized recreation during the winter includes the use of snowmobiles, ATV's, and recreationists driving into and through the Forest.

Unless specifically prohibited by a formal closure or Congressional designation (e.g. Wilderness), all roads and trails are available for motorized recreation. Some roads are not maintained for use by sedans, and some roads have such heavy use by log trucks that they are hazardous for non-commercial vehicles. The Forest Road Management Plan contains the road management objectives for each road. The maintenance level of the roads changes from year to year, depending on the land management activities on adjacent National Forest lands. Most trails were originally built to a standard for use by hikers or horses. If motorized use has been a gradual development over the years, then the trail is probably not built to the standards necessary to accommodate motorized use.

Off-Road Vehicles. ORV's are one of the fastest growing of the dispersed uses. Trail bikes, 4-wheel drive (4 x 4), and three-wheel vehicles all place increasing demand on the trails, roads, and accessible off-road areas of the Forest.

Off-Road vehicle use has been severely limited by a lack of opportunities. Only about five percent of the existing trail system is open for trailbike use and most of that mileage is poorly maintained. Most of the Forests 2,829 miles of roads are open to motorized recreation. The Naches Pass Wagon Road, Evans Creek ORV Area, and sites in the Greenwater drainage, all on the White River Ranger District, provide some of the only off-road terrain available to four-wheel drive vehicles.

The vast majority of the Forests motorized use occurs on the White River District, on the south end of the Forest. Table III-61 shows 1984 use for the White River Ranger District. It should be noted that these figures differ significantly from those reported in RIM, due to errors, and that much of the entire ORV use on the Forest occurs on this District - the numbers may not be applied to the other Districts.

Table III-61
White River Ranger District Off-Road Vehicle Use

Season	Type of Use	RVD's
Summer	4 x 4	48,000
	Trailbikes, 3-wheel	64,000
Winter	Snowmobiles	36,000
	4 x 4, 3-wheel	12,000

There is very limited opportunity to increase the available supply for off-road vehicles. Most of the Forests trails are simply not suitable for ORV use. Many contain steep terrain with fragile soils and vegetation; conflicts with existing heavy hiking use and trail construction and maintenance standards that cannot accommodate ORV use are other problems.

In addition, most of the Forest that is currently unroaded or trailed is not well suited to cross-country vehicle use; obstacles include dense vegetation in the low and middle elevations, fragile vegetation in the high country, and universally rugged terrain.

Because of the real and/or perceived conflicts between motorized and nonmotorized users, the most likely area for future development of this activity lies in the Roaded Natural ROS Class.

Snowmobiles. Another of the faster growing recreational activities, snowmobiling recorded nearly 17,000 RVD's in 1983. Actual use is most likely higher. The majority of this use occurred in the Greenwater Drainage near Stampede Pass, in the Mt. Baker National Recreation Area (NRA), and in the Mountain Loop highway area. A total of 168 miles of forest roads and trails

are available for this use, plus an unknown number of acres. The largest of the unroaded snowmobiling areas is within the Mt. Baker NRA.

The Forest-wide capacity for this activity is nearly 86,000 RVD's. The current supply exceeds demand, although much of this potential supply contains less desirable terrain and conditions. Other potential snowmobiling areas on the Forest require plowed parking to facilitate use. With increasing use, conflict between nordic skiing and snowmobiling is likely.

Opportunities Under the National Recreation Strategy

The National Forest can become a leader in providing customer service and satisfaction by:

- Enhancing existing recreation opportunities;
- Providing a broad spectrum of outdoor recreation opportunities, including a variety of developed sites, to accommodate a variety of customer preferences;
- Providing a broad spectrum of trail opportunities to accommodate the increasing variety of trail oriented recreation activities;
- Expanding winter recreation opportunities;
- Expanding customer information, education and interpretative opportunities.

The Mt. Baker-Snoqualmie National Forest can encourage, establish, and sustain a diverse spectrum of recreation opportunities, services and facilities in recreation service partnerships with outdoor recreation and user groups; other recreation providers; and groups representing ethnic minorities, elderly, disabled, economically disadvantaged and youth.

Timber sales, K.V. funds and recreation mitigation for hydroelectric projects can be used to provide a variety of recreation opportunities and facilities.

Recreation Use Conflicts

The location of the Forest, close to the growing Puget Sound metropolitan area, is a key factor in the often conflicting demands for use of the National Forest. As the recreating population grows, the demands on a finite resource also continue to grow. Some recreation uses are incompatible; others cause resource damage because of the level or type of use. The ability of the Forest to supply opportunities for all types of recreation - and resolve use conflicts - is a major issue in the planning process. Some of these conflicts are highlighted below:

1. Overcrowding of popular areas, especially when weekends and holidays coincide with good weather.
2. Overuse of winter and summer, motorized dispersed areas: snowmobiles, 4-wheel drives, and three-wheelers all use areas such as the Greenwater Drainage (White River District), leading to overuse and user conflicts.

3. Increased winter dispersed use is leading to conflicts between motorized and nonmotorized users in such areas as Tonga Ridge (Skykomish District) and Canyon Creek, and Glacier Creek (Mt. Baker District).

4. Growth in nordic skiing has resulted in use of marginal and unsuitable areas - a growing avalanche safety hazard.

5. Winter ORV use conflicts with use of available deer, elk, and mountain goat winter range.

6. Water recreation is conflicting with bald eagle winter forage on the Skagit River System and, to a lesser degree, on the Nooksack and Skykomish Rivers. A study of the effects of river rafting on eagle populations on the Skagit has been funded.

7. Growth of hunting and the greater density of road networks has lessened the quality of the hunting experience on the Forest. Selective road closures have been instituted during hunting season to allow for deer and elk escapement and to improve the quality of the hunt.

8. The Forest is nearing the point of probable conflict between proposed hydroelectric power plants and recreation use/American Indian use areas.

9. Changes in classification, such as the designation of an additional 350,000 acres of wilderness in 1984, can effectively decrease the available acres for some types of recreation. Both summer and winter ORV use are now restricted to a smaller, available area.

FOREST TRAILS

There are currently 1,384 miles of system trails on the Mt. Baker-Snoqualmie National Forest. Some trails receive very heavy use. In 1988, the total trail system received over 373,000 recreation visitor days of use. Table III-64 shows the existing system trail inventory, both wilderness and nonwilderness trail, by user type.

Table III-62
Existing System Trail Inventory - In Miles

Primary Objective	Wilderness	Nonwilderness	Total
Hiker	202	245	447
Pack and Saddle 1/	330	183	513
Mountain Bike	0	26	26
Motorbike 2/	0	71	71
Snowmobile 3/	0	168	168
Cross-Country Ski 4/	13	106	119
Barrier Free	0	9	9
Interactive	0	5	5
Jeep (4X4) 5/	0	26	26
TOTAL	545	839	1384

1/ Also open to hikers.
2/ Also open to hikers and pack and saddle use.
3/ Open to all users.
4/ Separate from snowmobile trails.
5/ Primarily in Evans Creek Area.

Hikers, horse riders, and recreationists with motorized equipment all utilize the Forest trail system. The steep slopes and unstable soils of much of the Forest, plus the short duration of the dry summer season, limit trail use. About 32 percent of the trails are designed exclusively for the primary objective of hiking. Motorized use occurs on only 7 percent of the trail system, primarily on the Mt. Baker and White River Ranger Districts.

The earliest trail builders were American Indians, prospectors, and pioneers. When the Forest Service began trail construction for administration and fire suppression in the early part of the century, many trails followed the old trade and market routes. Trail location was the shortest distance between two places and trails were often excessively steep.

In recent decades, trail use has changed. Recreation, rather than protection, is the dominant use. Trail location and design standards take into consideration the recreationist's experiences, including convenience and scenic vistas. Trails may be located to protect fragile terrain. This is in sharp contrast to the earlier trails. A number of miles of older trails are still in use, however, many (nearly one-third) are inadequate for present day use.

With current use levels, the damage to older trails has become a problem for both the visitor and the manager. Poorly designed and improperly located

trails now need reconstruction or relocation. An estimated $7,000,000 is needed to bring the estimated 493 miles of inadequate trails up to standard.

Backpackers and climbers continue to informally expand the trail system as they search out new routes in trailless areas. Many of these new way-trails will require management in the future to prevent further resource damage. The Forest will begin to actively manage some of these areas to retain their trailless characteristics.

Special Classification

Approximately 106 miles of trail have been given national recognition for outstanding scenic or recreation value. The longest is the Pacific Crest National Scenic Trail, designated by Congress in 1968. The trail winds for about 96 miles within the forest boundary, along the crest of the Cascade Mountains. Four other trails have been designated as National Recreation Trails, as shown in Table III-63.

Table III-63
Trails of National Recognition

Trail Name and Number	Ranger District	Miles
Shadow of the Sentinels #623	Mt. Baker	0.5
Ice Caves Trail #723	Darrington	1.2
Deception Falls Nature Trail #1078	Skykomish	0.5
Skookum Flats Trail #1194	White River	7.6
Pacific Crest Trail #2000	Darrington, Skykomish, North Bend, White River	96.0

Demand

Trail use is a large portion of the total recreation use on the Forest. Hiking and walking are the largest trail use activities, and both continue to grow. Until the last two years, horse and trailbike use remained fairly stable over the last decade, each accounting for about 10 percent of the total trail use. Use in these two activities has dropped in the last few years. Trail construction and reconstruction (for all types of users) is a major public issue on the Mt. Baker-Snoqualmie National Forest.

Supply

The opportunity to increase the supply of trails on the Forest is available. The 1979 Interim Trails Management Plan proposed 56 new trails or trail extensions, the current (1983) cost of implementing this plan is approximately $1,550,000 (construction and reconstruction only). An updated trail plan is included as part of the Forest Plan, Appendix E.

Not all currently trailless areas of the Forest are available for trail development. Sizeable areas will be managed without trails for one or more of the following reasons: high elevation; area is already accessed by informal "high route" or way-trails and capacity will be reached without trail access; or the desire to retain some areas in a pristine, trailless condition.

WILDERNESS

The wilderness preservation system, established under provisions of the Wilderness Act of 1964, seeks to create and preserve areas in an unimpaired condition. Management of wilderness, therefore, is aimed at protecting ecosystems in a natural condition and this takes precedence over human and recreational use. Washington State contains just over 12 percent of the wilderness in the lower 48 states; about 10 percent of the state is wilderness. While these figures appear large, nearly all of this land is virtually inaccessible due to steep, mountainous topography; also, snow precludes recreation use of most primitive areas eight months of each year.

All of the National Forests and the three National Parks within the State contain wilderness. The Mt. Baker-Snoqualmie administers eight wildernesses, a total of 721,781 acres (R2MAP acres, which may differ from legal acres, or acres reported in this FEIS). Nearly 42 percent of net Forest acres are wilderness. Fifty-five percent of the state's population resides within a one-hour drive of wilderness on the Mt. Baker-Snoqualmie.

These areas contain some of the most rugged and beautiful country in the Pacific Northwest. Majestic old-growth forests are represented, as are alpine meadows, glaciers, high rock peaks, and hundreds of lakes. The variety of scenery and topography truly provide outstanding opportunities for solitude and primitive recreation.

Table III-64
Wilderness - Net R2MAP Acres - 1984

Wilderness	Net Acres
Mt. Baker	122,676
Glacier Peak	282,267
Noisy-Diobsud	15,015
Boulder River	50,388
Henry M. Jackson	75,836
Alpine Lakes	145,358
Clearwater	14,255
Norse Peak	15,923
TOTAL	721,718

Current Vegetation Condition

The plant communities within the wilderness areas have developed generally with minimal human influence. Over the centuries, most have been subjected to some form of periodic natural disturbance, such as fire, wind storms, avalanche, or insect epidemic. The most significant of these is fire. The plant communities on the western slopes of the Cascade Mountains have developed under a regime of periodic, high intensity, stand-replacement fires. An interval of 400 to 500 years between stand-replacement fire on a given acre is not uncommon. Fire does occur, however. For the past several hundred years, wilderness on the Forest has been subjected to numerous lightning storms each year. Most have been small, self confining fires that burn only small areas. It is only during

very specific combinations of weather and topography that conditions are such that fire starts will spread rapidly over large areas.

Within wilderness, the only natural phenomenon that man has had any influence on has been fire. Aggressive fire suppression programs within wilderness have been in place for over 75 years with little apparent affect on the natural ecosystems. The plant communities and accumulation of dead material existing in the wilderness today is not the result of past fire protection efforts.

Of the total wilderness acres, 61 percent (440,196 acres) are forested with trees. There are 284,922 acres with a productivity of 20 cubic feet per acre per year - 40 percent of the total wilderness acres (and 61 percent of the forested acres). The standing volume of these 284,922 acres is estimated to be 11,564.95 MMBF (2,309.38 MMCF) by 1995.

There are specific, isolated areas with the individual wilderness areas where soil compaction and trampling of native vegetation by human overuse has resulted in modification of the native plant communities. Some of these are identified in the wilderness use conflicts section below.

Wilderness Descriptions

Mt. Baker Wilderness

Mt. Baker Wilderness, designated in 1984, has a rich cultural heritage. Native Americans named the 10,778 foot volcanic mountain "Komo Kulshan," meaning White, Steep Mountain (Easton 19xx). They still consider the volcanic peak a spiritual place and use the area for traditional religious purposes. Mountain climbing expeditions became popular in the 1920's. Today, skiing, mountain and rock climbing, and snowmobiling still bring thousands of recreationists to Mt. Baker each year. State Highway 542 which ends at the Heather Meadows Area is a major access corridor that brings visitors to the core of the wilderness. The area receives considerable recreation use from Canadian visitors.

The 122,676 acre wilderness is located on the western slopes of the Cascade Crest and extends from the Canadian border to Twin Sisters, just north of State Highway 20. It is adjacent to the North Cascades National Park, the newly designated Mt. Baker National Recreation Area, and the Mt. Baker Ski Area.

The Wilderness contains heavily forested slopes of western red cedar, Douglas fir, and western and mountain hemlock. There are over 10,000 acres of permanent glaciers on Mt. Baker and other peaks. The terrain is extremely rugged, with steep slopes and numerous ridges, dissected by small streams. Mt. Baker periodically exhibits thermal activity.

Figure III-20

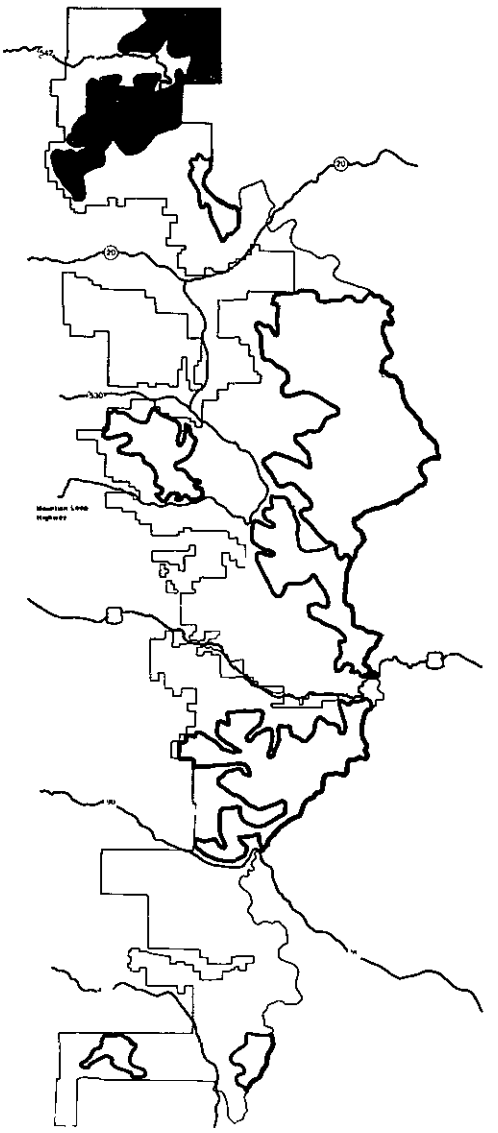
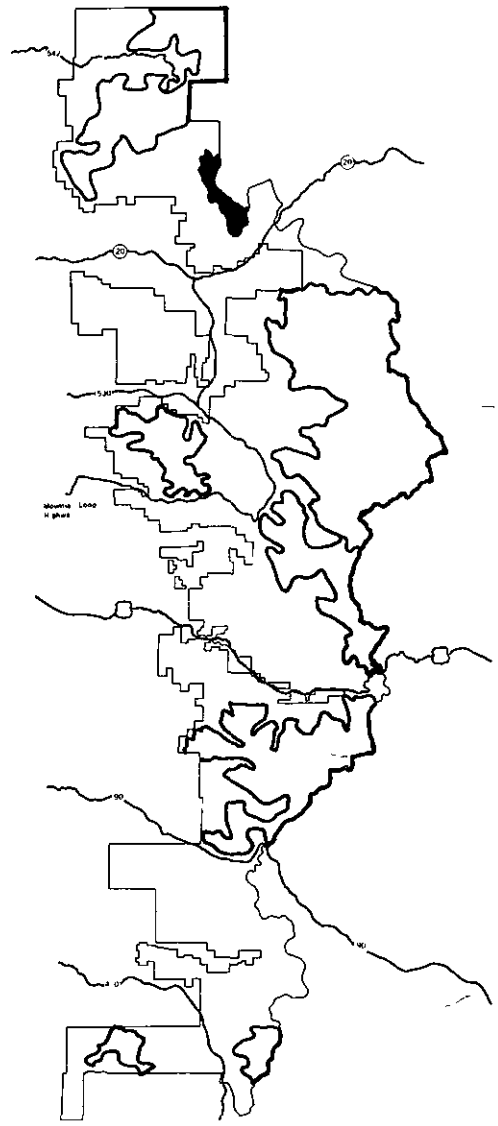


Figure III-21



Noisy Diobsud Wilderness

The 15,015 acre Noisy-Diobsud Wilderness is adjacent to the North Cascades National Park. The topography, however, creates a physical separation from the Park. The terrain, dominated by Mt. Watson, is extremely rugged; steep slopes and ridges dominate the area. Noisy Creek dissects the northern portion; Diobsud Creek flows through the southern portion of the Wilderness.

Vegetation cover is typical of the western slopes of the Cascades: cedars, Douglas fir, true firs, western and mountain hemlock, and, at higher elevations, alpine meadows.

Climbing is popular and there is heavy recreation use at Watson Lakes. There are few trails or other popular destinations. The area contains important Native American traditional religious use sites as well as other historic sites and artifacts.

Glacier Peak Wilderness

The Glacier Peak Wilderness was designated in 1964; additions were made in 1968 (12,721 acres added to the Mt. Baker-Snoqualmie portion) and in 1984 (55,793 acres).

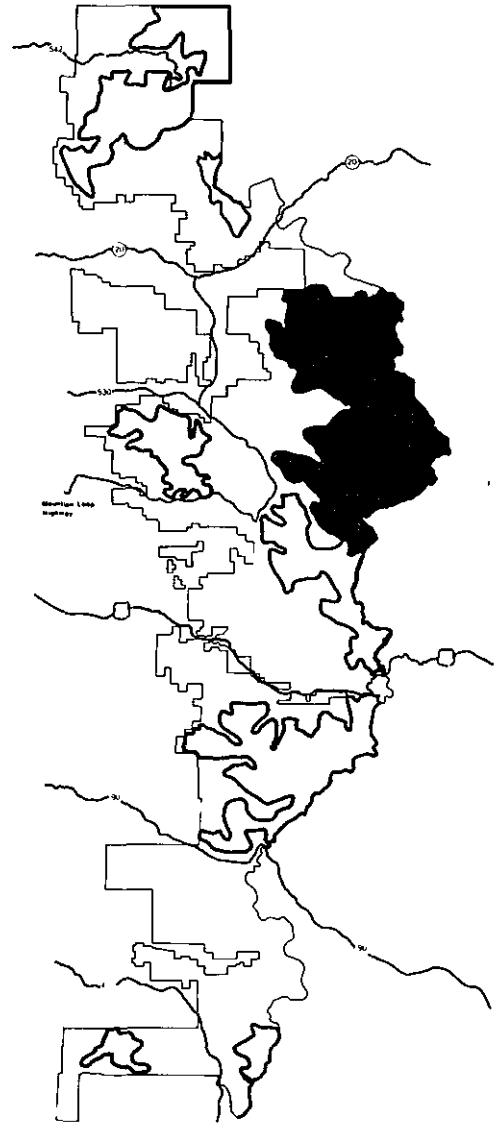
The central feature of the wilderness is 10,541 foot Glacier Peak, one of the five volcanic peaks in the Washington Cascades. The wild country surrounding Glacier Peak is among the largest untouched expanses of mountain terrain in the Northwest. The topography is very rugged, with peaks rising 5,000 to 8,000 feet above the valleys. Nearly all of the higher peaks support ice fields and over 90 glaciers are found within the wilderness.

Glacier Peak also contains heavily forested valleys and the headwaters of several major river systems, including the Skagit and the Skykomish. There are over 400 miles of trails, including 47 miles of the Pacific Crest National Scenic Trail, in Glacier Peak Wilderness.

The U.S. Geologic Survey completed an economic geology survey in 1983, finding only low-grade deposits; most important is a large, low-grade copper-molydenum deposit at Glacier Peak Mine.

Much of the area is known to have been used by Native Americans for seasonal food gathering.

Figure III-22



Boulder River Wilderness

Boulder River Wilderness - 50,388 acres - was designated in 1984. It is located west of Glacier Peak and south of the town of Darrington.

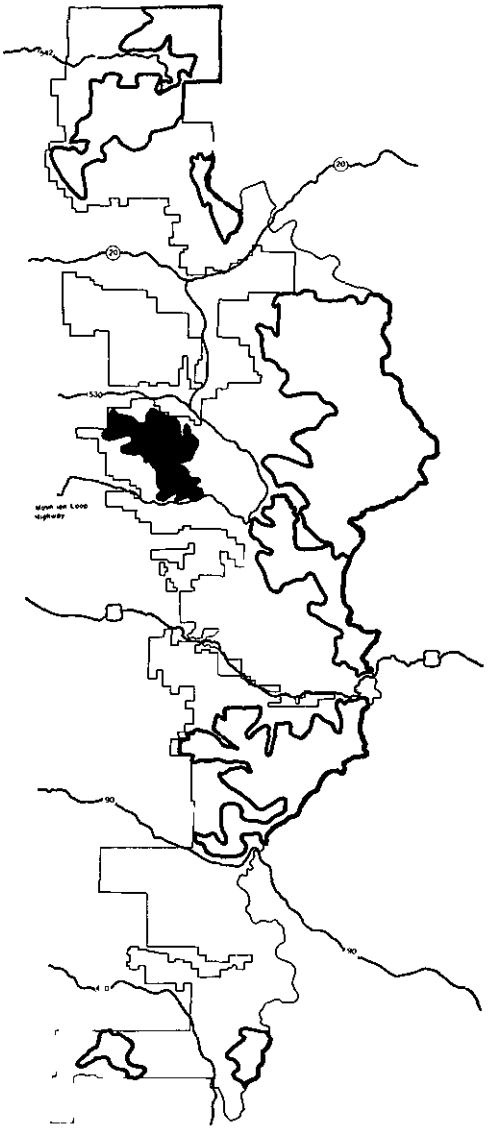
The Wilderness encompasses the magnificent Boulder River Valley and the surrounding peaks, ridges, and high alpine meadows of Whitehorse Mountain and Three Fingers. Elevations range from 1,200 feet in the valleys to nearly 6,900 feet on Three Fingers. The Boulder River valley provides a fine example of old growth forest consisting of Douglas fir, western red cedar, and western hemlock.

Boulder River Wilderness provides easily accessible terrain for year-round recreation use; relatively snow-free winter hiking trails are rare in wilderness. Present recreation use is concentrated on Boulder River, Goat Flats, and the surrounding alpine area.

The Long Creek Research Natural Area (RNA) is located within the Boulder River Wilderness; its principal feature is a western hemlock forest.

Historical sites and artifacts exist in the Wilderness; the area also contains sites and materials of importance to Native Americans.

Figure III-23



**Chapter III
Wilderness**

Henry M. Jackson Wilderness

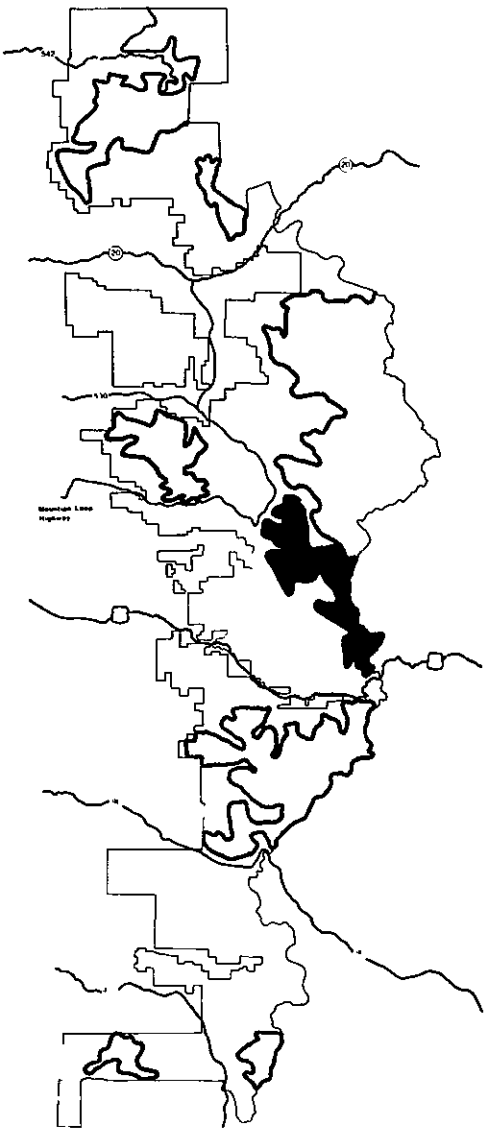
Designated in 1984, the Henry M. Jackson Wilderness includes favorite hiking areas of the late Washington State Senator. The Wilderness is adjacent to Glacier Peak Wilderness and is located on the Mt. Baker-Snoqualmie and Wenatchee National Forests. Of the 103,600 acres in the Wilderness, 75,836 are located on the Mt. Baker-Snoqualmie.

The terrain is very rugged and steep, dominated by a number of peaks, including Monte Cristo, Bedal, and Sloan. Vegetation includes western red cedar, Douglas fir, true firs, spruce, and hemlock. There are approximately 30 lakes in the Wilderness.

A number of trails in the Wilderness cross the Cascades at prominent gaps in the crest. Some of these routes date to very early Indian and pioneer exploration days. There are artifacts and several unconfirmed historic sites in the Wilderness. The area is also important to Native Americans for current practice of traditional religion.

There is substantial and varied recreation use in Henry M. Jackson Wilderness. Climbers, hikers, fishermen, and horsemen frequent the area. The Pacific Crest National Scenic Trail crosses the southern portion of the Wilderness.

Figure III-24



Alpine Lakes Wilderness

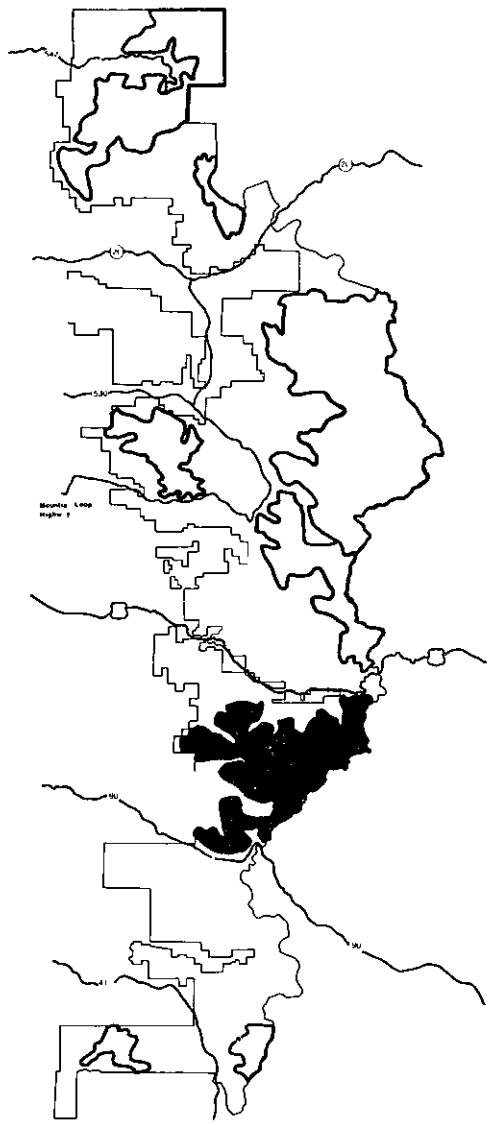
The Alpine Lakes Wilderness takes its name from the over 700 mountain lakes nestled among the glacial cirque basins, high rocky peaks, and heavily forested valleys of the Wilderness. Alpine Lakes Wilderness was designated in 1976.

The Wilderness is located in the central Cascade Mountains, in portions of the Mt. Baker-Snoqualmie and Wenatchee National Forests. It is one of the most popular wildernesses in the nation and one of the most accessible: half of the State's population lives within a one-hour drive. The two major cross-state highways border the area: U.S. Highway 2, at Stevens Pass, to the north, and Interstate 90, at Snoqualmie Pass, to the south.

The Mt. Baker-Snoqualmie portion of Alpine Lakes Wilderness contains over 90 miles of trails, including the Pacific Crest Trail, and 15 trailheads. Alpine Lakes receives considerable day-use, due to its proximity to major highways.

Recorded mining claims are located primarily in West Fork Miller River, Coney Basin, the Middle Fork Snoqualmie drainage, and near the Miller River-Lennox Creek drainages. The Dutch Miller mine is promising for high-grade copper ore. These mines represent potential acquisition issues in the future.

Figure III-25



Clearwater Wilderness

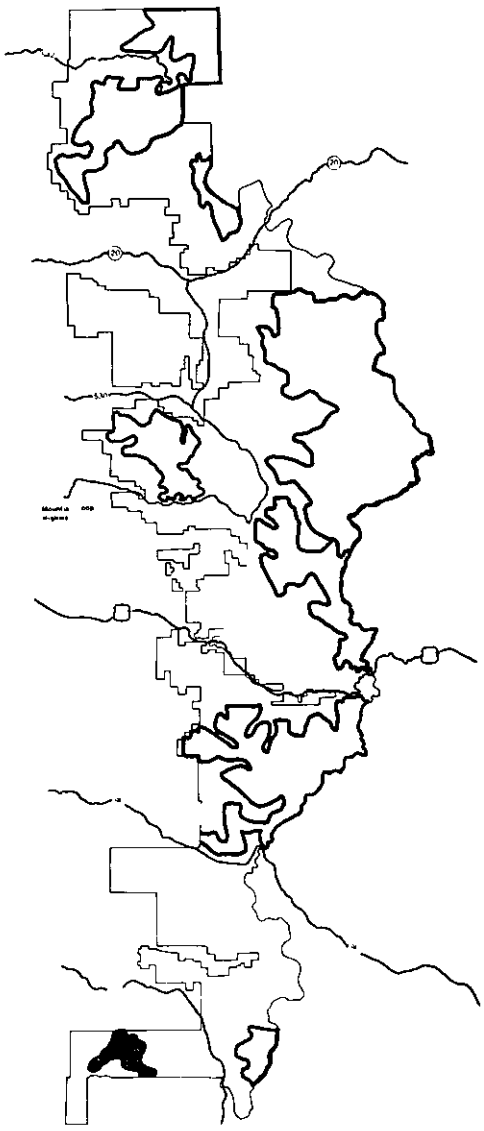
The 14,255 acre Clearwater Wilderness is adjacent to the northern boundary of Mt. Rainier National Park. The Clearwater was designated wilderness in 1984.

The terrain is moderate, interspersed with some steep and rocky sections. The headwaters of the Clearwater River are located within the Wilderness. Vegetation is typical of the western slopes of the Cascades, with fine representation of several coniferous species. Large, old growth timber is present in the lower elevations of the Clearwater valley.

A potential Research Natural Area, Lily Lake, lies within the Wilderness. There are several other small lakes in the Clearwater. These are popular day-use sites, as there is good road access up to the wilderness boundary.

The Clearwater Wilderness contains areas which are significant to Native Americans for traditional religious use. Cultural resources are also present.

Figure III-26



Norse Peak Wilderness

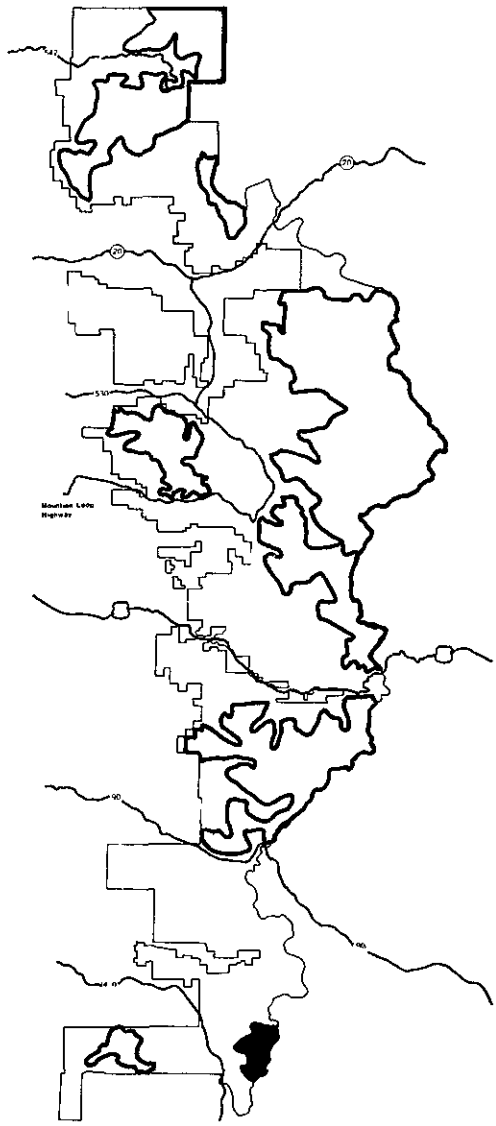
The Norse Peak Wilderness, designated in 1984, contains 50,923 acres between Chinook and Naches Pass on the Mt. Baker-Snoqualmie and Wenatchee National Forests. The Mt. Baker-Snoqualmie administers 15,923 acres. The southwest corner of the Wilderness abuts Crystal Mountain Ski Area.

The topography is generally steep, with rocky high-elevation terrain, narrow valleys, mountain lakes, and open, park-like basins. Norse Peak is the predominant peak. The Wilderness contains a unique geologic feature, Arch Rock. Vegetation includes Englemann spruce, Douglas fir, true firs, western and mountain hemlock, ponderosa, white, and lodgepole pine, larch, and western red cedar.

The Pacific Crest National Scenic Trail crosses the Wilderness from the Crystal Mountain area to Naches Pass. Norse Peak Wilderness is popular for recreation, particularly hiking and horse use. Easy access to Corral Pass and Government Meadows has led to severe overuse in some areas of the Wilderness. Portions of Norse Peak have been favorite motorized use areas for snowmobiles, 4-wheel drive, and trailbikes. Some of this use continues illegally.

The Wilderness contains areas deemed significant by Native Americans for traditional religious purposes.

Figure III-27



Wilderness Capacity

The potential use capacity for wilderness is based upon the subdivision of the wilderness into Wilderness Recreation Opportunity Spectrum (WROS) classes. The central notion of the spectrum is to offer recreationists alternative settings in which they can derive a variety of experiences. There are five mapped WROS classes: Transition, Trailed, General Trailless, Dedicated Trailless, and Special. These terms are defined in the Glossary. Within each class certain activities, settings, and management standards can be expected. These are discussed in detail in the Forest Plan, Standards and Guidelines.

Table III-65 shows the acres of the wilderness by WROS class; Table III-68 shows acres of WROS for each wilderness. Most of the wilderness acres are trailless; there is some potential to build additional trails in the General Trailless WROS class. This potential is discussed in the supply section, below.

In Table III-66, only the Glacier Peak Wilderness has acres in Dedicated Trailless. In the current situation and until the Forest Plan is implemented, only Glacier Peak has a Wilderness Management Plan that includes these acres. No acres of Special Area have yet been identified.

It is worth noting that, while the Trailless component of the WROS contains a large percent of the wilderness acres, only a small percent of the wilderness recreation can occur here. Much of the Trailless Class contains steep slopes and permanent, or long-lasting snow cover. Only 4.3 percent of the wilderness land is less than a 35 percent slope in the eight wildernesses.

Wilderness can accept only a low amount of use - compared to other dispersed areas and uses - due to the non-degradation policy and the fact that recreation is only one of the resources for which wilderness is managed. The wilderness of the Forest also provides for high quality watersheds, wildlife habitat, biological diversity, opportunities for research, and the preservation of unaltered ecosystems.

Table III-65
Wilderness ROS Acres - Current Situation

ROS Class	Acres 1/	% Wilderness
Transition	12,067	1.7
Trailed	44,356	6.1
General Trailless	585,326	81.1
Dedicated Trailless	80,000	11.1
Special	0	0
TOTAL	721,749	100.0

1/ R2MAP acres.

Table III-66
WROS by Wilderness, Current Situation 1/ - Acres

Wilderness	Transition	Trailed	General Trailless	Dedicated Trailless
Mt. Baker	5,470	5,005	112,203	
Noisy-Diobsud	190	0	14,825	
Glacier Peak	1,140	17,866	183,197	80,000
Henry M. Jackson	634	5,301	69,965	
Boulder River	211	2,428	47,748	
Alpine Lakes	2,302	11,235	131,820	
Clearwater	1,352	1,816	12,777	
Norse Peak	760	1,330	12,143	
TOTAL	12,059	44,981	584,678	80,000

1/ Only Glacier Peak has a Wilderness Management Plan with Dedicated Trailless acres at this time. All acres for this table are estimated.

Current Wilderness Use

There were 459,500 Recreation Visitor Days of wilderness use in 1989. In 1988, Alpine Lakes and Glacier Peak were the most heavily used wilderness areas in the Pacific Northwest. As shown in Table III-67, use increased sharply from 1976 to 1977, due to the designation of Alpine Lakes Wilderness. A similar increase occurred with the inclusion of the eight new wildernesses in 1984.

Use continues to grow with the increasing population of the Puget Sound area. The wilderness use on the Forest is among the heaviest in the nation.

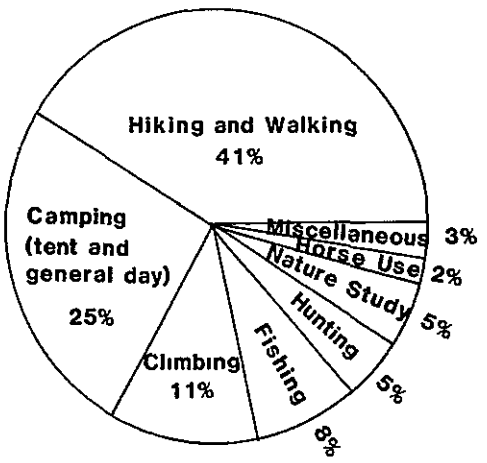
Table III-67
Wilderness Use - 1975-1989 - RVD's

1975	111,800
1976	116,800
1977	192,000
1978	156,100
1979	140,500
1980	170,200
1981	153,200
1982	147,600
1983	245,700
1984	274,500
1985	313,200
1986	340,000
1987	497,500
1988	455,517
1989	459,517

Over 40 percent of wilderness use is hiking. A majority of this hiking is day-use, a reflection of the accessibility of the wilderness. Camping, both tent and general day camping, accounts for another 25 percent of the wilderness RVD's. Hunting and fishing in wilderness receive less use. Norse Peak and Henry M. Jackson Wildernesses are popular horse use areas, however actual numbers for this activity are not available.

Figure III-28 shows relative wilderness use by activity, based on data from Glacier Peak and Alpine Lakes Wilderness. This chart shows the primary reason for going to the wilderness, or primary activity, not the absolute numbers engaged in that activity. Obviously, those engaged in camping had to arrive there by foot or by horse.

Figure III-28
Wilderness Use By Activity



1984 Data
Alpine Lakes and Glacier Peak

According to the 1984 Regional Guide for the Pacific Northwest Region, "the region does not currently have the capability to meet projected demand for wilderness use within the system." This use can be expected to increase, not only as a result of rapid population growth, but also as use in presently unroaded areas is displaced by other resource activities.

An analysis of wilderness capacity and use on the Forest shows that several wildernesses are over capacity in at least one WROS class; others are nearing capacity. Alpine Lakes, Glacier Peak, and the Clearwater were estimated to be over capacity in 1989. Boulder River and Henry M. Jackson are nearing capacity.

Most of these areas are within a two-hour drive of the Seattle-Tacoma metropolitan area. Easy access from major highways has resulted in severe overuse of some portions of Alpine Lakes, Clearwater, and Norse Peak Wildernesses. Much of this use is day-use hiking and walking; it is concentrated on a few, very popular trails (within Transition WROS zone). Refer to Chapter IV, FEIS for more discussion of capacity.

Wilderness Use Conflicts

Many current and potential conflicts of use exist in the wilderness. One of the most severe is overuse at specific locations. Roads and major highways near the wilderness boundary provide easy access, leading to overuse at some sites. Examples include I-90 and U.S. 2, Alpine Lakes Wilderness; the Corral Pass road up to Norse Peak Wilderness; and private roads that terminate at the Clearwater Wilderness boundary near Cedar and Lyle Lakes. Other sites experiencing overuse include:

Wilderness	Site
Mt. Baker	Lake Ann, Chain Lakes, Heliotrope Ridge, Hannegan Pass, and and Mazama Park.
Noisy-Diobsud	Watson Lakes.
Glacier Peak	Slide Lake, Lime Ridge, Miners Ridge, Kennedy Hot Springs, Lake Byrne, White Pass, Blue Lake, Cub Lake, Boulder Lake Green Mountain, Meadow Lake, Crystal Lake, Granite Lake, and Kool Aid Lake.
Boulder River	Boulder River, Kelcema Lake, Canyon Lake, and Goat Flats.
Henry M. Jackson	Goat Lake, Glacier Basin, Silver Lake, and Twin Lakes.
Alpine Lakes	Snow Lake, Gravel Lake, Upper Necklace Valley, Talapus and Olallie Lake, Pratt Lake, West Foss Valley, Dorothy Lake, and Fisher Lake.
Clearwater	Summit Lake, Cedar Lake, and Lyle Lake.
Norse Peak	Quinn and Lost Lakes, Arch Rock, and Echo Lake.

Other problems and conflicts include:

-Historical ORV and snowmobile use in Norse Peak Wilderness, especially near Corral Pass. Several popular routes are now inside the wilderness boundary.

-Horse use early in the season in the Norse Peak Wilderness.

-Snowmobile use overlapping from the Mt. Baker NRA into the Mt. Baker Wilderness. Historic snowmobile use in the upper reaches of Canyon Creek, now within the Mt. Baker Wilderness boundary.

-Historical use of Mt. Baker by large climbing parties, sometimes up to 100 people.

-Aircraft noise in wilderness, especially military aircraft in Alpine Lakes, Glacier Peak, and Mt. Baker.

-Potential designation of Class I airsheds in the new wildernesses may effect activities outside the wilderness.

ROADLESS AREAS

This section includes a brief overview of the roadless area situation. Refer to Appendix C for a detailed, site specific analysis of each roadless area parcel. Each of these areas has been analyzed for their wilderness potential.

Roadless areas are defined by nationally established criteria as tracts of land 5,000 acres of larger, with no engineered roads or other substantial development. They may also be smaller areas that are adjacent to existing wilderness areas. They are relatively undisturbed tracts of the Forest's ecosystem which have been neither set aside as wilderness, nor altered by road building, timber harvesting, or campground development. Although old wagon trails, primitive roads, cabins, camps, and other minor evidence of human endeavor can be found in these areas, they still resemble the untouched forest first viewed by western settlers. There are approximately 402,930 acres of such lands on the Mt. Baker-Snoqualmie National Forest.

There are 101 separate roadless area parcels located throughout the Forest; the majority are located north of U.S. Highway 2. Individual parcels range in size from 30 to 51,000 acres. Twelve roadless areas remain in their entirety, with no wilderness designation of any of the originally inventoried acres. The largest of these are Eagle Rock (33,177 acres), Higgins Mountain (13,127 acres), and Pressentin (15,057 acres). Some parcels are small "fringes" less than 100 acres in size. Others, such as the western Tomyhoi-Silesia portion of Mt. Baker, the Dickerman portion of Boulder River, and portions deleted from Noisy-Diobsud, Henry M. Jackson, and Glacier Peak Wildernesses contain substantial acres.

These lands, inventoried in the Roadless Areas Review and Evaluation - RARE II - (USDA 1979), were not designated wilderness by the Washington State Wilderness Act of 1984 (US 1984). Roadless areas equal about 24 percent of the net acres of the Forest.

These areas provide diverse, undisturbed habitats for fish and wildlife, and can be especially important for species sensitive to human disturbance or dependent of such limited habitat components as old-growth conifers. For the recreationist, roadless areas offer opportunities for solitude and physical challenge not available in more developed settings. Streams in roadless areas are often a source of high-quality water for communities within the Forests zone of influence. Many of the Forest's roadless areas contain extensive acres of old-growth forest, which is valuable to local and regional economies.

Large or small, these roadless parcels were excluded from wilderness designation because of other resource values, or to create a more identifiable or manageable wilderness boundary. Wilderness designation for these roadless parcels will not be considered in this Mt. Baker-Snoqualmie Forest Plan. Areas remaining roadless will be studied again in the next round of planning. All resources, including wilderness, will be evaluated to determine how the areas are to be allocated and managed.

The commercial forest land within the roadless areas has been calculated in the forest annual allowable harvest totals, but this timber has had limited availability for harvest since the beginning of the RARE I process in 1972. An adjusted programmed harvest level was negotiated in 1982; a 1984 revision

further reduced the allowable sale quantity to reflect the Washington Wilderness Act.

Following transmission of the RARE II Final Environmental Impact Statement to EPA and the public in January 1979, the Forest began limited selling of timber within the roadless areas. Initially, blow-down just inside the roadless area boundaries was targeted for salvage. Later entries focused on those areas identified in the Forest 5-year timber sale program. These entries reflected management direction in the Ranger District Multiple Use Plans.

From fiscal year 1979 through fiscal year 1988, 72 timber sales with an estimated volume of 263.4 MM board feet were sold within the roadless areas. These sales ranged in size from 3 to 274 acres; most were under 100 acres in size. Road construction has been very limited. Slightly more than half of these sales involved road construction; mileage was generally 1 1/2 miles or less.

These areas also remained available for dispersed recreation, wildlife habitat, and other uses.

A number of the RARE II areas were designated as wilderness in 1984; however, the allocation and management of the roadless areas remains a major issue. Substantial public comment on the future of the roadless areas was received in response to the DEIS. Many comments favored keeping the roadless areas in their natural state; many other respondents strongly favored opening the roadless areas to motorized use.

Many areas possess scenic attractions, wildlife habitat, and contain a variety of recreation opportunities. Some areas contain sizeable acreage of old growth forest, valued for wildlife habitat, timber production, and aesthetics. About 42 percent of the acreage is considered tentatively suitable for timber production. Table III-68 shows some summary information about the roadless areas. Figure III-29 shows the general location of the roadless areas.

Table III-68
Summary Table - Roadless Areas

Total Acres	402,930
Total Number of Parcels	101
No. Parcels Less Than 100 Acres	14
No. Parcels 100 to 999 Acres	42
No. Parcels 1,000 to 4,999 Acres	24
No. Parcels 5,000 Acres and Larger	21
Total Acres of Tentatively Suitable 1/	161,175
Total Acres of Old Growth 1/	203,538
Primitive and Semi-Primitive Nonmotorized ROS Acres	260,346

1/ These acres include overlaps.

Figure III-29
Roadless Areas

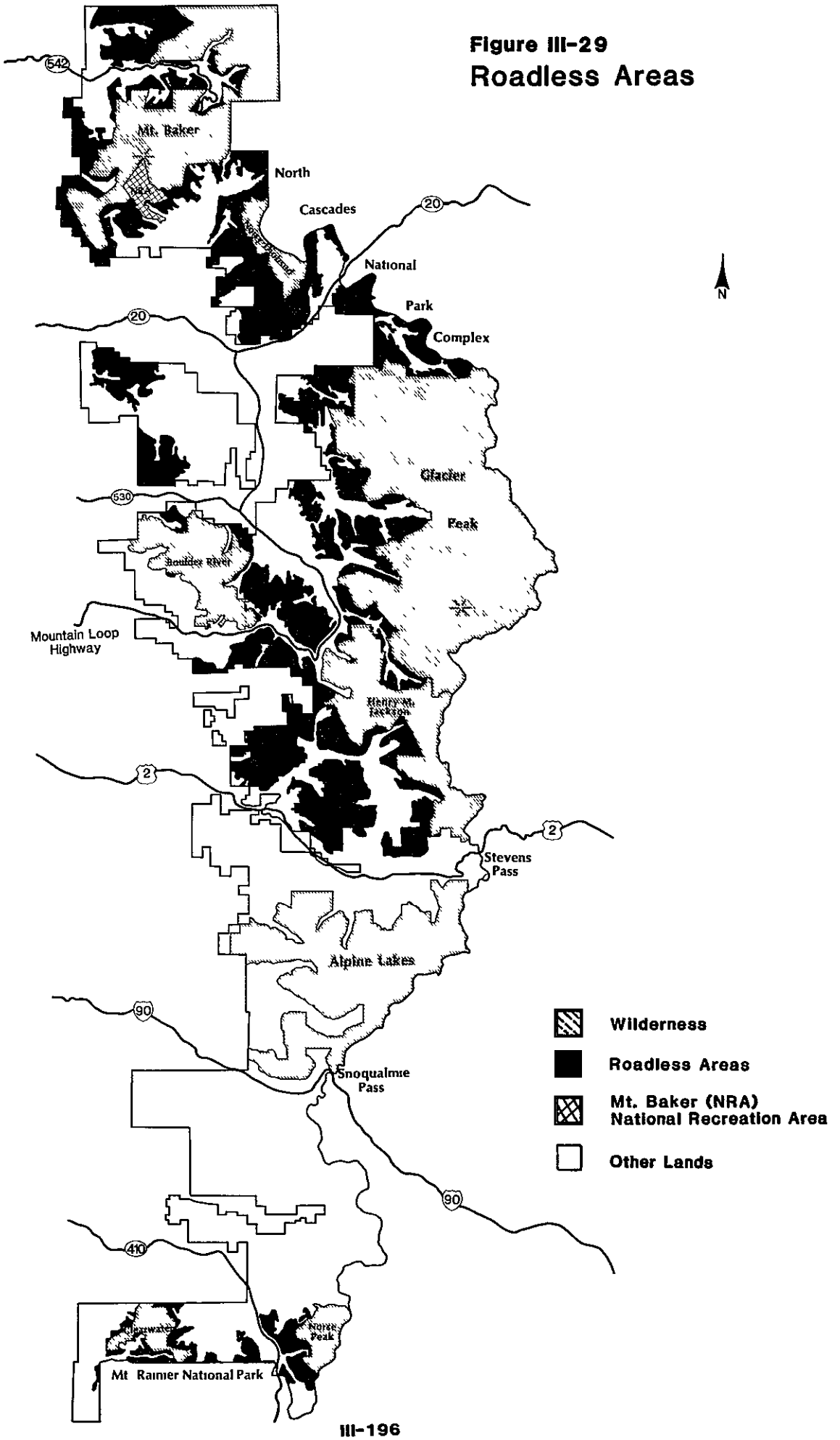


Table III-69 - in two parts on the pages below - provides a summary of the attributes for each of the inventoried roadless areas. Wilderness characteristics and key resource values are identified by area. The individual parcels have been grouped into geographically similar areas for this table. The detailed legend for Table III-69 provides descriptions of each of the attribute ratings used in the table. For more information on each parcel, refer to FEIS, Appendix C.

Legend for Table III-69 - Roadless Area Attribute Ratings

Ratings = High, Medium (shown as Mod), Low, and None or Negligable (0).

Manageability and Boundaries - Ability to manage and protect the area's natural character considering such factors as size, shape, and position (including boundary location) relative to external influences.

High - Inherently protected through excellent topographic positioning, favorable external influence (i.e. land allocation, physical conditions), or very limited hazards/risks to natural character.

Mod - Part of area subject to external influences, or overall positioning and physical conditions are at some risk.

Low - Considerable portions at risk or subject to external influences; manageability highly dependent on degree of protection provided in areas outside unroaded part.

0 - Protection largely unattainable due to present activities and conditions that are not inherently mitigated. Risks to natural character and processes high.

Natural Integrity - Extent to which long-term ecological processes are intact and operating, or are free of disturbances; consideration of extent to which human influences have altered natural conditions and are apparent to user.

High - Extremely limited, or not apparent.

Mod - Small portions of area affected by human activity, or recovery of past impacts approaching natural state and not perceived by user.

Low - Considerable area impacted, or perceived recovery of past change incomplete or apparent to user.

0 - Much of present ecosystem is primarily a result of recent or past activity by man; or major portion is directly or indirectly (from periphery) influenced by human activity; readily noticed by user.

Opportunities for Solitude - Area's feeling of solitude (how it provides for remote and backcountry setting).

High - Most of area free of external influence and provides a strong feeling of remoteness and solitude.

Mod - Fringes influenced by sight and/or sound of human activity; solitude aided by vegetative or topographic conditions.

Low - External influences persist over much of area; vegetation and topography generally only aid to providing solitude.

0 - Most of area within sight or sound of human activity; topography and vegetation provides only limited relief.

Opportunities for Primitive Recreation - Opportunities for primitive and unconfined types of recreation activities; how well the area provides outstanding opportunities for unusual adventures or excitement.

High - Varied type (more than those associated with foot travel only); unique experience, or experience of adventure/excitement.

Mod - Varied type (good mix of foot travel associated activity); potential for adventure exists.

Low - Limited type; adventure or challenge related to topographic difficulty and distance from nearest roaded access.

0 - Type and adventure not different than much of adjacent lands.

Special Features - Unique, abundant, or varied flora, fauna, historic, scientific, and physiographic features; where protection from nonconforming activities would enhance management of unusual or sensitive species or features.

High - Existence over much of area or very unique.

Mod - Existence of species or features over much of area that would be enhanced; limited extent of unique or sensitive elements.

Low - Limited enhancement opportunity; unique or sensitive elements limited to very small areas, or other allocations, standards or guidelines afford adequate protection.

0 - Species and features not different than surrounding areas.

Table III-69
Summary of Roadless Area Attributes

Roadless Area	RARE II Number	Capability: Manage-ability	Natural Integrity	Opportun. Solitude	Primitive Rec. Opp.	Challeng. Exper.	Special Features
Mt Baker (Canyon Cr. Block)	6041	Mod	High	High	High	High	High
Mt. Baker (North Block)	6041	Low	High	Low	Low	Mod	Mod
Mt. Baker (West Block)	6041	Low	High	Mod	Mod	Mod	High
Mt. Baker (South Block)	6041	Low	Mod	Low	Low	Low	0
Mt. Baker (Noisy Diobsud Block)	6041	High	High	High	High	Mod	Mod
Oakes Peak	6043	Low	High	Low	Low	Low	Low
Alma Copper	6044	High	High	Mod	High	Mod	Low
Hidden Lake	6045	Low	Mod	Low	High	Low	Mod
Glacier Peak H	H6031	Mod	High	Mod	Mod	Mod	0
Glacier Peak I	I6031	High	High	High	High	High	0
Glacier Peak G	G6031	Low	Low	Low	Low	Low	0
Glacier Peak J	J6031	Low	Mod	Low	Low	Low	Low
Glacier Peak M	M6031	Low	High	Low	Low	Low	0
Glacier Peak A	A6031	Low	Mod	Low	Low	Low	0
Glacier Peak L	L6031	Low	Mod	Low	Low	Low	0
Glacier Peak B	B6031	Mod	High	Mod	Mod	Mod	Low
Glacier Peak K	K6031	Low	High	Mod	Mod	Mod	0
Pressentin	6048	Mod	High	High	Mod	Low	0
Higgins Mountain	6049	High	High	High	Mod	Low	Mod
Prairie Mountain	6060	Low	Low	Low	Low	Low	0
White Chuck Mountain	6051	Low	Mod	Low	Low	Mod	0
Boulder River	6050	Low	Low	Low	Low	Low	Low
Eagle Rock	6054	High	High	High	High	Mod	Low
Tolmie Creek	6056	0	Low	Low	0	0	0
Clearwater	6055	Mod	Low	0	Low	0	0
Lonesome Lake	6057	Low	Mod	0	0	0	0
Sun Top	6058	Low	Mod	Low	Low	0	Low
Silver Creek	6059	Low	Mod	Low	Low	Low	0
Norse Peak	6034	mod	High	Low	Low	0	Low

Table III-69 (continued)

Availability - Other Resource Potential

Name of Area	RARE II Number	Recreation	Fish/ Wildlife	Water	Livestk. Opera.	Ecology	Timber	Minerals Oil/Gas	Cultural	Land Use Author	Non-Fed Lands	Fire	Insect/ Disease
Mt Baker (Canyon Cr Block)	6041	High	High	High	0	Mod	Mod	Low	Mod	Low	0	Low	0
Mt Baker (North Block)	6041	High	High	Mod	0	Mod	High	Mod	Mod	0	0	Low	0
Mt Baker (West Block)	6041	Mod	High	High	0	High	Mod	High	Mod	0	Mod	Low	0
Mt Baker (South Block)	6041	Mod	Mod	High	0	Mod	High	Low	Mod	0	0	High	0
Mt Baker (Noisy Diobsud Block)	6041	High	High	High	Low	Mod	Mod	Low	0	Low	High	High	0
Oakes Peak	6043	Low	Low	Low	0	Low	Low	Low	0	0	0	Low	0
Alma Copper	6044	Low	High	Mod	0	Mod	Mod	Low	Mod	0	Low	Mod	0
Hidden Lake	6045	Low	Mod	Low	0	High	Low	Low	Mod	0	0	Low	0
Glacier Peak H	H6031	Low	High	High	0	Mod	Mod	Mod	Mod	0	Low	High	0
Glacier Peak I	I6031	Mod	Mod	Mod	0	Mod	Mod	Low	Mod	0	0	Low	Low
Glacier Peak G	G6031	Low	Mod	Low	0	Mod	Mod	Mod	Low	0	0	High	0
Glacier Peak J	J6031	Mod	Mod	Low	0	Mod	Mod	Mod	Low	0	0	Mod	0
Glacier Peak M	M6031	Low	Low	Low	0	Mod	Mod	Low	Low	0	0	Low	0
Glacier Peak A	A6031	Low	Low	Low	0	Mod	Low	Low	0	0	0	Mod	0
Glacier Peak L	L6031	Mod	High	Low	0	Mod	Low	High	Low	0	0	Low	Low
Glacier Peak B	B6031	Mod	Mod	Mod	0	Mod	Low	Low	Low	0	0	Low	Low
Glacier Peak K	K6031	Mod	Mod	Mod	0	Mod	Low	High	Low	0	0	Mod	0
Pressentin	6048	Low	High	Mod	0	Mod	Mod	Low	0	0	Low	Low	0
Higgins Mountain	6049	Low	Mod	Mod	0	Mod	Mod	Low	0	0	Mod	Low	0
Prairie Mountain	6060	Low	Mod	Low	0	Mod	High	0	0	0	0	Low	0
White Chuck Mountain	6051	Low	Mod	Low	0	Mod	Low	Low	0	0	0	Low	0
Boulder River	6050	Low	Mod	Low	0	Mod	Low	Low	0	0	0	Mod	0
Eagle Rock	6054	Mod	High	Mod	0	Mod	Low	Mod	Mod	0	Mod	Low	Low
Tolmie Creek	6056	Low	Low	Low	0	Mod	High	Low	Low	0	0	Low	0
Clearwater	6055	Low	Mod	Mod	0	Mod	High	Mod	0	Mod	0	Low	0
Lonesome Lake	6057	Low	Mod	Low	0	Mod	Mod	Low	0	0	0	Low	0
Sun Top	6058	Mod	High	Low	0	High	High	Low	0	Low	0	Mod	0
Silver Creek	6059	Low	Low	Low	0	Mod	Mod	Mod	Low	0	0	Low	0
Norse Peak	6034	High	Mod	Low	0	Mod	Mod	Mod	Lo	0	0	Mod	0

Based on the attributes and ratings of Table III-69, six roadless areas on the Forest have demonstrable wilderness potential. All six consistently rating "high" in a majority of the attributes.

They include:

- Canyon Creek Block of the Mt. Baker Roadless Area - 25,046 acres
- Noisy-Diobsud Block of the Mt. Baker Roadless Area - 51,400 acres
- Alma Copper - 8,193 acres
- Glacier Peak, Parcel I - 12,755 acres
- Higgins Mountain - 13,127 acres
- Eagle Rock - 33,177 acres

Again, refer to FEIS Appendix C for more information.

Roadless Area Supply and Demand

One measure of demand for roadless areas is reflected in the demand for recreational opportunities within semi-primitive nonmotorized (SPNM) ROS settings and similar settings within wilderness. As discussed in the recreation section of this chapter, demand for this type of recreation already exceeds supply in the non-wilderness areas, and will soon exceed supply in the wilderness.

Of the 402,930 acres of inventoried roadless areas, all or portions of any of the 101 roadless parcels could be left in their existing condition in order to preserve their wilderness potential. From the above, six of the Forest's roadless areas have greater potential for wilderness than the other areas described and evaluated in Appendix C.

WILD AND SCENIC RIVERS

There is one designated Wild and Scenic River on the Forest and 47 potential river additions to the National System on the Forest. This discussion briefly summarizes the situation on the Forest. Refer to Appendix E for a detailed description of each potential river, including maps and a list of attributes.

The Skagit Wild and Scenic River was designated in 1978 (PL 95-625). It contains 58.5 miles of recreational river, all on the Skagit River, and 100 miles of scenic river: 21.8 miles on the Cascade River, 50.8 miles along the Sauk River, and 27.4 miles on the Suiattle River. Just over 50 percent of the 38,939 acres within the management corridor are State or privately owned. The Skagit Wild and Scenic River system is managed under the 1984 Final River Management Analysis and Plan.

The Skagit drainage provides a variety of recreation use, including one-third of the total river rafting occurring on the Forest (RIM). Nature study and viewing wildlife are also very popular, as the Skagit is the winter home for the largest population of eagles in the lower 48 states. The river is renowned for its steelhead sport fishing. Recreation use of the system is growing, and the potential exists for conflicts between wintering eagles and recreation use. Several research projects are currently evaluating this situation.

The Skagit drainage basin provides habitat for a vigorous, diverse fishery of national significance, including five species of salmon, three species of sea-going trout, and a diversity of resident fish. Approximately 30 percent of the young anadromous fish entering Puget Sound are hatched in the Skagit River System. This fishery has an estimated commercial value of $17 million during odd-numbered years, when the pink salmon migrate upstream, and $6 million during even-numbered years. The Skagit is also the principle fishery for three American Indian tribes. As mentioned above, the fishery and its associated habitats make the Skagit River a principal wintering area for the bald eagle. These birds are protected under the Threatened and Endangered Species Act.

Potential Additional Rivers

The Wild and Scenic Rivers Act established criteria for the addition of other rivers to the National System. The National Park Service (formally Heritage Conservation and Recreation Service) conducted an inventory of potential rivers. Portions of the sixteen rivers on that inventory are within the Forest boundary.

Besides the sixteen rivers on the inventory, other rivers have been considered in this planning effort. A total of 51 rivers were identified and studied for their eligibility as Wild and Scenic Rivers; 47 rivers were determined to be eligible. Eligibility is determined by applying the critieria cited in Section 1(b) and 2(b) of the Wild and Scenic Rivers Act, as interpreted by the USDA-USDI Guidelines. To be eligible for inclusion, a river must be free-flowing or restored to a free-flowing condition and possess one or more "outstandingly remarkable" values, including: scenic values, recreational value, geologic value, fisheries or wildlife value, historic value, cultural values, or other, including ecological values. The table below shows the list of 47 rivers that were determined to be eligible. These rivers will be protected so as not to lose their eligibility until Congress makes their determination.

Table III-70

Rivers Studied for Potential Eligibility

Inventoried River	Total Miles	Inside Wilderness	Inside National Park	Inside Forest Boundary	Outside Forest Boundary	% Inside Forest Boundary
			miles			
Silesia Creek	11 3	6 8	4 5	6 8	4 5	60%
North Fork Nooksack	43 0	1 8	2 5	22 3	20 7	52
Wells Creek	7 7	3 0	0 0	7 7	0 0	100
Bar Creek	4 0	3 0	0 0	4 0	0 0	100
Middle Fork Nooksack	20 0	2 7	2 0	6 3	13 7	32
South Fork Nooksack	39 0	0 8	0 0	6 8	32 2	17
Bell Creek	4 5	0 0	0 0	4 5	0 0	100
Baker River	15 0	0 0	13 0	2 0	13 0	13
Noisy Creek	6 1	2 2	3 0	3 1	3 0	51
Diobsud Creek	10 8	7 5	0 0	10 8	0 0	100
Illabot Creek	16 0	5 0	0 0	12 8	3 2	80
South Fork Cascade River	7 0	7 0	0 0	7 0	0 0	100
Buck Creek	11 0	10 0	0 0	11 0	0 0	100
Downey Creek	12 0	11 0	0 0	12 0	0 0	100
Suiattle River extension	20 5	20 5	0.0	20 5	0 0	100
White Chuck River	24 0	12 0	0 0	24 0	0 0	100
North Fork Sauk River Extension	11 0	11 0	0 0	11 0	0 0	100
South Fork Sauk River Extension	8 0	1 0	0 0	8 0	0 0	100
North Fork Stillaguamish	52 0	0 0	0 0	9 5	42 5	18
North Branch	4 5	0 0	0 0	4 5	0 0	100
Deer Creek	24 0	0 0	0 0	6 2	17 8	26
Boulder River	13 9	11 0	0 0	12 0	1 9	86
South Fork Stillaguamish	42 0	0 0	0 0	23 0	19 0	55
Jim Creek (to fork)	15 0	0 0	0 0	1 4	13 6	9
Canyon Creek (to fork)	11 5	0 0	0 0	1 5	10 0	13
South Fork Canyon Creek	9 5	2 5	0 0	9 5	0 0	100
Skykomish River including South Fork Skykomish	48 1	0 0	0 0	4 1	44 0	9
North Fork Skykomish	29 0	6 0	0 0	26 9	2 1	93
Troublesome Creek	4 7	2 3	0 0	4 7	0 0	100
West Cady Creek	7 5	2 2	0 0	7 5	0 0	100
Tye River	11 7	0 0	0 0	9 4	2 3	80
Miller River (to fork)	3 7	0 0	0 0	2 8	0 9	76
West Fork Miller River	5 3	1 0	0 0	5 3	0 0	100
East Fork Miller River	8 0	2 0	0 0	8 0	0 0	100
Foss River (to fork)	4 4	0 0	0 0	3 7	0 7	84
West Fork Foss River	3 0	1 5	0 0	3 0	0 0	100
East Fork Foss River	8 0	6 0	0 0	8 0	0 0	100
Beckler River	13 5	0 0	0 0	12 8	0 7	95
Rapid River	12 8	6 0	0 0	12 8	0 0	100
Deception Creek	10 0	9 5	0 0	10 0	0 0	100
Middle Fork Snoqualmie	36 0	5 5	0 0	24 4	11 6	68
Taylor River	10 0	1 5	0 0	10 0	0 0	100
Pratt River	9 7	20 0	0 0	9 7	0 0	100
Carbon River	27 5	0 0	7 0	3 0	24 5	11
White River	35 0	0 0	15 0	9 4	25 6	27
Clearwater River	11 0	4 0	0 0	4 5	6 5	41
Greenwater River	21 4	8 0	0 0	16 9	4 5	64
	763 6	176 3	45 0	445 1	318 5	58

Other Designations

Portions of the Skykomish River system have been designated by the State of Washington as a Scenic River under the provisions of the State Scenic River System Act (RCW 79.72). This designation applies only to city, county, and State lands. This river features substantial runs of anadromous fish, bald eagle feeding and perching areas, and communal roost sites. Portions of the river, especially outside the Forest boundary, support a variety of boating opportunities including white-water rafting.

In 1988 the State of Washington released the Washington State Scenic River Assessment. This report documents the evaluation of several outstanding rivers in the state, and identifies 18 rivers which possess the natural, cultural, and recreational values that would make them suitable additions to the Washington State Scenic River System. The Carbon, Nooksack and Stillaguamish Rivers are the rivers included in this lists which cross the Forest.

RESEARCH NATURAL AREAS

Research natural areas are part of a national network of field ecological areas designated for research and education and aid in maintaining biological diversity on Forest lands. Research natural areas are established to preserve a wide spectrum of pristine natural communities or ecosystems, or those having special characteristics of scientific importance. They maintain biological diversity, serve as reference areas for the study of long-term ecological change, and offer scientists, biologists and others the opportunity to study plant communities and ecological processes in unmodified conditions (Franklin and others, 1972). Besides the Forest Service, the Bureau of Land Management, the National Park Service, the U.S. Fish and Wildlife Service, and the Department of Energy have classified land as research natural areas.

Along with study, research, and educational purposes, RNA's provide a baseline area against which the effects of human activities in similar environments can be measured. They also provide gene pool preserves for plant and animal species, especially rare and endangered types (Franklin and others 1972).

Each involved agency has developed similar regulations for management of RNA's and to protect the scientific and educational values of each area. Ideally, areas are sufficiently large to protect the feature of interest from significant unnatural influences. Logging activities are not permitted. Recreation and other public use is not a recognized use of RNA, although it may be allowed so long as it does not alter the features for which a given area was set aside. Deliberate manipulation of the area, however, may be authorized under certain circumstances in order to preserve the vegetation for which the area was created.

As of 1986, there were 102 research natural areas in Oregon and Washington, 39 of which are in Forest Service jurisdiction. The Mt. Baker-Snoqualmie National Forest has three established research natural areas, totaling 2,837 acres. They are listed below in Table III-71.

Table III-71
Established Research Natural Areas

Name of RNA	Principle Features	Date Established	Acres
N.F. Nooksack River	Douglas-fir, western hemlock forests	1934	1,407 1/
Lake Twenty-two	Western redcedar, western hemlock forests and subalpine lake	1947	790
Long Creek	Western hemlock forest, climax red alder forest	1947	640

1/ The area was initially 1,495 acres, but in 1973, 88 acres were subtracted to allow removal of danger trees along the highway.

Research Natural Area Needs

The Western Slopes and Crest Province has a need for examples of ecosystems or habitats that might be found on the Mt. Baker-Snoqualmie National Forest. They include:

Ecosystem or Community

Douglas-fir less than 75 years old (old burn)
Douglas-fir 100-150 years old
Old-growth western redcedar forest, northern portion of province
Red alder forest
Mountain hemlock-Pacific silver fir forest, northern province
Subalpine parkland mosaic (tree groups with a variety of meadow types)
Heather-huckleberry communities
Subalpine lush herbaceous communities, including Valeriana-Veratrum and Rubus-parvifolium-Pteridium types
Alpine Community Mosaic with Krummholz tree groups
Low elevation lake and drainage basin temperate forest
Subalpine lake and drainage basin (with fish)
Large upwelling cold spring
Typical hot spring

Potential Research Natural Areas - Supply

A study was completed to determine if the Mt. Baker-Snoqualmie National Forest had areas meeting the above description that would be suitable for an RNA. Areas for consideration were identified; further investigation indicated five candidate areas that were potentially suitable. Table III-72 gives these areas, with a brief description, along with a priority for RNA listing. Figure III-30 shows the general location of existing and potential RNA's on the Mt. Baker-Snoqualmie Forest.

Three potential RNA are located within designated wilderness: North Fork Nooksack Addition (Mt. Baker Wilderness), Chowder Ridge (Mt. Baker Wilderness), and Lily Lake (Clearwater Wilderness). Approximately 80 percent of the Green Mountain potential RNA is located inside the Glacier Peak Wilderness. There is established recreation use at Green Mountain and at Perry Creek.

Wilderness designation precludes any use of motorized equipment within the wilderness boundary. While there is limited active research occurring within the three existing RNA's, location of research natural areas within wilderness imposes some limitations to the type and extent of research that could conceivably take place. Some feel the dual designation of RNA and wilderness will ensure protection of the natural ecosystems of the RNA and further preserve its environments and species.

The North Fork Nooksack River Research Natural Area is located in the northern-most Ranger District of the Forest, off the Mount Baker Highway, and just five miles from the Canadian border. It is the least accessible of the three research natural areas and the topography is very steep. The highway bounds the RNA for about three miles, and a short nature trail has periodically been opened. Otherwise, there is little human disturbance.

Lake Twenty-two Research Natural Area is located near Pilchuck Mountain and east of the small town of Verlot. This RNA is easily accessible from the Mountain Loop Highway; a 2.5 mile trail leads to glacier-created Lake Twenty-two. Despite its low elevation (about 2,500 feet), permanent snowfields are found in the lake basin (Franklin and others 1972). Heavy recreation use is well established, especially at the north end of the lake and along the trail.

The Long Creek RNA is located two miles northeast of Lake Twenty-two, within the Boulder River Wilderness. The RNA was established some years before the Boulder River Wilderness was designated in 1984. Long Creek RNA contains two-thirds of the Long Creek drainage; there is little or no recreation use.

All three research natural areas have been named potential National Nature Landmarks.

Demand for Research Natural Areas

While there are currently 102 research natural areas in Oregon and Washington, additional areas are continually being sought to provide needed representation of major forest, range communities, and aquatic features, as well as for unique and rare species. All the agencies involved, plus the Pacific Northwest Research Natural Area Committee, search for suitable areas to protect. The Pacific Northwest Region uses Research Natural Area Needs in the Pacific Northwest (Dyrness and others 1975) to identify specific needs in the two states. These needs are listed by physiographic provinces. The Mt. Baker-Snoqualmie is in the "Western Slopes and Crest Province, Washington Cascades." The Washington Natural Heritage Plan also contains an updated source of specific research natural area needs.

Within this province, there is need for 31 terrestrial and 18 freshwater sites. The three existing RNA's on the Mt. Baker-Snoqualmie National Forest satisfy some of the needs as do other RNA's administered by other Forests or agencies on the western slope of the Cascades in Washington.

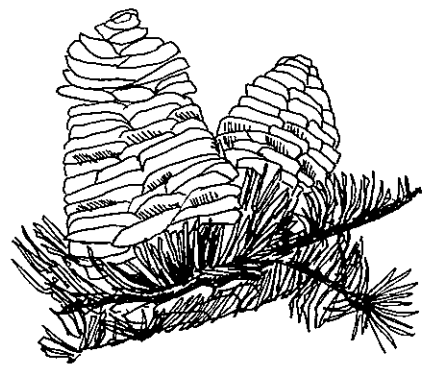


Table III-72
Potential Research Natural Areas 1/

Area	Approx. 2/ Acres	Need/Cell 3/	Priority 4/	Possible Alternate Sites
Addition to North Fork Nooksack RNA 5/	2,460	Example of Douglas-fir, 75 year old burn, (Terrestrial cell = 1). Also includes wide array of subalpine meadow communities found in existing RNA.	Low	Token representation elsewhere.
Lily Lake 5/	800	Represents high-elevation mountain hemlock-Pacific silver fir forest (Terrestrial cell = 16). Lake is typical of mid-to-high-elevation subalpine lakes (Aquatic cell = 8).	Low-moderate	North Cascades Park may be alternate for cell 16 Lake Twenty-two may suffice for example of lake (cell 8).
Perry Creek	2,066	Represents unique assemblage of rare fern species (plant cells = 13, 14, 17, 25, 26) Also has Alaska cedar (in stand with mountain hemlock and subalpine fir. (Terrestrial cell = 19) and heather-huckleberry community (Terrestrial cell = 21)	High	None for ferns. Possible alternate sites in North Cascades Park for Alaska Cedar and heather-huckleberry communities.
Green Mountain 6/ 7/	2,060	Represents subalpine parkland mosaic, heather-huckleberry communities, and subalpine lush herbaceous communities. (Terrestrial cells = 20, 21 and 22)	Medium-high	Possible alternate sites in North Cascades Park.
Chowder Ridge 5/ 6/	1,920	Alpine community mosaic with Krummholz tree groups (Terrestrial cell = 24).	Medium	Possibly found in Mt Rainier and N. Cascades Parks.

1/ Research Natural Area Needs in the Pacific Northwest (Dyrness and others 1974).
2/ Acres digitized from map and may differ from R2MAP
3/ A cell is an ecosystem or organism which needs to be represented and protected by a RNA.
4/ Priority represents the urgency of placing a sample ecosystem in RNA status. Urgency is determined by measuring the risk of losing all examples of the ecosystem to other uses. (Dyrness and others 1974).
5/ Located in wilderness.
6/ Potential National Natural Landmark
7/ Partially located in wilderness.

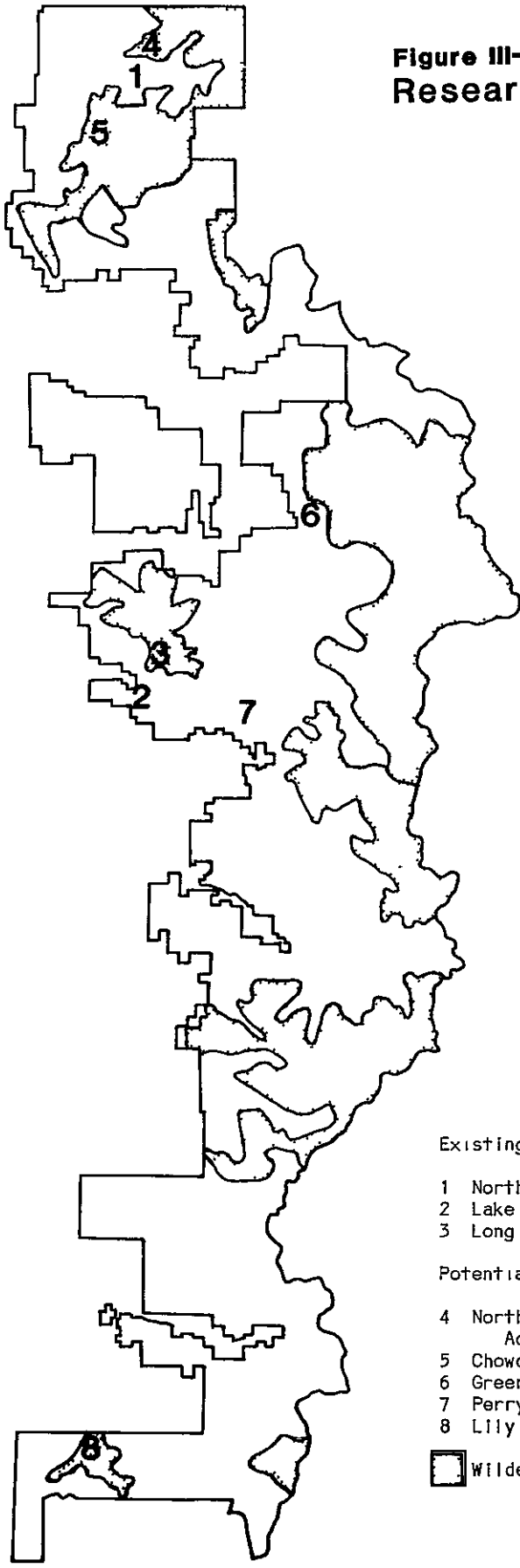


Figure III-30
Research Natural Areas

Chapter III
Air, Fire

AIR

Along with soil and water, air is an essential component of the Forest Ecosystem (Huston, 1979). In addition to being a physical resource, air is also an aesthetic resource; the visual experience has value to the forest visitor and to the people who reside in the area (Washington State Department of Ecology, 1985). Both nature and humans can cause changes in air quality including visibility. Natural phenomenons such as fog, smoke from lightning caused fires, pollen and windblown dust all may affect air quality. Aerosols such as oxides of nitrogen, hydrocarbons, sulfur dioxide, and carbon monoxide have the potential to damage forest resources and impair visibility. What begins as air pollution often ends up in the soil and water and can affect the health and vigor of the ecosystem.

Air Quality

The air quality is generally good over the Forest area. Limited monitoring of the regulated pollutants by local pollution control agencies indicate concentrations decline to the east of the developed metropolitan area around Puget Sound. However, levels of these pollutants are well under Federal and State ambient air standards necessary to protect human health.

The only continuous monitoring program currently on-going is of Total Suspended Particulate (TSP) levels at a site near the Tolt Reservoir by the Puget Sound Air Pollution Control Agency. Data collected since 1980 indicates a fairly constant annual geometric mean of TSP of around 10 microns per cubic meter of air, well below the state standard of 60 microns/cubic meter. For comparison: values measured in the metropolitan areas near Seattle are in the 35-45 micron/cubic meter range. Peak daily concentrations are less than the annual average concentrations of the urban areas.

Previous monitoring efforts of other pollutants within the Forest by the Washington Department of Ecology and the Federal Environmental Protection Agency have been discontinued because of low ambient levels. This supports the estimate that minimal rates of atmospheric deposition are occurring.

Traffic on Interstate 90 and U.S. Highway 2 are the heaviest of any roads within the Forest. Though not measured within the Forest boundary, it is felt that the current levels of carbon monoxide, sulphur and nitrogen emmissions are well below current State and Federal standards.

Ozone is found in the Puget Sound region in concentrations approaching State and Federal standards. The highest concentrations normally occur during the summer months, and are due to the solar heating. The photochemical processes that produce ozone in the atmosphere take time to complete. As a result, the highest concentrations of ozone normally occur 15 to 25 miles downwind of the sources of the pollution. In the past, ozone concentrations in the area to the west of the Forest have exceeded State ambient air standards, but increased controls on hydrocarbons in the metropolitan areas have lowered concentrations to acceptable levels.

It should be noted that most monitoring to date has centered around the pollutants themselves, to compare their concentrations with standards for human health. Considerably less has been done on monitoring the effects, if any, of

airborne pollutants on forest ecosystem components. Currently, the Forest Service has funded a Federal Environmental Protection Agency research effort called the Western Conifers Project to evaluate the ways and extent that air pollution may affect forest vegetation. Results of this research are just now beginning to be published. One finding that may impact future forest resource management: the low pH levels measured in fog water near Mt. Rainier and Mt. Baker that has precipitated from air masses that stagnated over urban areas. What happens when these acidic air masses intercept forested areas of the Forest is not completely understood, but the findings do raise a potential for serious impact (Basabe, 1989).

Monitoring visibility is another current project now underway. This is part of a regionwide effort to characterize the quality of visibility in the Class I areas of the Region. Baseline data is currently being developed for a series of sites throughout the Northwest, including one just south of Stevens Pass near the Alpine Lakes Wilderness. The data from that site are insufficient to show any trends to date, but they do give an indication that visibility, when expressed as mean average standard visual range, is among the best in the Region (Air Resource Specialists, 1989).

Prescribed Burning

Prescribed burning is the practice of using fire under prescribed conditions to accomplish a variety of resource management objectives. Among these are:

- disposal of unutilized material resulting from road, trail, or other construction projects;
- disposal of residue resulting from harvest or cultural treatments to mitigate fire hazards;
- modifying vegetation to improve habitats for certain wildlife species;
- treating infested areas to prevent further spread of disease and/or insects;
- allow natural processes to prevail in wilderness areas;
- prepare sites for regeneration.

Prescribed burning may involve burning as it occurs on the ground (broadcast burning) or burning material that has been piled by machine or hand (pile burning). A key element in the application of all prescribed fires is a site specific prescription that establishes that parameters for fire use.

Prescribed burning on National Forest land is accomplished under the guidelines of the Washington State Smoke Management Plan, a part of the State Implementation Plan required by the Federal Clean Air Act, and the Final EIS on Managing Competing an Unwanted Vegetation, Pacific Northwest Region, Record of Decision. (See discussion earlier in this chapter, in Commercial Timber). The Smoke Management Plan is administered by the Department of Natural Resources. It considers the potential for smoke dispersion, the likelihood of smoke drift to sensitive population centers or Class I areas, and the amount to be burned, etc. There may be days that no burning is permitted, or that burning is severely restricted. No burning is permitted on weekends during the period from July 1 through Labor Day. Most prescribed burning on the Forest is done outside that window. Generally, broadcast burning is done in the spring and burning of piled debris is done in the fall.

Trends

The Vegetation Management EIS (USDA 1988b) requires that prevention of the need to burn is a preferred alternative. The Forest has taken an active position in reducing the amount of prescribed burning and to encourage utilization as an alternative to disposal. Refer to the wood residue section, page III-77, in this chapter.

Tighter merchantability specifications have resulted in more material being removed by the timber purchasers, thus reducing the amount left on the site for disposal. In addition, an increased awareness of the role that woody debris plays in maintaining long-term site productivity and wildlife habitats has resulted in the need to leave more material on the site. Analysis has shown that the contribution logging residue plays in fire protection needs has been overstated on the Forest (Richter, 1987 and Kapral, 1986). Alternatives that eliminate the need to use prescribed burning are preferred in all project-level analyses.

During the period from 1980 to 1989, the amount of prescribed burning done on the Forest declined from an average of 3,500 acres per year to approximately 250 acres per year. This represents a shift from broadcast burning of almost 55 percent of the harvested areas to burning approximately 10 percent. The current level of prescribed burning will continue into the future.

Burning of organic material has been identified as a major source of fine particulates in the Puget Sound area. In order to protect human health and achieve Federal goals to improve visibility where it had been impaired, the Washington Department of Ecology (in their 1985 Revision to the State Implementation Plan for Visibility Protection) has established a goal of a required 35 percent reduction in emissions of TSP from prescribed burning by 1990. The baseline for this reduction was calculated from the historical average for the period 1976-1979. The entire Puget Sound area averaged 155,900 tons of suspended particulates per year from prescribed burning sources; 57,000 tons or 37 percent were attributed to prescribed burning activities on the Mt. Baker-Snoqualmie.

Since the establishment of the baseline data, less broadcast burning has been done on the Forest, and emissions from prescribed burning dropped dramatically. Prescription parameters and ignition techniques have reduced consumption (thus particulate emissions). Post ignition mop-up has been more aggressive, reducing the smoldering phase (the period with the highest emission rates).

Prescribed burning of natural vegetation for wildlife habitat improvement or wilderness management purposes will generate considerable levels of particulate emissions. Since this a relatively new practice on the Forest, actual emissions rates are unknown. It is felt that 7.5 tons per acre burned is a reasonable estimate.

Class I Airsheds

The Forest has two federally designated Class I airsheds: Glacier Peak and Alpine Lakes Wilderness. The remainder of the Forest is designated as a Class II airshed. Mandatory Class I Federal areas are defined as all international parks, all national wilderness areas and memorial parks exceeding 5,000 acres

in size, and all national parks over 6,000 acres in size (Section 169A of the Clean Air Act, 1977 Amendments). Visibility protection within these areas is required.

The Washington State Department of Ecology must obtain Federal land manager concurrence that any proposed facility with pollution potential will not have any unmitigated impacts on the Air Quality Related Values in Class I areas. Values that may be considered include: visibility within the wilderness, water quality in high-elevation lakes and streams used by anadromous fish, any threatened or endangered plants that may be present in the area, etc. These will not vary by alternative, nor should management under any alternative affect the impacts from any off-Forest developments.

Visibility within the Class I areas of the Forest is usually good, though there are periods when visibility is temporarily impaired by smoke from prescribed burning, campfires, or from urban pollutants. Other adjacent Class I areas, administered by the National Park Service, may also be impacted by activities occurring on the Forest.

The areas added to the Wilderness System by the Washington State Wilderness Act of 1984 remain designated as Class II under the Clean Air Act. Redesignation of these wildernesses to Class I must be recommended by the State and analyzed by the Forest Service. To date, no recommendations have been made; any analysis would be outside the scope of this Forest Plan.

Recent research and field investigation have examined the possibility of acid deposition occurring on the Forest. During the month of September, 1985, samples were taken from 26 lakes on the Forest. These will be analyzed to determine how many lakes are already acidic and how many others are potentially sensitive to deposition (EPA 1985). Refer to the Water section of this chapter.

FIRE

Wildfires started by lightning have always been a part of the natural cycle affecting the structure of plant communities over broad acres of forest land. These fires often appeared to be catastrophic at the time. (Brown 1985) Fire has played a significant role in the ecosystem of the Mt. Baker-Snoqualmie National Forest. The presence of fire scarred trees and stumps, and of ash layers under the duff of old-growth stands are indicators that fire has been present for hundreds of years.

Before modern fire protection efforts began, fires occurred infrequently but often with high intensity. Lightning was the principal ignition source. These fires interrupted the plant succession patterns; the result is a randomly distributed mosaic of even-aged patches of vegetation. The size of these fires was limited by weather conditions, topographic features, drainage patterns, and natural barriers. Local ecological studies show these stand replacement fires occurred at intervals of 150 years at lower elevations on the south end of the Forest, to 300 to 1,000 years in higher elevations along the Cascade Crest.

Organized fire protection on the Mt. Baker-Snoqualmie National Forest began in the early 1900's with the detection and suppression of lightning fires. During this period, much of the current trail system was built to access the back

country. In the 1940's, an increasing number of roads were built, primarily to access timber. This improved access for fire protection, but also brought more people and activities into the Forest. Human-caused fires increased into the 1960's as use increased faster than did the capability to protect the area from fire. Prevention programs were intensified and more sophisticated fire-fighting equipment was used.

Currently, the Forest maintains six fixed emergency fire lookout stations; in the late 1940's, 53 fixed lookouts were maintained. Improved road systems, supplemented by the use of fire detection aircraft have reduced the need for fixed fire lookouts. In addition, approximately 60 percent of all wildfires are initially reported by the general public. A variety of communication and public media systems are used to inform the public of fire prevention activities, current weather and forest conditions, and forest fire prevention needs.

Since 1960, the number of human-caused fires has remained fairly stable due to more effective prevention efforts. Railroad associated fires have continued to decline due to increased prevention and improved equipment. The ratio of fire starts caused by lightning and caused by man has remained fairly constant since 1960; lightning caused fires are 44-46 percent of the total.

Wildfire

The following table shows a comparison of the total number of fires on the Mt. Baker-Snoqualmie for the period 1970-79 and 1980-89.

Table III-73
Total Fires by Decade

	1970-1979		1980-1989	
Cause	Number of Fires	Acres Burned	Number of Fires	Acres Burned
Lightning	332	246	104	29
Equipment Use	21	413	18	284
Recreation Activities	265	232	252	59
Debris Burning	49	1,200	18	158
Railroad	2	<1	5	<1
TOTAL	669	2,019	397	530

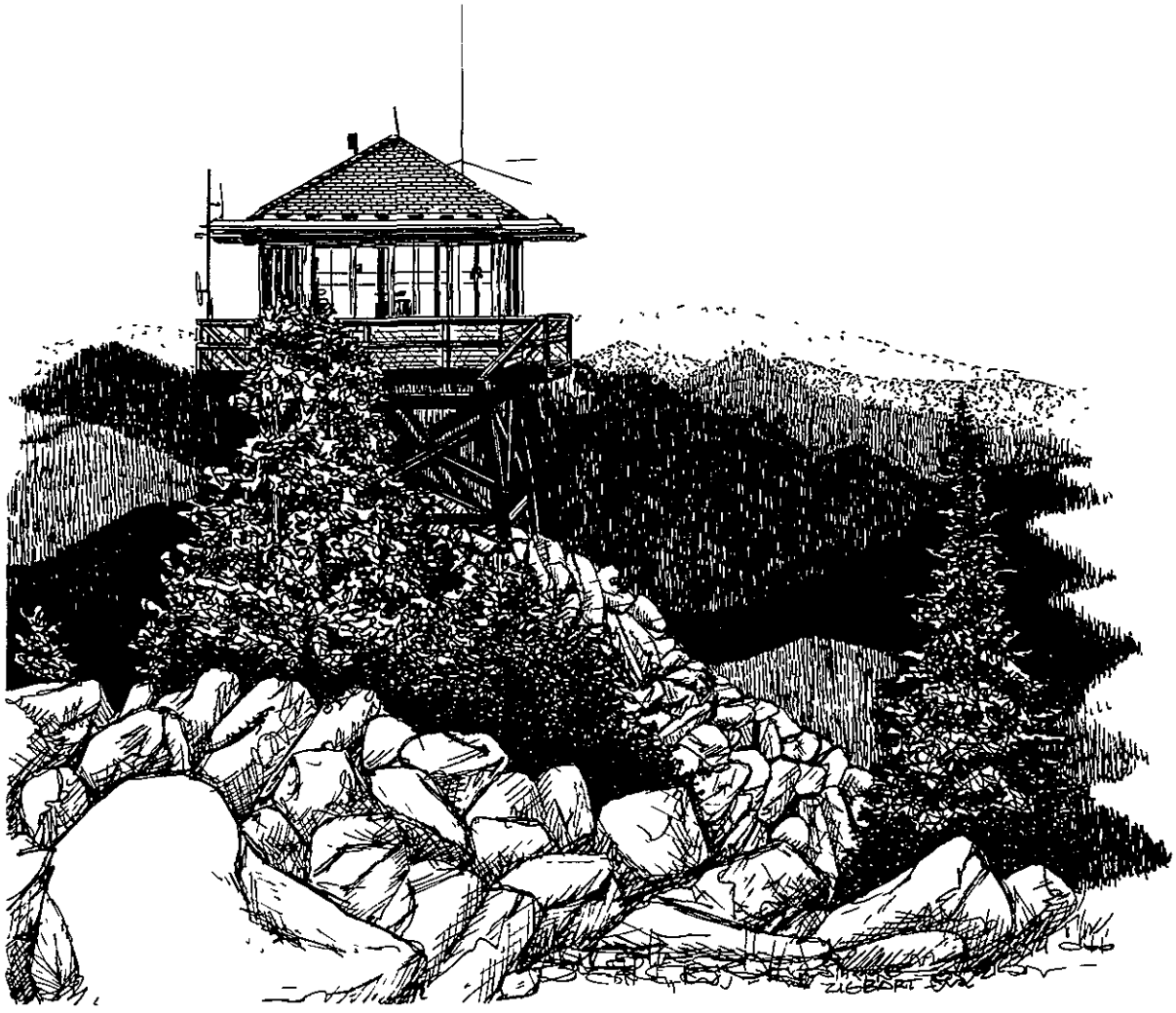
The majority of these fires (97%) were less than 10 acres in size. Most were slow spreading, low intensity fires that did little damage to soil or to living vegetation. The 36 fires over 10 acres in size were often associated with debris disposal activities or logging operations during periods of critical weather, especially east winds or as multiple fire start situations. Three started on private land adjacent to the forest and burned onto National Forest lands. Of the total larger than 10 acres, only 3 were caused by lightning.

A comparison between the 1970 decade and the 1980 decade shows little difference in numbers and burned acres except for lightning and debris burning. Lightning fires are a random event of nature and do not reflect past

management activities. The decline in number of debris burning fires and acreage burned is a direct result of the decline in amount of burning the forest has been doing.

Looking at the past 30 year period, the number of 10 acre and larger fires was about the same for each of the three decades. Large fires have been the exception. In 1967, during a three day period of critical weather and multiple fire starts, a total of 5,277 acres burned, 4010 from a single start. In 1988 a fire that originated in a logging operation on the forest burned a total of 2,600 acres of private and federal lands the majority of which was untreated logging residue. The forest can expect one fire in the 2,500 to 4,000 acre size class once every 15 or 20 years.

The frequency of fire starts and the typical size that has been experienced in the past 30 years is typical of an ecosystem that is not dominated by historic fire. Most ecosystems of the Western Cascades have developed under a regime of very infrequent but large high intensity stand replacement fires, occurring on a return interval of once every 250 to 500 years. It is reasonable to assume that fire protection efforts have not effected the ecosystem diversity of the forest.



Current Protection Programs - Reintroducing Fire Into the Natural Ecosystem

In the early part of this century, most resource agencies adopted the policy that forest and range fires were intolerable and damaging. The high intensity protection programs of the recent past have all but eliminated fire in the natural ecosystem. However, recent ecological studies have re-examined the role of fire in the ecosystem. With the overall objective of reducing fire suppression costs and maintaining or enhancing various forest resources, new programs are gradually being introduced.

In May 1984, the Mt. Baker-Snoqualmie adopted the Forest Service Appropriate Wildfire Suppression Response policy. Three possible strategies are available to the land manager: control the fire, contain it, or confine it. The selected strategy for each fire depends on variables such as land values of the area, the threat to public or private property or resources, the weather, the type of fuels burning, terrain factors, and people and equipment available to fight the fire. The confine strategy will generally be used in wilderness, where natural fire is considered to be an essential part of maintaining the wilderness ecosystem. Confine will also be applied to fires in other high elevation areas where the vegetation is sparse. Little or no resource damage is expected.

At this time, the Alpine Lakes Wilderness is the only wilderness on the Forest with an approved prescribed fire plan. (Refer to Alpine Lakes Wilderness Prescribed Natural Fire Action Plan.) This action plan was implemented in the summer of 1983. Since 1983, there have been seven fires in wilderness (the Mt. Baker-Snoqualmie portion). All spread to less than an acre, and burned themselves out.

The use of fire as a vegetative/habitat management tool may increase. The suppression actions of wildfire may decrease in areas with "near natural" management objectives. Where major investments in improvement and intensive management have been made, quick fire suppression response will continue to be a goal.

Coordination With Other Agencies

The 100 plus miles of boundary common with two National Parks and the 260,000 acres of private land inside the forest boundary have necessitated continued cooperation and coordination of fire protection programs over the years. Various operating agreements exist with the National Park Service and the Department of Natural Resources to facilitate this cooperation. The Forest also maintains close working relationships with the Bureau of Land Management.

In addition, the Mt.Baker-Snoqualmie National Forest has specific operating plans with the Northwest and South Puget Regions of the Washington State Department of Natural Resources; North Cascades and Mt.Rainier National Parks; the Puget Sound Agency of the Bureau of Indian Affairs; and the British Columbia (Canada) Forest Service. These agreements provide for sharing of personnel and equipment for initial attack and support for up to 24 hours without exchange of funds and for extended periods on a reimbursable basis.

The Mt.Baker-Snoqualmie also protects numerous small parcels of Bureau of Land Management lands (totaling approximately 700 acres) within and adjacent to the forest.

Other local operating agreements guide: a joint Forest Service - Department of Natural Resources dispatch office at Enumclaw; an offset protection agreement, where the FS and DNR exchange Initial Attack responsibilities on approximately 20,000 acres of intermingled lands; operations of two Initial Attack Engines, jointly staffed by Forest Service and DNR personnel; and forest dispatching of National Park Service overhead and crews for reinforcement actions outside the local area.

In addition to the suppression coordination efforts between the various wildland protection agencies in the Puget Sound Area, fire training, detection services, fire weather data collection, public use restrictions, and fire prevention activities are all done on an inter-agency coordinated basis.

With the probability of declining budgets and workforce constraints an all agencies there will be an increasing demand for coordination and cooperation between the Mt.Baker-Snoqualmie National Forest and the other wildland fire protection agencies.

MINERALS

Overview

Minerals are fundamental to the Nation's well being; Forest Service policy encourages the exploration for and development of the mineral resources on national forest land. At the same time, mineral exploration, development, and production activities are integrated with the use, conservation, and protection of all other resources.

Mineral commodities are classified by law into three distinct groups: locatable, leasable, and salable. Management of each commodity varies considerably as does the authority of the Forest Service to control the exploration for and development of each commodity.

Locatable minerals are those minerals which, when found in valuable deposits, can be acquired under the General Mining Laws of 1872 (as amended). Examples of locatable minerals occurring on the Mt. Baker-Snoqualmie National Forest include, but are not limited to, copper, gold, molybdenum, tungsten, olivene, chromite, nickel, zinc, silver, lead, and uncommon varieties of limestone, gemstones, and other minerals having unique and special values.

Citizens and those who have declared their intent to become citizens of the U.S. have a statutory right to explore vacant, unwithdrawn public land for these minerals. Upon discovering a valuable deposit, they have a right to locate, mine, and remove the minerals. Forest Service control of these activities is limited to minimizing impacts on surface resources. This is accomplished by reviewing plans of operation to ensure environmental protection standards are met. Protection standards include standards for air, water, cultural resources, threatened and endangered species, and many others. The prompt reclamation or restoration of disturbed lands is accomplished as part of the operating plan process.

Leasable minerals are those mineral commodities which may be acquired under the Mineral Leasing Act of 1920, as amended, the Mineral Leasing Act for Acquired Lands, and the Geothermal Steam Act of 1970. Recent law affecting leasable minerals includes the Federal Onshore Oil and Gas Leasing Reform Act of 1987, and in 36 CFR parts 228 and 261 Regulations, published in the Federal Register in final, March 1990. On the Mt. Baker-Snoqualmie, leasable minerals include coal, oil, gas, and geothermal resources. Also included are all minerals except saleable when occurring on acquired lands. These minerals are subject to exploration and development under leases, permits, or licenses granted by the Secretary of Interior. This authority is administered by the Bureau of Land Management. Forest Service authority for management of these leasable minerals is still oriented toward surface protection. However, its control of prospecting and development activities is considerably stronger in this case than it is for locatable minerals. Table III-74 summarizes Forest Service mineral leasing responsibilities for the public land it administers.

Table III-74
Mineral Disposal and Activity Responsibilities

Commodity	Public Domain Administered by the Forest Service	Acquired Lands Administered by the Forest Service	Preliminary Prospecting Permits 1/
Oil and Gas	BLM requests F.S. consent for leasing & F.S. approves all surface use activities.	BLM requests F.S. consent to lease & F.S. concurrence for permit to operate.	F.S. has authority to issue a permit.
Coal	BLM requests F.S. consent to lease & permit to operate.	BLM requests F.S. consent to lease & permit to operate.	F.S. permit specifically prohibited.
Hardrock Minerals	Locatable = Non-discretionary.	BLM requests F.S. consent to issue a prospecting permit, to lease, & operate.	F.S. has authority to issue a permit.
Geothermal	BLM requests F.S. 2/ consent to lease & to operate.	BLM requests F.S. consent to lease & to operate.	F.S. has authority to issue a permit.

1/ Permits are nonexclusive, do not allow removal of minerals for other than sampling, and do not lead to a preference right lease.
2/ Both public domain and acquired lands categories.

Recommendations concerning the availability of lands for mineral leasing are based on whether development activities could be implemented on National Forests lands and meet the current land management direction.

Processing of mineral use authorizations for federally owned leasable minerals is directed by the policies and procedures set in the June 19, 1984 Interagency Agreement between the Forest Service and the Bureau of Land Management (BLM). In summary, the agreement calls for the Forest Service to participate with the BLM in the formulation of site-specific terms and conditions in the operating plans. The plans must provide appropriate mitigation measures to ensure that adverse impacts on surface resources will not exceed applicable environmental protection standards. Procedures for leasing oil and gas resources and administering the associated activities are addressed in the Federal Onshore Oil and Gas Leasing Reform Act of 1987, published final in the Federal Register, March 1990.

Salable minerals are common varieties of sand, stone, gravel, pumice, pumicite, cinders, and clay. In general, these minerals are of widespread occurrence, and are of relatively low unit value. They are generally used for construction materials and for road building purposes. These minerals are disposed of under the authority of the Materials Act of July 31, 1947, as amended by the Act of

July 23, 1955. Disposal of salable minerals from public lands administered by the Forest Service is totally at the discretion of the Forest Service (see regulations in 36 CFR part 228). Management of operations on permit areas is similar to the management of leasable mineral activities.

Geologic Setting

The Mt. Baker-Snoqualmie is located along the west side of the crest of the Cascade Mountains. The core of the Cascades - a young range in geologic time -consist primarily of granitic and metamorphic rocks. The contact zones between these two types of rocks are of considerable interest because these zones are often the geologic environment in which metallic mineral resources occur. There are also several ultrabasic bodies (gabbro and dunite) which are located within the area and are of importance for their mineral resource values.

The flanks and foothills of the Cascades, down to the Puget Sound Lowlands, consist of sedimentary, metasedimentary and volcanic rocks, which may or may not be overlain by recent (in geologic time) alluvium and/or deposits of glacial materials. It is these younger sedimentary rock which are of importance for their potential oil, gas, and coal resources.

There are three inactive volcanoes on or near the Forest: Mt. Baker, Glacier Peak, and Mt. Rainier. All have been volcanically active in Recent (geologic) time. That volcanism was the source of the extensive andesitic flows north of Mt. Rainier, the pumicite and limited volcanic flows around Glacier Peak, and the relatively restricted volcanic flows around Mt. Baker. It is these volcanic centers and the associated fault systems which appear to have the most potential for the occurrence of geothermal related resources.

The Cascade Mountains and the entire Puget Sound area were shaped, to a considerable extent, by both continental and alpine type glaciation. The results of that glacial activity are the large "U" shaped valleys and the abundant glacialfluvial and glaciolacustrine sand, gravel and clay deposits. Those deposits have provided ample supplies of construction materials for the industrial demands and urban expansion of the Puget Sound area.

Locatable Minerals

The Mt. Baker-Snoqualmie National Forest has a long history of mining, dating back to the late 1800's. Numerous mining claims have been located and maintained since that time. Presently, there are approximately 4,000 mining claims properly recorded for the Forest. The majority of these are located in the Middle Fork Snoqualmie, Sunset-Silver Creek, Vesper Peak, Silverton, Sultan, Darrington, Sauk River, Lone Jack and Twin Sisters areas. These claims reflect a continuing interest in the locatable mineral resources of the Forest.

A mineral resource overview has been prepared to assess the present and future potential for the development of locatable mineral resources on the Forest. The overview is based on a literature search. A rating for the potential for the occurrence of mineral resources has been assigned to various areas. It is considered a probabilistic assessment. It indicates, on a relative scale, the odds for successfully finding mineral resources which can be profitably developed. A total of 148,187 acres within the Forest have a moderate to high potential for development of locatable minerals; see Table III-75.

Table III-75
Potential Minerals

Locatable Minerals:	148,187	acres have Moderate to High Potential.
	69,141	acres of these are withdrawn as wilderness.
Energy Minerals:	1,230,478	acres are classified Prospectively Valuable.
	536,848	acres of these are withdrawn as wilderness.

As Table III-75 indicates, the Forest contains potentially significant occurrences of copper*, gold, molybdenum, silver*, lead*, zinc*, chromium*, nickel*, and olivine. (* = Commodities identified as critical or strategic minerals.) Of the metallic minerals, copper and gold appear to have received the most interest in recent years. The copper deposits are not only of interest for their copper values; copper deposits are also often associated with molybdenum, silver, gold and tungsten, which would be produced as by-products should development of the copper occur.

Exploration/development activities have declined during the past few years. This decline is most likely attributed to low market prices and higher costs for resource protection and rehabilitation. Also, availability of land for mineral entry has been affected by withdrawals associated with wilderness designation.

However, interest continues to be expressed, measured by the number of claims located and maintained, by annual assessment work completed, and by the number of notices of intent received. Areas of most interest appear to be the Vesper Peak, Miners Ridge, Carbon River, Church Mountain, Grand Excelsior and Sunset-Silver Creek areas. Interest in the gold deposits of a few other areas is reflected in the number of operating plans filed. Most of this current activity is of a superficial nature.

There are a variety of minerals collected recreationally on the Forest; quartz crystals, garnet, talc or soapstone, olivine, and pyrite appear to be the main

targets of collectors. Of these, the recreationists are most attracted to the garnet occurrences in the Denny Creek, Maloney, Guye Peak, and Vesper Peak areas, where the garnets are not only of good quality but are also often associated with magnetite, epidote, vesuvianite, quartz and calcite crystals. The best known occurrences of quartz crystals is reported to be in the Snoqualmie River drainage. Good agate is reported to be in the Green River drainage and carving grade talc can be found along Marble and Sibley Creeks.

Those collectable minerals of á "locatable" nature are removed from valid mining claims under the authority of the Mining Law of 1872 and an approved operating plan. Removal of more than nominal amounts of the collectable, common variety minerals requires that a permit be issued.

The Forest contains a variety of nonmetallic mineral resources, which may or may not be locatable. Olivine is the only one being commercially produced at the present time. The Twin Sisters massif near Mt. Baker is one of the largest deposits of nearly pure olivine (iron magnesium silicate) in the world. Northwest Olivine has been mining 30,000 tons per year (gross value is $25/ ton or $ 750,000 per year) for several years in the Twin Sisters area. Two other potential producers are attempting to enter the olivine market. Since the resource is virtually inexhaustible, these deposits will meet any foreseeable demand.

The Forest also contains numerous deposits of limestone, some of which are cement grade and may be of a locatable nature. Most deposits are thin, rarely exceeding a thickness of 50 feet; however, some are much larger and may contain reserves of 1,000,000 tons or more. Though the resource is known to exist on the Forest, other limestone sources adequately serve the existing market; consequently, there is presently no limestone production from the Forest.

Clay of glacial origin is found along several major drainages. Samples taken on the South Fork Stillaquamish River have been tested by a major producer and found to have valuable properties for use in the manufacture of certain types of brick. However, there is no present production of clay.

The Forest also has garnet deposits which have potential, but presently there is no indicated interest in developing the resource for commercial purposes.

As on-going mineral activity is relatively minor in scope, locatable mineral resources on the Forest presently play a limited role in the National, Regional, and State-wide social and economic structure. But, the economic and, to some extent, the social characteristics of eastern Snohomish and Whatcom Counties could be significantly affected should the price or demand situation for both precious and base metal commodities change. As new depositional models are formulated and extrapolated to areas having potential, exploration activities may be attracted to these parts of the Forest. The result would be to generate heavy pressures on Forest management within these areas.

Leasable Minerals

Leasable mineral potential has not been assessed in the same manner as have the locatable mineral resources. Portions of the Forest have been classified by the Bureau of Land Management (previously U.S. Geological Survey and Mineral Management Service) as being prospectively valuable for oil, gas, coal, and geothermal resources. Those areas classified as prospectively valuable for

leasable minerals are the areas considered to have at least a "moderate" potential for future development until exploration proves otherwise.

A total of 1,230,478 acres within the Forest are classified as prospectively valuable for development of energy minerals (Table III-77). Only 18,225 acres are classified prospectively valuable for oil and gas resources. A total of 18 oil and gas leasing applications, covering 76,893 acres, have been received by the Forest.

The leasing cycle is in a downturn mode; without some important discovery of oil or gas in the area or a return to the energy shortage situation of the mid-70's, it is expected to stabilize or decline slightly over the next 5 years. Revenue produced from mineral leasing on the Mt. Baker-Snoqualmie National Forest during Fiscal Year 1985 was $52,949, of which $26,475 was returned to the State and counties. This represents rental returns only. Should production begin, royalties would increase this revenue substantially.

Based upon available data, oil and gas resources are not presently known to exist on the Forest in commercial quantities. However, to date, only limited geophysical surveys for oil and gas have been conducted. All of the leasing activity has been concentrated in the White River and Carbon River areas, where Eocene marine and nonmarine sedimentary rocks may underlie younger volcanic rocks. It is doubtful that the area would contain oil, but it does have an unexplored potential for the occurrence of natural gas. From existing information, the potential for the occurrence of petroleum resources on Forest lands appears to be low. Barring any significant discoveries off-Forest, oil and gas activity on the Forest over the short-term is expected to remain relatively minor and will be dominated by speculative leasing actions and exploration activities.

A total of 76 geothermal lease applications have been received; 25 of these are pending (February, 1990). As with oil and gas, geothermal resources are not known to occur on the Forest in commercial quantities. However, the majority of the Forest has been classified "prospectively valuable" for the resource: 1,222,812 acres, which includes areas overlapping acres prospectively valuable for development of other energy minerals. Until deep exploration proves otherwise, the area is considered to have at least a moderate potential for the occurrence of this resource.

According to a recent study (Bloomquist and others 1985), the lands managed by the Forest have 14 identified hot or mineral springs. Of these, none have been identified as having direct utilization potential. The Mt. Baker and Baker Hot Spring sites (T.38N.,R.7,8 and 9E.) are identified as having electrical generation potential. The majority of applications received by the MBS have been filed for areas around Mt. Baker; several applications have also been filed for the Sulphur Creek Hot Springs area, which may be an indication of unexplored potential there. In the near future, any geothermal activities on the Forest are likely to be dominated by exploration until a proven resource is identified. Large scale development in the Mt. Baker area is possible, but not likely within the next twenty years.

The forest presently has no coal leases or pending coal lease applications. However, large portions of the Forest have been classified "prospectively valuable" for coal resources: 107,850 acres, which includes areas overlapping acres prospectively valuable for development of other energy minerals. In

response to changing energy demands, considerable attention has recently been focused on the coal deposits lying just outside the southwest part of the Forest. Should development in this area occur, expansion into the coal on National Forest lands is possible.

There has also been considerable interest in potential production of methane from unmined and unminable coal seams in Washington, which would help to meet the energy demands of the future. Even though this type of development represents a potential future use of the coal, it is unlikely that such development will occur within the next ten to twenty years.

Salable Minerals

The Forest maintains a detailed inventory of rock sources. That inventory is available at Ranger District offices. The dominant market for these mineral materials (sand, gravel, and stone) is the Forest's timber management program. The future demand for these materials will reflect the level of road building and maintenance needed in conjunction with timber harvest activities. Disposal of other types of common variety minerals is insignificant, and presently, the supply appears adequate to meet the anticipated future demand for construction purposes.

The total production of sand, gravel, and stone during the period from 1970 to 1979 was approximately 6,000,000 tons, with a gross value of $11,000,000. Sand and gravel comprises about 10 percent and stone 90 percent of this total. Annual production rates are quite variable, ranging from about 350,000 to 1,350,000 tons. Current production is about 350,000 to 400,000 tons per year. The majority of this is construction materials supporting Forest Service timber management and State highway construction.

In the immediate future, the demand for this resource is expected to lessen in response to reduced road construction activities associated with timber harvest activities. The demand for county and State highway construction is significant locally, but highly variable in the long term.

Supply - Demand Summary

According to U.S. Bureau of Mines data, Washington State ranked 33 out of the 50 states in annual mineral production during 1984. Of the minerals produced in Washington, sand and gravel and industrial minerals far exceeded any of the other commodities. With several gold mining operations coming on line throughout the State, however, production in the future may reflect a change. The Mt. Baker-Snoqualmie's contribution to overall State production was minor.

Except for olivine, locatable mineral activities on the Mt. Baker-Snoqualmie have been depressed during the past few years, due to depressed gold, silver and copper prices and to a shortage of risk capital. However, Bureau of Mines data indicates the demand for mineral resources will continue to increase at an annual rate of at least 1.0 percent to 2.2 percent. As a consequence, locatable mineral related activities (claim staking and maintenance, exploration, development, panning, sluicing, suction dredging and rockhounding) are expected to remain at the current level or possibly increase slightly throughout the next 10 years.

Should exploration activities being conducted throughout Washington State prove positive and new theories concerning mineralized environments be developed and extrapolated to the Mt. Baker-Snoqualmie, mineral activities on this Forest would increase somewhat. Should gold, copper and silver prices return to previous levels, activities related to these three commodities would increase significantly.

Leasing activities are anticipated to decline somewhat over the short-term, but exploration for geothermal, coal, and oil and gas resources in localized areas may increase. Assuming the nationwide demand for energy resources will continue to increase and, considering the political environment around foreign sources of oil, it is highly likely that the demand for domestic sources of oil and alternative sources of energy (coal and geothermal) will increase significantly. The result would be a significant increase in energy mineral exploration activity on the Forest.

While the public's demand for common variety minerals is expected to continue at current levels or possibly increase slightly, the Forest Service demand is expected to decrease slightly. As a consequence, the overall demand for these mineral commodities is expected to decline somewhat over the next ten years.

Land Status

All lands on the Forest are open to prospecting and mining except in certain areas, such as campgrounds or administrative sites which are formally withdrawn from mineral entry; areas where mineral rights are in other than public ownership; or where the mineral estate is outstanding. Presently, the Mt. Baker-Snoqualmie N.F. has 82 areas withdrawn from mineral entry, totaling 14,600 acres. These areas are withdrawn primarily to protect roads, developed recreation sites, and administrative sites.

Mineral withdrawals in designated wilderness are a special category. The Wilderness Act of 1964 authorizes prospecting. However, as of January 1, 1984, or as of the Washington State Wilderness Act of 1984 (July 3, 1984), the minerals in lands designated as wilderness are withdrawn from all forms of appropriation under the mining laws. Valid mining claims perfected prior to

those dates may still be operated. Subject to operating plan requirements, claimants may conduct mining or mining-related activities on valid mining or mill site claims within wilderness, if the claims were perfected as of withdrawal from mineral entry. Forest Service objectives are ensuring that any development project would have as little impact on wilderness resources as possible. No new leases will be issued in wilderness.

The Forest has additional areas which have been withdrawn from mineral entry for the benefit of other agencies (such as FERC, The Geological Survey, etc.), usually to protect reclamation projects, powersites, and transmission corridors. Those withdrawals have not been identified here.

Land status changes (exchanges, disposal, withdrawal) have the potential to affect the availability of mineral resources for future production. The effect of a change in ownership is usually minor, since valuable mineral deposits will generally be developed whether in public or private ownership. However, the effects - both direct and cumulative - of withdrawing lands from mineral entry can be significant.

Review of withdrawals outstanding as of October 21, 1976, is mandated by Section 204 of the Federal Land Management and Policy Act of 1976. That required review is not a part of this planning process, but all existing withdrawals will be reviewed prior to 1991. Recommendation for retention, revocation, or partial revocation will be made based upon an analysis of the resources being protected and of the mineral potential of the area. Where adequate protection is provided by other means or a withdrawal is no longer necessary, it will be revoked or reduced in size. Requests for any new withdrawals will be processed according to Bureau of Land Management regulations and Forest Service guidelines.

Reserved minerals, which involve those situations where the surface estate was conveyed but the mineral estate was reserved to the United States, generally are subject to the location of mining claims and normal mineral leasing procedures.

Outstanding minerals, which involves those situations where the Forest Service acquired the surface estate but not the mineral estate, are not subject to location or leasing under the Federal mining laws. The Forest Service assumes the role of any other surface owner. Based upon past practice, the surface estate will be managed consistent with the principles of the surface management regulations (36 FCR 228).

Access Requirements

Reasonable access is essential to mineral exploration and development. In general, existing forest roads and trails are adequate to satisfy the access requirements for the level of exploration activity conducted during the past 10 years. With several notable exceptions in wilderness, all of the potential mineral areas are served either by existing passable roads or by roads and trails impassable only due to natural deterioration, a result of non-use and lack of maintenance. Otherwise, there are no identifiable major needs for access to any of the inventoried mineral potential areas. Local access needs within areas will be authorized in connection with site-specific activities to be proposed in operating plans.

LAND OWNERSHIP AND LAND USES

As briefly discussed in the introduction to this chapter, 259,545 acres (13%) of the 1,983,774 acres within the boundary of the Mt. Baker-Snoqualmie National Forest are not National Forest land. Most of this intermingled land is located in the southern portions of the Forest, south of Interstate 90.

Principle corporate owners of adjacent and intermingled lands are: Weyerhaeuser Company, Plum Creek Timber Company, Scott Paper Company, and Georgia Pacific Corporation. Much of this land is managed for timber production.

In intermingled or "checkerboard" ownership areas, industrial forest management practices usually result in much faster harvest of old-growth timber on private land. This rate of cutting and the related road construction substantially affects roading, timber harvest, wildlife habitat management, scenery, and recreation on public lands because of the cumulative effects of timber harvest and roading on soil and water quality. It also limits the opportunity to manage public lands for unroaded uses.

Other principle owners are the City of Seattle, in the Cedar River Watershed (see below), and the Washington State Department of Natural Resources.

In addition, there are many existing withdrawals of land, for mineral entry for power sites, electric power withdrawals, water withdrawals, and recreation withdrawals. The Bonneville Power Administration has four energy transmission corridors that cross the Forest, which are managed under agreements signed with the Forest Service. These are discussed in detail below.

Land Ownership Adjustment Program

In the past, the Forest and the large corporate owners of intermingled lands managed their adjacent holdings through mutual access, under cost-share agreements. A number of small land exchanges were made to consolidate ownership, but few large acre exchanges were made.

Since 1975, the number of land exchanges has increased. National policy is to complete land exchanges to consolidate National Forest lands and non-National Forest lands within the exterior boundary of the Forest. Isolated tracts, detached parcels, and projecting narrow strips of National Forest land are examples of lands considered for exchange.

Other considerations in land exchange are the resources on each parcel. The Forest aims to acquire lands that increase the Forest's ability to provide services and produce goods. Lands sought for acquisition should be mostly free of legal and administrative constraints, and should allow a broad range of management options. For example, the program seeks to acquire lands with important fisheries, cultural sites that are candidates for the National Register of Historic Places, habitat for threatened or endangered species, or lands with vegetation that may improve the species and age distribution in an area.

In 1976, under the Alpine Lakes Management Area Act (P.L. 94-357), the Forest Service was directed to acquire private in-holdings in the Wilderness and the Intended Wilderness. Once acquisition of all non-Federal lands within the

Intended Wilderness was completed, those Intended parcels were to be added to the Alpine Lakes Wilderness.

All exchanges in the Intended parcels were completed in 1985 and the 25,977 acres of Intended Wilderness have been added to the Alpine Lakes Wilderness.

There are three land exchange cases in progress on the Forest; under consideration for acquisition are about 8,000 acres of non-federal land. The parcels involved are located throughout the Forest, excluding the White River Ranger District.

Cedar River Watershed Agreement

Seattle draws its water from the South Fork Tolt River and the Cedar River, both of which are partly on National Forest lands. For the Cedar River, a 1962 Cooperative Agreement between the City of Seattle, Forest Service, and private landowners has directed management in the watershed. During the last 20 years, as timber was harvested from National Forest lands within the watershed, the cut-over areas were exchanged for city land within National Forests throughout the State of Washington. Approximately 18,000 acres remain to be exchanged.

The management goals of that Agreement for City-owned lands have recently been modified by the City's Secondary Use Policies. As new findings on wildlife/ wildlife habitat protection needs become known, changes in the management direction for National Forest lands in the watershed are likely to occur as well.

The Forest Service will initiate negotiations on a new Cooperative Agreement between the City of Seattle and the Forest, to reestablish goals and objective for management of the watershed. Until a new agreement is negotiated, the Forest Service will not enter into new land exchanges affecting National Forest lands within the Cedar River watershed. Pending a new agreement, the 1962 Cooperative Agreement remains in effect. When a new agreement is reached, the Forest Plan will be amended to incorporate its goals and direction.

Land Use By Others

The Forest provides lands for a wide variety of special uses by private individuals and public agencies. Such uses are authorized by special use permits, mining laws, and withdrawal authority of other agencies. The most common are those covered by special use permits. Special use permits are grouped into nine categories. Examples of permitted special uses are: electronic sites, telephone lines, roads, reservoirs, pipelines, hydroelectric feasibility studies, powerlines, and organized group events.

There are 590 special use permits (April 1990) on the Mt. Baker-Snoqualmie; they are shown, by category, in Table III-76. Activities involving the greatest area include ski slopes, cooperative easement cost shared roads, powerlines, powerplants, and electronic sites (primarily Jim Creek Electronic Site). These uses produced $ 628,700 in fees in fiscal year 1985. The number of permits and acres under permit change as some permits terminate and new uses are added.

Table III-76
Special Use Permits

Ranger Dist.	Category 1/ 100	200	300	400	500	600	700	800	900	Total
Mt. Baker	21	80	0	9	35	40	12	2	8	99
Darrington	8	6	1	5	1	1	3	4	6	35
Skykomish	18	6	2	8	8	12	2	8	12	76
North Bend	42	2	6	8	8	2	6	6	2	82
White River	212	10	0	1	0	2	1	2	70	298
TOTAL	301	32	9	31	52	21	24	22	98	590

1/ Category
100 - Recreation
200 - Agriculture
300 - Community and Public Information
400 - Feasibility
500 - Industry
600 - Energy Generation & Transmission
700 - Transportation
800 - Communications
900 - Water
700 - Transportation
800 - Communications

The demand for electronic and telephone facilities has been increasing each year. Television and movie filming is also a very popular use of the Forest. Because of the proximity to the Seattle-Tacoma metropolitan area, the trend for special uses is maintaining existing levels or a slight increase.

Special uses are periodically inspected to ensure compliance with conditions of the permit and to evaluate the appropriateness of continuing such use. Most permittees are charged fees for the privilege of using National Forest lands.

THE BUILT ENVIRONMENT - ROADS

The Forest road system is a major component of the environment. Roads provide access for all types of recreation and viewing of scenery. One of the popular uses of National Forest land is driving for pleasure. The road system also provides access for the extraction of resources from the land: timber, minerals, etc. Roads allow easy access for fire protection; the old lookout system has almost completely been replaced by aerial surveillance and improved road access. Roads also provide access for many types of fish and wildlife habitat improvement.

Road construction also probably results in the greatest amount of ground disturbance of any forest activity (Wildesen 1982). The impacts of road construction and road use following construction are numerous. Excavation of a road prism removes support for the soil above the cutbanks. Depending on the soil type, slope steepness, and presence of subsurface water, roads across some sideslopes can initiate or accelerate slope failure (Anderson 1971, Swanston and Swanston 1976).

Roads - and to a lesser degree, trails - intercept and change the surface and subsurface drainage patterns. Rainfall on many roads, especially paved roads, becomes instant runoff, as there is no longer any soil to store and slowly release water.

The relationship between forested roads and the occurrence of increased erosion and sedimentation is well documented. Some have concluded that forest roads are the primary initiator of erosion caused by human activities (Sibbons and Salo 1973, Yee and Roelofs 1980). Increased sediment in streams after road construction can be dramatic and long-lasting; the incremental sediment from roads, on a per unit basis, is often many times that from all other land management activities, including log skidding (Yee and Roelofs 1980). In turn, sediment in streams can have a direct and adverse effect on salmonids and their habitat. Roads influence wildlife and their habitat. Effects vary by species, by time of year, and depend on whether roads are open or closed to human use.

For example, the existence of a road may have little impact on species such as deer, elk, and mountain goats; the traffic and associated human activities that occur because the road is open disturbs these species (Geist 1978).

Road management, including year around or seasonal closures, can be used to protect a number of resources. There is the potential to reduce human activity in sensitive wildlife areas (such as bald eagle habitat, or peregrine nesting/foraging territory) and to protect cultural resources from vandalism.

The Forest Road System

The Forest road system includes approximately 2,829 miles of roads. Of these, 2,302 miles are located on National Forest lands within the forest boundary. In addition, the Forest shares in the administration, maintenance, and reconstruction of about 527 miles of roads. Of these, 335 miles occur on private lands within the forest boundary. The Forest has acquired legal rights of access across the private land to reach National Forest land. The other 192 miles are on private, county, or State lands outside the forest boundary. Legal access has been acquired to reach National Forest land.

The road system is divided into three functional classes. Arterial roads form a network of primary travel routes, and usually connect to public highways. Arterial roads are developed for constant, and long-term use. Collector roads serve smaller areas and connect to Forest arterial roads or public highways. They may be operated full-time or intermittently. Local roads connect destinations or facilities, such as recreation areas, trailheads, or timber sales, to collector or arterial roads. Local roads may be developed for either short- or long-term use.

Over half of the 2,829 miles of roads on the Forest system are local roads; about 32 percent are collectors and 17 percent are arterial roads.

Table III-77
Existing Road System (1984) - Miles of Roads

	Within N.F. Bndry		Outside N.F. Bndry	
Functional Class	Roads on NFS Land	Roads on Private Land	Roads on State, Co. & Private Land	TOTAL
Arterial	326	56	105	487
Collector	753	107	52	912
Local	1,223	172	35	1,430
TOTAL	2,302	335	192	2,829

A majority of the existing roads were initially built to access areas planned for timber harvest, as part of a timber sale contract. Other roads, primarily main access, were constructed using appropriated funds to provide access for a broad range of uses. A third category were built primarily for recreation access to campgrounds, trailheads, and other features.

Once constructed, roads are managed for the range of uses planned for the area. Future demands may require construction of additional roads for recreation as well as timber access needs, but most of the demand for additional dispersed recreation access will be met by the roads constructed for timber sales. Reconstruction of some roads (widening, paving, adding shoulders etc.) can better accommodate a mix of users.

The average road density on the Mt. Baker-Snoqualmie, on areas managed intensively for timber production, is currently about four miles of road per square mile, or 3 percent. The density, when spread over most sub-basins is less, due to the presense of lands managed for other than timber.

Currently, some of the system roads are closed to public use; most of these are temporary roads that were constructed to access timber harvest areas. They may be reopened to again access those areas if future management goals so indicate. Others are accessible only by high-clearance vehicles. The table below shows the situation as of June, 1986.

Table III-78
Miles of Road By Accessibility - 1986

Total System Roads	2,829 miles	100 %
Accessible to Passenger Car	1,039	37 %
Accessible Only to High Clearance Vehicles	1,483	52 %
Closed to Public Use	307	11 %

Maintenance

Vegetation Management. Removal of unwanted roadside vegetation is important for safety and visibility and also to protect the road investment. Annually, an average of 300 to 400 miles of roads are "treated". Only a very small amount of herbicides were used. The Forest (and Pacific Northwest Region) are currently under an administrative stay against use of herbicides. Refer to the discussion in the Commercial Timber section of this chapter for more information on the regional programmatic environmental impact statement for Managing Competing and Unwanted Vegetation. Road maintenance has been, and continues to be accomplised by mechanical means.

Road Construction and Maintenance Costs. The following costs have been applied on the Mt. Baker-Snoqualmie National Forest; constant 1982 dollars are shown.

Table III-79
Road Construction and Maintenance Costs

Development and Construction Costs	Costs Per Mile 1982 Dollars
Arterial & Collector	$ 280,000 1/
Local	$ 145,000 1/
Temporary	$ 21,000

Maintenance Costs	Costs Per Mile (1982 $)
Appropriated Funds (cost/mile, arterial-collector/year)	$ 300
Charged to Purchasers (cost/thousand board foot)	$ 50

1/ Includes preconstruction and construction engineering.

THE BUILT ENVIRONMENT - UTILITY CORRIDORS

Four utility corridors cross the Forest under Memorandum of Understanding agreements signed with the Bonneville Power Administration (BPA) in 1974. The major transmission corridor follows the Green River, crossing the Cascade Mountains at Stampede Pass. The other three corridors are located along the Skagit River, through Stevens Pass, and across Snoqualmie Pass. A total of 30.5 miles of utility corridor are located on National Forest land. Table III-80 and Figure III-31 show the acres involved in each corridor and the approximate location of each.

Each corridor contains several powerlines; corridors range in width from 150 to 600 feet; a total of approximately 1500 acres are in utility corridors. The existing utility Corridor Project Plan and Right-of-Way Maintenance Plan guide construction and maintenance activities. Current management of the lands within the corridors is limited, though the corridors do receive some dispersed recreation use, such as cross-country skiing, snowmobiling, and hiking and horse use. Planned activities and management uses, such as growing Christmas trees, are coordinated with the BPA.

Some amount of "vegetation management", or removal of unwanted vegetation, is done each year in the utility corridors. It is necessary to limit the height of trees and shrubs in the corridors so that the vegetation does not interfere with the transmission lines. The Forest Service and Bonneville Power Administration and Puget Sound Power and Light coordinate vegetation management in the corridors. Management plans have been developed for each mile segment of each powerline within the four corridors. Standards are established, detailing how high the brush may reach, etc. Both companies are responsible for the actual work.

Removing brush and trees in the corridors has been accomplished, in the past, by helicopter application of herbicides or by spraying the chemicals from a truck. Stream crossings and water courses have always been "treated" by hand chopping the unwanted vegetation. Since 1984, all removal of brush and trees has been done mechanically or by hand. Refer to the detailed discussion in the Commercial Timber section of this chapter.

Table III-80
Miles of Utility Corridor - National Forest Land

Green River-Stampede Pass	5.9
Skagit River	0.3
Skykomish River-Stevens Pass	17.4
Snoqualmie River-Snoqualmie Pass	6.9
TOTAL	30.5

Washington State is currently operating with a surplus of generated power; however, this surplus can be expected to be depleted within the next few years. The continued growth of the Puget Sound area is placing increasing demands on the regional power supply system. The projected demand for

electricity through the year 2002 ranges from an annual growth rate of 0.3 to 2.7 percent (BPA, Forecast of Electric Consumption in the Pacific Northwest, 10/86).

As many of the potential additional power sources are located east of the Cascade Mountains, at Hanford, the need for transmitting energy across the utility corridors through the Cascades will continue. The one remaining cross-Cascade utility corridor lies in the Pyramid Peak-Tacoma Pass area. See Figure III-31, on the next page. Future power lines may also run from Hanford, south to Portland, and then north to Seattle.

Present transmission capacities are adequate to serve the Puget Sound Area through the mid-1990's. Afterwards, higher capacity lines would need to be installed over Stampede or Snoqualmie Pass. BPA is currently evaluating tranmission requirements for serving the Puget Sound Area. Expansion of capacity on Stevens Pass, which serves the north Puget Sound Area, could be needed prior to the year 2000. New technology allows a four-times increase in the capacity of each existing power line, with only a minimal increase in the corridor width.

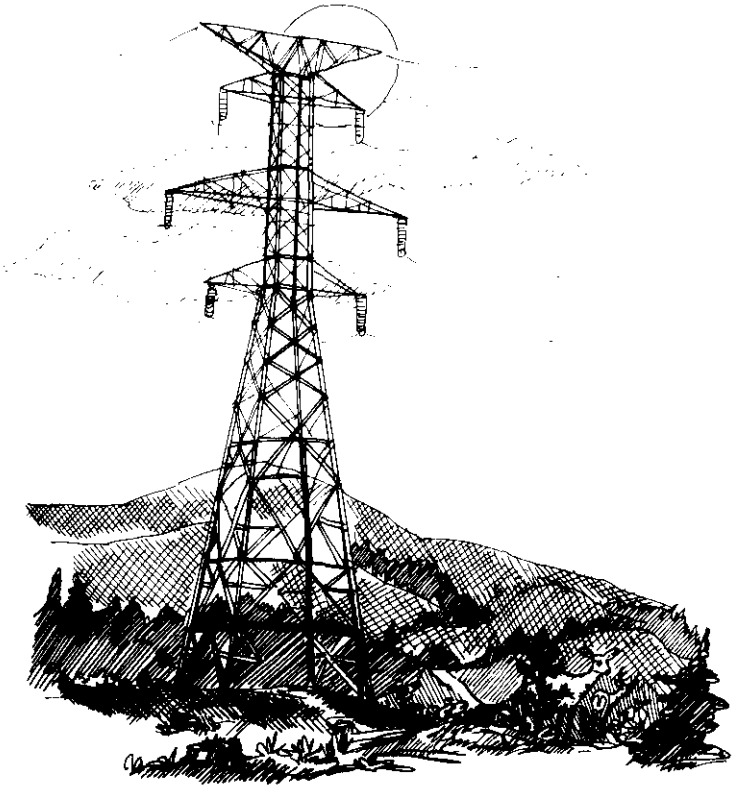
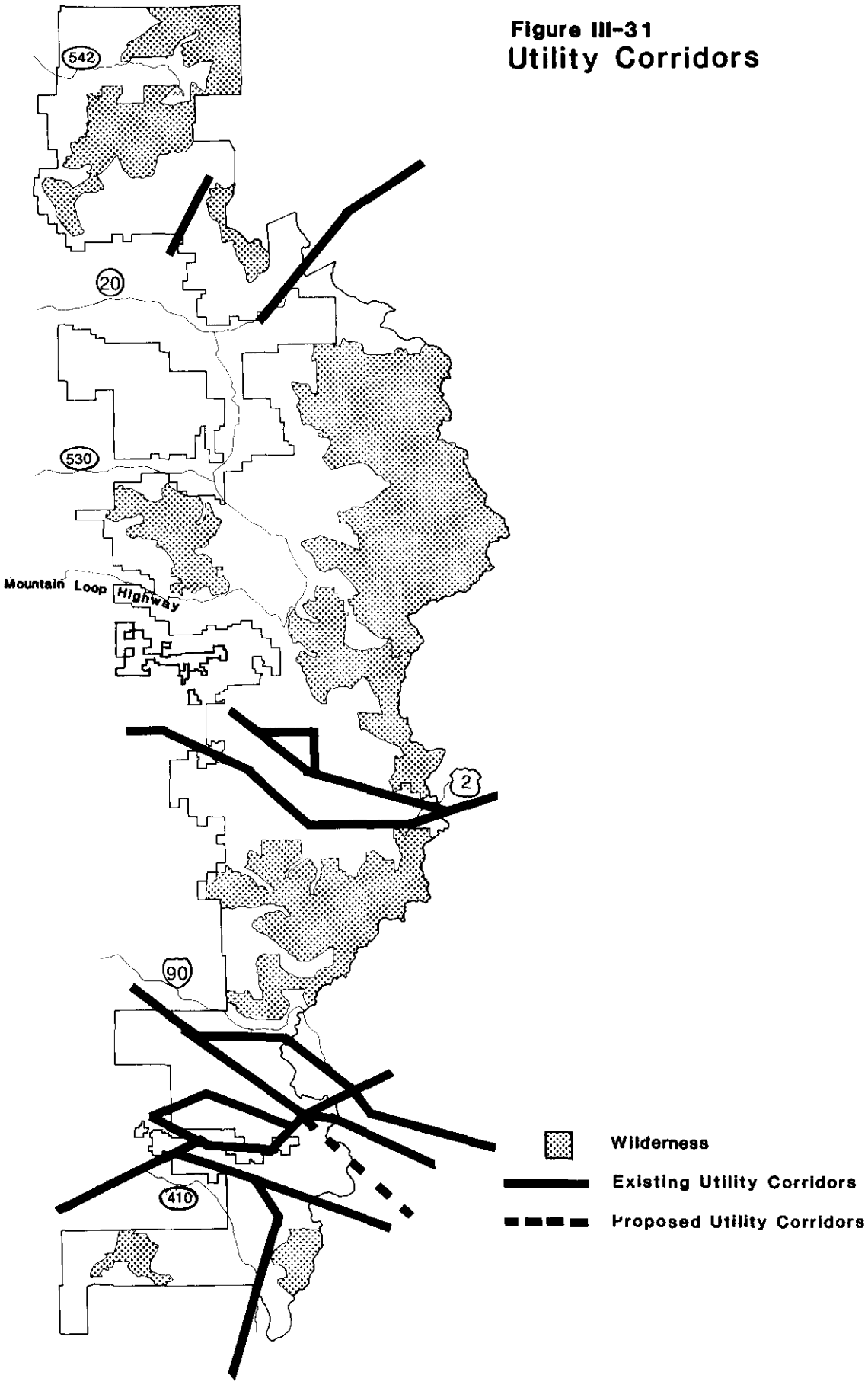
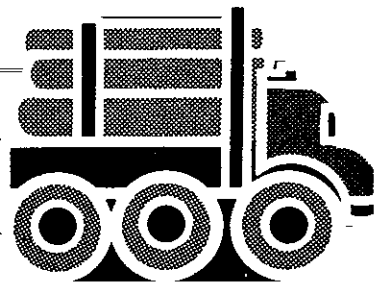


Figure III-31
Utility Corridors



Chapter IV



CHANGES BETWEEN DRAFT AND FINAL - CHAPTER IV

Several areas of major change between the draft and final EIS have been discussed in previous chapters; these include developing and displaying two new alternatives. The environmental consequences of implementing Alternatives I and J (Preferred) are included here.

Other major changes in this chapter include:

- The effects of including the hydrologic cumulative effects analysis, completed to develop a procedure to meet the water quality management requirement are reflected in the effects of implementing all alternatives (except NC).

- Based on public comment, additional discussion has been added on the effects of implementing the alternatives on old growth, diversity of vegetation, and plants.

- The discussion of effects on wildlife has been expanded.

- Based on public comment and interest, discussion of the effects of implementing the alternatives on trails has been expanded and separated from the discussions on roads.

CHAPTER IV - ENVIRONMENTAL CONSEQUENCES

A. INTRODUCTION

Environmental consequences are the physical, biological, social, and economic results of an alternative, if implemented. The analysis of these effects provides a scientific basis for comparing the alternatives considered in detail.

This chapter describes the direct, cumulative, and indirect effects of the alternatives. It also describes planned mitigation measures, beyond those listed in Chapter II of this FEIS, and any conflicts between the effects of the alternatives and other organizations' plans and policies.

While Chapter III presents a detailed discussion of the various resources that make up the affected environment, this chapter includes additional discussion of the interrelationships among the resources. Activities or programs that change or impact one component of the environment may have effects on other components as well. The source or basis for these analyses are cited in the text and included in the references section of Chapter V.

The net public benefits from the Mt. Baker-Snoqualmie National Forest are obtained from resources with market and assigned prices, as well as from resources and conditions for which prices cannot be determined. Nonpriced benefits include both quantifiable and qualitative outputs and effects. Both quantifiable and qualitative outputs and effects are crucial for understanding the whole picture of environmental consequences and the net benefits to the public. They are discussed here and in the comparison of the alternatives in Chapter II.

The chapter is arranged by environmental components - soils, water, vegetation, etc. - and the consequences of implementing any of the alternatives are presented resource by resource. The components of the environment are discussed in the same order as presented in Chapter III.

1. Soils
2. Water
3. Vegetative Diversity
4. Old Growth
5. Wildlife
6. Fish
7. Human Community
8. American Indian Religious and Cultural Use
9. Archaeological and Historic Properties
10. Scenery
11. Recreation
12. Trails
13. Wilderness
14. Research Natural Areas
15. Roadless Areas
16. Wild and Scenic Rivers
17. Air
18. Fire
19. Minerals
20. Land Ownership and Use
21. Roads

The interactions between these 21 environmental components and the allocation and program elements of each of the alternatives make discussion of the relative direct, cumulative, and indirect effects of each course of action quite complicated. In order to simplify the discussion, 19 specific allocation and program elements have been identified that may have direct effects on one or more of the 21 environmental components listed above. These 19 allocations and program elements are:

Chapter IV
Introduction

1. Changes in Soils and Water
2. Timber Harvest
3. Old Growth
4. Integrated Pest Management
5. Wildlife Habitat Improvement
6. Fish and Riparian Habitat Improvement
7. American Indian Religious and Cultural Use
8. Archaeological and Historic Properties
9. Scenery
10. Recreation
11. Trails
12. Wilderness
13. Research Natural Areas
14. Wild and Scenic Rivers
15. Air
16. Fire
17. Mining, Energy Development
18. Land Uses
19. Roads

The following discussions of the direct effects of the alternatives on each of the 21 environmental components include only those allocation and program elements having a direct effect on an individual component. Therefore, if one of the above 19 elements does not have a direct effect on an environmental component, it is not addressed.

Likewise, the discussions of indirect effects have been structured to reduce redundancy. Each of the 21 environmental components may have indirect effects on the other environmental components on the above list. Therefore, each discussion of indirect effects will address the indirect effects of the individual environmental component on the components following it on the list. This system of analysis avoids duplication of discussions of indirect effects.

Much of this analysis is based on existing research and professional experience, in addition to computer modeling to determine the estimated outputs for each alternative. Many predictions are based on average values and are at best rough estimates. In some cases, there simply is not enough information available about these interrelationships. An important part of implementing the final Forest Plan will be monitoring the accuracy of these predictions to provide more and better information for future planning. The Monitoring Plan is in the Forest Plan, Chapter 5. Research needs have also been identified (See the Plan document, Chapter 2).

As noted in Chapters II and III, the Forest Service is presently under an administrative stay against the use of herbicides. For planning purposes (and for construction of managed yield tables), it was assumed that herbicides will be available. (See Forest-wide Standards and Guidelines in the Forest Plan.) The use of chemicals for site preparation and release has been a small program in the past. In this chapter, the environmental effects of herbicides will not be discussed. This issue has and will continue to be addressed in separate environmental analyses and NEPA documents at the Regional and Forest levels. Any additional consideration of this issue will be through similar processes at the Regional level, or through Forest environmental analyses tiered to the Pacific Northwest Region's FEIS for Managing Competing and Unwanted Vegetation (USDA, 1988).

B. MANAGEMENT ACTIVITIES AND THEIR GENERAL EFFECTS

Some forest management activities broadly affect the environment, such as timber harvest, road construction, and development of areas for recreation etc. The activities of people in the forest can also impact the environment. The section below briefly summarizes forest management activities and their major effects on the environment. On the Mt. Baker-Snoqualmie, changes in vegetation (timber harvest and associated activities) and the construction and maintenance of roads generate a majority of the effects discussed in this chapter.

Cutting Vegetation: This activity requires cutting down and removing trees for their commercial value, and to reduce competition from unwanted species for sunlight and nutrients. Cutting vegetation:

- eliminates the natural condition of areas not previously cut;
- changes species composition by altering the stage of plant succession in the cutover area and in the basin(s) in which the cutting occurs;
- changes age distribution of the vegetation in the cutover area and in the basin(s) in which the cutting occurs;
- alters, for some period of time, the scenery of the area;
- changes amount and arrangement of organic debris such as logs, branches, and twigs;
- kills roots, temporarily reducing resistance to landslides on unstable slopes;
- changes wildlife habitats in the cutover area, and changes the distribution of these habitats in the basin(s) in which the cutting occurs;
- increases growth rate of vegetation on the cutover area;
- alters microclimate by increasing daily temperature fluctuations; and increases surface winds;
- cutting adjacent to streams changes the type and timing of organic debris deposits in stream systems;
- changes the timing and amount of peak flow of streams;
- cutting adjacent to streams increases the temperature of streams and lakes;
- generates revenues locally through returns to the counties, and generates jobs.

Road and Landing Construction: These activities require heavy equipment (tractors, trucks, earth movers) to develop stable surfaces capable of supporting log trucks and log yarding equipment across mountain slopes. The construction, maintenance, and use of roads and landings:

- o permanently displaces, compacts, or buries the topsoil along the road, eliminating or greatly reducing vegetation on the road surface;
- o increases erosion by interrupting and redirecting surface and ground water flow, and exposing the subsoil on cutbanks and fill slopes;
- o increases stream sedimentation and turbidity;
- o may divide wildlife ranges;
- o may block fish passage in streams;
- o provides travel routes for some wildlife species;
- o provides access to resources (timber, recreation opportunities) in remote areas for motorized visitors, loggers, recreationists, and others;
- o increases noise from motors, logging whistles, and people.

Construction of Fish Habitat Structures: This activity involves blasting bedrock, or placing logs, gabions (cobble-filled wire baskets), concrete, or boulders, in stream channels. Fish structures:

- o change stream flow;
- o alter the movement and distribution of stream gravel and sediment;
- o increase the quantity and quality of fish habitat;
- o may introduce fish into streams which originally did not have fish, thus altering the native ecosystem.

Burning Vegetation or Organic Debris: This activity involves broadcast burning in cutover areas to: 1) lower the hazard of wildfire by reducing fuel; 2) reduce competing vegetation to increase sunlight and nutrients for desired species; 3) facilitate tree planting. Burning vegetation:

- o alters the soil by changing the availability of certain nutrients, and resistance to erosion;
- o may alter or destroy soil flora/fauna, reduce long-term site productivity;
- o temporarily alters the scenery of the area;
- o reduces the risk of wildfire and the difficulty of suppressing it;
- o creates smoke in local airsheds;

- alters the microclimate by increasing surface temperatures as long as the black color remains;
- converts long-term nutrient sources (woody debris) into short-term nutrients.

Planting Vegetation: This activity introduces desired species into areas where the vegetation has been cut, or cut and burned. The objective is to enhance economic, ecological, or aesthetic values. Planting vegetation:

- may change species composition, or introduce non-native plant species;
- alters visual characteristics;
- increases soils strength and resistance to erosion by promoting root growth and ground cover;
- may change forage and habitat for some wildlife;
- initiates future timber crops.

Trail Construction: This activity requires light equipment and manual labor to develop stable surfaces (on a much smaller scale than for roads) capable of supporting pedestrians across forested slopes, and, where allowed, off-road vehicles and horses. Trails:

- increase soil erosion by interrupting and redirecting surface water flow;
- by making remote areas accessible to hikers, can increase resource damage from changed use patterns;
- provide travel routes for wildlife.

Construction of Other Recreation Facilities: These activities involve the construction of various buildings, parking lots, shelters, signs and signposts, vault toilets, pavement, etc. to make the use of recreation areas more pleasurable. Recreation facilities:

- attract people to small areas. This results in soil compaction, injury to vegetation, disturbance of wildlife, and increased noise;
- provide safety and comfort for visitors;
- eliminate small areas of wildlife habitat;
- contaminate, or increase the risk of contaminating the soil and streams immediately adjacent to the facilities;
- reduce contamination from human waste and waste water in heavily used areas.

C. EFFECTS THAT DO NOT DIFFER AMONG ALTERNATIVES

Threatened and Endangered Species

Plants

There are no known threatened and endangered plants on the Forest. Standards and Guidelines provide for protection and maintenance of sufficient habitat to meet the recovery objectives for the bald eagle, American peregrine falcon, grizzly bear, and gray wolf. Alternative NC (No Change) will also comply with provisions of the Endangered Species Act of 1973, even though the law is not fully incorporated into the current Timber Management Plans (which are the basis for Alternative NC). To date, impacts on the Potential Yield have been insignificant.

Animals

Under all alternatives, bald eagle, American peregrine falcon, and grizzly bear management is guided by the management goals, habitat objectives, and standards and guidelines in the following T&E recovery plans: (1) Final Pacific States Bald Eagle Recovery Plan; (2) Pacific Coast Recovery Plan for the American Peregrine Falcon; and (3) Grizzly Bear Recovery Plan. Management Standards and Guidelines have been established to assure that Forest management activities will not degrade or compromise T&E species habitat, including the gray wolf. There is currently no recovery plan for the gray wolf.

Bald Eagle. The calculations and management information concerning the bald eagle in the FEIS and PLAN were based on a Recovery Plan objective of protecting one existing and two potential nest sites, each at least 31 acres in size, and protecting known communal roost areas. These areas are Management Requirement areas for the bald eagle, and are protected from timber harvest and other disturbing activities under the Plan. Additional nesting, roosting, and feeding areas will likely be discovered during eagle habitat inventories and other activities. Such sites will also be managed under the bald eagle standards and guidelines.

Management Area 16A of the Forest-wide mitigation addresses the specific restrictions involved with any activity which may have potential adverse impacts on bald eagles and their habitat. Implementation of any of the alternatives will facilitate recovery of the bald eagle.

Grizzly Bear. This species is considered a management indicator species due to its threatened status and occurrence on the Forest. The present Grizzly Bear Recovery Plan does not designate specific minimum habitat requirements for the Forest and for this reason, no MR has been established. Habitat evaluation and population studies are underway, and due for completion in 1991, for the North Cascades Ecosystem. Following this, a determination will be made by the U.S. Fish and Wildlife Service on the feasibility of recovering grizzly bears in this area. Until these evaluation and population studies are completed, proposed major construction and non-construction actions will follow the Section 7 consultation process as developed by the North Cascades Grizzly Bear Working Group and agreed upon by the U.S. Fish and Wildlife Service.

Any grizzly bears occurring on the Forest will be protected. The Forest Plan will be modified if needed to support recovery objectives and management

requirements, should there be a decision to recover the grizzly bear in this ecosystem.

American Peregrine Falcon. As with the grizzly bear, this species is considered a management indicator species due to its Federal status (endangered) and its historical occurrence on the Mt. Baker-Snoqualmie. No MR has been established, as the 1982 Recovery Plan did not identify any recovery habitat on the Forest. This recovery plan is currently being revised. If the revised recovery plan identifies a minimum habitat level for the Forest, the Forest Plan will be modified as needed to support recovery plan objectives and management requirements. In the interim, any occupied sites will be protected as they are discovered.

The Forest-wide Standards and Guidelines for T&E species apply to the American peregrine falcon as there are no specific guidelines for this species. However, in accordance with the Forest management goal and direction to provide habitat to aid in recovery of threatened and endangered species, habitat enhancement opportunities, if identified, will be designed to meet or exceed the requirements of the Pacific Coast Recovery Plan for the American Peregrine Falcon (1982).

Gray Wolf. The gray wolf, like the peregrine and grizzly bear, is considered a management indicator species due to its endangered Federal status and documented occurrences on the Forest. As of yet, it is not clear whether wolf sightings on the Forest represent breeding individuals or packs, only transient or dispersing individuals, or other non-breeding animals (e.g. released captive-bred wolves). There is at present no recovery plan for the gray wolf, so no minimum habitat levels have been identified.

The effects of the alternatives on gray wolf are not known but are thought be similar to effects on grizzly bear habitat. The factors most likely to affect suitability of the Forest for gray wolves are prey population abundance, and remote areas where human activities and road traffic are at low levels. The Forest-Wide Standards and Guidelines for T&E species apply to the gray wolf. There are no specific standards and guidelines for gray wolf. Should a recovery plan for the area be developed, the Forest Plan will be modified to support recovery objectives and incorporate management requirements.

Any identified habitat protection or enhancement opportunities will be designed to meet the requirements of a gray wolf recovery plan, if developed. This is in accordance with the Forest management goals and direction to provide habitat to aid in recovery of T&E species.

Other Sensitive Species. Six Region 6 Forest Service Sensitive animal species which occur on the Forest are candidates for federal listing. Category 2 candidate species are the bull trout, the marbled murrelet, Townsend's big-eared bat, the California wolverine, and the North American lynx. The Northern spotted owl is proposed for Federal listing. Two sensitive plant species, suspected but not known to occur on the Forest, are Category 2 candidates for federal listing. They are Calamagrostis crassiglumis and Castilleja cryptantha. The common loon, also a sensitive species, is not a candidate for Federal listing.

It is Forest Service policy to protect the habitat of sensitive species from adverse modification or destruction, as well as to protect individual organisms

from harm or harassment as appropriate (FSM 2670.3). All Forest Service projects, programs, and activities are reviewed for possible effects on threatened, endangered, and sensitive species. Forestwide management direction was designed to protect sensitive species' and their habitats, and calls for the development of species management guides for all sensitive species. These guides will determine viable population levels of each species and appropriate management to maintain viable populations. Should any of these species be added to the Federal Threatened and Endangered Species List, they would then be managed according to the provisions of the Endangered Species Act.

In addition, no action will be taken under any alternative which would lead to the classification of any sensitive species as threatened or endangered. Sensitive plant surveys are required during any project design stage.

Summary

No adverse direct, indirect, or cumulative effects are expected to occur, due to management activities in any alternative, for T&E&S species. Identified bald eagle roost areas and nesting sites are protected as Management Requirement Areas. No timber harvest or other disturbing activities will be allowed in these areas. Direct effects on the present habitat condition of these species are expected to occur to varying degrees depending on the alternative. However, no alternative will decrease T&E habitat requirements below recovery plan levels. Any management activity which may result in adverse effects on a T&E species would require consultation with the U.S.D.I. Fish and Wildlife Service.

Forest-wide management direction, as well as specific management area direction, was designed to protect T&E habitats and/or facilitate recovery. To summarize, no action will be taken under any alternative which would adversely affect the recovery of any threatened or endangered species, and to the extent possible, management will facilitate recovery.

Timber Harvest Activities. In the first decade timber harvest activities in all alternatives would occur primarily in old growth stands; harvest would occur utilizing primarily even-aged silviculture systems (clearcutting). The effects of timber harvest activities include reduction of habitat, temporal displacement, change in numbers and composition of species, and increased interaction with humans.

Special Habitats. All alternatives contain provisions, through land allocations and forestwide standards and guidelines, for special wildlife habitats not represented by indicator species. These special habitats are discussed in Chapter III, Wildlife.

Habitat Improvements. All alternatives provide for wildlife habitat improvements through implementation of the Forest's Comprehensive Fish and Wildlife Plan (Sikes Act--Public Law 93-452) and K-V (Knutson-Vandenberg Act) projects.

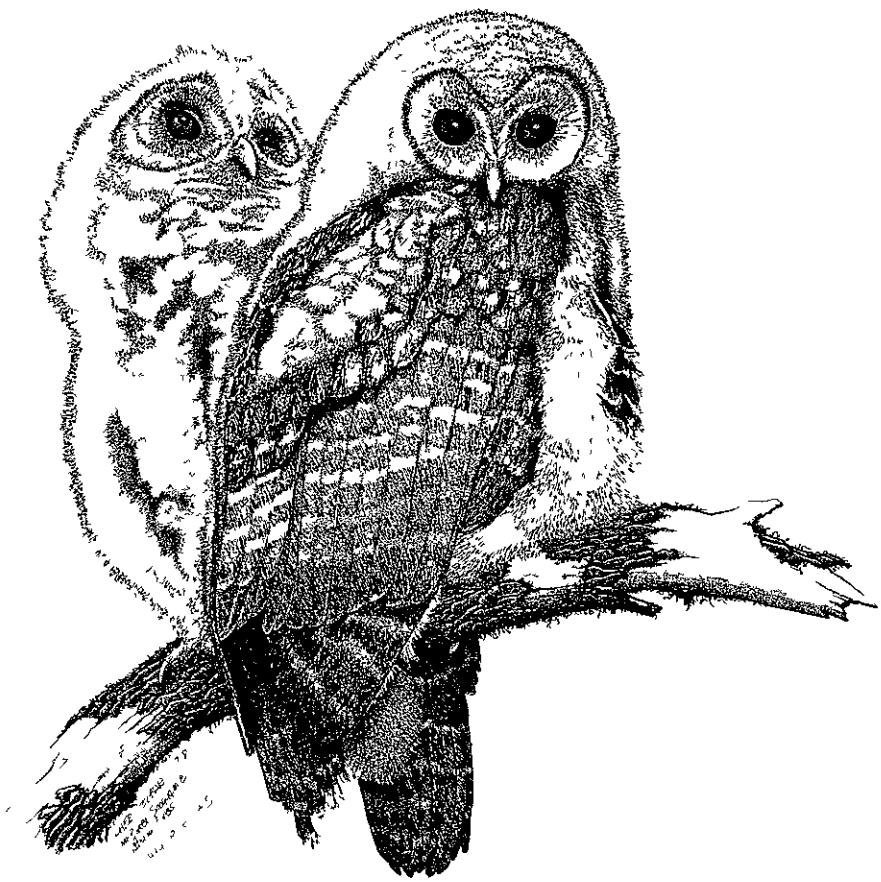
Overall. Regardless of the alternative considered, the ecosystem will continue to change through time. None of the alternatives are designed to return the Forest ecosystems to those of any previous time in history.

American Indian Cemeteries

In all alternatives, American Indian cemeteries have high protection from any development.

Civil Rights

Various Civil Rights, Affirmative Action, and Equal Opportunity Acts require that Forest Service hiring, supervisory, and contracting practices be conducted in a manner conducive to meeting established Regional and Nationwide goals in these areas. These practices will be maintained in all alternatives. In all alternatives, positive steps will be taken to ensure that facilities, sites, and activities will not be denied to any individual on account of race, color, creed, sex, marital status, age, handicap, or national origin.



D. EFFECTS THAT VARY BY ALTERNATIVE

SOILS AND WATER

Soils - The Direct Effects of Each Alternative

General

As a nonrenewable resource, soils can be affected by activities which cause soil erosion, soil compaction and changes in nutrient cycling. Road construction, timber harvest, mining, and residue management activities cause the greatest effect. Activities such as trail construction, recreation facility construction, fish habitat projects, etc. have a relatively minor impact.

Landslides, slump earthflows, and debris torrents are common mass erosion events west of the Cascades, and are very commonly and widely distributed on the Mt. Baker-Snoqualmie. In many cases, debris torrents and/or landslides are the result of natural events (floods, rain-on-snow storms) and management activities (Doyle 1985 unpublished). The rate of occurrence of debris torrents is closely related to timber harvest and the density and condition of forested roads (Swanson and Dryness 1975).

Changes in water velocity, volume, and/or direction cause changes in soil. Erosion, both surface and mass wasting, adversely affects soils by reducing soil productivity from the loss of topsoil and total amount of soil, and the resulting reduction of water storage capacity and total rooting capacity. This can be quite significant where soils are inherently erosive or unstable.

Timber harvest causes changes to soils which result from disturbance, root decay, compaction, and changes in nutrient cycling. Disturbance is caused by logs coming into contact with the ground during yarding, operation of tractors during construction of landings and spur roads, and by removal or piling of residue material.

The amount of soil erosion from disturbance, by alternative, is somewhat measurable. (See Table IV-1.) Other direct effects are harder to measure. In general, effects are greater in alternatives with a high number of acres assigned to timber management and roading.

Direct Effects of Timber Harvest on Soils

After trees are cut, root decay reduces the structural strength of the soil. Soils are most susceptible 3-15 years after harvest, after most original roots have deteriorated but before new roots have developed to the point of furnishing adequate root strength (Ziemer 1981). This is most important on unstable soils.

Past practices show that soil compaction is only a concern with tractor harvest; cable systems have not contributed to significant compaction except on landings and spur roads. As only a small percent of the Mt. Baker-Snoqualmie is tractor logged, the total effect of soil compaction caused by tractor harvest is minor.

Timber harvest causes changes in the nutrient cycling process within soils. These nutrient relationships are complex and highly interrelated. However, past management practices show that where erosion control practices and correct silvicultural and logging systems are used, soil productivity can be maintained and in some cases, improved over the long-term (by improving soil moisture and the soil nutrient budget.)

The table below, based on available data (Snyder 1981), shows erosion relative to timber harvest in the first decade. Background erosion is a result of past harvested areas and existing roads. New erosion results from first decade timber harvest, road construction, and road reconstruction.

Table IV-1
Erosion Relative to Timber Harvest During First Decade

Alternative	Background Tons/Year	New Tons/Year	Total
NC	83,253	79,567	162,820
A (No Action)	61,549	41,342	102,891
I	58,207	38,467	96,674
B (RPA)	57,663	38,043	95,706
H	55,263	36,058	91,321
J (Preferred)	53,789	34,738	88,527
C	41,539	25,919	67,458
G-Modified	42,109	24,737	66,846

Thinning and release programs can have both adverse and favorable impacts on soil nutrients.

Burning causes physical and chemical changes in the soil. The magnitude of these changes depends upon: intensity and duration of the fire, thickness of the duff, and the moisture content of the soil and duff.

Chemical changes occur as the soil pH, phosphorus, exchangeable potassium, calcium, and magnesium increase immediately after burning. Nitrogen is lost by volatilization. However, nitrogen fixation, both symbiotic and non-symbiotic, is more active following fires and in some ecosystems nitrogen fixation may restore the lost nitrogen to the soil (USDA 1979). Soil properties subject to physical changes include texture, structure, organic matter, and duff removal which can lead to erosion. In the northwest, Dyrness and Youngberg (1957) reported that only severely burned soils were significantly changed in particle size distribution, soil structure, and organic matter.

Some studies indicate that these changes in soil do not have long lasting effects. Comparing paired burned and unburned soil plots from areas burned 25 years ago (in the western Cascades of Oregon and Washington), Kraemer and Hermann (1979) found there were no statistically significant differences in the properties of the soils. This suggests that broadcast burning does not have a lasting effect on chemical and physical properties of soils.

The extent and duration of impacts to soil physical and chemical properties is directly related to fire intensity. Boyer (1980) determined that threshold values for duff and surface nitrogen were 15% bare ground on soils with a very high surface erosion hazard and a 50% reduction of total nitrogen in the surface two inches. On the MBS these conditions are normally obtained under a severe wildfire or intense broadcast burn. Most broadcast burning on this Forest is done under conditions that leaves the duff uncharred at the duff-soil interface. At this burn intensity any physical or chemical changes are too small to be measurable.

However, assuming that some changes will occur, the area affected by these changes will be proportional to the total acres burned. Based on Standards and Guidelines and ecological factors, an estimated 10 percent of final harvest acres will be broadcast burned during the first years of the initial decade of implementing the Forest Plan. (See Table IV-2.) During this period more residue will be 1) removed as commercial products; 2) retained for site productivity and habitat needs; and 3) located in higher elevations, all of which will reduce the intensity, if not the need to burn. By the end of the first decade, the proportion of final harvest acres that will be broadcast burned will be reduced to approximately five percent of the area. This ratio should continue into future decades.

Table IV-2
Acres of Final Timber Harvest, Broadcast Burned Per Year

Alternative	Total Acres Final Harvest, 1990	Ac. Broadcast Burned, 1990	Ac. Broadcast Burned, 1997
NC	4,240	424	212
A (No Action)	4,068	407	203
I	3,260	326	163
B (RPA)	3,221	322	161
H	3,042	304	152
J (Preferred)	2,865	287	143
C	1,873	187	94
G-Modified	2,291	229	115

Direct Effects of Archaeological and Historic Properties on Soils

Excavation of an archaeological site will have small-scale, localized effects on soils of the area: soils are physically removed. The greatest amount of site excavation is likely to occur in Alternatives NC, A, I, and B; in these alternatives, more acres of timber will be harvested, and it is through such ground-disturbing activities that most sites are found and possibly excavated. In Alternatives H and J (Preferred), moderate amounts of excavation will occur.

Direct Effects of Recreation on Soils

The activities of developed and dispersed recreationists can destroy ground vegetation and cause soil compaction. Compaction is a progressive process over

time, and depends upon the number of people on an area. The effects occur in all alternatives and vary only slightly. Effects are localized and occur only on a very small percentage of the Forest, but they can be intense where they do occur.

The development and operation of ski areas impacts soils in those areas. All alternatives have opportunities for future expansion of existing areas. Alternative I would allow expansion to occur outside of the existing permit area of Crystal Mountain. If development occurs, effects will include soil erosion during lift construction and slope grooming, compaction from concentrations of people during the summer, and some effects to soils from salt applied to snow during spring grooming. The displacement of topsoil can be significant in these high-elevation areas, because the inherent fertility is low and the exposed subsoil is even less fertile than the original topsoil.

Direct Effects of Mining and Energy Development on Soils

The potential for mining development is somewhat dependent upon the level of restrictions, and the number of acres allocated to management areas that preclude development.

Mineral exploration involves borings, diggings, and access trails and roads. These produce localized but severe impacts to soils. Soils are displaced, compacted, and eroded. Extraction of minerals would have a severe impact on soils, the extent of which depends upon the size and type of mine. Soils may be taken out of production or removed entirely, depending on the type of operation.

Geothermal, gas, and oil exploration and/or development would have similar effects. Oil spillage would cause detrimental chemical changes to soils. Any required pipelines would disturb soils during installation.

Direct Effects of Roads on Soils

Construction of roads has a number of effects on soils. During construction, soils are severely compacted, displaced, and sometimes eroded; soil productivity on the sites is sharply reduced or destroyed. Construction on steep slopes causes a potential loss of soil stability. Roads also intercept and change the surface and subsurface drainage patterns. Soil erosion can occur when water flows are directed and concentrated on soils with no vegetation.

The effects depend upon a number of factors. In locations where soils are stable, and good construction and maintenance are accomplished, the impacts to soils are much less than where the reverse occurs.

Where soils and bedrock are inherently unstable, excavation of a road prism removes toe support for the soil above the cutbank, which increases the potential for slope failure. This "cut" material is usually added as "fill" on the slope just below the road. It adds weight to the slope, and the re-worked fill material is also inherently less stable than the natural underlying soil. The fill material itself has failure potential and it also increases the failure potential of the underlying natural soil (from the weight of the fill plus the the additional weight of the water it will adsorb.)

Road construction will take between 40 and 133 acres of land out of production per year in the first decade. As shown in Table IV-3, Alternative NC removes the most acres from production, Alternative G-Modified the least, with the others in between. Estimates of soils that are lost as a result of road impacts are more difficult to quantify, as soil is lost from both surface erosion and slide events. The method used to develop the data shown in Table IV-3 is fully described in a document on file at the Forest Supervisor's Office (Snyder 1981)

It must be fully understood that the numbers generated by this method are, at best, only an approximation of the true numbers. Due to uncertainties involved, it is not possible to accurately predict actual amounts of erosion which can be expected to occur in a planning area in a given time period (Ellson 1981). However, the numbers have value as an index, and the relative differences are valid. A brief description of the process used follows:

Sediment is that part of erosion that reaches water. Therefore, to estimate sediment it is first necessary to estimate erosion. The procedure for estimating erosion was divided into two phases, one for mass movements (slides) and one for surface erosion. Total erosion is the summation of these two sources.

Mass Movements: Three sample areas representing a cross section of soil and topographic factors on the Forest were evaluated on aerial photos using stereo photo techniques. The total area was 75,000 acres.

All slides of 1/4 acre or larger were recorded. Slides were recorded as to size, soil type, whether they occurred in timbered areas, clearcuts, or along roads and whether or not they entered water.

In managed areas only the past 20 years were considered. This was divided by 20 to determine a yearly average.

All slides were treated as debris avalanches. Area was measured on photo and average depth of two feet was estimated to provide volume. Volume estimates were converted to tons.

A natural slide background rate was taken as 0.1 ft/year (estimate).

The increased total slide area in clearcuts over comparable soil types in timbered areas was taken to mean that this additional area is that which was involved in slide movement as result of timber harvest.

Surface Erosion: Surface erosion estimates were based on 10 surface erosion collector plots which have operated for one year.

Actual surface erosion expected is based on average of disturbance from different harvest methods and roads.

Sediment was estimated from "stiff" diagrams and using aerial photos to estimate landslide amounts entering water.

The values for erosion and sediment as developed through this procedure are valid for comparison purposes only. They show the relative differences

that would be caused by various management activities on the primary soil and topographic types.

The figures in Table IV-3 include surface erosion and sloughing that occurs on cutbanks and fill slopes. This occurs most frequently during the first year after construction. During the next five years, the erosion rate steadily declines and then it tends to level out.

Table IV-3
Road Impacts to Soils

Alternative	Acres Removed From Production	Background Sediment Tons/Yr	Road Construction Sediment Tons/Yr
NC	133	33,314	6,030
A (No Action)	94	14,994	3,251
I	86	17,780	2,936
B (RPA)	81	14,905	3,095
H	71	14,964	3,086
J (Preferred)	67	14,896	2,916
C	52	12,832	2,432
G-Modified	40	14,299	1,983

Road management activities, or lack thereof, can also affect soils. Keeping the road drainage systems clear can prevent water diversion and soil erosion.

Soils - The Cumulative Effects of the Alternatives

The cumulative effects to soils are those additive actions to soils in place or over an area which change their productivity over time. They are caused by the multiple application of one or more types of effects.

Cumulative impacts to soils occur over an area, as each additional unit of timber harvested contributes to the total amount of soil that is disturbed and subjected to detrimental impacts. New harvesting adds to the impacts of past cutting on both public and private lands within the Forest boundary. In addition, sequential events occur in place that cause cumulative soil impacts. Soils are impacted by yarding during logging. Fuel reduction and site preparation activities, such as residue removal and broadcast burning, cause additional impacts. Soils are subjected to further impacts when intermediate harvest or the next clearcut harvest occurs on the location.

The amount of impact can be expected to be in proportion to the acres harvested by each alternative with Alternatives NC, A, I, and B impacting soils the most.

Much of the transportation system for public and private lands within the Forest boundary is in place and has removed soil from production. The addition of new roads has a cumulative effect on the total area of soil taken out of production. Also, the erosion and sloughing that occurs along cut and fill slopes has a detrimental cumulative effect, both to the on-site soils and those

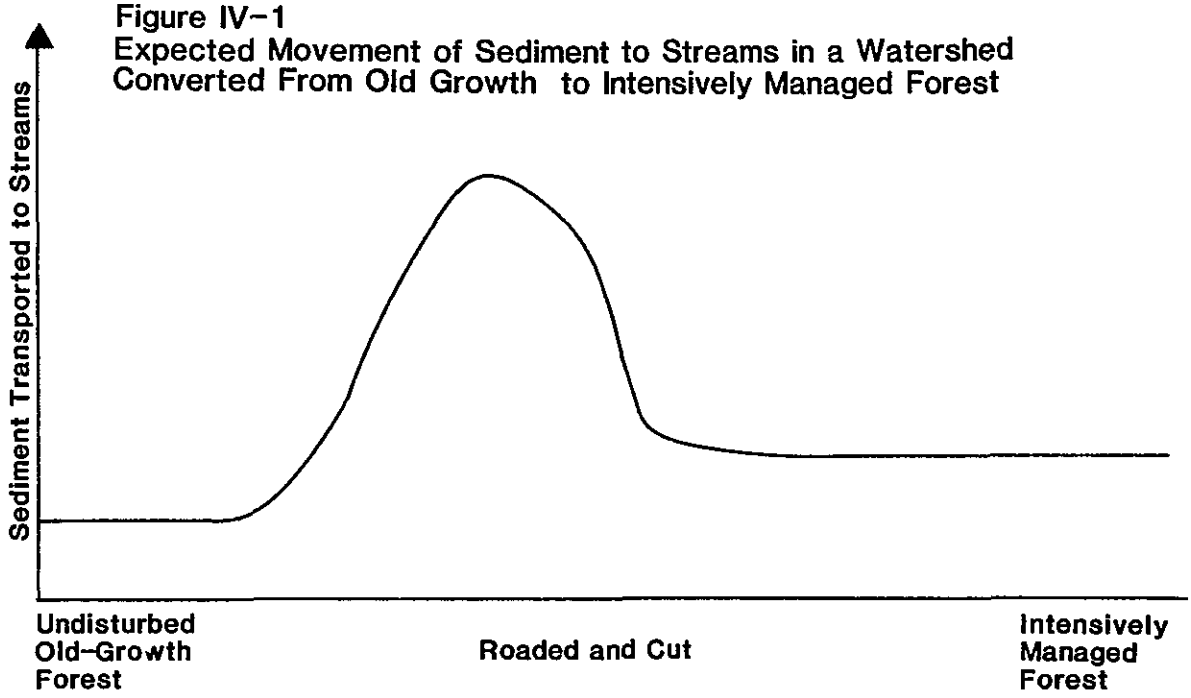
downslope. The alternative that constructs the most roads will have the most effect. Alternative NC constructs far more roads than any of the other alternatives at 28 miles a year. Alternatives A, and I will construct 18.8 and 17.1 miles per year, respectively, during the first decade. Alternatives C and G-Modified construct the least, 10.3 and 8.1 miles, respectively; the other alternatives fall between these.

Soils - The Indirect Effects on Other Resources

Water

Changes in soil which promote surface erosion and/or mass wasting can strongly affect water quality, specifically sedimentation. (See Figure IV-1) There will be an increase in turbidity as a result of soil disturbance.

Figure IV-1
Expected Movement of Sediment to Streams in a Watershed
Converted From Old Growth to Intensively Managed Forest



Increased sedimentation in any of the watersheds may result from surface erosion or mass wasting. The significance depends upon the volume and type of sediment, and whether the water is taken directly from a stream or from an impoundment; sedimentation has less effect if water is taken from an impoundment, which acts as a settling basin. Impoundments in the Cedar River and Tolt River Watersheds are the most effective because soils there are dominated by sands and gravels which rapidly settle to the bottom. The Green River watershed, and more so the Sultan, contain soils that have a higher percentage of silts and clays which remain in suspension for long periods. For those watersheds where water is taken directly from a stream, the amount and type of sediment which enters the stream will have a direct effect on the quality of the water taken out.

Changes in the soil that decrease water storage capacity affect water runoff. The most significant occurrence of this change is when an area once occupied by soil is replaced by a road. Rainfall (which is seasonally heavy on the Forest) on a road becomes instant runoff, as there is no longer any soil to store and slowly release water. Alternatives with the most new road construction include NC, A, I, and B. Of lesser significance, surface erosion and/or mass wasting events reduce the depth of soil, reducing storage capacity and allowing runoff to occur sooner. Soil compaction, which occurs in small areas, reduces the rate of water entry and therefore increases the rate of runoff. This effect is vastly overshadowed by the effect of large areas of vegetation removal.

The literature applicable to the west slopes of the Cascades suggests that clearcutting can increase water yields by decreasing interception and transpiration, thus making more water available for run-off. There is the potential to cause peak water flows to occur sooner after heavy rain events and there may be higher peak flows. In addition, activities associated with timber harvest often cause water to be concentrated and misdirected onto areas where flow did not previously occur (Dyrness 1965, Froehlick and Bergland 1976, Cline and others 1977, Harr and Krygier 1972, Harr 1976a 1976b 1979, Stan and others 1979, Haris 1973, Johnson and Beschta 1980, Krygier 1971, Power 1974, Rothacher 1971 and 1973, Hess 1981).

There are no significant indirect effects on flood plains and wetlands as a result of changes in the soils from implementing any of the alternatives.

Vegetative Diversity

Implementation of alternatives will cause changes in soils that indirectly affect vegetation. The most pronounced change is the displacement of soil where land is removed from production, such as during excavation for new roads. On all roads other than temporary spurs, the soil is permanently removed and does not support any vegetation. The amount of land removed ranges from 94 acres per year (first decade) in Alternatives A and NC to 40 acres per year in Alternative G-Modified.

Temporary roads remove soil from production for several years. Often, disturbed areas are scarified, seeded, and replanted. This partially restores soil production, although soils do not provide the same level and quality of vegetation that they did prior to the disturbance.

Soil compaction affects vegetation by restricting root development and movement of air and water through the soil; growth is slower and less vigorous.

Fire, either prescribed (such as broadcast burning) or wildfire, causes changes in soils that indirectly affect vegetation. Fire can accelerate plant succession, cause retrogression, or act as the removal agent to perpetuate a vegetative cycle (Boyer and Dell 1980). Past management practices have shown that changes in soils, by burning, that affect vegetation have more effect on brush and understory vegetation than timber. An example is the common establishment of fireweed after burning.

Old Growth

See previous discussion of the Indirect Effects of Soils on Vegetative Diversity.

Wildlife

Changes in wildlife habitats due to changes in soil are limited to those changes that may affect cover, forage, calving areas, and/or travel routes.

Most significant are changes in soils due to road construction, where the original soil is removed or changed so that it is totally non-supportive of any type of cover or forage. The extent of these effects are assessed in the Direct Effects of Roads on Wildlife section later in this chapter.

Soil disturbance and compaction in clearcuts may change the habitat by altering both forage and cover. The extent of these effects are assessed in the Direct Effects of Timber Harvest on Wildlife section later in this chapter.

Fish

Changes in soil which increase surface erosion and/or mass wasting can have a major effect on fish spawning and rearing, when this material reaches stream channels and is deposited as sediment. The extent to which fisheries will be affected depends upon the type and size of the disturbance and the susceptibility of a particular soil to be involved in a mass wasting event. Activities associated with Alternatives NC and A will generate the most sediment; the sediment index is estimated to be 125,000 tons per year during the first decade for Alternative NC, and 102,900 tons per year for Alternative A. Alternative G-Modified has the least, with an index of 66,800 tons per year. (See the Direct Effects of Roads on Water, Table IV-6, for more detail.)

Human Community

Changes in soils as a result of implementing alternatives can impact the human community. A significant effect occurs when an activity causes an impact to soils resulting in a mass wasting event (a slump or slide) or road-fill washouts. Typically, slide material enters a stream, is transported during a flooding event, and is deposited onto property. This type of event has occurred in the past and there is risk of future occurrence. The alternatives that cause the most soil disturbance (NC, A, I, and B) have the greatest potential for causing this type of occurrence.

Changes in soils as a result of implementing alternatives are not likely to affect the economy.

American Indian Religious and Cultural Use

Changes in soil as a result of implementing any of the alternatives would not affect American Indian Religious and Cultural Use, but might reflect other significant effects (for example, road construction).

Archeological and Historic Properties

Soil disturbance resulting from implementing any of the alternatives would have significant effects on archeological properties and less impact on historical properties, which for the most part consist of standing structures. Effects would be most widespread in Alternatives NC and A, least in Alternatives C and G-Modified. Effects would be high in Alternatives B, H, I, and J (Preferred).

Scenery

Changes in soils as a result of implementing alternatives will have a significant effect on scenery.

The most visible change in scenery occurs where raw soils are exposed. Scenery is also strongly affected where the soil colors contrast with the colors of vegetation. Mass wasting events strongly affect scenery due to the unnatural color and shape of irregular gashes on hillsides. Those alternatives with the highest harvest levels (NC, A, I and B) will have the largest area of exposed soils. Alternatives C and G-Modified will have the lowest amount of exposed soils.

Recreation

Changes in soils as a result of implementing alternatives will have only minor effects on developed recreation.

Changes in soils as a result of implementing alternatives will cause some minor changes to dispersed recreation. When unprotected and subject to use by vehicles (especially ORV's) during wet conditions soils change to deep mud. This affects the quality of the ORV experience.

Trails

Changes in soils as a result of implementing alternatives have little effect on trails. Some weakening of soil strength adjacent to trails could result in small landslides causing trail damage. These changes will occur on trails passing through wet soil areas when repeated traffic (especially horse) convert the soil to mud.

Wilderness

Changes in soils, as a result of implementing the alternatives, will have an effect on the naturalness of wilderness. The alternatives that favor the primitive end of the WROS will result in less soil disturbance, thus will be more natural in appearance and in ecosystem development. Alternatives C, G-Modified, and H have the least human use within wilderness (Decade 1); Alternatives I, A, and J (Preferred) will have the most.

Research Natural Areas

No effects from changes in soils on Research Natural Areas are anticipated.

Roadless Areas

No effects from changes in soils on Roadless Areas are anticipated.

Wild and Scenic Rivers

No effects from changes in soils on Wild and Scenic Rivers are anticipated.

Air

There will be no measurable changes in air quality caused by changes in soils as a result of implementing alternatives of this plan. Changes will be limited to increased particulate concentrations caused by wind blown dust for disturbed soils or vehicular traffic. These events are limited in extent and are of short duration. There will be no measurable effect on noise as a result in changes in soils brought about by the alternatives.

Fire

Changes in soil properties and characteristics as a result of implementation of alternatives will have some effect on fire protection. Exposed mineral soils that result from alternative implementation can create a barrier which may restrict wildfire spread. Alternatives NC and A will have the greatest amount of exposed soils while C and G-Modified will have the least amount of exposed soil to effect fire spread. Chemical and/or physical changes in soils can result in vegetative communities that may be different from those previously present on the site. This change in vegetation may present different fire spread characteristics, i.e. more flamable annual vegetation than somewhat resistant native perennials.

Minerals

Changes in soils as a result of implementing alternatives will have no effect on minerals.

Land Ownership and Use

Changes in soils as a result of implementing alternatives will have no effect on land ownership and use.

Roads

Changes in soils as a result of implementing alternatives will have no effects on roads.

Mitigation Measures for Soils

Potential impacts to 95,500 acres of highly unstable soils have been eliminated by removing these lands from the tentatively suitable land base; no timber harvest or road construction is permitted.

The primary method of mitigating damage to soils from timber harvest activities is to ensure that the anticipated level of disturbance is within the limits of the soil to absorb. This was ensured by using a cumulative effects process that set a cap on the amount of harvest that could occur regardless of the alternative. Other mitigation includes fully suspending logs to restrict ground contact of highly sensitive soils, and limiting the size of timber harvest units on unstable soils. Soil disturbance is mitigated by such measures as scarification of compacted areas, revegetation, and proper channeling of water. These measures, when properly done, have been quite effective. The long-term effects of vegetative removal will need to be monitored to determine if adverse effects are occurring.

Techniques such as "soil ripping" followed by revegetation may be applied in heavily compacted areas (such as a landing). While this does not completely return soil to its pre-compacted condition, past experience has shown that it is effective in restoring soil productivity.

Erosion on ski areas can be effectively mitigated by controlling runoff, using contour ditching and revegetation of slopes. When surface soil is removed during slope grooming, mitigation measures include stockpiling and saving the surface soil while the grooming is taking place, then respreading the original surface soil. These measures have been used in the past with good success.

The potential for impacts to soils from broadcast burning can be mitigated by using prescriptions resulting in lower intensity and duration, thus ensuring that the lower portion of the duff layer remains intact. This prevents significant adverse changes in physical and/or chemical properties of the soil.

The use of "light handed" suppression techniques that minimize the amount of surface disturbance from fireline construction and post fire restoration activities will minimize surface erosion associated with fire suppression activities.

There are two types of mitigation for road construction. The most effective mitigation is the use of practices that prevent soil damage from occurring. The second type of mitigation is the use of practices that reduce or reverse damage that has already occurred.

Conflicts Between The Effects of the Alternatives and Others' Plans and Policies for Soils

There are no anticipated conflicts between the plans and policies of others and the effects of the alternatives on soils.

Water - The Direct Effects of Each Alternative

General

The environmental effects - direct, cumulative, and indirect - of one or more Forest management activities on water quality and quantity must be examined on a watershed basis. There are 66 watersheds on the Mt. Baker-Snoqualmie; these

are hydrographic watersheds, not the municipal watersheds discussed in Chapter III.

Direct Effects of Timber Harvest on Water

Removing vegetation affects water in several different ways. The interrelationships of timber harvest, the hydrologic process, and the kinds of impacts that are incurred, are briefly discussed in Chapter III.

Regeneration timber harvesting can have the following effects on water:

o Total annual water flows are increased following extensive timber removal.

Completely clearcutting small watersheds can increase annual yields by 50 cm (Fredriksen and Harr 1979). In larger watersheds, where only a small percentage of the total area is cutover at one time, water yield increases would be considerably less. Increases in water yields as a result of sustained yield harvesting in the larger watersheds (such as the Cedar River) may be almost undetectable (Heilman 1979). Harr (1983) developed a regression equation for use in estimating potential increases in annual water yield, which can be expected from clearcutting in western Oregon and Washington based on research results in experimental watersheds. Initial on-site increase of up to 20 inches are predicted, though they completely disappear in about 27 years. The equation predicts smaller annual water yield increase when annual precipitation is less.

Harr estimated that sustained increases in water yield from most large watersheds in western Oregon and Washington subject to sustained forest management are, at best, three to six percent more than flows from an undisturbed forest. Kattelmann et al. (1983) estimated similar maximum potential increases in Sierra Nevada watersheds if minimum standards for all applicable laws were followed. However, they concluded that the typical increase in a large watershed drops to approximately one percent when constraints are imposed to meet other resource demands. A similar scenario is expected in Region Six National Forests due to multiple use considerations. Flow increases on these forests have already been realized due to past harvesting, so there is little or no potential for increasing yields in most large watersheds.

This is especially true on the Mt. Baker-Snoqualmie, as timber harvest levels of the past (over 300 million board feet annually) have dropped. (Refer to Chapter III.) Other factors which further minimize potentials to affect changes in streamflow are high natural variability, lack of flow measurement accuracy (within five percent, at best, so potential changes are less than what is measurable in large watersheds), and the fact that most of the flow increases occur when they are least needed or useable - during spring runoff on the eastside, and during fall storms on the westside.

o Effects of harvesting timber on groundwater recharge and aquifers are similar to effects on streamflow, except for timing differences; eg., aquifer responses are typically slower and flucuate less than streamflow.

The above-mentioned research findings indicate timber harvesting, as will be practiced under any selected forest plan alternative, is expected to

have a negligible, unmeasurable effect on downstream aquifers. There is no realistic potential to modify timber harvesting to measurably increase downstream water supplies. This assumes management practices are conducted in a manner which reasonably maintains water infiltration characteristics, as is typical of current practices on National Forest System lands. Best Management Practices (see Appendix I and Plan Standards and Guidelines) will ensure adequate infiltration characteristics are maintained. Only if extensive, contiguous areas were compacted would infiltration be expected to be reduced so as to adversely affect downstream aquifers. This is not expected to be significant because tractor logging, from which most compaction normally occurs, is very limited on the Mt. Baker-Snoqualmie.

- Water yields will not be noticeably different from one alternative to another or from the present situation.

- Openings in the forest canopy tend to accumulate more snow than adjacent forested areas.

- There is some evidence that clearcutting in the transient snow zone can add water to high flows that cause flooding. Although intensive forest management may not cause catastrophic flooding or channel erosion, it might add enough water during naturally high critical flows to increase level of flooding or channel erosion. It might be that a particular situation may cause high flows that would not result in catastrophic flooding, but when additional water attributable to harvest activities is added, the result could be catastrophic.

- The water chemistry of some streams and lakes is affected by timber harvesting activities.

- Management of the vegetation within riparian areas is very critical. Retention of vegetation that will provide the shading and large organic debris recruitment is important within riparian areas. In some streams, loss of vegetation will affect stream temperatures.

Figure IV-1 (page IV-7) shows the expected movement of sediment to streams in a watershed converted from an undisturbed old-growth forest to an intensively managed forest. (Refer to Table IV-6 for the actual amount of sediment, by alternative, produced by various management activities, plus natural background sediment.)

Implementation of any of the alternatives will have minor effects on wetlands, based on the Forest-wide Standards and Guidelines and the Standards and Guidelines for riparian areas (MA 13). These measures minimize the risk of disturbance. While all alternatives will have a relatively low risk of creating disturbance in wetlands, the alternatives that prescribe the most ground-disturbing activities (NC, A, I, and B) create the most risk. Any areas that are disturbed will be rehabilitated.

Table IV-4 shows the condition of the Forest's Class II and III watersheds (or Allocation Zones; refer to Chapter III, page III-14 and III-109). The ratings - A for acceptable condition and U for unacceptable condition - are based on the hydrologic cumulative effects analysis, completed to develop a method to meet water quality and riparian MR's. This is documented in detail in Appendix

H, FEIS; the process is summarized in this section, pages IV-30 to 32 and discussed in Chapter IV, Fish, pages IV-91 and IV-92.

In all alternatives, to meet management requirements, the acres available for final timber harvest are limited, by Decade, in the watersheds listed. This will allow those in an unacceptable condition to recover and improve to an acceptable condition; it will also prevent those watershed currently in an acceptable condition from becoming degraded. Refer to Appendix H, and Forest Plan, Chapter 4, Forest-wide Standards and Guidelines for Water and Riparian Areas.

There is one watershed on the Forest (rated unacceptable) that, and due to the seriousness of the damage, will receive no timber harvest activities for the first two decades of the Plan, in all alternatives except NC (which does not meet MR's). That watershed is Deer Creek, on the Mt. Baker Ranger District.

Chemicals used for vegetative control can create water toxicity. Chemical entry into streams is mainly through direct application to stream surfaces or through drift from nearby treatment units. Standards and Guidelines (Appendix D and the Forest Plan) provide specific direction for any application of chemicals near water. The use of any herbicides will follow the direction established in the Pacific Northwest Region's FEIS for Managing Competing and Unwanted Vegetation (USDA 1988b). Norris (1978) found that leaching of chemicals through the soil profile is the process most feared by the general public, but is the least likely to occur. Chemicals used in forestry are relatively immobile in soil.

Fire causes rapid mineralization and mobilization of nutrient elements that enter the soil solution and eventually the stream through leaching and overland flow. Both wildfire and prescribed fire can affect water by causing an increase in sedimentation and causing changes in water chemistry (Stednick and others 1982); researchers do not believe that these chemical changes cause long-term degradation. Data to support quantitative fire impacts on water is not available, but it can be assumed that impacts to water will be in proportion to the total acres burned.

Direct Effects of Wildlife on Water

Management of municipal watersheds with controlled access, such as the Cedar, Green, and Tolt River watersheds, can be affected by changes in elk, deer, and mountain goat populations or management activities. Increased populations of these animals would be expected because of a greater use of available habitat, allowed by minimal harassment and limited vehicular traffic in the closed watershed. There is ongoing research into the effects of increased animal populations on domestic water supplies.

An effect of minor significance occurs with the installation of fish habitat structures which cause sedimentation, and once installed, change water velocity, which may affect channel erosion, causing sedimentation.

Table IV-4
Watersheds - Acceptable/Unacceptable

AZ	NAME	CATEGORY	RATING	NF ACRES
Mt. Baker Ranger District				
2	Illabot Creek	II	A	15,522
3	Chilliwack, Mostly Unroaded	II	A	11,677
4	Canyon Creek	III	U	17,463
5	Lower Reach, North Fork Nooksack	II	A	13,284
6	Glacier Creek/M.F Nooksack, North	II	A	9,441
8	Middle Fork Nooksack, Unroaded	II	A	6,777
9	Upper Reach, North Fork Nooksack	II	A	24,731
10	Middle Fork Nooksack, South	II	A	6,187
11	South Fork Nooksack	III	U	19,045
14	Swift-Park Creeks	II	A	6,439
15	Baker	II	A	23,142
16	Baker Lake, Unroaded	II	A	10,300
17	Lake Shannon	II	A	10,012
18	Lake Shannon, Mostly Unroaded	III	U	11,888
20	Jackson Creek, Mostly Unroaded	III	U	8,404
22	Middle Reach, Skagit, Mostly Unroaded	II	A	12,482
23	Upper Reach, Skagit River	II	A	9,483
26	Cascade River	II	A	23,671
27	Lower Reach, Skagit River	II	U	3,252
28	Lower Reach, Skagit, Mostly Unroaded	II	A	10,961
29	Deer Creek, Northwest	III	U	10,474
30	Finney Creek	III	U	20,888
31	Deer Creek Southeast	III	U	6,274
32	Deer Creek, Unroaded	III	U	7,179
38	Sauk River, Northeast	II	U	6,209
Darrington Ranger District				
34	Middle Reach, N.F. Stillaguamish, Mostly Unroaded	II	U	3,887
35	Middle Reach N.F. Stillaguamish South	II	A	6,990
37	Upper Reach, North Fork Stillaguamish	III	U	30,809
39	Sauk River, Northwest	III	A	43,421
40	Suiattle River	II	A	41,749
41	Suiattle River, Mostly Unroaded	II	A	10,792
42	White Chuck River	II	A	15,965
44	Canyon Creek	III	U	15,816
45	Sauk River, Unroaded	II	A	16,450
46	Lower Reach, South Fork, Stillaguamish	III	U	16,008
48	Upper Reach, South Fork, Stillaguamish	III	U	34,063
49	Sauk River Forks	III	A	25,446

AZ	NAME			
Skykomish Ranger District				
47	Sultan River, Unroaded, North	II	A	2,597
51	Sultan River, Unroaded, Southeast	II	A	6,166
52	Sultan River	III	A	7,917
53	N.F. Skykomish River, Unroaded, South	II	A	19,830
54	N.F. Skykomish River, Unroaded, North	III	A	14,001
55	North Fork Skykomish River	III	A	9,735
56	N.F. Skykomish River, Unroaded, West	II	A	11,192
57	Skykomish River, Mostly Unroaded	II	A	9,227
59	Tye River	II	A	4,095
60	Beckler-Rapid Rivers	II	A	39,788
61	South Fork Skykomish River, Unroaded	II	A	5,153
62	South Fork Skykomish River	II	A	2,344
63	Skykomish River/Tolt	II	A	3,632
65	South Fork, Skykomish River	II	A	23,503
67	Tye/Beckler River	II	A	20,166
68	Foss River	II	A	6,313
69	Miller River	II	A	5,386
North Bend Ranger District				
70	Tolt River, Mostly Unroaded	II	A	6,612
71	North Fork Snoqualmie River	II	A	7,305
72	Taylor River	II	A	6,172
73	Middle Fork Snoqualmie River	II	A	4,345
74	Upper Reach, M.F. Snoqualmie River	II	A	11,529
75	Pratt River	II	A	9,165
77	South Fork Snoqualmie River	II	U	17,419
81	Upper Reach, Green River	II	U	17,062
82	Green River, North	II	A	7,384
83	Green River, South	II	A	12,124
White River Ranger District				
84	Greenwater	II	U	18,520
85	Lower Reach, White River	II	U	2,321
86	Clearwater	II	A	3,315
90	Huckleberry Creek	II	A	10,008
91	West Fork White River	II	A	16,874
93	Carbon River/Puyallup	II	A	15,711

Direct Effects of Archaeological and Historic Properties on Water

Excavation of archaeological sites may result in short-term, small scale changes in water quality and clarity. If excavation occurs along a stream bank, the sediment load of the stream will be increased for a short period and accelerated erosion along the cut bank may occur. These effects would be most pronounced in Alternatives NC, A, and I, least pronounced in Alternatives C and G-Modified.

Direct Effects of Recreation on Water

Lift construction and slope grooming at ski areas, and recreation use in campgrounds can create disturbed areas which can cause small amounts of sediment. Dispersed recreation use affects water through placement of human wastes in or near water, and through introduction of pollutants from pets (such as dogs introducing giardia).

The amount of maintenance in recreation areas can have an effect on water quality, sanitation, and aesthetics. Low levels of maintenance in moderately to heavily used areas may result in health, aesthetic, and water quality problems.

Riparian and wetland areas, as discussed in Chapter III, are particularly susceptible to impacts from recreation facilities (Bull and Skovlin 1981). However, in all alternatives, the amount of habitat lost through campground expansion or other site development will be quite small. Alternatives I and G-Modified propose no new construction. In the other alternatives, some new recreation construction will remove a minimal amount of habitat, while at the same time, some less-efficient sites will be phased out and allowed to return to a natural condition.

Direct Effects of Trails on Water

Trail construction and management will have a very minor effect on water due to the very small amount of land, Forest-wide, affected by trails.

Direct Effects of Mining, Energy Development on Water

Mining will impact the water resource only if areas are explored or developed for minerals. Mining activities can affect both surface and subsurface water resources by changes in surface runoff. There may also be effects on sediment yield, erosion, water chemistry, stream channel characteristics and stability, aquifer recharge, and ground water quality. The degree or amount of effect depends upon the commodity involved, equipment used, and location of the operation.

The primary impact from mining is chemical pollution (Down and Stocks 1977); severe water toxicity can occur. In addition, geothermal, gas, and oil operations may require pipelines that disturb soils during installation.

Considering the regulatory controls available for water resources, it is assumed that the impacts caused by mining will not be significant under any alternatives, nor vary significantly by alternative. It can be assumed that effects will be less under Alternatives C and G-Modified, followed by J (Preferred), H, and I, where more area is withdrawn from mineral entry or

managed under "highly" restrictive management strategies. (Refer to the Minerals section of this chapter.)

In all alternatives in Decade 1, there is no expected production of energy minerals, and only slight variations from current production of non-energy minerals.

The alternatives that, through assignment of acres to management areas, allow the greatest development of small hydroelectric projects should have the greatest potential impact on the water resource. Table IV-5 shows the effect of the alternative land allocations on 109 potential FERC projects.

Table IV-5
Development of Potential Small Hydroelectric Projects, By Alternative

Status	NC	A	I	B (RPA)	H	J (Pref)	C	G (Mod)
	number of projects							
Allowed by Allocation	1/	68	80	76	68	64	45	53
Precluded by Allocation	1/	4	5	3	7	16	14	14
Questionable 2/	1/	37	24	30	34	29	50	42

1/ Alternative NC is similar to Alternative A.
2/ Project may be precluded either by allocation or project design.

Access roads, pipelines, and powerhouse construction for hydroelectric projects may disturb soil, resulting in sediment in the streams; if soils are unstable, mass movement into the stream is a possibility.

Small hydro projects also reduce water flow rates, as water is diverted into the pipeline. During flood periods, the diversion structure acts as a barrier which alters velocity. This can change rates and locations of sediment deposition, and may create stream bank erosion. Also, water on which flow and velocity has been reduced is likely to increase in temperature. Full mitigation is legally required for any adverse impacts on fish and wildlife resources.

Direct Effects of Roads on Water

Forest roads cause stream sedimentation. In addition to stream sedimentation from mass soil wasting from roads, surface erosion from road surfaces, cut and fill slopes, and drainage ditches also contribute sediment to streams. Road construction can also impede or change surface and subsurface runoff patterns.

Implementation of alternatives would contribute sediment as shown in Table IV-6. Heavy truck traffic on roads plus mass soil movements (landslides) cause most of the road-related sediment, rather than the road construction itself.

Table IV-6
Sediment Produced From Various Sources
Thousand Tons Per Year During First Decade

Alternative	Harvest	New Roads	Old Roads	Background 1/	Total
NC (No Change)	47.5	3.8	18.6	55.1	125
A (No Action)	38.1	3.2	14.9	46.5	103
I	35.5	3.0	14.8	43.2	97
B (RPA)	35.0	3.1	14.9	42.8	96
H	33.0	3.1	14.9	40.3	91
J (Preferred)	31.8	2.9	14.8	39.8	89
C	23.5	2.4	12.8	28.7	67
G-Modified	22.7	2.0	14.2	27.8	67

1/ From acres of previously disturbed ground plus natural sedimentation. It varies due to different amounts of rehabilitation work done on existing roads among the various alternatives.

Cederholm and Salo (1979) found on the Clearwater River that when the roaded portion of a sub-basin area exceeds 2-3% the accumulations of sediment in streambeds became significant. While it is recognized that the conditions on the Mt Baker-Snoqualmie are somewhat different, it does form a basis of comparison, lacking better data. The average road density on this Forest, and the actual acres intensively managed for timber production, is about four miles per square mile, or three percent. The density, when taken over most sub-basins is less due to the presence of other management areas such as SOHA's. As a subdrainage normally has some unsuitable or nonforest land, and is not 100% managed for timber, the percent of a drainage that is roaded will vary. In many places, it will be somewhat less than three percent density. Of course there is much more to the issue than just density. On the Mt. Baker-Snoqualmie, where slopes are steep and unstable, location, construction, and maintenance are of major importance. In order to approach a three percent density without significant impact, roads must be located to avoid unstable soils, be constructed using Best Management Practices, and be fully maintained to prevent landslide failures and drainage failures. Assuming that this will occur, roads will contribute a sediment level less than critical even in alternatives with high levels of road construction (NC, A, I, and B) (long-term studies such as Cedarholm and Salo 1979).

Implementing the alternatives in the large, municipal watersheds will have the following effects regarding road construction:

Cedar River. All alternatives will permit road construction, reconstruction, and maintenance to occur as necessary.

Green River. All alternatives will permit road construction, reconstruction, and maintenance to occur as necessary.

Sultan River. Alternative C prohibits new road or trail construction except for special administration or access of other ownership. All other alternatives will permit road construction, reconstruction, and maintenance to occur as necessary.

Other Municipal. Alternative C prohibits new road construction except for accessing other ownership. All other alternatives will permit road construction, reconstruction, and maintenance to occur as necessary.

Major stream sedimentation impacts can still occur from mass erosion after sedimentation from surface erosion has dropped to a low level and a road is considered relatively stable (Megahan and Kidd 1972). Extensive road systems often convert large amounts of subsurface water to ditch flow, causing a more rapid, severe runoff event (Hess, 1981). Mitigation measures, proper construction, and timely maintenance can help negate these effects.

Water - The Cumulative Effects of the Alternatives

Table IV-7 shows major management activities that can cause cumulative effects. Some exert more influence than others. Management activities on public and private lands can affect the 66 watersheds both outside and within National Forest boundaries. Due to resource limitations and data constraints, this cumulative effects assessment will only address the major causes of effects. One or two minor causes may not affect water quality and/or quantity, but a host of minor causes plus the presence of one or two major causes could result in major cumulative effects.

Table IV-7
Management Activities (On and Off Forest) Potentially Causing Adverse Cumulative Effects on Watersheds (Riparian Areas, Floodplains, and Wetlands)

Management Activity	.....Degree of Effect..... Major	Minor
Timber Regeneration Harvesting	X	
Intermediate Harvest		X
Road Construction	X	
Road Management	X	
Trail Construction and Management		X
Wildlife Habitat Improvement		X
Watershed Improvement		X
Fish Habitat Improvement	X	
Recreation Development	X	
Site Preparation		X
Residue Removal		X
Prescribed Fire		X
Wildfire	X	
Mineral Exploration & Extraction	X	
Geothermal, Gas, Oil	X	
Land Use Grant		X
Special Uses	X	
Insect and Disease Control		X
	X	

In most cases, there is little or no data, and little or no professional knowledge or information on the cumulative effects to water values from such activities as trail construction and operation and other forms of dispersed recreation. These activities generally encompass small areas and may or may not be within riparian areas, floodplains, or wetlands. If these minor causes are combined with other events (major causes plus natural causes), the cumulative effects to water quality and quantity would likely be the same as those that will be described. Only the intensity or degree of effect could be different.

Most of the major cumulative effects to water quality/quality are direct in nature. Forest management activities may occur on a short or long-term basis. The potential adverse cumulative impacts and their extent are dependent upon what impacts occur, and how, where, and when they occur.

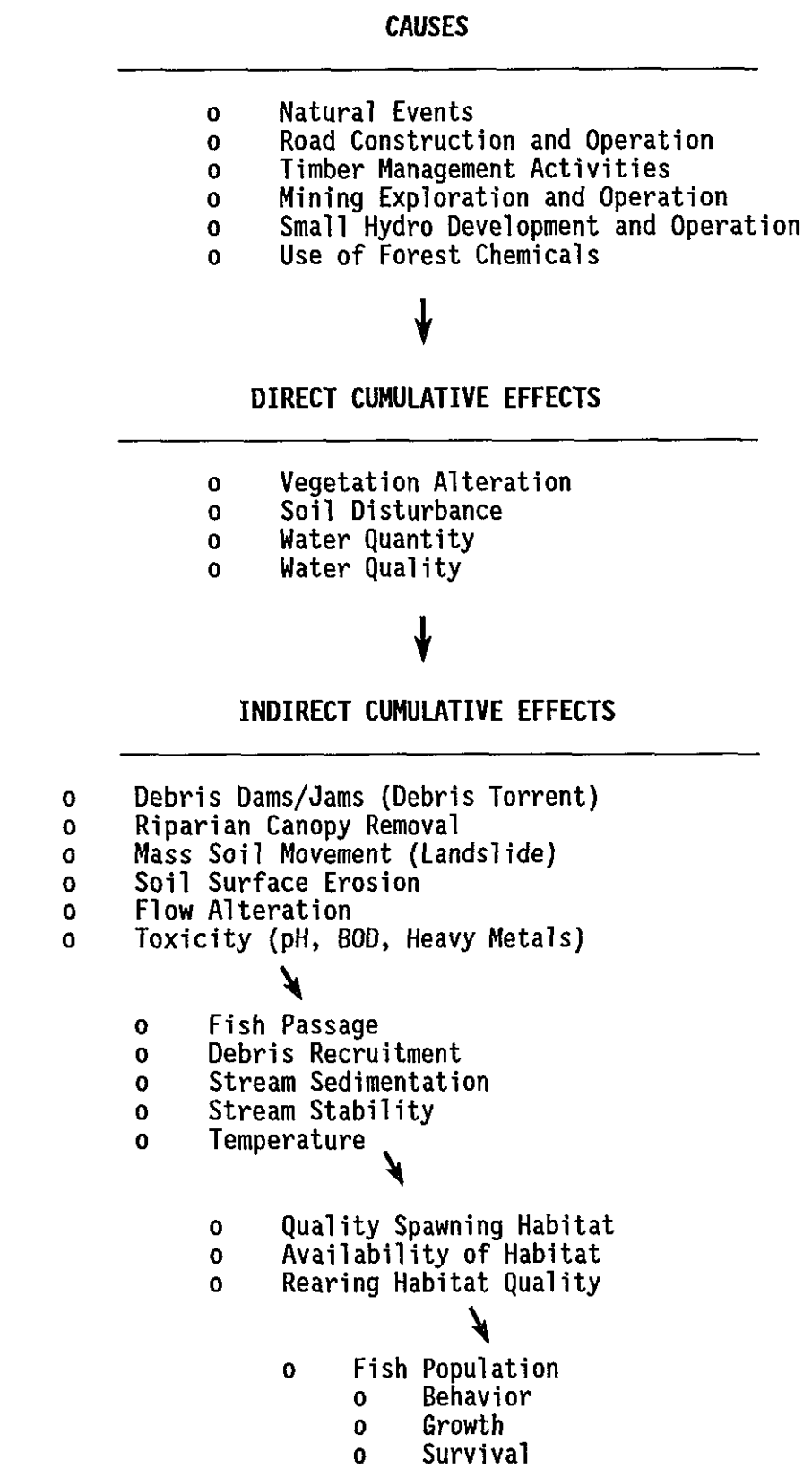
The impacts caused by management activities and the interrelationships of these are complex, as shown in Figure IV-2. This figure is a model depicting what and how activities have the potential to create major adverse cumulative effects on water quality and quantity and directly or indirectly affect the primary beneficial use of this water, the various anadromous and resident fish populations of the Forest. Activities that potentially have adverse cumulative effects include timber management activities (timber harvesting, site preparation, reforestation, intermediate harvest, and fertilization), road construction and management, mineral exploration and extraction, special uses and grants (small hydro, administrative sites), and use of chemicals on the Forest. Natural events are also shown as a potential cause of cumulative effects.

Process for Assessing Cumulative Effects

The major contributor to cumulative effects is timber harvest and associated activities. Past activities have resulted in severely deteriorated watersheds on 18 of the allocation zones and significant deterioration on many others. This deterioration was determined by evaluating the factors of stream channel stability, streambank stability, pool/riffle ratio, and amount and mobility of large woody debris.

None of the alternatives will have a further negative impact on watersheds. This is because the Forest assessed cumulative effects by developing a process that was used to evaluate the condition of each allocation zone (AZ) and then establish a harvest constraint level based on this condition and the AZ's capability to absorb and recover from timber harvest generated impacts. This harvest constraint level applies equally to all alternatives. It establishes, for watershed protection purposes, the maximum harvest level that can occur on each AZ for each decade. The harvest rate on each AZ is different and was determined by evaluating the physical and past management factors which are unique to that AZ. The background and the process are discussed in greater detail in Appendix H.

Figure IV-2
Effects of Management Activities on Soils, Water, Fisheries



Water - The Indirect Effects on Other Resources

Vegetative Diversity

Changes in water as a result of implementing any of the alternatives can have indirect effects on vegetation and timber. Several management activities can cause the water table to rise or fall, either of which will affect vegetation. One common change, resulting from a rising water table, is that red alder will become established in an area that was previously dominated by conifers.

Changing waterlevels can have a major effect on wetlands, causing them to dry up and change to other vegetation or habitats, or flooding and killing wetland vegetation. Flood waters can deposit sediment and bury vegetation; if silt is deposited, vegetation in the short-term will be destroyed, but in the long-term, vegetative growth could improve. High water flows can also undercut banks, resulting in local soil slides which destroy the vegetation on the areas affected. Saturated soils may result in mass wasting, which in turn causes vegetative destruction. These effects can be quite significant in local areas.

The risk of these changes occurring would be greatest in those alternatives that have the greatest harvest levels, NC, A, I and B. Alternatives C and G-Modified would have the lowest level of risk due to the lower levels of acres harvested over time.

Old Growth

The effects would be the same as those described above in Vegetative Diversity.

Wildlife

Implementation of the alternatives will not cause many changes in water which would affect elk, deer, and mountain goats. One change in water that could have an effect is increased snow pack accumulation from clearcuts, which could cause changes in migration routes and habitat usage. Indirect effects on the northern spotted owl, pileated woodpecker, pine marten, primary cavity excavators, or their habitats from changes in water are not likely.

Conditions which cause the water table to rise could significantly affect burrowing animals. Also, changes in water table level would change the vegetation on the site and could affect the types of mammals present. For example, if an area were to become swampy, it might become favorable habitat for beaver.

Changes in water that could affect reptiles and amphibians are changes in flow, temperature, and water table, and increased sedimentation. Either a rise or lowering of the water table would cause changes in soil wetness and vegetation composition. Risk of these changes occurring would be highest in Alternatives NC, A, I and B, and lowest in Alternatives C and G-Modified. Alternatives H and J (Preferred) would fall between these two groups.

Fish

Changes in water quantity and quality can cause significant effects on fish and fish habitat; the most significant effects are related to lowflow conditions (impacts on availability of rearing and spawning habitat) and highflow

conditions, e.g. flood or peak flow events (impacts of bedload and sediment deposition on spawning and rearing habitat). Alternatives NC and A would have the highest risk, while C and G-Modified would have the lowest.

Any on-Forest or off-Forest management activity that singly or in combination with other water use activities impact the quality and/or quantity of the Forest's aquatic systems will have a negative impact on the fish or fish habitat resources. This is discussed in detail in Appendix H.

The effects of municipal watershed management on fish vary by alternative, depending upon the amount of timber harvest, road construction and road use. The effects to fish and fish habitat within the large watersheds (Cedar, Green, and Sultan Rivers) are tied primarily to the level of roading and timber harvest. Provisions for fish habitat restoration in all alternatives will mitigate some effects. The greatest effect will occur in Alternatives NC, A, I and B. In Alternative C, the Sultan River and other small municipal watersheds would be closed to timber harvest activities; there would be the least effect to water.

Human Community

Changes in water as a result of implementing alternatives can cause changes in land use. A significant effect occurs when an activity causes a mass wasting event and this material enters streams. During high water it is transported downstream (sometimes as a debris torrent) and occasionally deposited onto property causing damage to land and/or buildings.

Changes in water as the result of implementing the alternatives could have an effect on prime forest and farm land adjacent to rivers and their tributaries. Flooding could change the land by sediment deposition or erosion.

Changes in water that cause changes in fish production can cause indirect changes in that sector of the economy. Fish production would not fall below the MR level for fish production (the current level) for any alternative. The highest risk of this occurring would be in alternatives with high harvest levels, NC, A, I and B. Alternatives C and G-Modified will have the lowest risk due to the lower harvest levels.

American Indian Religious and Cultural Use

Changes in water as a result of implementing alternatives may affect the values of inventoried American Indian religious and cultural use sites and areas. Purity of environment is an important value in spirit and legend sites; degradation of the water quality or quantity will impact the value of these sites for religious and cultural practices. These changes would be most pronounced in Alternatives NC, A, B, and I, and least in Alternatives C and G-Modified. Changes in fish populations resulting from changes in water can also affect the ability of the Forest to contribute to Treaty obligations. (See the discussion of Fish resources later in this chapter.)

Archaeological and Historic Properties

There are no measurable effects.

Scenery

Changes in water as a result of implementing alternatives would have only localized affects on scenery, such as bank erosion, landslides, or channel changes initiated by high water flows.

Recreation

Changes in water as a result of implementing alternatives could have minor, localized effects on developed recreation. Changes may include local degradation of drinking water in developed sites from chemical contamination or sedimentation. More likely to be significant on a local basis is erosive destruction caused by high water flows, associated with storm events.

Watershed restoration and improvement projects will vegetate eroded areas and stabilize areas of high erosion. There will likely be short-term impacts from traffic, dust, and noise during construction, but in the long run, these projects would improve the recreation setting by improving water quality of adjacent streams.

Changes in water that would affect dispersed recreation (motorized) are high water flows, associated with storm events, that causes road closures due to landslides and washouts. This is a minor problem Forest-wide, but locally can occur with any alternative. Unroaded dispersed recreation could be indirectly affected by increased water flows and/or misdirected water that causes trail erosion, muddy trail conditions, and trail closures due to landslides and washouts. This also can occur locally with any alternative.

Trails

There may be local indirect effects on trails. Increased water velocity and misdirected water can cause erosion and trail washout. Any impact is likely to occur in any alternative, but would be very minor Forest-wide.

Wilderness

There is no measurable effect.

Research Natural Areas

There is no measurable effect.

Roadless Areas

There is no measurable effect.

Wild and Scenic Rivers

Any management activities affecting water quality or quantity could have an adverse effect on Wild and Scenic River designation.

Air

There is no measurable effect.

Fire

There is no measurable effect.

Minerals

There is no measurable effect.

Land Ownership and Use

There is no measurable effect.

Roads

Changes in water as a result of implementing alternatives may affect roads. A road that is adjacent to a river can be removed by that river during flooding. However, in the more commodity-oriented Alternatives (NC, A, I and B) the risk would increase as more roads are constructed.

Mitigation Measures for Water

Mitigation measures that are applicable to all alternatives (Forest-wide Standards and Guidelines) and mitigation measures appropriate for each management area are discussed in Chapter II. There are some state-of-the-art, but expensive and sophisticated, watershed restoration techniques that will be occasionally used. These may include stabilizing landslide areas, installing check dams in steep drainage areas, and permanent and temporary water barring of road prisms. These activities are effective, but expensive techniques. They will be used on a case-by-case basis at the project level as determined by District personnel. A seriously damaged area will likely be repaired, regardless of watershed class, provided that repair is necessary to protect resource values, and funds are available.

Guides, steps, and recommendations to minimize the impacts of road construction on streams are available (Yee and Roelofs 1980, Sidle 1980, Amaranthus and others 1985). In addition, proper maintenance has been identified as an essential part of minimizing erosion and sedimentation from road surfaces (Sidle 1980, Lantz 1971).

Measures to control waste and drainage water from mines, and measures to impound mill tailings will be required, as will the installation of waterbars, culverts, and fords to prevent erosion of roadbeds and stream crossings. Except when required for mining purposes, avoidance of channels and floodplains of live streams will be required. If avoidance is impossible, appropriate reclamation will be required.

Proper control of chemicals and organic pollutants will be done in accordance with The Final Environmental Impact Statement for Managing Competing and Unwanted Vegetation, December 1988, and the Mediated Agreement.

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Water

The City of Seattle

The Cedar River Watershed is managed under a 1962 Agreement between the Forest Service and the City of Seattle. The agreement provides for timber harvest on a sustained yield basis within the watershed. As National Forest lands have been cut, they have been exchanged to the City for City lands located elsewhere. On August 7, 1988, the Seattle City Council adopted Ordinance 114632, which embodies the new Secondary Use Policies for the Cedar River Watershed. The City will set aside approximately 50% of its lands in a reserve precluding timber harvest. They will prepare a long-range timber harvest plan for second-growth lands outside that reserve. In addition, the policies call for acquiring 4,000 - 6,000 acres of old-growth forest that are currently NFS lands, to be maintained as old-growth habitat. This ordinance may, in the future, cause the 1962 Agreement to be amended.

Under Alternative J (Preferred) this agreement would be renegotiated and, until a new agreement was developed, no new exchanges affecting national forest lands in the watershed would occur. Alternatives NC, A, I and H would continue with the 1962 agreement and lands would be harvested and exchanged. In Alternative B, all national forest lands would be retained and old growth stands kept. All national forest lands would be exchanged except for old growth stands in Alternatives C and G-Modified.

City of Tacoma

The Requirements for Protection of Water Supply in the Green River Watershed states that the policy of the City of Tacoma is to limit access to the Green River Municipal Watershed Area to persons who either live within its confines, or are employed in the area. Outdoor recreation is not considered a compatible use, and is not approved within the borders of the Green River Watershed on city lands. National Forest lands are open to recreation use, but access is limited to entrance from Stampede Pass at the east end of the watershed.

Alternatives B and I prohibit recreation use on National Forest lands except those authorized to participate in controlled hunts, and use of the Pacific Crest trail. All other alternatives provide for controlled recreation use on National Forest lands.

City of Everett

The objective of the Sultan River Basin Resource Management Plan is to provide a common framework to guide the desired activities of a variety of government agencies, having jurisdiction and interests in the basin, in a way which will allow maximum utilization of resources while preserving and maintaining the highest levels of water quality. The plan identifies a need for a management agreement (in the form of a memorandum of understanding). It also contains general management guidelines for the management of the timber resource in the basin.

Alternative C (closed watershed) conflicts with this plan. Alternatives B and I modify the current objective of consolidating National Forest land by maintaining ownership of isolated parcels of land within the watershed.

VEGETATIVE DIVERSITY

Diversity can not be described or tracked as a single number or index. In its broadest sense, diversity is the variety of life. To describe present and planned diversity on the Forest, we must have a manageable way to describe the variety of plant and animal species and biological processes. The elements of diversity include the viability, distribution and abundance of wildlife and plant populations; structure and composition of managed Forests; the role of agents such as fire and insects; long-term productivity; and the fragmentation of scarce community types.

The following section addresses the effects of alternatives on diversity of vegetation species and communities. A subsequent section addresses effects on wildlife diversity. See also the Soils and Fire section for effects on these elements of diversity.

Vegetative Diversity - The Direct Effects of Each Alternative

General

Management of vegetation for the production of goods and services, and natural succession results in constant changes in the abundance and distribution of plants and animals on the Forest (Odum 1971). Maintenance of biological diversity of vegetation is essential to the long-term goals of the Forest. The diversity of plant communities on the Forest has changed from historic times to current conditions, and all alternatives will have additional effects. Plant community diversity is affected both by the amount and kinds of habitats on the Forest, and by the amount and distribution of successional stages. As discussed in Chapter III, diversity elements include:

(1) viability, distribution, and abundance of plant populations; this includes maintaining viable populations of all threatened, endangered and sensitive plant species and not eliminating any species from an area;

(2) structure and composition of forest communities, including diversity of tree species, and numbers of horizontal layers of vegetation at the ground, shrub, understory tree and overstory tree levels, and;

(3) maintenance of longterm productivity, including maintenance of soil productivity, dead and down trees, and a duff layer; and

(4) fragmentation and reduction of scarce or fragile community types, such as old-growth, riparian communities, vegetation communities in cliff, cave and talus areas, and hardwood communities.

Regardless of the alternative considered, the ecosystem will continue to change. None of the alternatives are designed to return the Forest ecosystems to those of any previous time in history.

In the absence of fire or timber harvest, most plant communities will change toward "climax conditions", represented by species of vegetation that are able to survive and reproduce continually. Timber harvesting, fire, and other disturbances stop the successional trend, and move it back to an earlier stage.

All of the alternatives except Alternative NC are designed to meet legal requirements (36 CFR 219.27) for the preservation and enhancement of diversity of plant and animal communities to the extent practicable. Management requirements (Appendix H), management area category assignment, and Standards and Guidelines in Chapter 4 of the Forest Plan are tools for achieving legally mandated and socially desirable levels of protection of all species of plants and animals, while providing needed outputs of goods and services to the nation. (Refer to Chapter II, Table II-9(a-o) for the outputs of goods and services for all alternatives.)

Nearly all of the activities performed in managing the National Forest cause changes in the vegetation on the Forest. Some of these activities occur so infrequently, are so localized in nature, or affect such a small acreage that in the first decade, the effects are considered to be minor.

Direct Effects of Timber Harvest on Vegetative Diversity

Direct Effects Common to Alternatives. Timber harvest and the related timber management activities of site preparation, reforestation, stocking level control, fertilization, and intermediate harvest all affect vegetation. These activities have the greatest single effect on vegetation of any of the management activities conducted on the Forest.

Acres harvested in Decade 1 are a direct indicator of the magnitude of the effects of timber harvest on vegetation, by alternative. These effects include the cutting and removal from the forest of all trees that are of a merchantable size. Material that is not merchantable is either left on the ground as is, rearranged (chipping etc.), or relocated to a central area for disposal later, either as useable residue, cutting for fuelwood, or burning. Harvesting trees also affects the other vegetation in the harvest area; it is frequently damaged or destroyed during the removal of merchantable material. Some species of shrubs, forbs, and grasses cannot tolerate direct sunlight following removal of the overstory vegetation; these species will be replaced by more sun-tolerant plants.

During the first decade, timber harvest activities in all alternatives will occur in old growth stands varying from 100% of the acres harvested in Alternative NC for a high to 59% of the acreage harvested in Alternative A for a low; harvest will basically be accomplished utilizing even-aged silvicultural systems. Under all alternatives, total acres of remaining old growth will decline as a result of timber harvest. Acres harvested in old growth stands, by alternative, are shown in Table IV-8, below.

Each microsite that is cut will respond to changes in light, heat, and nutrients available, and each may respond with a different mix of grasses and forbs adapted to that site. When reforested, either by planting or natural regeneration, the seedlings introduced to the site overtop these grasses and forbs, thus changing the light, heat, and nutrient relationship. The plant successional sequence will then begin again. On suitable lands, this continues, over time, until the stand is harvested again, and the cycle begins again.

Table IV-8
Summary of Acres Harvested in Old Growth Stands (mature large) in the 1st Decade, by Alternative

Alternative	Total Acres Harvested 1st Decade	Old Growth 1/ Acres Harvested 1st Decade	% of Acres Harvested that Are Old Growth
NC (No Change)	42,000	42,400	100%
A (No Action)	40,684	23,841	59%
I	32,599	22,750	70%
B (RPA)	32,207	22,098	69%
H	30,416	20,673	68%
J (Preferred)	28,654	18,879	66%
C	18,734	11,548	63%
G-Modified	22,906	14,201	62%

1/ Old Growth based on mature large material only.

Following harvest and prior to reforestation, the cutover site will be prepared for planting or seeding, removing undesirable vegetation which would compete with the young tree seedlings and/or logging residue. The amount of site preparation is highly dependent on specific site needs and could vary substantially within an individual harvest unit. Site preparation methods may include broadcast burning as well as mechanical, manual, and chemical methods in accordance with the Final Environmental Impact Statement for Managing Competing and Unwanted Vegetation, December 1988, and the Mediated Agreement. Fewer acres will be broadcast burned over time. (Refer to the Direct Effects of Each Alternative on Soils.) Generally, less site preparation is done in the Pacific silver fir zone, as importance is placed on protecting seedlings already established prior to the timber harvest activities.

All harvested acres will be reforested through either natural or artificial means. If seedlings are planted, reforestation is generally done within 1 to 2 years after harvest; a three-year period is allowed in the timber yield tables, in case of poor seed years. If the area is to be naturally regenerated, reforestation occurs within four years, with a seven-year period allowed in the yield tables. All alternatives reforest at least 70% of the harvested areas artificially.

Where artificial reforestation is employed, species other than those planted will occur in the stands, both from seedlings remaining after harvesting and from natural seed sources. Most artificial reforestation activities match the species to the site, and in favor of those species which have the greatest growth and economic potential, usually Douglas fir, Pacific silver fir, noble fir, western hemlock, western red cedar and white pine. In some instances, an introduced species will be used; noble fir will be planted on specific sites on the Darrington and Mt. Baker Ranger Districts.

Stocking level control - pre-commercial thinning, release, etc. - will be practiced on some lands to increase the growth rates and/or control species

composition. Stocking level control is normally accomplished manually with the use of chainsaws. Chemicals, prescribed fire, or mechanical methods may also be used where practical. Excess trees may be of the same species or of lower value species than the crop trees. Normally coniferous trees are preferred over hardwood species, ie., alder, cottonwood, etc., because of their historically higher values.

By removing competing trees, the growth rate of the remaining "crop trees" will increase. Board foot gains from pre-commercial thinning vary by site anywhere from +6 to +66 percent (Reukema and Bruce 1977). This increase in growth rate allows the production of larger sized trees in a shorter period of time that are less susceptible to bark beetle infestation. Stocking level control maintains plants found in early successional stages for a longer period of time.

Because the diversity of managed forest stands is somewhat lower than the natural diversity of forest stands, one way to compare management alternatives is to compare the total number of acres on the Forest which will be subject to timber harvest. These acres allocated to management areas with some level of timber harvest are compared below.

Alternatives do not vary widely in the number of old-growth acres remaining at the end of the first decade, although a difference is clear over the longer term (e.g. five decades). The difference among alternatives at the end of the first decade lies more in the degree of fragmentation of old growth blocks, the distribution of old growth, and the acreage remaining at lower elevations. (See Old Growth, this chapter)

No federally-listed threatened or endangered vegetative plant species have been found to date on the Forest; sensitive plants which are known to occur or suspected to occur are discussed in Chapter III. Where these are found, policy requires that activities be modified to protect them, as needed to maintain viable populations. Refer to Chapter III, Vegetation, for information on individual species, and to the Forest Wide Standards and Guidelines in the Forest Plan. Because there is a lack of information on the habitat requirements of sensitive plant species, and inadequate information on their distributions and occurrence, the more ground-disturbing activities which occur, the more the risk of inadvertently having a detrimental impact on a listed species.

Alternatives. There are 1,723,500 acres on the Forest; 1,301,000 of which are forested. The potential for changing overall diversity of plant communities is based on the number of suitable acres in each alternative. Table IV-9, Acres Subject to Timber Harvest, By Alternative, displays forested acres subject and not subject to vegetative manipulation.

A review of the table indicates that Alternatives NC and A have the highest potential for changing the overall diversity of plant communities on the Forest. While Alternatives I, B, H and J (Preferred) have a moderate potential for change. Alternative C and G-Modified have the lowest potential of all to cause changes in overall diversity of plant communities.

Table IV-9
Acres Subject to Timber Harvest, By Alternative

Total Forested Acres = 1,301,100

Alternative	Forested Acres Available for Timber Harvest	Forested Acres Not Harvested
NC (No Change)	579,800 acres (45%)	721,300 acres (55%)
A (No Action)	412,508 acres (32%)	888,592 acres (68%)
I	386,512 acres (30%)	914,588 acres (70%)
B (RPA)	380,448 acres (29%)	920,652 acres (71%)
H	358,754 acres (28%)	944,346 acres (72%)
J (Preferred)	346,411 acres (27%)	954,689 acres (73%)
C	256,206 acres (20%)	1,044,894 acres (80%)
G-Modified	247,091 acres (19%)	1,054,009 acres (81%)

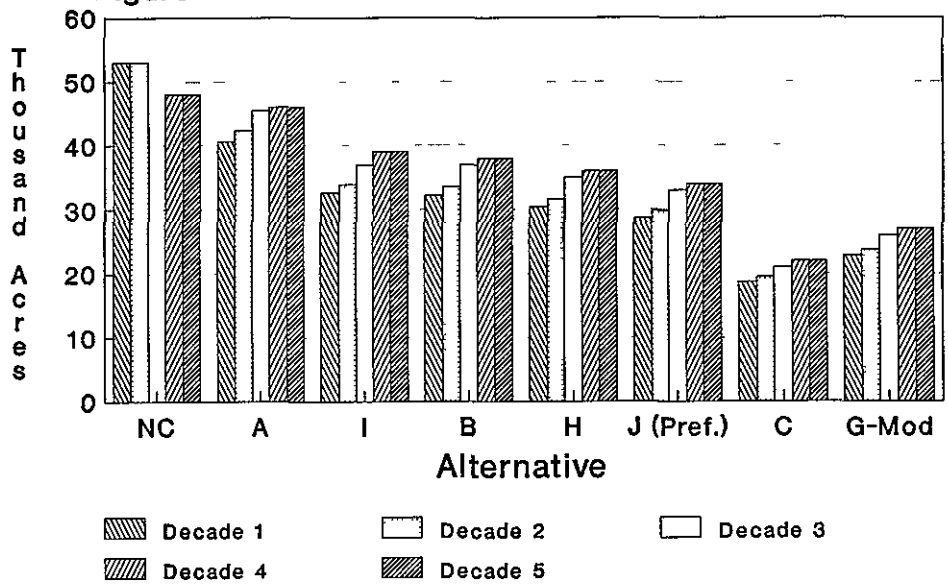
The potential for change varies from a high of 579,500 acres (45%) subject to harvest in NC to a low of 247,091 acres (19%) subject to harvest in Alternative G-Modified. Conversely Alternative G-Modified has the most acres 1,054,009 (81%) where no vegetative manipulation (harvest) will occur and Alternative NC will have the least number of forested acres 721,300 (55%).

Changes in plant communities are directly affected by the number of acres harvested and/or treated by some type of silvicultural practice. These types of treatments can take many different forms, but can be described as regeneration, reforestation and silvicultural treatments.

Regeneration harvest entails the removal of the existing stand of trees. This results in a change in plants from older larger ones to smaller younger ones. The more acres that are harvested, the greater the change. Alternatives NC and A have the greatest number of acres regenerated in the first decade and over the first five decades. Alternative I, B, H and J (Preferred) produce a mid level of timber harvest in the first decade varying from 3,260 acres per year in Alternative I to 2,865 acres per year in Alternative J (Preferred). These same alternatives fall in the same grouping over the first five decades. Alternatives C and G-Modified have the lowest number of acres regenerated in the first decade, 1,873 acres per year and 2,291 acres per year respectively and over the first five decades. A summary of acres final harvest can be found in Figure IV-3, Acres of Final Harvest.

With varying levels of harvest there will be varying degrees of risk of inadvertent loss of individual plant species, and of loss of distribution of sensitive or uncommon plant communities, such as alder riparian vegetation and lower elevation old-growth. There will be a high risk of loss in Alternative NC and A, a moderate risk of loss in Alternatives B, I, H, and J (Preferred) and a low risk in C and G-Modified.

Figure IV-3 Acres of Final Harvest



For Alternatives A, B, I, H, J (Preferred), C and G-Modified, management requirements would prevent losses of minimum levels of vegetation types and age classes. Riparian standards and guidelines would provide a fairly high level of protection to these areas. MR areas for mature and old-growth forest types (spotted owl, pine marten, and pileated woodpecker MR's) will maintain a network of old-growth set-asides, ranging from 160 acres to 2200 acres in size, over the Forest. Riparian MR requirements would maintain mature and old-growth riparian vegetation areas which would provide connections among other MR areas.

In Alternative NC, management requirements for prevention of serious environmental impacts are not applicable to this alternative. It can be inferred from this that there be significantly more risk of loss of individual plant species (including sensitive plant species) or communities, particularly those related to lower elevation old-growth forest types and riparian areas, than other alternatives. With this, there will be some loss of distribution over the Forest of older, coniferous and older riparian forest stands and undisturbed plant communities of all types. Forest-wide Standards and Guidelines would not be in-place to limit timber harvesting in riparian areas and to maintain long-term productivity of managed sites.

The level of regeneration harvest also determines the number of acres to be reforested in each alternative. Again NC and A will have the highest level of reforestation, Alternatives I, B, H, and J (Preferred) will have moderate level and C and G-Modified will have the lowest. Two types of regeneration will occur: artificial and natural. Better than 70% will be reforested using artificial means in all alternatives. Alternative NC will use artifiical methods 100% of the time. Alternatives I, B, H, J (Preferred) and G-Modified

will range from 72% (A) to 76% (B), and Alternative C will use artifiical methods 70% of the time. A summary of reforestation can be found in Table IV-10, Acres of Silvicultural Treatments, By Alternative, Decade 1.

Table IV-10
Acres of Silvicultural Treatment, By Alternative, Decade 1

Alternative	Treatment			
	....Reforestation.....		.....Thinning.....	
	Natural	Artificial	Precommercial	Commercial 1/
NC (No Change)	0	4,360	3,000	200
A (No Action)	1154	2,914	1,141	200
I	862	2,398	996	200
B (RPA)	772	2,449	989	200
H	835	2,207	1,005	200
J (Preferred)	781	2,084	996	200
C	569	1,304	615	123
G-Modified	607	1,684	873	175

Acreage receiving silvicultural treatment, precommercial and commercial thinning varies by alternative. Alternative NC has the highest level of precommercial thinning of all alternatives, 3000 acres per year followed by Alternatives A, H, I, J (Preferred), B, G-Modified and C, respectively. Alternative C has the lowest level of 615 acres per year, an 80% reduction from Alternative NC. Commercial thinning remains constant in Alternatives NC, A, B, I, H and J (Preferred) at approximately 200 acres per year. Alternatives G-Modified and C have fewer acres commercial thinned, 175 acres per year in G-Modified and 123 acres per year in C.

The reduction of older successional stages is proportional to the harvest of acres containing mature large sawtimber (old-growth.) Each of the alternatives have different acreages of old-growth available for harvest and enter them at different rates. By the end of the first decade, a pattern of old-growth harvest begins to emerge with Alternative NC having the most acres harvested 42,400 acres. Alternatives I, A, H, and J (Preferred) harvest from between 22,750 acres to 18,879 acres of old-growth. The lowest levels of old-growth harvest occur in Alternatives C and G-Modified where 11,548 acres and 14,201 acres are harvested, respectively. (See Table IV-8.)

This pattern continues through the fifth decade where almost all acres meeting the old growth definition will be harvested and converted to younger successional stages on suitable lands. The number of acres still meeting the old growth definition on suitable lands varies from 7,824 acres in Alternative G-Modified to a high of 33,134 acres in Alternative C. This does not represent the total old-growth remaining as more acres meeting the old growth definition are allocated to non timber prescriptions. When this is taken into account the number of acres of latter successional stages (old growth) remaining varies from 573,427 acres in Alternative C to a low of 431,538 acres in Alternative

NC. (See Table IV-11 for future information on old growth remaining through the first five decades.)

Table IV-11
Remaining Old Growth and Mature Acres by Alternative
on Total Acres and Suitable Acres

Alt		Decade	1	2	3	4	5
*NC	T	643,538	601,138	558,738	516,338	473,938	431,538
	S	232,509	190,109	147,709	105,309	62,909	20,509
A	T	643,538	617,500	572,101	550,032	523,009	496,525
	S	163,169	137,131	97,732	69,668	42,640	16,156
I	T	643,538	620,263	588,321	562,687	538,866	515,712
	S	157,660	134,385	102,443	76,809	52,988	29,834
B	T	643,538	620,609	589,051	563,740	540,197	513,020
	S	157,826	134,897	103,339	78,028	54,485	27,308
H	T	643,538	622,865	594,095	572,920	551,777	526,086
	S	145,778	125,105	96,335	75,160	54,017	28,326
J	T	643,538	624,660	599,355	579,963	560,760	535,094
	S	140,817	121,939	96,634	77,242	58,039	32,373
C	T	643,538	631,689	617,473	605,916	594,498	573,427
	S	103,245	91,396	77,180	65,623	54,205	33,134
G	T	643,538	629,337	610,074	596,450	582,945	570,670
Mod	S	80,612	66,491	47,228	33,604	20,099	7,824

T = Total Acres mature large, 240 years of age or older.
S = Total acres mature large, 240+ yrs. on lands suitable for timber harvest.
*NC Based on Potential Yield Statement 1985 Final Harvest.
Alt. A-J Based on FORPLAN acres by age class.

Direct Effects of Integrated Pest Management (IPM) on Vegetative Diversity

Insect, disease, and animal damage control activities are minor programs on the Forest, and are usually performed on very localized areas. The control activities that do have an affect on vegetation, such as dwarf mistletoe control, are generally accomplished through timber harvest activities.

In some activities, such as recreation development, trail construction, wildlife habitat improvement, etc., the opportunity exists to introduce foreign vegetative species. The introduction of new species is generally short-lived, as the native natural plant species will out-compete them. However, there are

instances where, on a local basis, foreign species have thrived (tanzy ragwort is an example) and outcompete native species. In some cases, these species need to be controlled, under a noxious weed treatment plan.

Direct Effects of Wildlife Habitat Improvement on Vegetative Diversity

Habitat improvement is directed primarily toward deer, elk, and mountain goat. Its effect on vegetation primarily includes scheduling and locating timber harvest activities to achieve an optimum mix of forage, hiding, thermal, and optimal cover on winter range. This optimum mix results in mature timber stands on 37-45 percent of the winter range at all times, to provide optimal cover. These stands of trees are larger than would normally occur on areas managed for timber production. The optimal cover stands also have small natural openings where low-growing browse species of vegetation occur.

Projects to improve deer, elk, and especially mountain goat habitat may involve burning areas to provide more forage in the early plant successional stages. Other options include seeding, planting, and fertilizing grasses and shrubs, as well as timber harvest to improve forage and cover arrangement.

Alternatives NC and A have no assigned winter range improvement areas, although some habitat improvement would be done in compatible management areas in all alternatives. Refer to Chapter II, Table II-8, which shows the acres allocated to MA's 14 (Deer and Elk Winter Range, Improvement) and 15B (Mountain Goat, Habitat Improvement). Alternative B includes 106,632 acres and Alternative C includes 39,057 acres of assigned habitat improvement for deer, elk, and mountain goat. All other alternatives assign habitat improvement acres to deer and elk only: Alternative I, 106,632 acres; Alternative H, 34,239 acres; Alternative G-Modified, 26,622 acres; and Alternative J (Preferred), 33,587 acres.

Direct Effects of Fish and Riparian Habitat Improvement on Vegetative Diversity

Fish habitat improvements and associated maintenance activities, conducted along and within stream courses throughout the Forest, amount to small acreage. It is estimated that about 50 small (one acre or less) impoundments and about ten to twenty miles of streamsides will have some vegetative manipulation conducted on them over the next ten-year period. Seeding for deer, elk, and other species along streams may provide more shade, reduce stream temperatures, and increase streambank stability. Changing vegetation near streams (through prescribed fire or other methods) may affect fish habitat.

Direct Effects of Archaeological and Historic Properties on Vegetative Diversity

Protection of, and mitigation for cultural resources involves minimal manipulation of vegetation. Protection of an archaeological site or historic structure through avoidance may result in retention of vegetation, with current plant species remaining and natural processes continuing. This can include commercial timber species, otherwise suitable for timber harvest. Excavation of an archaeological site will result in removal of vegetation over a small, localized area. Usually the scale of disturbance is so low, that the effect is short-term.

Direct Effects of American Indian Religious and Cultural Use on Vegetative Diversity

Management of American Indian religious and cultural use sites have little effect on vegetation. The consultation process with affected tribes, prior to any proposed project, may result in deferring or relocating the activity, or mitigation measures to lessen the effect on the site. Experience to date has shown this has little effect on vegetation.

Direct Effects of Scenery on Vegetative Diversity

The only effects of scenic viewsheds on vegetation and timber from implementation of any of the alternatives is the reduction of management activities on suitable lands assigned to scenic viewshed. Activities will be extended over time, 200 years in foreground areas and 100 years in middleground areas, to meet visual objectives of an alternative. This will result in a retention and eventual mixing of plant species and successional stages in these areas. These changes, combined with forested areas which are excluded from harvest because of unsuitability, will result in a landscape which has all successional stages represented. Table IV-12 shows acres assigned to scenic viewsheds, by alternative.

Acres managed for foreground will retain a diversity of tree species and age classes; timber is managed at about 65 percent of full yield. In acres managed for middleground, timber harvest yield will be about 86 percent of full yield.

Table IV-12
Scenic Corridors - Thousand Acres

Alternatives	Foreground	Middleground
NC (No Change) 1/	NA	NA
A (No Action)	3.3	0.0
I	29.2	0.0
B (RPA)	4.0	0.0
H	24.6	81.5
J (Preferred)	23.4	85.8
C	65.7	57.5
G-Modified	9.5	0.0

1/ The TM Plan upon which Alternative No Change is based was developed in 1963. It was not an integrated resource plan, and consequently did not address all resource uses and outputs. The missing information cannot be reasonably estimated, since acres of retention and partial retention were not determined in the TM Plan.

Direct Effects of Recreation on Vegetative Diversity

Recreational improvements on the Forest such as campsites, picnic areas and trailheads currently occupy about 1855 acres or about 0.1 percent of the

Forest. Ski areas occupy about 6,335 acres or about 0.4 percent of the Forest. Some vegetation is more resistant to trampling than others, thus, as the more sensitive plants are eliminated, the mixture of vegetation will change over time within developed recreation sites.

The recreational activities and facilities on a developed site require space that would otherwise be occupied by vegetation. Consequently, establishing a developed recreation site results in the loss of a significant portion of the vegetation in that area.

Alternatives with the largest developed recreation site programs would have the most effect on vegetation on the actual site - a very small amount Forest-wide. Briefly, Alternative I proposes the largest program, followed by Alternatives C, H, J (Preferred), and A (NC would be similar to A). Alternatives B and G-Modified decrease emphasis on new developed site opportunities. The effects of ski area development on vegetation would be the same in all alternatives except Alternative I which allows expansion of Cystal Mountain beyond current permit boundaries. (Refer to the Direct Effects of Each Alternative on Recreation section of this chapter for more detailed information.)

The effects of dispersed recreation on vegetation are minor Forest-wide but can be measurable at localized high use sites. Dispersed campsite users may carve on trees, remove branches, and cut down standing trees. Campsite establishment and expansion in dispersed areas can result in denuded sites; depending on use level, vegetation may not return or the original species may be replaced by more hardy species. Social trails can proliferate from user campsites. Damage is more pronounced and slower to recover at higher elevations, where soils are shallower, and the growing season is shorter. The effects will be most noticeable in alternatives that assign the fewest acres to nonmotorized dispersed recreation: Alternatives A (NC is similar to A), B, and I. Alternatives G-Modified, C, and J (Preferred) provide the largest acreage of nonmotorized dispersed recreation.

Total RVD's for alternatives will be positively correlated with the likelihood of recreational uses affecting vegetation and possibly affecting threatened, endangered and sensitive plants. Alternatives I, A, B and H have the highest levels of RVD's.

Direct Effects of Trails on Vegetative Diversity

Development of trails, trail maintenance, and trail use may cause changes in or complete removal of vegetation, though the effects are much smaller in scope and size than those involved with construction of roads. Trail construction removes approximately one-half acre of vegetation per mile. Alternatives I,and G-Modified would construct 350 miles of new trails in the first decade; Alternative J (Preferred) constructs 220 miles; Alternative C, 178; Alternative H, 155 miles; Alternatives NC and A, 140 miles each; and Alternative B, 102 miles.

Direct Effects of Wilderness on Vegetative Diversity

Natural changes in the diversity of plants may have indirect, localized effects within wilderness. Any effects would be the same in all alternatives.

Direct Effects of Wild and Scenic Rivers on Vegetative Diversity

The recommendation for Wild and Scenic River designation for specific rivers affects the amount of timber harvested on any suitable lands within river corridors. Until Congressional action, the "outstanding remarkable" values of the eligible rivers must be protected. After designation, timber activities will be allowed in Scenic and Recreation classifications.

The degree of visual resource protection offered in the viewsheds adjacent to the rivers becomes the means to evaluate acceptable levels of timber activity. As a result of longer average rotations needed to meet the goal of these allocations, activities will be extended over time. This will result in a retention and eventual mixing of plant species and successional stages in these areas. These changes, combined with forested inclusions of unsuitable timber land, will result in a landscape which has all successional stages represented. Classification would add to the natural diversity of vegetation in river corridors, as larger, older trees are retained.

Alternatives NC, B, and I have no rivers recommended for designation. Alternative H recommends the North Fork of the Nooksack, the North and South Forks of the Skykomish, the Tye River, and the Middle Fork of the Snoqualmie as suitable for designation. These five rivers total 23,616 acres of National Forest land, encompassing one quarter mile on either side of each river. Alternatives C and G-Modified recommend 47 rivers as suitable for designation. Alternative C recommends 606 miles (193,920 acres) and G-Modified recommends 796 miles (254,720 acres). Alternative J (Preferred) recommends 452 miles on 30 rivers or 144,640 acres.

Direct Effects of Mining, Energy Development on Vegetative Diversity

Mineral and energy extraction can potentially change or completely remove vegetation through clearing for physical developments associated with these activities. Most exploration activities are currently conducted from the existing road system and have little or no affect on vegetation. Mineral extraction is extremely speculative. Due to current demand for minerals and the high costs associated with development, no mineral production is anticipated in any of the alternatives in the next decade. In the event that some development does occur, the Forest-wide mitigation measures state that an environmental analysis must be conducted to determine the stipulations needed to protect other resources. Efforts will be made to reclaim all sites. To date, little vegetative manipulation has taken place on mining claims on the Forest.

Geothermal, oil, and gas development have the potential for changing vegetative diversity, but no activity is predicted in the first decade.

Direct Effects of Land Uses on Vegetative Diversity

Land use grants and land exchanges are administrative activities that may have a direct effect on vegetation. The granting of a special-use permit may result in destruction of vegetation, such as clearing for a structure, but the acreage involved is generally small. Approximately one percent of the Forest is currently under special-use permit and this figure is not expected to change in any of the alternatives.

Land exchanges may result in changes in vegetation conditions on lands moving out of federal ownership. Changes will vary depending on the location and the new owner. It can be anticipated that most land exchanges will result in harvesting of timber and young stands on the area; in addition, private landowners are not required to meet Forest Service policy on endangered, threatened or sensitive plant species. Sizes of openings will also tend to be larger on private ownerships.

There are about 1500 acres in utility corridors, 0.09 percent of the Forest. The land occupied by the corridor is removed from production of commercial vegetation, though there is some production of Christmas trees. Diversity is affected as the vegetative characteristics are altered (through maintenance to remove unwanted vegetation) during the lifetime of the corridor. Vegetation maintenance would not vary by alternative. (Refer to Chapter III for a description of the maintenance program.) No construction of new corridors is anticipated during the first decade.

Direct Effects of Roads on Vegetative Diversity

Road construction activities are included in all alternatives and have direct effects on vegetation. Effects include removal of the land from vegetative production, plus subsequent management (removal, pruning, etc.) of the vegetation along the road corridor. An average of five acres of land is cleared for each mile of road constructed (a Forest-wide average). Table IV-13 shows the acres of vegetation removed in each alternative by road construction activities.

Table IV-13
Vegetation Removed By Road Construction - Acres

Alternatives	Decade 1	Decade 2	Decade 3
NC (No Change)	1400	1200	700
A (No Action)	940	850	540
I	855	760	465
B (RPA)	805	720	445
H	705	615	420
J (Preferred)	670	590	395
C	515	455	270
G-Modified	405	385	285

Land taken out of production ranges from 1400 acres in Decade 1 in Alternative NC, to 405 acres in G-Modified, with the other alternatives falling in between.

Road construction is greatest in Alternative NC. By the end of Decade 3, when all planned road construction is completed, about 3,330 acres of currently vegetated land will be roaded (0.2%). Alternative G-Modified, with the fewest miles of new road construction would affect approximately 1,075 acres of vegetation over the next three decades. Not reflected in Table IV-13 are the miles of existing roads that would be closed and revegetated: about 300 miles

in Alternative C, 20 miles in H, 65 miles in G-Mod., and 25 miles in J (Preferred).

In addition to arterial and collector road construction, temporary roads would be built to facilitate timber harvest activities. (Refer to Table IV-48 in the Roads section later in this chapter for the miles of local roads by alternative.) These roads are located primarily in timber harvest units; following harvest, the roads would be closed and the area revegetated.

Vegetative Diversity - The Cumulative Effects of the Alternatives

No quantitative analysis was completed to determine the cumulative effects of the alternatives on plants and plant communities. The Forest instead chose major indicators of diversity and developed quantitative and qualitative representations of these indicators. These include:

Protection of Riparian Areas
Habitat for mature and old-growth wildlife indicator species
Acres of old-growth
Dead and Defective Tree Habitat
Maintenance of Long-term productivity
Maintenance of all vegetative communities
Protection of fragile and uncommon habitat types
Maintenance of viable populations of all threatened, endangered, and sensitive plant and animal species.
Acres of Forest under timber management and acres in natural condition.
Maintenance of viable populations of mature and old-growth wildlife indicator species

These indicators have been addressed in the previous Soils and Direct Effects on Vegetative Diversity sections, and in the following Old Growth, Wildlife, Fish, and Fire sections. They are likely to be inadequate to describe biological diversity in total because current knowledge concerning all components necessary for maintenance of diversity is inadequate. There is mounting evidence that retaining all the pieces of the ecosystem is essential for long-term production of goods and services, as well as to life itself. All of the alternatives, except NC, are designed to provide legally mandated levels of diversity; therefore no significant, cumulative effects are predicted. Because of the uncertainty as to the requirements for maintaining all elements of diversity, the risk level of an alternative is likely to be related to the amount of lands on the Forest allocated to human uses and consumptive production.

Vegetative Diversity - The Indirect Effects on Other Resources

Discussions of indirect effects on the environment are complex and difficult to separate out; discussions within the Soils, Old Growth, Wildlife, Fish, Wilderness, and Fire sections of this chapter also address indirect effects relating to biological diversity.

Old Growth

See Direct Effects of Timber Harvest on Vegetative Diversity.

Wildlife

Changes in vegetation will have long-term effects on the habitats of many species. In areas of the Forest managed for timber production, the numbers of those animals that prefer a late successional or old-growth habitat will decline due to the decrease in this habitat over time.

Also affected are deer, elk, and mountain goat habitats. Major effects will be the changes that will occur in the cover/forage relationship, and the amount and quality of thermal cover. Clearcut harvest generally improves the quality and quantity of forage by creating openings in forest stands and initiating plant succession. Preferred forage is increased, but the area no longer provides thermal or hiding cover that may be essential. The effects would be magnified if large openings occur within winter range. Harvest may also impact migration routes (Harper 1969, Reynolds 1966, Swanson 1970), and remove habitat. Alternative NC and A would have the greatest change in vegetation while Alternative C and G-Modified have the least change in vegetative condition. The remainder of the alternatives fall in between. (See the Direct Effects of Timber Harvest on Wildlife, later in this chapter; also refer to Chapter III, Wildlife for additional discussion.

Fish

Changes in vegetation have the potential to severely affect anadromous or resident fish. However, in all alternatives, management requirements and mitigation measures will provide for maintaining at the MR level or improving current levels of habitat capability.

Human Community

There is no measurable effect.

American Indian Religious and Cultural Use

Changes in diversity of vegetation in any of the alternatives are not expected to have significant adverse effects on American Indian Treaty rights. (See the discussions of the Direct Effects of Timber Harvest on Wildlife and on Fish later in this chapter.)

There are effects on American Indian Religious and Cultural Use from changes in vegetation and timber. The effects of timber harvest on vegetation can be disturbing to religious use of spirit sites. The logged area has lost its purity, at least temporarily, and the purity and isolation of surrounding areas is reduced.

Cutting of cedar, particularly old-growth cedar, is perceived as irreparable destruction. All alternatives result in a substantial loss of cedar within the inventoried acres over five decades. Only Alternatives C and G-Modified will protect, over time, fifty percent of the cedar areas. Over the Forest, as a whole, Alternatives NC, A, I, and B will result in the most extensive removal of old growth cedar. Alternatives H and J (Preferred) will result in intermediate levels of removal.

Timber harvest will have localized effects on those ceremonial plants growing in the area. Clearcutting does increase the abundance of those seral species

used for ceremonial purposes; however, the religious suitability of seral species when gathered in clearcuts is diminished or destroyed. Alternative C protects, from timber harvest, the largest percentage of inventoried ceremonial plant areas, followed by Alternatives G-Modified, J (Preferred), and H. Alternatives NC, A, B and I allow the most harvesting in these flora areas.

Some changes in the diversity of plant communities may enhance cultural uses, such as gathering of foods and materials, or berry picking. These are normally enriched as old-growth successional stages are converted to younger stages through timber harvest. However, existing evidence indicates demand for such enhancement is limited or non-existent.

Archaeological and Historic Properties

Ground disturbance associated with vegetative manipulation has the potential to affect archaeological and historical properties. The more extensive the ground disturbance, the greater the effect on these properties. However, through the Forest-wide Standards and Guidelines and in compliance with law, cultural resource inventories implemented as a result of proposed timber sale projects have resulted in most of the findings on the Forest. To date, funding for cultural resource inventories has come mostly from timber sale funds. These compliance activities will produce archaeological and historical information for public interpretation.

Timber harvest is most extensive in Alternatives NC, A, I, and B. This will result in the greatest effects. Although fewer sites will be left undisturbed and in their original condition, more information may be available for interpretation. Impacts may also be sustained in areas managed for timber production in Alternatives H and J (Preferred). Alternatives C and G-Modified will result in the least amount of ground disturbance and the fewest number of losses.

Scenery

Changes in vegetation will have an appreciable effect on scenery in all alternatives as a result of vegetation manipulation. There will be both short- and long-term effects that will vary by alternative. The effects will be most visible on those lands with a timber management emphasis, as opposed to those that are managed primarily for other emphasis, but which still permit timber harvest. (Refer to the Direct Effects of Timber Harvest on Scenery, later in this chapter.)

Recreation

People staying at developed sites may find their daytime dispersed recreation precluded or altered by nearby timber harvest. The presence of, and intensity of trucks hauling logs by a campground will create noise and a potential safety hazard which may reduce the quality of the recreational experience. This may be offset by increased access. Consequently, alternatives that provide for a high level of timber harvest (NC, A, B, I, H) will indirectly affect and ultimately reduce dispersed recreation for developed site users. This will be true for most family summer camping experiences. However, this may not be the case for off-road vehicle use and for fall hunting, as these users are less affected by timber harvest activities (Clark and Stankey 1979). These impacts are minor in all alternatives.

Fall hunters seeking deer, elk, birds, and bear drive the road system hoping to spot quarry. The more numerous the cutting units (with resulting openings and food sources) the more likely they are of success. Alternatives that harvest higher amounts of timber (NC, A, B, I, and H) will increase the satisfaction of these groups.

The more extensive the timber harvest the greater the shift toward the roaded modified and roaded natural ROS classes.

Trails

Vegetative manipulation and associated timber management practices will affect trails primarily by changing the character of the recreational setting. Some trail users will be displaced during and for a period of time after the harvest activity (Anderson and Brown 1984, Clark and Stankey 1979). During the actual harvest or post-harvest site preparation activities, the trail prism is likely to be made impassable by felled timber; portions of the trail prism may actually be destroyed during yarding or other associated ground disturbing activities. This will require temporary closures, relocations, or reconstruction of effected trail segments.

Alternatives NC, A, B, and I would have the greatest effect on trails through timber harvest in Decade 1. The least impact would result from Alternatives C and G-Modified. The other alternatives impact a moderate amount of acreage in the first decade.

Wilderness

Effects are insignificant in all alternatives.

Research Natural Areas

No effects are expected from changes in vegetative plant diversity to Research Natural Areas. Timber harvest would preclude future designation of Perry Creek (200 acres) in Alternative B.

Roadless Areas

No effects.

Wild and Scenic Rivers

The more unique ecological value the more apt that the river will be considered for formal designation.

Air

The indirect effects on air quality caused by changes in vegetation are minimal. Living vegetation, through photosynthesis, converts carbon monoxide to carbon dioxide, a process important in maintaining life on earth. Vegetation manipulating practices included in this plan result in removing vegetation and replacing it with the same, or other vegetation. There is conflicting research evidence on what the effects on the photosynthetic process are when older forests are replaced by younger vegetation. Standards and

Guidelines ensure that the lands will be revegetated soon after vegetation is removed. Any alternative that includes management practices that converts lands containing living vegetation to other uses will have an impact on the rate of carbon monoxide/carbon dioxide exchange. All alternatives contain a limited amount of such conversion but the effects on local, regional or global scale are not measurable. All alternatives would have the same effect over time.

Fire

Modification to vegetation affects fire in a number of ways. Removal often changes the micro climate from a moist shaded condition to a more exposed drier situation which can increase intensity and rate of spread of fire. Likewise, most vegetation manipulation activities result in residue left on the area in the form of dead branches, stems, etc. These also contribute to fire intensity and spread. Standards and Guidelines, especially those that emphasize vegetation utilization or removal from the site tend to mitigate this situation. Though all alternatives include some vegetation modification and will affect fire potential, the low frequencies of fire starts from natural and accidental causes make the differences minimal in comparing alternatives.

Minerals

Threatened and Endangered plant species are protected by the Endangered Species Act. Mineral related activities that have the potential to impact these species or critical habitat would not be approved. This will be the same for all alternatives.

Land Ownership and Use

There are no measurable effects.

Roads

Changes in vegetation will have some minor effects on roads in all alternatives. Vegetation adjacent to roads will encroach on roads over time requiring control actions. Encroaching vegetation decreases sight distances as it grows taller on shoulders and cut/fill slopes. Control is needed when safety hazards result.

Vegetative management activities such as tree cutting, moving the logs to the landings adjacent to roads, and loading the logs on trucks causes damage to road cut and fill slopes, road surfacing, and drainage structures. The damage generally consists of displacement of soil and surfacing, culvert ends being crushed, and displacement of erosion control vegetation.

Snow plowing of roads will be needed to access some sites for planting in the spring. Access for reforestation activities may also require that some roads be built and maintained for use for one to two years after the timber sale harvest activities are completed. Alternatives NC, A, B, and I contain the greatest impacts in this area.

Mitigation Measures for Vegetative Diversity

To reduce the probability of introducing non-desirable foreign or off-site species of vegetation, additional mitigation measures may be employed. Where cut and fill slopes are treated for bank stabilization, a specific prescription will be developed identifying objectives, maintenance plans, and expected results, both short and long-term. In most cases, grasses and fertilizer are applied, providing for quick growth of the ground cover. This initial cover generally gives way to natural, on-site species of vegetation over time. To prevent long-term or unwanted weed species from being introduced, certified seed (known species of a given purity) will be requested. Similar processes will be followed for the implementation of other, similar activities (USDA 1979), including any type of erosion control measures on trails, transportation corridors, mineral exploration and extraction, and ski slopes as well as range, fisheries, or wildlife enhancement activities.

Other precautions will also be taken. A site specific evaluation and prescription will be made by a qualified professional (USDA 1985). Further, a literature review and/or research should validate that introduction of a specific species to a new environment will grow and flourish and reach the end objective for which it was introduced.

Mineral operating plans will include revegetation of sites.

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Vegetation, Timber

An evaluation of the plans and policies of others indicates some potential conflicts between the effects of the alternatives on vegetative diversity and those plans.

County plans are generally compatible with National Forest management; however, as lands adjacent to the Forest are developed or managed for timber production, Forest Service management is affected. Wildlife species dependent on old-growth timber can be adversely affected. This would be most evident in Alternatives NC, A, B, and I which produce higher timber yields.

Skagit County, Eastern Planning District has a policy that recreational uses and areas should be encouraged in appropriate Forest areas, provided they do not conflict with or become burdensome to commercial timber operations. Alternatives C and G-Modified allocate a significant portion of the tentatively suitable forest lands to recreational uses.

Whatcom County Comprehensive Plan policy for forested lands is that timber should be regarded as the preferred use of these lands. Alternative C and G-Modified allocate significant portions of forested lands to non-timber uses.

Safety Standards for Logging Operations, State of Washington requires that "danger trees" be felled for safety. Often standing dead trees, and defective standing green trees which would be desirable to leave to meet dead and defective tree requirements, and to maintain long-term ecosystem productivity, conflict with this safety concern. All alternatives, except NC, include the retention of dead and standing green trees for wildlife habitat. Under all alternatives, timber harvest units will have to be planned so that dead and defective tree requirements can be met, while providing for worker safety.

Clumping of these retention snags and trees, choice of logging system, harvest unit design, and selection of safe trees to leave are all means to mitigate this conflict. The larger the amount of timber harvest in an alternative, the more frequently this conflict may arise. Also, concentrated of timber harvest in a smaller amount of suitable acres is likely to increase the risk of not meeting dead and defective tree requirements in those areas. Conversely, areas which do not have timber harvest will likely retain their often high, natural dead and defective tree levels.

Master Plan for Mt. Rainier National Park proposes that lands along the west and north boundaries have a primary objective of preservation. All alternatives, except C, permit some timber harvest activities adjacent to the Park boundary.

OLD GROWTH

Old Growth - The Direct Effects of Each Alternative

General

Issues of old-growth are very complex and occur on local, regional, and national levels. (Refer to Chapters II and III, for differing definitions and values of old growth.) Of concern are the amount and distribution of the stands remaining, questions about the possibility of replacing old growth in the future, and the long period of time it would take to grow replacement old growth. The amounts and distribution of natural, old-growth forest stands are the issues addressed in this section. (Refer to related discussions in this chapter on Soils, Vegetative Diversity, Wildlife, Fish, and Fire.)

There are 232,500 acres of mature and old-growth forest found within wilderness areas on the Forest and another 134,400 acres outside of wilderness which are unsuited for timber management. None of these areas will be altered by timber harvest under any alternative, although they may be affected by other activities, such as recreational use. In all of the alternatives other than Alternative NC, the total percentage of the Forest available for timber harvest varies from 19 percent to 32 percent. All of the alternatives would have 431,538 or more acres of old-growth remaining after the fifth decade.

This sets a framework for a discussion of the effects of alternatives on old-growth. There is a moderate difference in total remaining acres of old-growth on the Forest, but alternatives do vary in the amount of acreage which is assigned to management area categories other than wilderness and MR areas which will maintain older forest areas unharvested. They will harvest suitable timber areas at different rates. They will also produce different results in the way the remaining old-growth will be distributed over the Forest: the amount of low-elevation old-growth retained and the degree of fragmentation of remaining old-growth outside of reserved areas.

Direct Effects of Timber Harvest on Old Growth

Alternative NC places the highest number of acres of old-growth acres within management areas suitable for timber harvest, 232,509 acres. Alternatives A, B, and I have the next highest levels, 163,169; 157,826; and 157,660 acres, respectively. Alternatives H and J (Preferred) have moderate levels of old-growth in the suitable-for-timber harvest category, 145,778 and 140,817, respectively. Alternative G-Modified places the lowest number of old-growth acres in management categories which include timber harvest: 80,692 acres.

Table IV-11 in the Vegetative Diversity section, Figure IV-4, and Figure IV-5 show the amount of remaining old growth, both total and on lands suitable for timber harvest, for each alternative, in the first five decades. Under all alternatives, the amount of old-growth will decrease. The alternatives are not greatly different in the total amount of old-growth remaining through the first decade. Differences are more apparent starting with the second decade.

Alternative NC will result in the largest decrease in old-growth acres. It does not provide the network of MR old-growth areas. Old-growth will be both decreased and less well-distributed under this alternative than under any other. Remaining old-growth outside of reserved areas will become highly

Figure IV-4 Total Old Growth Remaining

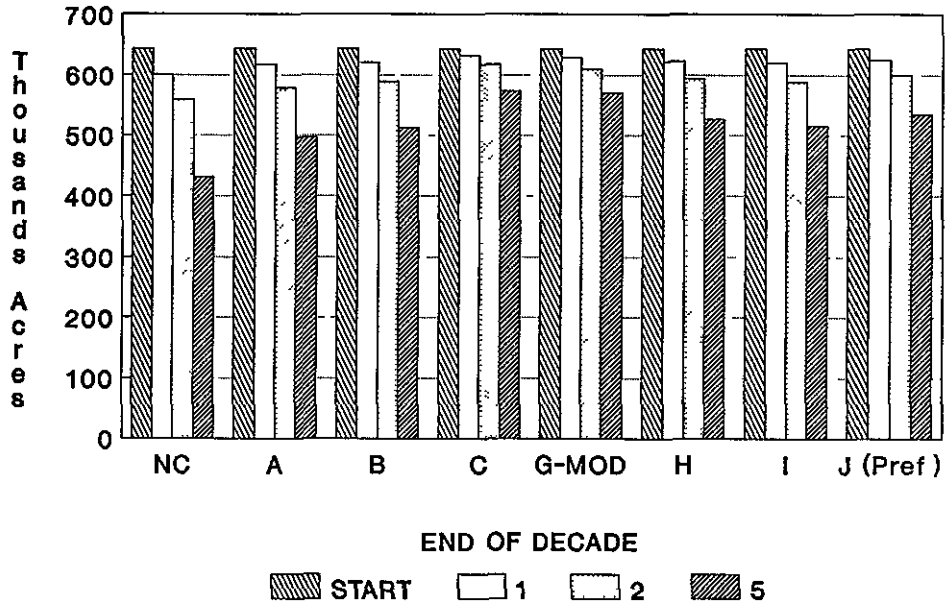
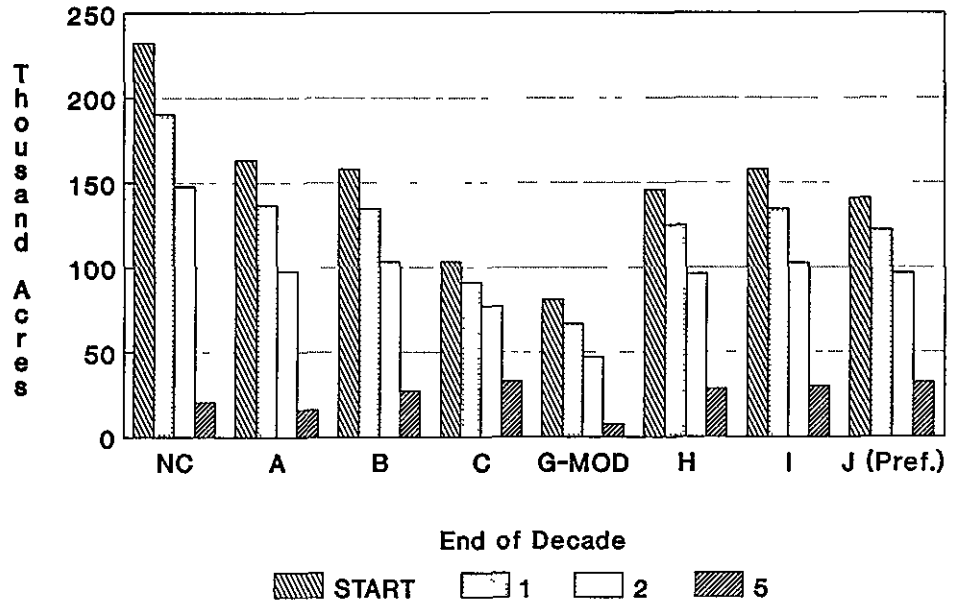


Figure IV-5 Old Growth Remaining (Suitable Acres)



fragmented over time. Alternative NC has the highest rate of cutting old-growth in the early decades. With the highest number of old-growth acres categorized as suitable to start, it has the largest number of suitable old-growth acres remaining at the end of five decades. However, it has the lowest total amount of old-growth remaining of the range of alternatives.

Alternative A has the second-lowest amount of old-growth remaining. Because Management Requirements are included in this and the remaining alternatives, a network of MR spotted owl, pileated woodpecker, and marten areas, and mountain goat MR areas will remain untouched by timber harvest. This provides an amount and distribution of old-growth which is designed to maintain viable populations of old-growth dependent species. Riparian management areas will maintain corridors of mostly older forest between MR areas.

Alternatives B, H and I have similar amounts of remaining old-growth in the first and fifth decades and similar rates of harvesting. They are intermediate to other alternatives in both aspects.

Alternatives C, G-Modified , then J (Preferred) provide for the most retention of old-growth over time. In the first decade, C and G-Modified maintain more old-growth than J (Preferred). These three alternatives have the lowest rates of harvesting old-growth.

Alternative C and G-Modified concentrate old growth timber harvesting on 20% and 19%, respectively, of the Forest. This will allow the maintenance of more large, contiguous old-growth areas, but will highly fragment the areas where harvesting does occur. These alternatives will maintain the highest amount of ecologically effective old-growth, i.e. larger blocks of old growth. Alternatives A, H, I, and J (Preferred) allow timber harvest on 29%-32% of the Forest (See Table IV-8 in the Vegetative Diversity section), with amounts of fragmentation and maintaining old-growth blocks intermediate to those of Alternative NC and Alternatives C and G-Modified.

Alternatives also differ in the amount of old-growth which will be harvested at higher and lower elevations. Table IV-14 shows the number of acres that will be harvested above and below the 3000' elevation (in the Western Hemlock, Silver Fir, and Mountain Hemlock types), under the alternatives. Under all alternatives, most of these acres are old-growth acres and stands past maturity, with large-diameter trees. Table IV-15 displays the modeled amounts of final harvest of mature, large trees (over 21 inches in diameter; average diameter 32"), compared to the harvesting of mature, small trees (less than 21 inches in diameter).

Table IV-14. Mature, Large-sized Acres Harvested by Elevation Zones (In Thousands of Acres)

		Alternatives						
First Decade Timber Harvest								
Elevation	NC	A	I	B	H	J(Pref)	C	G-Mod
+3000 ft	N/A	7.9	9.0	8.8	8.1	7.2	5.2	5.1
-3000 ft	N/A	16.0	13.8	13.3	12.5	11.7	6.3	9.1
Five-decade Timber Harvest								
+3000 ft	N/A	43.3	48.0	47.1	42.1	36.1	23.3	23.1
-3000 ft	N/A	101.6	79.4	86.6	75.3	72.3	46.5	49.7

Table IV-15. Percentages of Timber Harvest Acres By Size and Age Class

	Alternatives							
	NC	A	I	B	H	J(Pref)	C	G-Mod
Mat. Lg. 1/	100	59	70	69	68	66	61	62
Mature Small 2/	0	12	14	14	14	14	13	14
Immature/Mature Small & Poles 3/	0	19	12	12	15	17	21	19
Hardwoods (all sizes)	0	5	3	3	3	3	3	5
Mature Lg/Sm Inaccessible	0	5	1	2	0	0	2	0

1/ Mature large stands are over 21" dbh; the average size is 26" in dbh with an average age of 246 years. Most of these acres are old growth.

2/ Mature small stands are less than 21" dbh; average size is 20" in dbh with an average age of 145 years. Most of these acres are old growth, at higher elevations.

3/ Immature/Mature Small-Pole stands are less than 21" dbh and can be old growth, mature, or younger; average size is 18" in dbh with an average age of 93 years. Most of these stands are mature or old growth.

Direct Effects of Integrated Pest Management (IPM) on Old Growth

Pest control or the lack thereof will affect the condition of old growth stands in any alternative. Major insect and/or disease epidemics have been centered in these stands in the past. It can be anticipated that this will occur again therefore, control activities may be needed to protect these stands as well as adjacent managed stands.

Alternatives C and G-Modified, with the most acres of old growth, will have the greatest risk of major epidemic and application of control measures. Conversely, the alternatives with the fewest acres of old growth, NC and A, will have the lowest risk of epidemics and control activities. However, control measures may be used in these low risk alternatives due to the value and investment of the managed stands.

Control activities will be conducted in accordance with Integrated Pest Management Guidelines, Forest Standard and Guidelines, and Management Objectives for each area.

Direct Effects of Mining, Energy Development on Old Growth

Mineral and energy extraction can potentially change or completely remove vegetation old growth through clearing for physical developments associated with these activities. Mineral extraction is extremely speculative. Due to current demand for minerals and the high costs associated with development, no mineral production is anticipated in any of the alternatives in the next decade. In the event that some development does occur, the Forest-wide mitigation measures state that an environmental analysis must be conducted to determine the stipulations needed to protect other resources. Efforts will be made to reclaim all sites. To date, little vegetative manipulation has taken place on mining claims on the Forest.

Direct Effects of Land Uses on Old Growth

Land use grants and land exchanges are administrative activities that may have a direct effect on old growth. The granting of a special use permit may result in destruction of old growth, such as clearing for a structure, but the acreage involved is generally small.

Land exchanges usually result in changes in vegetation conditions. Changes will vary depending on location and the objectives of the new owner. It can be anticipated that most land exchanges will result in harvesting of timber and young stands on the area; in addition, private landowners are not required to meet Forest Service policy on endangered, threatened or sensitive plant species. Sizes of openings will also tend to be larger on private ownerships.

It is anticipated that land use grants, land exchanges and special uses will be the same level in all alternatives.

Direct Effects of Roads on Old Growth

Road construction activities are included in all alternatives and have direct effects on old growth acres. Effects include removal of lands that can be classified as old growth. An average of five acres of land is cleared for each mile of road constructed.

The alternatives that harvest the greatest number of acres of old growth will also build the largest number of roads in and through old growth stands. It can be expected that Alternatives NC and A will have the largest number of roads built in old growth stands. Alternatives C and G-Modified will have the least number of road miles built in old growth stands with the remainder of the alternatives falling in-between.

Old Growth - The Cumulative Effects of the Alternatives

The cumulative effects of the alternatives on old growth are tied to the level of management activity. Timber harvest and road construction, both on and off the Forest, are the major activities that affect old growth. Land allocations, e.g. semi-primitive nonmotorized, nonmotorized recreation, mountain goat habitat, scenic viewsheds, etc., may preclude or lessen activity.

Alternatives such as C or G-Modified, which have high levels of acreage assigned to non-harvest prescriptions, will maintain the largest acreages of old growth and harvest the fewest acres. Alternatives such as NC and A have the fewest acres set aside and the largest number of old growth acres harvested, thus resulting in the fewest acres of old growth maintained through time.

Inventory data for old-growth are not available for private lands within and adjacent to the Forest. However, most of the large private, industrial land owners have indicated they intend to harvest nearly all of their old-growth within the next decade. Old-growth stands also occur in the Mt. Rainier and North Cascades National Parks, adjacent to the Forest. This old-growth will remain essentially as it is today, barring natural catastrophic effects.

The State of Washington Department of Natural Resources (DNR) manages 1.4 million acres of commercial forest land in western Washington. As of 1983, approximately 74,000 acres (5%) was considered to be old-growth (Washington State DNR 1983). Approximately 11,000 old-growth acres are not scheduled for harvest during the first decade of the DNR's Forest Land Management Program. A State Task Force, appointed by the Governor, is currently evaluating the issue of managing for some spotted owl habitat areas on DNR lands.

Old Growth - The Indirect Effects on Other Resources

Wildlife

Changes in old growth have long-term effects on the habitats of many species. In areas of the Forest managed for timber production, the numbers of animals that prefer a late successional or old growth habitat will decline due to the decrease in this habitat over time.

Also affected are deer, elk and mountain goat habitats. Major effects will be the changes that occur in the cover/forage relations and the quantity and quality of thermal cover. The alternatives that maintain large stands of old growth, C and G-Modified, provide more hiding and thermal cover. Alternatives that have higher harvest levels of old growth stands, such as NC, A and B, produce more forage.

Fish

Changes in old growth have the potential to severely affect anadromous or resident fish with the highest risks coming in Alternative NC and A, where the most old growth acres are harvested over the 50 year period. Alternative C and G-Modified have the lowest risk with the other alternatives falling in between. However, in all alternatives, management requirements and mitigation measures will provide for maintaining at the MR level or improving current levels of habitat capability.

Human Community

There are no measurable indirect effects of Old growth On the Human Community in any of the alternatives.

American Indian Religious and Cultural Use

Changes in old growth vegetation in any of the alternatives are not expected to have significant adverse effects on American Indian Treaty rights. (See the discussions of the Direct Effects of Timber Harvest on Wildlife and on Fish later in this chapter.)

There are effects on American Indian Religious and Cultural uses from changes in old growth. The effects of loss of old growth can be disturbing to religious use of spirit sites. The logged area has lost its purity, at least temporarily, and the purity and isolation of surrounding areas is reduced.

Cutting of cedar, particularly old growth cedar, is perceived as irreparable destruction. All alternatives result in a substantial loss of cedar within the inventoried acres over five decades. Only Alternatives C and G-Modified will protect, over time, fifty percent of the cedar areas. Over the forest as a whole, Alternatives NC, A, I and B will result in the most extensive removal of old growth cedar. Alternatives H and J (Preferred) will result in intermediate levels of removal.

Some changes in the number of acres in old growth plant communities may enhance cultural uses, such as gathering of foods and materials, or berry picking. These are normally enriched as old growth successional stages are converted to younger stages through timber harvest. However, existing evidence indicated demand for such enhancement is limited or non-existent.

Archaeological and Historic Properties

The maintenance of old growth stands will result in less properties being disturbed due to inactivity on the acres. It will also result in less sites being found because activities scheduled in old growth stands often result in their discovery.

Scenery

Changes in old growth will have an appreciable effect on scenery in all alternatives as a result of vegetation manipulation. There will be both short- and long-term effects that will vary by alternative. The effects will be most visible on those lands with a timber management emphasis, as opposed to those that are managed primarily for other emphasis, but which still permit timber

harvest. (Table IV-8 in the Vegetative Diversity section shows the acres of harvest per decade.) (Also refer to the Direct Effects of Timber Harvest on Scenery later in this chapter.)

Recreation

The maintenance or loss of old growth will affect those people who want to visit this type of vegetative stand. Alternatives C and G-Modified will provide the most acres while NC and A will provide the least.

Trails

There is no measurable effect.

Wilderness

Indirect effects are insignificant in all alternatives.

Research Natural Areas

No effects are expected from changes in Old Growth to Research Natural Areas. Timber harvest will preclude future designation of Perry Creek (200 acres) in Alternative B.

Roadless Areas

There are no know indirect effect on Roadless Areas from changes in Old Growth in any alternative.

Wild and Scenic Rivers

The more unique its ecological value, including old growth value, the more likely it is that a river will be formally designated as wild and/or scenic. Alternatives C and G-Modified retain the highest number of acres in an old growth condition; Alternatives NC and A have the fewest acres.

Air

The indirect effects on air quality caused by changes in old growth are minimal. Living vegetation, through photosynthesis, converts carbon monoxide to carbon dioxide, a process important in maintaining life on earth. Vegetation manipulating practices included in this plan result in removing old growth and replacing it with the same, or other vegetation. There is conflicting research evidence on what the effects on the photosynthetic process are when older forests are replaced by younger vegetation. Standards and Guidelines insure that the lands will be revegetated soon after vegetation is removed. Any alternative that includes management practices that convert lands containing living vegetation to other uses will have an impact on the rate of carbon monoxide/carbon dioxide exchange. All alternatives contain a limited amount of such conversion but the effects on local, regional or global scale are not measurable. All alternatives over time would have the same effect.

Fire

Modification to old growth vegetation affects fire in a number of ways. Removal often changes the micro climate from a moist shaded condition to a more exposed drier situation which can increase the intensity and rate of spread of fire. Likewise, most vegetation manipulation activities result in residue left on the area in the form of dead branches, stems, etc. These also contribute to fire intensity and spread. Standards and Guidelines, especially those that emphasize utilization, or removal from the site, tend to mitigate this situation. Though all alternatives include some modification of old growth and this will affect fire potential, the low frequencies of fire starts from natural and accidental causes make the differences minimal in comparing alternatives. All alternatives will have the same effect over time.

Minerals

There are no measurable indirect effects.

Land Ownership and Use

There are no measurable indirect effects.

Roads

There are no measurable indirect effects.

Mitigation Measures For Old Growth

All of the alternatives except Alternative NC are designed to meet legal requirements (36 CFR 219.27) for the preservation and enhancement of diversity of plant and animal communities to the extent practicable. A network of Management Requirement areas for old growth and mature species are distributed over the Forest under all alternatives except Alternative No Change. Wildlife management indicator species for these areas are the spotted owl, the pine marten, and the pileated woodpecker. This network consists of spotted owl areas (2,200 acres in size), pileated woodpecker areas (300 acres in size) and pine marten areas (160 acres in size). Information on these requirements can be found in Appendix I. In addition, riparian Standards and Guidelines will maintain mature and old growth stands in many areas adjacent to streams, which will provide corridors of older, connecting habitat between MR areas.

In addition, many more acres of old growth are maintained in wilderness areas and forested lands that are unsuitable for timber production. These acres are fixed for all alternatives. Additional acres are set aside via the designation of acres in which timber harvest is precluded. This varies with each alternative.

Conflicts Between Effect of the Alternatives and Others' Plans and Policies for Old Growth.

There are several plans in conflict with alternatives emphasizing timber harvest, thus indirectly affecting old growth habitat.

City of Seattle

The Cedar River Watershed is managed under a 1962 Agreement between the Forest Service and the City of Seattle. The agreement provides for timber harvest on a sustained yield basis (see Glossary) within the watershed. As National Forest lands have been cut, they have been exchanged to the City for City lands located elsewhere. On August 7, 1988, the Seattle City Council adopted Ordinance 114632, which embodies the new Secondary Use Policies for the Cedar River Watershed. The City will set aside approximately 50% of its lands in a reserve precluding timber harvest. They will prepare a long-range timber harvest plan for second-growth lands outside that reserve. In addition, the policies call for acquiring 4,000 - 6,000 acres of old-growth forest that are currently NFS lands, to be maintained as old-growth habitat. This ordinance may, in the future, cause the 1962 Agreement to be amended.

Under the Alternative J (Preferred) this agreement would be renegotiated and, until a new agreement was developed, no new exchanges affecting national forest lands in the watershed would occur. In addition, a SOHA (Management Area II) will be allocated within the watershed. Alternative G-Modified would result in more SOHA's and MR acres within the Cedar River Watershed. Alternative C would stipulate land exchange with two SOHA's intact; the City of Seattle would be required to maintain the SOHA's. Alternatives NC, A, I and H would continue with the 1962 Agreement, and all old growth acres would be harvested.

The State of Washington

Strategies for Washington's Wildlife (WDG 1982) contains a comprehensive strategy for the management of Washington's wildlife, game, and fisheries resources until 1995. It emphasizes habitat protection and improvement. Washington Department of Wildlife Program Plans gives population and animal harvest objectives for wildlife in 1989, lists key elements needed to meet these objectives, and shows the priorities for activity within the plan.

Strategies for Washington's Wildlife (WDG 1982) could be in conflict with Forest alternatives that emphasize timber harvest NC, A, B, and I, because of the land classification, harvest levels, and resulting loss of old growth. The same is true for the Wildlife Program Plans, Washington Department of Game.

Possible conflicts also exist with the Statewide Comprehensive Plan for Fish and Wildlife on the National Forests in the State of Washington. The primary goal of this Plan is to maintain and enhance existing fish and wildlife populations. Heavy timber harvest alternatives (NC, A, B, I) can result in unacceptable reduction in old growth habitat and thus reduction in old-growth dependent species.

WILDLIFE

The management objective for wildlife resources is to provide habitat capable of indefinitely supporting all native and desirable nonnative wildlife species. All alternatives, except the No Change Alternative, are designed to meet legal requirements (36 CFR 219.27) for the preservation and enhancement of diversity of plant and animal communities. The No Change Alternative does not fully incorporate the following provisions of NFMA:

36 CFR 219.19(a)(1),(2) and 219.27(a)(6) - Requires that wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species,

36 CFR 219.26, .27(a)(5), .27(g) - Requires that diversity of animal communities be provided and maintained.

Wildlife - The Direct Effects of Each Alternative

General

Land allocations affect wildlife populations. Alternatives that allocate relatively large amounts of land for preservation of specific wildlife resources result in the best long-term protection. Alternatives that allocate the most land to categories other than General Forest, especially those allocations with no timber harvest or with lengthened rotations of timber harvest, also result in the best protection of species requiring older forest successional stages. In areas of the Forest managed for timber production, the numbers of those animals that prefer a late successional or old-growth habitat will decline due to the decrease in this habitat over time.

In the absence of fire or timber harvest, most plant communities (and thereby animal communities) will change toward "climax conditions", represented by species of vegetation that are able to survive and reproduce continually. Timber harvesting, fire, and other disturbances basically reverse the successional trend, moving succession back to an earlier stage.

Management requirements (Appendix I), management area category assignment, and standards and guidelines are tools for achieving legally mandated and socially desirable levels of protection of all species of plants and animals, while providing needed outputs of goods and services to the nation. Refer to Table 2-7a for the outputs of goods and services for all alternatives.

Direct Effects of Timber Harvest on Wildlife

Table IV-16 shows the acres of old-growth and mature acres remaining in each decade, by alternative. Old growth habitat is reduced in all alternatives. According to Hall and others (1986b), regeneration harvest of old growth in Western Washington can be expected to displace or eliminate most of the 77 species that use a typical stand as primary breeding habitat, while gaining 28 new species in the grass-forb condition. Most of the displaced species will not return until plant succession on the unit reaches the large saw timber stand condition. Displacement or elimination of wildlife species would be the greatest in Alternatives NC, then A, followed by Alternatives I and B.

Table IV-16
Remaining Old Growth and Mature Acres [1] by Alternative
Total Ac and Suitable [2] Ac

Alt		Decade	1	2	3	4	5
*NC	T	643,538	601,138	558,738	516,338	473,938	431,538
	S	232,509	190,109	147,709	105,309	62,909	20,509
A	T	643,538	617,500	572,101	550,037	523,009	496,525
	S	163,169	137,131	97,732	69,668	42,640	16,156
I	T	643,538	620,263	588,321	562,687	538,866	515,712
	S	157,660	134,385	102,443	76,809	52,988	29,834
B	T	643,538	620,609	589,051	563,740	540,197	513,020
	S	157,826	134,897	103,339	78,028	54,485	27,308
H	T	643,538	622,865	594,095	572,920	551,777	526,086
	S	145,778	125,105	96,335	75,160	54,017	28,326
J	T	643,538	624,660	599,355	579,963	560,760	535,094
	S	140,817	121,939	96,634	77,242	58,039	32,373
C	T	643,538	631,689	617,473	605,916	594,498	573,427
	S	103,245	91,396	77,180	65,623	54,205	33,134
G-Mod	T	643,538	629,337	610,074	596,450	582,945	570,670
	S	80,612	66,491	47,228	33,604	20,099	7,824

T = Total Acres mature large, 240 years of age or older.
S = Total acres mature large, 240+ yrs. on lands suitable for timber harvest.

[1] T = Total Acres mature large, 240 years of age or older.
S = Total acres mature large, 240+ yrs. on lands suitable for timber harvest

[2] Suitable acres are those acres suitable for timber harvest in each alternative.

*NC Based on Potential Yield Statement 1985 Final Harvest
Alt. A-J Based on Forplan Ac by Age Class

Populations of old-growth and mature forest indicator species will vary among alternatives: some maintain habitat for MR population levels over time, while others maintain higher levels. Population estimates for spotted owl, pileated woodpecker, and pine marten for Decades 1, 2, and 5 are shown in Table IV-17.

Table IV-17
Population Estimates for Old Growth and Mature Forest Wildlife Indicator Species

Outputs/Effects	Unit of Measure	NC 1/	A 2/ (No Action)	I	B (RPA)	H	J (Pref)	C	G Mod.
Northern Spotted Owl, end of:									
Decade 1	Pairs	-	111	112	112	113	114	116	116
Decade 2			98	100	100	102	104	111	110
Decade 5			74	78	77	81	83	96	99
Pine Marten, end of:									
Decade 1	Indiv.	3/	4,207	4,214	4,216	4,327	4,337	4,489	4,479
Decade 2			3,800	3,915	3,832	3,951	4,018	4,309	4,281
Decade 5			2,800	2,937	2,910	3,110	3,213	3,870	3,823
Pileated Woodpecker end of:									
Decade 1	Pairs	3/	841	843	844	865	867	865	896
Decade 2			760	783	766	790	804	790	856
Decade 5			560	587	582	622	643	622	765

1/ The timber management plan upon which the No Change Alternative is based was developed in 1963. The plan was not an integrated resource plan, and consequently did not address all resource uses and outputs Habitat capability was calculated using the same models as used for other alternatives.

2/ For purposes of comparison, habitat capability for spotted owls was determined using the same model as used for other alternatives. However, direction in Alternative A is to manage for 84 sotted owl management areas of 1,000 acres in size and does not meet FSEIS requirements.

3/ Population numbers would be similar to those shown in Alternative A for Decade 1. Populations would be expected to decline at a rate faster than Alternative A because no specific provision is made in Alt. NC to maintain viable populations.

By the second decade, the loss of habitat which has already occurred and which will occur in the first decade is reflected in the population estimates for these species. The values are estimates of maximum habitat potential in each alternative. In Alternative NC, population numbers would be expected to be similar to Alternative A for the first decade, and then decline at a faster rate, because no specific provision is made in Alternative NC to maintain viable populations.

All alternatives, except Alternative NC, designate the same number and size of pileated woodpecker and pine marten habitats, to meet the MR's. All but NC and A have the SEIS network of spotted owl habitat areas. Differing amounts of additional habitat capability would derive from old growth and mature habitat habitat suitable for these species that is assigned to other compatible

management areas, such as wilderness and semi-primitive nonmotorized and suitable habitat in areas available for timber harvest, but which have not yet been harvested. For the first decade, population estimates for Alternative NC are expected to be similar to Alternative A; thereafter, they would decline at a faster rate, as no specific provisions are made to maintain viable wildlife populations in this alternative.

Alternatives provide for dead and defective tree habitat at the 20 percent (MR), 40 percent or 60 percent population levels on lands managed for timber production (Table IV-18). Areas not subject to timber harvest will generally maintain high levels of this habitat. These areas will support a varying number of primary cavity excavators, usually greater than what suitable timber lands will support.

Table IV-18

Percent of Potential Populations
of
Primary Cavity Excavators on Suitable Lands

NC	A	I	B	H	J	C	G-Modified
1/	40%	20%	20%	40%	40%	60%	20%

1/ Estimated to be similar to Alt. A for the first decade. No provisions made for cavity excavators

The viability of snags left in timber harvest areas varies. When timber stands are clearcut, snags and green trees designated for wildlife retention may be cut for safety reasons, or knocked over in the process of yarding logs. Older unmanaged stands, which usually containing many large snags, will be replaced with younger, intensively managed stands. Snags retained in clearcut units of the previous stands remain standing for 10 to 20 years, on the average, and then fall and become down logs. The young stands which have grown up around them will not produce large snags until decades later. To provide for "recruitment" of new snags during this interim period, green trees must be left at the time the stands are harvested, to become snags in later years. Timber yield tables have been adjusted to account for the decreased timber production as a result of leaving some trees unharvested.

Timber harvesting will have long-term effects on deer, elk, and mountain goat habitats. Major effects will be the changes that will occur in the cover/forage relationship, and the amount and quality of thermal cover.

Major effects on deer, elk and mountain goats will be brought about through changes in the abundances of forage and cover, and their proportions to one another, and particularly in the amount and quality of thermal cover. Clearcut harvest generally improves the quality and quantity of forage by creating openings in forest stands and initiating plant succession. Preferred forage is

increased, but the area no longer provides thermal or hiding cover that may be essential. The effects would be magnified if large openings occur within winter range. Harvest may also impact migration routes (Harper 1969, Reynolds 1966, Swanson 1970), and remove habitat. (Refer to Chapter III, Wildlife for additional discussion.)

Alternatives provide for significantly different levels of foraging habitat for deer and elk; provisions for optimal thermal cover for these species are generally reciprocal, that is, lower where open forage availability is higher.

All alternatives reduce thermal cover in winter range for big game species. Winter deer and elk habitat capabilities under the alternatives are shown in Table IV-19. These habitat capability numbers include the increases due to forage enhancement of timber harvest units in winter range. The amounts of winter range enhancement differ from one alternative to the next and are discussed in the subsequent section on Effects of Habitat Improvements. Increases in forage production in the first decade offset the decline in thermal cover, resulting in increased habitat capability (higher populations) for deer and elk. By the second decade, due to decreasing thermal cover, habitat capability returns to near-present levels (slightly below in some alternatives and slightly above in others. By the fifth decade, habitat capability increases, in Alternatives J, A, B, H and I, decreasing slightly in Alternatives C and G. However, the model used is primarily a forage-based model, and may overestimate the longterm capability for alternatives with high timber harvest and underestimate it for those with low timber harvest levels. See Appendix B for a discussion of the deer and elk winter range calculations.

Summer deer and elk habitat capabilities are shown in Table IV-20. In all alternatives, summer deer and elk habitat capability remains roughly at constant levels under all alternatives. These levels are higher than winter range habitat capability levels. Winter capability is probably a better predictor of the sustainable level of actual animal populations, since winter range is limiting to most populations of deer and elk on the Forest and off-Forest also. Few off-Forest winter range areas provide, or will continue to provide, adequate levels of optimal thermal cover for wintering deer and elk.

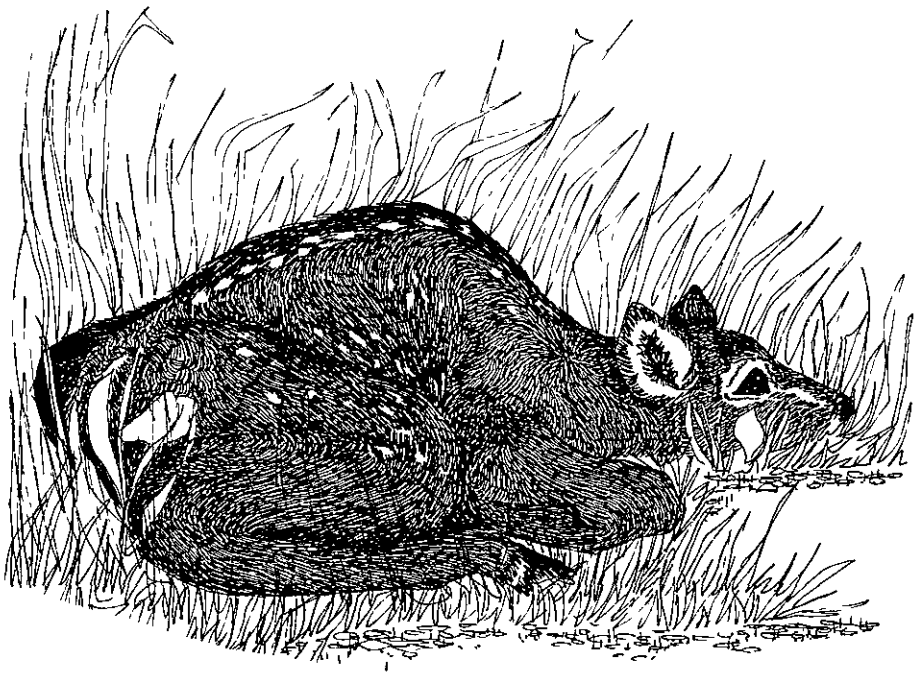


Table IV-19

Deer and Elk Winter Range Habitat Capability By Alternative

Alt		Start	1	2	3	4	5
NC	Deer	1/	-	-	-	-	-
	Elk	1/	-	-	-	-	-
A	Deer	13,330	16,520	14,400	14,450	15,360	15,740
	Elk	680	780	720	730	780	790
I	Deer	13,330	15,250	13,450	12,760	13,470	14,190
	Elk	680	770	700	670	700	740
B	Deer	13,330	15,350	13,510	12,770	13,390	14,300
	Elk	680	157,826	134,897	103,339	78,028	54,485
H	Deer	13,330	15,300	13,410	12,530	13,090	13,970
	Elk	680	770	690	660	690	730
J	Deer	13,330	15,160	13,390	12,510	12,840	13,580
	Elk	680	770	690	660	680	710
C	Deer	13,330	14,610	12,680	11,120	11,390	12,110
	Elk	680	740	660	600	610	640
G-Mod	Deer	13,330	14,870	12,950	11,740	12,230	12,410
	Elk	680	750	670	620	650	650

1/ The timber management plan upon which the No Change Alternative is based was developed in 1963. The plan was not an integrated resource plan, and consequently did not address all resource uses and outputs. Populations would be expected to decline at a rate faster than Alternative A.

Table IV-20

Deer and Elk Summer Range Habitat Capability By Alternative

Alt		Start	1	2	3	4	5
NC	Deer	1/	-	-	-	-	-
	Elk	1/	-	-	-	-	-
A	Deer	19,600	19,750	19,730	19,580	19,690	19,970
	Elk	1,230	1,240	1,260	1,280	1,290	1,300
I	Deer	19,600	19,740	19,700	19,550	19,660	19,740
	Elk	1,230	1,240	1,260	1,280	1,280	1,290
B	Deer	19,600	19,740	19,690	19,550	19,650	19,810
	Elk	1,230	1,230	1,260	1,280	1,280	1,290
H	Deer	19,600	19,730	19,670	19,520	19,620	19,720
	Elk	1,230	1,240	1,250	1,280	1,280	1,290
J	Deer	19,600	19,720	19,640	19,480	19,570	19,650
	Elk	1,230	1,240	1,250	1,270	1,280	1,280
C	Deer	19,600	19,670	19,530	19,320	19,370	19,410
	Elk	1,230	1,240	1,250	1,270	1,270	1,270
G-Mod	Deer	19,600	19,680	19,570	19,370	19,420	19,510
	Elk	1,230	1,240	1,250	1,270	1,270	1,280

1/ The timber management plan upon which the No Change Alternative is based was developed in 1963. The plan was not an integrated resource plan, and consequently did not address all resource uses and outputs. Populations would be expected to decline at a rate faster than Alternative A

Mountain goat habitat capability decreases in all alternatives (Table IV-21) due to the removal of thermal cover by timber harvest, although this decrease is much greater in Alternative A. This is a major limiting factor to the goat population. Although the areas of thermal cover that receive timber harvest are improved in terms of forage, this improvement can not replace the loss of thermal cover. Current populations numbers appear to be considerably lower than the current habitat capability. Disease; parasites; disturbance from vehicles on roads; human recreational activities; and over-harvesting, legally and illegally, all may be factors in keeping goat populations lower than they might be.

Table IV-21

Mountain Goat Habitat Capability

Alt	Start	1	2	3	4	5
NC	1/	-	-	-	-	-
A	1450	1430	1400	1380	1350	1330
I	1450	1440	1440	1430	1420	1410
B	1450	1440	1440	1420	1410	1400
H	1450	1450	1440	1420	1420	1410
J	1450	1450	1440	1430	1420	1420
C	1450	1450	1450	1445	1440	1440
G-Mod	1450	1450	1450	1450	1450	1450

1/ The timber management plan upon which the No Change Alternative is based was developed in 1963. The plan was not an integrated resource plan, and consequently did not address all resource uses and outputs. Populations would be expected to decline at a rate faster than Alternative A

Timber harvest also affects recreational uses of wildlife. Many wildlife species avoid areas of human activities. Forest users hunting, viewing and photographing wildlife may find their recreation precluded or altered at specific sites by nearby timber harvest. The presence of, and intensity of trucks hauling logs by a campground will create noise and a potential safety hazard which may reduce the quality of the recreational experience. However, these users can enjoy increased access, where that enhances or facilitates their activity. Alternatives that provide for a high level of timber harvest will affect these dispersed recreation opportunities the most. Fall hunting is less likely to be affected by timber harvest activities (Clark and Stankey 1979). These impacts are minor in all alternatives.

Some hunters seeking deer, elk, birds, and bear drive the road system hoping to spot quarry. The more numerous the cutting units (with resulting openings and food sources) the more likely they are of success. Alternatives that harvest higher amounts of timber will increase the success of these Forest users.

Direct Effects of Wildlife Habitat Improvement on Wildlife

Wildlife habitat improvement projects vary by the habitats to be enhanced. These projects are both structural and nonstructural in nature, and include, but are not limited to, creation of snags, osprey and loon nesting platforms, roost and nest boxes, burning, planting and seeding for forage production, and timber harvest to create optimum dispersion of habitat components.

Deer and elk winter range habitat in assigned and compatible management areas will be considered for timber harvest (thus improving forage) where it would benefit winter range habitat conditions. In addition, small units located adjacent to thermal cover, would be designed. Harvest would be limited to a maximum of approximately 6 percent per decade. The optimal ratio of forage, thermal/hiding cover, and optimal thermal cover is discussed in the Forest Plan, Management Prescription for Management Area 14, 15. Habitat improvement may be considered in the additional areas, depending on the standards and guidelines for those areas.

Table IV-22 shows the totals for acres assigned to habitat improvement in each alternative and additional acres in compatible MAC's which include winter range considerations in their standards and guidelines and which may be considered for habitat improvement when timber is harvested. These additional acres are lands of inventoried deer and elk winter range that are assigned to management areas compatible with habitat improvement. This table also show the actual number of acres on which timber is harvested in these MAC's managed for winter range in the first, second and fifth decades. These areas would be considered for forage enhancement.

Direct Effects of Recreation on Wildlife

Most of the effects on wildlife populations and habitat by recreational use and facilities are not major, but vary somewhat among uses and alternatives.

However, site-specific impacts, due to developed recreation sites, trail construction and use, or dispersed activities, such as ORV use or hunting, will have adverse effects on localized wildlife communities. Many wildlife species avoid areas of human activities.

Associated with developed recreation site maintenance in all alternatives is the removal of "hazard" trees, which are often large snags. This results in a reduction of habitat for species using old-growth forest or snags. Snag removal reduces cavity excavator density and diversity (Zarnowitz 1982).

Existing campgrounds are generally located within the low-elevation riparian areas that are also used by many species throughout the year, and by deer and elk as winter range. Any construction or reconstruction of developed sites physically removes some forage and cover; use of surrounding habitat may be affected by new or increased vehicular traffic.

Ski area expansion, in all alternatives except I, should have minor effects on big game habitat. Alternative I allows expansion of Crystal Mountain to the maximum skiable area and may affect mountain goats by removal of habitat and increased disturbance.

Table IV-22
Acres of Deer and Elk Winter Range In Management Areas Which Benefit Habitat and Acres of Forage Enhancement Per Decade, By Alternative

	Alternatives						
	NC 1/	A	I	B	H	J (Pref)	C	G-Mod
Deer & Elk Winter Range (WR) MAC acres	NA	0	106,632	158,824	34,239	33,587	39,057	26,623
Additional Acres In Compatible MAC's[2]	NA	113,098	118,038	94,647	222,487	245,960	241,706	85,943
Total Acres Managed for Deer/elk WR	NA	113,098	224,670	253,471	256,726	279,547	280,763	112,566
Timber Harvest WR Acres Available For Forage Enhancement[3]								
First Decade	NA	2,634	10,081	13,338	10,966	9,576	7,723	4,706
Second Decade	NA	1,548	6,903	8,566	7,308	7,378	8,615	8,088
Fifth Decade	NA	5,843	23,046	32,813	26,379	21,321	20,134	19,499

1/ The timber management plan upon which the No Change Alternative is based was developed in 1963. The plan was not anintegrated resource plan, and consequently did not address all resource uses and outputs. The information in this table was developed using the management *areas assigned in alternatives. No MA's are assigned in Alternative NC and the above* information cannot be reasonably estimated.

2/ Acres Suitable for Improvement are those deer and elk winter range or mountain goat habitat areas located in management areas that are compatible with habitat improvement, e.g. scenic, roaded natural dispersed recreation, etc.

3/ The total acres available for forage enhancement in a decade are the acres of Deer and Elk Winter Range MAC on which timber is harvested plus the acres of compatible MACs on which timber is harvested.

Alternatives NC, A, B, and I will create the highest level of conflict between wildlife and recreationists because of their emphasis on roaded modified and roaded natural recreation settings. These alternatives also provide moderate to high ORV use, and have the highest amount of road construction. The potential for disturbance is high, as these alternative provide more access and easier access to previously unroaded areas.

Although Alternative B emphasizes an increase in big-game numbers, the amount of road building, and high acreage in RN and RM creates a situation of potential conflict with wildlife.

Effects of Alternative J (Preferred) would be intermediate to those of A and C. Operation and expansion of developed recreation sites can result in change or loss of habitat, displacement or harassment of wildlife, change in wildlife species composition, and increased potential for conflicts between humans and wildlife (Thomas and others 1979a). In all alternatives, effects would be minor and very site specific. In the first decade, only limited construction occurs; any new construction to meet future demand would likely be extensions of existing sites.

The effects of dispersed recreation on wildlife are likely to be significant, since this Forest has a very high recreation use level. These effects are mainly associated with human disturbance and vehicular traffic. Effects can be great if dispersed activity occurs in or near specialized habitat or summer and winter ranges (Geist 1978, Lyon and others, 1985). The effects may also be significant in critical habitats for threatened and endangered species, and species which are sensitive to human disturbance or which do not mix well with humans (e.g. grizzly bear). The continuous use of roads and trails has a greater effect on deer, elk, and mountain goat than does the construction of such facilities.

Alternative C will likely produce the lowest level of conflict between dispersed recreationists and wildlife, because of the high levels of primitive and semi-primitive nonmotorized recreation, strict wilderness management, road closures, and low level of ORV use. Except for ORV use in the Kelly Butte area, Alternative G-Modified would be similar.

Direct Effects of Trails on Wildlife

The effects of trails on wildlife are significant in that trails are the primary access for humans into animal habitats. Trail access increases the exposure of wildlife to hunting and harassment.

Development of trails, trail maintenance, and trail use may cause changes or complete removal of vegetation, though the effects are much smaller in scope and size than those involved with construction of roads. Trail construction removes approximately one-half acre of vegetation per mile. Alternatives I and G-Modified would construct 350 miles of new trails in the first decade; Alternatives J (Preferred), 220 miles; Alternative H, 90 miles; Alternative A, 70 miles; Alternative B, 50 miles; and Alternative C, 90 miles.

Direct Effects of Fire on Wildlife

Direct interactions between fire and wildlife populations vary widely. While some evidence of vertebrate mortality has been reported, the most commonly held opinion is that vertebrates are rarely killed in fires. Instances of mortality are usually negligible, in terms of the population. Fire may set back the successional stage of the vegetation, making it suitable for a different set of wildlife species than were in the area previous to the fire. The immediate post-fire environment presents terrestrial wildlife with a sudden and drastic modification of habitat structure and local microclimates. Vegetation growth and change following fire make for a dynamic system of successional change, favoring different species through time.

Spot-fires can increase the incidence of dead and defective trees, which may enhance the habitat for those species which use or require cavities for nesting or decaying trees for feeding.

Interactions of fire with invertebrate populations may be short-term or long-term. Population levels may decrease because the individuals or their eggs are killed, or their food supply or shelter are diminished. In some cases, populations of invertebrates are attracted to heat, smoke or damaged trees, and actually increase following fire.

Direct Effects of Mining, Energy Development on Wildlife

Mining activity has had minor effects in the past and is not expected to increase noticeably in the future. The effects that mineral related activities have on wildlife include, but are not limited to, the disturbance of migration, mating, and birthing habits and habitats.

The impacts of any mining activity will generally be disturbance from vehicles and humans, rather than substantial loss of habitat. Alternatives that restrict the fewest acres from mineral exploration, B and I, potentially would affect deer, elk, and mountain goats the most. Alternatives with the most acres allocated to deer and elk winter range and goat MR will be less likely to have any effect on the species from energy or geothermal exploration and development. These include Alternatives B, C, H, J (Preferred) and G-Modified.

The consequences of energy and geothermal activities on old-growth and mature wildlife habitat will likely be minimal, as change or loss of habitat and human interactions are generally very localized. Impacts may be significant if mining activity occurs near, or removes nest sites. Alternatives with the most road access, such as NC, A, H, B, and I, are more likely to encourage these developments.

Areas allocated to Northern spotted owl, pileated woodpecker, or pine marten can be withdrawn from mineral entry. Mineral exploration is most likely in those alternatives that place the fewest acres in restrictive categories and have the most road access: NC, A, I, H, and B. Alternatives G-Modified and C place the most acres in restrictive allocations. Alternative J (Preferred) is intermediate.

Extraction of sand and gravel has historically occurred in habitat favored by small wildlife species, including riparian zones and talus slopes. The potential exists for habitat loss in these areas in all alternatives, especially Alternatives B and I, which have the fewest acres in prescriptions that restrict mineral exploration. Effects would likely be site specific. As discussed above, alternatives that provide the most road access are more likely to encourage energy and geothermal activities.

Mining activities, small hydropower projects, and other activities which alter or remove vegetation and bring in or increase human disturbance may adversely affect wildlife needs. Wildlife habitats may be modified and species distribution influenced. During mining activities, wildlife may be exposed to toxic substances used or uncovered in the mining process. Vehicle uses and human movements produce noise and other disturbance which may affect reproduction, feeding, migration, or other activities of wildlife.

Reclamation of such sites may replace forage and draw some wildlife back to these areas.

Direct Effects of Land Uses on Wildlife

Land exchanges may result in changes in vegetation conditions. The effects of Timber Harvest are discussed above.

Development of utility and transportation corridors has the same potential to affect various animals as does road construction (see below). Maintenance of existing utility corridors in a low grass and shrub vegetative stage precludes use of the area as thermal cover for deer and elk, but keeps the land available for intensive forage use.

A proposal exists for one new utility corridor to be located between Pyramid Peak and Tacoma Pass. Alternative G-Modified precludes this development; it is not expected that this facility would be built in the first decade in any other alternative.

Direct Effects of Roads on Wildlife

For all species, the consequences of road construction and use include: reduction of habitat, increased human interaction, temporal displacement of wildlife, and changes in numbers and species composition. Effects from collector and arterial roads to wildlife are more substantial, as they generally remain open permanently; local roads are often closed and rehabilitated or abandoned after timber harvest. Proposed new road locations may need to be altered in order to protect specific species.

Alternatives with the most lands remaining unroaded and the fewest concentrated human activities will be of the highest benefit to species which use large habitat areas and avoid human activities. Roads needed for access to timber harvest areas allow the public greater access to wildlife habitat. Although roads provide travelways for many species, roads which remain open may result in increased road mortality, disturbance of wildlife, causing them to avoid habitat areas near roads, and increased legal and illegal hunting mortality.

Direct effects of road construction include the removal of snags within 100 to 200 feet of roads, reducing snag habitat; creation of additional brushy habitat for species such as the pine marten; loss of other types of habitat; and increased interaction with humans. In Alternatives NC, A, B, H, I, where higher miles of new roads would be constructed, the effects of this activity will be the greatest. Alternatives C and G-Modified, combining permanent road closures and a low amount of road construction, will have the least potential effects.

The suitability of vegetative cover for wildlife is modified by the amount of roads open to and traveled by the public. The effectiveness of wildlife hiding cover is reduced by an increase in roads. Specific roads can be closed to protect wildlife travel corridors, hiding cover, or seasonally-used habitats. Permanently closed roads can be seeded to provide additional forage. Deer and elk use of otherwise suitable habitat is reduced adjacent to open primary and secondary roads (Brown 1985). New road construction results in the direct loss of habitat. Trails accessible to motorized vehicles can have the same effects.

Human activities, including vehicles on roads, displace wildlife from one area to another, moving them into territories of other individuals and increasing competition of space and forage (Brown 1985). Increased access has a short-term detrimental effect on some species, which adjust to human traffic, such as songbirds and squirrels. Other species, such as elk, bear, and cougar are likely to continue to avoid areas of human use.

Deer and elk avoid areas of human use (Lyon 1985). When roads are open and traveled, deer and elk densities are reduced. Animals remaining within the area expend more energy avoiding the intrusion and this can affect survival and reproduction. When a particular type of habitat is in short supply, reductions in quality are more detrimental.

Roads affect small mammals by removing cover which allows them to become prey to predators.

Any changes in the road system are not likely to cause significant changes in the Northern spotted owl, pileated woodpecker, pine marten, primary cavity excavators, or their habitats. Management prescriptions contained in the Forest Plan restrict new road location and construction in these areas.

Road construction is greatest in Alternative NC. By the end of Decade 3, when all planned arterial and collector road construction is completed, about 3,330 acres of currently vegetated land will be roaded (0.2% of the Forest). Alternative G-Modified, with the fewest miles of new road construction would affect approximately 1,075 acres of vegetation over the next three decades. Not reflected in Table IV-13 in the Vegetative Diversity section are the proposed miles of existing roads that would be closed and revegetated: about 300 miles in Alternative C, 65 miles in G-Modified, 20 miles in H, and 25 miles in J (Preferred).

In addition to arterial and collector road construction, temporary roads would be built to facilitate timber harvest activities. (Refer to Table IV-48 in the Roads section later in this chapter for the miles of local roads, by alternative.) These roads are located primarily in timber harvest units; following harvest, the roads would be closed and the area revegetated.

Wildlife - The Cumulative Effects of the Alternatives

The cumulative effects of the alternatives on wildlife are generally tied to the level of timber harvest and road construction both on and off the Forest.

With the exception of the National Parks, adjacent landowners are not required to retain old growth to provide habitat for old-growth dependant species. Much of the old growth in these ownerships has already been harvested and the rest is expected to be harvested in the near future. Viewed in this light, Alternatives B, H, I, NC, A have potentially the greatest cumulative effects, as there is substantial habitat modification involved. The modifications result in the loss of old-growth habitat over a large area and over a long period of time. As trees take approximately 200 years to grow to an overmature stage, mitigation is often not possible, although, some harvest methods may provide these "old-growth" characteristics in less time. Alternative J (Preferred) would have a moderate cumulative effect, and Alternatives C and

G-Modified the least amount of cumulative effects, when considering all factors discussed above.

Management of adjacent lands also effects the snag and downed log habitat. Much of the adjacent lands are managed more intensively than the National Forest, many have already been harvested and are largely devoid of snags. Slash disposal practices vary with ownership, so that some lands also lack downed logs. National Forest lands are the only lands where policy requires the retention of snags or management of viable levels of cavity excavators.

The cumulative effects of timber harvesting and forage enhancement activities on deer, elk and mountain goat habitat and populations are shown in Table II-9k of Chapter II. Summer populations rise slightly, while winter habitat and populations show an initial increase, decrease for a period of time, and then increase in the fifth decade.

Deer and elk often occupy ranges which include Forest lands in one season (typically summer) and off-Forest lands in other seasons. Population levels are determined by habitat conditions both on and off the Forest. Habitat conditions vary with different landowners. Except for the National Parks, adjacent lands have generally been heavily cut over and/or affected by growing urban/suburban development close to the Forest boundary in the last fifteen years. These lands lack optimal thermal cover for winter range. The distribution of cover and forage areas is poor on these lands because openings tend to be large.

On summer range this is not likely to be limiting, but high-quality winter habitat is becoming increasingly scarce off of the Forest. This increases the significance of the Forest's winter habitat.

There could be desirable cumulative effects on elk, deer and mountain goats resulting from management of a controlled watershed, where decreased significant human disturbance and reduction in vehicular traffic will result in almost total use of available habitat by the animals.

Wildlife - The Indirect Effects on Other Resources

Fish

Enhancement of riparian areas for wildlife may have a benefit for fish by providing future large woody debris and shading. Alternatives C, G-Modified and J (Preferred) would provide the highest levels of enhancement. Alternatives B, H and I would provide a moderate level, while Alternative A would provide the lowest level of habitat improvement. Alternative NC contains no habitat improvement.

Human Community

There is no measurable effect.

American Indian Religious and Cultural Uses

Wildlife habitat improvement has the potential to reduce the purity and wildness of the natural environment surrounding spirit quest sites. Winter range closures may temporarily restrict motorized access to spirit quest sites. Alternative B has 178,982 acres of allocated deer and elk winter range and goat habitat improvement; Alternative C, 42,097 acres; and Alternative H 34,239 acres. Alternatives NC, A, I, and G-Modified will have no assigned goat habitat improvement.

Archaeologic and Historic Properties

There is no measurable effect.

Scenery

There is no measurable effect.

Recreation

Changes in populations of deer, elk, and mountain goat can affect hunting, and indirectly influence local economies. Alternatives A, B, and I provide the most Wildlife and Fish User Days, followed by Alternatives Hand J. Alternatives C and G-Modified provide the fewest user days.

Wildlife habitat improvements and maintenance can affect the recreation experience by increasing the number of animals available for consumptive and non-consumptive uses. This effect is most important for users who enter the Forest to view or hunt wildlife.

Seasonal closures to recreational use (especially ORV's) may occur in areas managed for calving, fawning, and deer and elk winter range and goat habitat.

The effects of bald eagle habitat management on developed sites will not vary by alternative. In all cases developed site use will be modified to accommodate the eagles. For example, the Money Creek campground contains a number of large snags used by eagles for staging before flying off to roost at night. The snags will be retained and the campground will be closed in early fall, when the windy weather starts. In the long-term, Money Creek campground will be closed; the eagle staging area will be protected and all snags will be retained.

In other cases, if a nest is established early in the year, near or in a developed site, public use of the site will be curtailed until the young have fledged, usually in mid-August. These effects will be evaluated in the environmental analysis process conducted when nesting habitat management plans are established.

Trails

Wildlife should have no significant effects on trails. Indirectly, however the location of these improvements may be affected by the presence of, or the needs of, a particular species of bird or mammal. For example, the location of a bald eagle or northern spotted owl nest may affect the location of a trail.

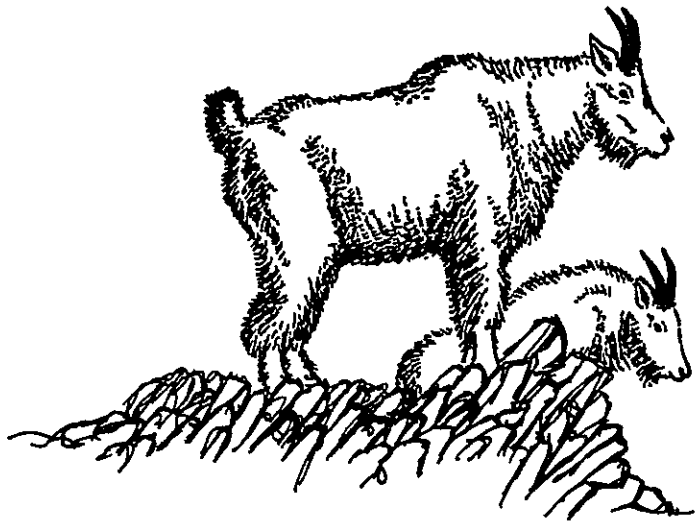
(See Direct Effects of Trails on Wildlife for more information on miles of trail by alternative.)

Wilderness

There is no measurable effect.

Research Natural Areas

There is no measurable effect.



Roadless Areas

There is no measurable effect.

Wild and Scenic Rivers

There is no measurable effect.

Air

There is no measurable effect.

Fire

There is no measurable effect.

Minerals

There is no measurable effect.

Land Ownership and Use

Wildlife should have no significant direct effects on utility corridors. Indirectly, however the location of these improvements may be affected by the presence of, or the needs of, a particular species of bird or mammal. For example, the location of a bald eagle or northern spotted owl nest may affect the location of a corridor. The potential utility corridor between Pyramid peak and Tacoma Pass will have to avoid SOHA's; this is the same in all alternatives.

Roads

Wildlife habitat management and improvement is expected to have an insignificant effect on the road system. However, wildlife management (in cooperation with the Washington State Department of Wildlife) may result in seasonal road closures during hunting and calving seasons. Additional closures may become necessary during other seasons in order to reduce animal harassment. The greatest effects would be seen in Alternatives NC, A, I, and B; the least, in Alternatives C and G-Modified.

Mitigation Measures for Wildlife

Most research on mitigation practices has been related to primary effects. Cumulative and secondary effects are more difficult to mitigate than are

primary effects since they usually affect wider geographic areas. Their impacts are more diffuse, and are therefore more difficult to define, and regulatory controls for wildlife are lacking or inconsistent among local jurisdictions. These three factors make it difficult for any one agency to fully protect wildlife resources at the local level (Comer 1984).

Mitigation and best management practices for fish and wildlife, described in the Forest-wide Standards and Guidelines and outlined in the last section of this chapter, are adequate to assure viable populations under any of the alternatives proposed, except Alternative NC, which makes no specific provisions to maintain viable populations.

The standard for open-road density for elk, deer, and mountain goat MR's is an average of two miles/square mile. The land manager has the option of restricting that to less than two miles if a conflicting situation might jeopardize a local viable population.

A timber harvest scheduling standard exists for the harvest intensity of the deer and elk winter range, and mountain goat habitat management areas. This standard should assure adequate acreage of optimum thermal cover on winter range, as well as optimum quality of thermal cover by providing an average of 160 to 200 year old trees (200 in mountain goat habitat).

Opportunities to protect specialized habitats, are provided for in the Forest-wide Standards and Guidelines, and specific management area prescriptions.

There are several specific measures that habitat managers can apply to maintain or improve bald eagle habitat. Nests are protected with a minimum quarter-mile radius buffer; the Forest-wide Standards and Guidelines and management area 16A prescription include other specific measures designed to protect known perching and roosting sites. There are other measures (some of which have not been proven but seem reasonable to institute in specific areas) for providing wintering birds with supplemental food, maintaining seclusion, and altering the shape, size and number of trees in use areas (Steenhof, 1978). Enhancing natural spawning populations of chum, Coho, and Chinook salmon in areas receiving bald eagle winter use would be an indirect benefit to eagles.

A study was initiated in 1985 to determine the effects of recreational activity on feeding and roosting eagles; it is a cooperative effort between the Forest Service and the U.S. Fish and Wildlife Service. If a substantial impact is found, mitigation measures will be developed to reduce these effects. Other human use next to winter use areas may be restricted by seasonal closures of roads, trails, or campgrounds. Signing critical habitat areas to discourage human activity may also be a suitable mitigation measure (Stalmaster, 1980).

Timber in potential or used habitat, may be topped, girdled, or partly limbed to maintain desired characteristics for perching, roosting or perhaps even nest trees (Stalmaster and others 1985).

Forest management practiced under all alternatives is compatible with maintaining and providing the eagle habitat. Regardless of the level of planned activity, the eagle will receive protection because of its threatened status.

In general, the Forest-wide Standards and Guidelines and Management Prescriptions provide adequate protection for selected forest management indicator species and their habitats at the MR level, except in Alternative NC (No Change), as discussed above. These habitats include: snags and dead and down woody debris habitats; riparian raptor nest sites; deer, elk and mountain goats ranges; and threatened and endangered species habitats.

Management Requirements for maintaining viable populations establish the least amount of mature and old growth forest to be retained. This is necessary to avoid losing species dependent on mature and old-growth forest. Old growth habitat lost to timber harvesting cannot be mitigated. If new silvicultural methods are established to harvest timber while providing for "old growth" characteristics at an earlier stand age these methods may be implemented as mitigation.

Mitigation for loss of snag habitat involves the retention of snags and future snags at various population levels between 20 and 80 percent biological potential of primary cavity excavators on lands suitable for timber production (except in Alternative NC). Nest boxes and the drilling of nest holes in trees replace habitat for some cavity-nesters. Down and woody material mitigation includes retention of slash piles and large woody debris throughout harvest units.

To assure habitat requirements are maintained for amphibians and reptiles as well as other ground-dwelling mammals and birds, it is desirable to specify a density of logs left per cutover acre; an example is 4 merchantable logs per acre in decomposition classes 1, 2, and 3, each having a volume of 40 cubic feet. See page 183 of Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington (Brown 1985).

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Wildlife

The Cedar River Watershed

The Cedar River Watershed is managed under a 1962 agreement between the Forest Service and the City of Seattle. The agreement provides for timber harvest on a sustained yield basis (see Glossary) within the watershed. As National Forest lands have been harvested, they have been exchanged to the City for City lands located outside the watershed. On August 7, 1989, the Seattle City Council adopted Ordinance 114632, which embodies the new Secondary Use Policies for the Cedar River Watershed. The City has set aside approximately 50 percent of its lands in a reserve precluding timber harvest. It will also prepare a long-range timber harvest plan for second-growth lands located outside the reserve. In addition, the policies call for acquiring 4,000-6,000 acres of old-growth forest, that are currently a part of the national forest, to be maintained as old-growth habitat. This ordinance may, in the future, cause the 1962 agreement to be amended. Under Alternative J (Preferred), this agreement would be renegotiated and, until a new agreement was developed, no new land exchanges would occur. In addition, a SOHA (Management Area 11) would be allocated within the watershed. Alternative G-Modified would result in more SOHA's and MR acres within the Cedar River Watershed. Alternative C would stipulate land exchange with two SOHA's intact; the City of Seattle would also be required to maintain the SOHA's.

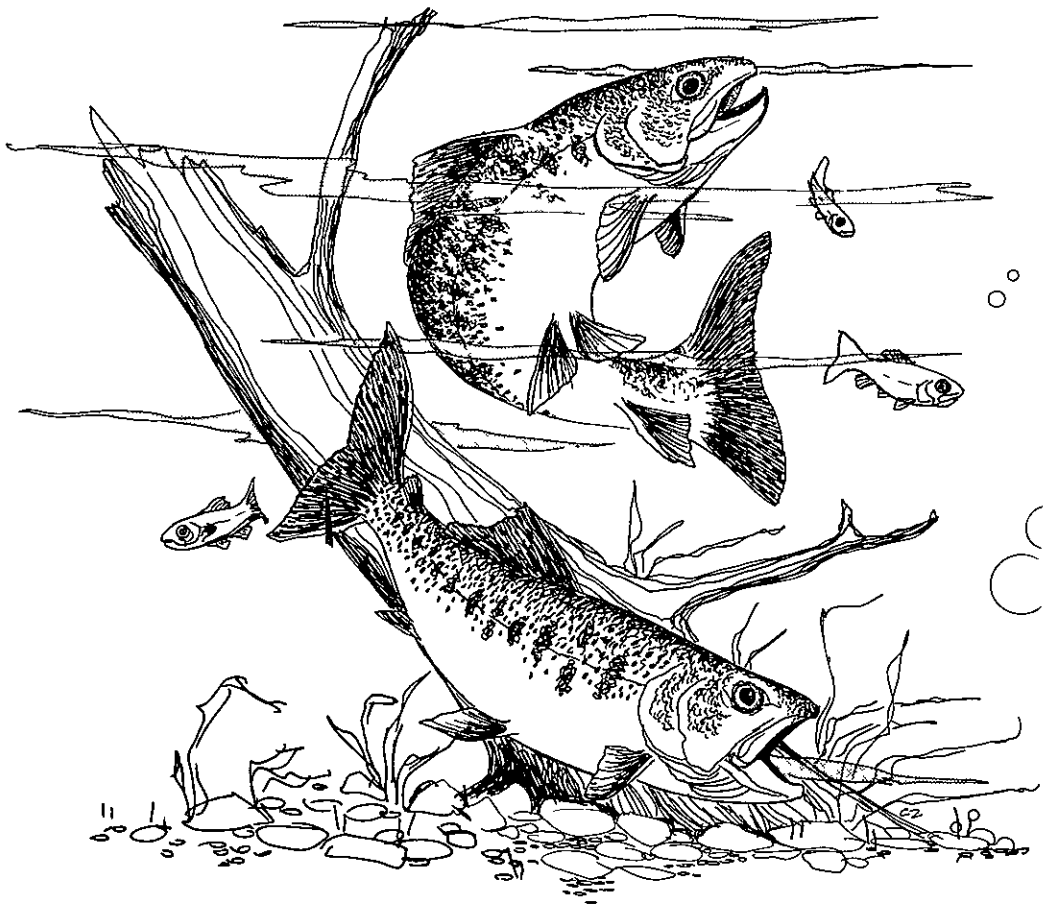
Other Plans

There are several plans in conflict with alternatives emphasizing timber harvest, thus indirectly affecting old-growth habitat and and dependent species.

Strategies for Washington's Wildlife (WDG 1982) could be in conflict with Forest alternatives that emphasize timber harvest because of land classification, harvest levels, and resulting loss of habitat. The same is true for the Wildlife Program Plans, Washington Department of Game.

Possible conflicts exist with the Statewide Comprehensive Plan for Fish and Wildlife on the National Forests in the State of Washington. The primary goal of this plan is to maintain and enhance existing fish and wildlife populations. Heavy timber harvest alternatives (NC, A, B, and I) could result in unacceptable reduction in old-growth habitat and thus reduction in old-growth dependent species.

Strategies for Washington's Wildlife (WDG 1982) contains a comprehensive strategy for the management of Washington's wildlife, game, and fisheries resources until 1995. It emphasizes habitat protection and improvement. Washington Department of Wildlife Program Plans gives population and animal harvest objectives for wildlife in 1989, lists key elements needed to meet these objectives, and shows the priorities for activity within the plan.



FISH

Fish - The Direct Effects of Each Alternative

General

The fish production capability of Forest fish habitats is directly dependent upon the protection and maintenance of riparian zone integrity, in-channel stability, stream bank stability, and desirable levels of pools and large organic debris in stream systems. Impacts upon these resources affect forest habitat capability to rear juvenile anadromous salmonids to the smolt stage and resident salmonids through the juvenile and adult stages. Furthermore, the anadromous salmonid life cycle involves both on- and-off-Forest habitats; from headwater streams to estuaries and the ocean. Any weak link within the cycle can have major influences upon a given fish population. Excess harvesting of fish, poor ocean food conditions, competition from hatchery stocks, and off-Forest land and water activities are potential impact factors beyond the Forest's control.

Management of salmonid fish habitat interacts significantly with nearly all other Forest resource management. By protecting, maintaining, or improving salmonid habitat capability and production, fish habitat objectives complement water quality goals and the desires of recreational, treaty, and non-treaty commercial fishing interests. Increasing numbers of the public enjoy fishing and the aesthetic values associated with fishing. But protecting, maintaining, and/or improving fish habitat can directly interfere or interact with the maximization of timber production capability, developed recreation plans, as well as road development plans and other special uses of the Forest aquatic systems. The ability of the Forest to rear resident trout and juvenile anadromous salmonids is directly related to how well both the aquatic and terrestrial habitat is managed.

The major effect of all alternatives on fish is a change in habitat condition. Viable populations of fish are maintained on the Forest in all alternatives; the amount of fish habitat capability to support and maintain fish populations above the viability level does vary by alternative. Viable populations of fish are defined as the current or existing levels of fish production across the Forest. The variation in alternatives is primarily a response to effects of forest management activities on key, in-channel and upslope conditions within stream systems, plus the emphasis on fish habitat restoration/improvement capital investment activities.

In general, alternatives displaying the least acres of final timber and associated road construction would protect and maintain fish and fish habitat values the most. Alternatives J (Preferred), C and G-Modified would afford the most protection, while alternatives NC, A, I, and B the least.

Direct Effects of Timber Harvest on Fish

Timber harvest and the associated road construction are the major management activities that affect the Forest's fish populations and their habitats. Based on Forest documentation and experience, the more acres of timber harvesting and the more miles of arterial and collector road construction, greater is the risk for adverse effects on fish habitat. Fish habitat components (in-channel stability, streambank stability, pool condition, and the presence and abundance

of large organic debris) are impacted by mass soil movement, surface soil erosion, and peak flow events that are triggered or influenced by harvest units and constructed roads.

In alternatives NC, A, I and B more acres are harvested and a high amount of roads are constructed, thus producing the highest annual sediment production for Decades 1 and 2. In addition, alternatives A, B and I show the highest levels of sediment and erosion relative to timber harvest and road construction during the first decade. (see Tables IV-1 and IV-3 in the Soils and Water section of this chapter.) The risk for adverse effects on fish and fish habitat is high in these alternatives.

Fish habitats face lesser risk of being impacted in alternatives with lower numbers of acres harvested and miles of road constructed, resulting in lesser amounts of sediment production (Alternatives H, J (Preferred), C, and G-Modified). Alternatives C and G-Modified generate the lowest levels of sediment due to management-caused erosion, while alternatives H and J (Preferred) generate moderate amounts of sediment from erosion relative to these activities.

Direct Effects of Wildlife Habitat Improvement on Fish.

Wildlife management emphasis areas generally affect fish and fish habitat in beneficial ways. Management Areas 11 (old growth habitat) and 12 (mature & old growth habitat) prohibit timber harvest and limit road and trail construction. Management Area 15 (Mt. Goat MR) prohibits timber harvest and road construction. The ecosystems in these areas are maintained and protected. This is beneficial to fish and fish habitat values. In addition, Management Area 14 (deer and elk winter range) contains a large number of acres located in the Forest's riparian areas. The Standards and Guidelines for managing deer and elk winter range in these riparian areas benefit fish and fish habitats.

Direct Effects of Fish and Riparian Habitat Improvement on Fish

Fish and fish habitat is one of the four riparian area-dependent resources. (See Management Area 13, Chapter II, FEIS.) In addition to the Forest-wide Standards and Guidelines for riparian protection, alternatives with high investment levels in MA 13 (Watershed, Wildlife, and Fisheries Emphasis in Riparian Areas) will best protect, maintain, and/or improve fish habitat. Alternatives J (Preferred), C, and G-Modified have high levels of capital investment for anadromous and resident fish habitat restoration and/or improvement. Alternatives B, H, and I provide high levels of investment for enhancement for anadromous fish only. Alternative A provides the management requirement level (MA 13A) for anadromous fish habitat restoration. Alternative NC has no provisions for fish habitat improvements.

Direct Effects of American Indian Religious and Cultural Use on Fish.

When religious and cultural use areas fall within riparian and wetland areas, fish and fish habitat will benefit. Alternative C would provide the most protection followed by G-Modified, J (Preferred), and H. Alternatives NC, A, B, and I would afford the least protection.

Direct Effects of Recreation on Fish.

The developed recreation intensities 3A (public sector sites), 3C (winter sports resorts), and 3D (private sector sites) have the potential to impact fish and fish habitat. These direct effects are usually very site specific; recreation impacts include alteration or modification of one or more of the key in-channel habitat components during construction or operation of a recreational site or facility, and the alteration of the natural characteristics of the riparian area. In addition, because they are located near aquatic systems, these developed recreational facilities may increase the potential for additional human harassment of some fish populations during critical life-cycle stages and increase the potential for human disturbance of fish habitat. Alternatives I, H, and J (Preferred) place high emphasis on developed recreation and would have higher potentials to affect fish and fish habitat. Alternative A would have the least effect, while alternatives B, C, and G-Modified would have moderate effects.

Direct Effects of Research Natural Areas on Fish.

Alternatives displaying the most acres designated as research natural areas would tend to increase the protection and maintenance of fish and fish habitat. Alternatives C, H, J (Preferred) and G-Modified would afford the most protection, while alternatives NC, A, I and B, the least protection provided by RNA's.

Direct Effects of Wild and Scenic Rivers on Fish.

One of the values qualifying for recommending a river for Wild and Scenic River designation is its fishery resource values. Alternatives displaying the greatest number of recommended wild and scenic rivers would afford the best protection and maintenance of the existing natural riparian area and fish habitats. Alternatives C and G-Modified afford the most protection (47 Rivers); Alternatives J (Preferred) (30 rivers) and A (15 rivers) afford the next level of protection; Alternative H with 5 rivers, and Alternatives B and I (0 rivers) afford the least protection.

Direct Effects of Air on Fish

The direct effect of air polluting chemicals and particulates resulting from the implementation of any of the alternatives would be minimal. A more likely impact is the indirect impact to habitat caused by changes in water quality. These impacts are described in a previous section of this chapter: Soil and Water. The impacts to water quality from the very low levels of chemical pollutants and suspended particulates is negligible and is the same for all alternatives.

The most likely sources of air quality related impacts on fish habitat are from outside of the Forest, and are not a function of the alternatives. The Federal Clean Air Act requires that proper consideration be given to fish and water impacts during the review process for new air pollution sources. The Standards and Guidelines reinforce this process.

Direct Effects of Roads on Fish

See previous discussion of Timber Harvest on Fish.

Fish - The Cumulative Effects of the Alternatives

On-and off-Forest management activities can cause cumulative effects on fish and fish habitat within the hydrologic boundary of a Forest watershed. One or more of the same types of management activities (e.g. more than one timber harvesting operation) and/or two or more different management activities (e.g. timber harvesting operation and a small hydro operation) within the same watershed, over time, are potential causes of cumulative effects to salmonid populations and their habitat. Any of these effects may be beneficial, adverse, or neutral in impacting fish and fish habitat.

Figure IV-2 in the Soil and Water section of this chapter displays major Forest management activities that can cause or trigger watershed and fish habitat cumulative effects. On this Forest, the major causes are timber harvesting and associated road building activities. Changes in the upslope conditions due to these management activities plus natural conditions lead to the transport of large amounts of water, sediment, and organic debris into stream channels. The major effects of this are changes in the stream channel and fish habitat conditions, including shifts in stream channel stability, changes in streambank stability, changes in pool/riffle complexity, and changes in the presence and abundance of large woody debris. These changes can occur in both the upper watershed area (first and second order channels) and in the lower watershed areas (third and fourth order channels). All of the third and fourth order channels are fish bearing channels; many of the Forest's second order channels also contain fish.

The past, present, and potential effects of the Forest's timber harvesting and road construction activities on the Forest's ability to protect and maintain a high level of fish habitat capability was assessed by the Forest through a hydrologic cumulative effects analysis process.

In this process, each Forest watershed was examined by a Interdisciplinary Team (composed of a fishery biologist, watershed specialist, geologist, forester, and engineer) to determine the present condition of four in-channel and fish habitat features. These were (1) stream channel stability (2) streambank stability (3) pool condition (4) presence or absence of large woody debris. These teams determined the overall channel and habitat conditions as acceptable or unacceptable by examining these four features. This was done by evaluating past harvesting and road construction records and by analyzing past stream channel conditions from stream survey data and aerial photos. Additional support information such as the soil resource inventory, landslide inventory, and flooding history files were also used. After the condition of a watershed was determined, (See Table IV-4), these teams derived a timber harvest level or activity that could be applied in that watershed over a 10 year period to either maintain or upgrade the watershed's condition. The results of this procedure are used to meet water quality and riparian MR's. The process and the resulting watershed assessments are covered in detail in Appendix H.

The Forest developed this process to address water quality and fish habitat cumulative effects because the existing processes and models were not applicable to or did not fit with the natural processes found in the watersheds on the Forest. For example, sediment models and recovery models used by other Forests in the Region were evaluated for use, but were found to be

inappropriate or inadequate for use on the Mt. Baker-Snoqualmie National Forest. None of these models incorporated how climatic factors, such as peak flow events, and upslope factors, such as mass wasting events, influence or affect in-channel factors, such as channel and bank stability, pool condition, and the supply of large woody debris, over space and time. Because of this, the Forest developed the process described in Appendix H.

Alternatives having a greater amount of acres harvested and roads constructed over the next four decades would have a higher potential for contributing to adverse fish and fish habitat cumulative effects (Alternatives NC, A, B, and I). These cumulative effects would include decreasing stream channel and streambank stability, loss of or lack of pools in providing habitat or channel structure, and the loss of, or displacement of, large woody debris from the channel. In addition, harvesting and/or road building in the riparian area reduces the recruitment of large wood into the channel network over time.

Alternatives C, G-Modified, and J (Preferred) would have less potential for cumulative effects because of the reduced acres harvested and roads constructed.

Fish - The Indirect Effects on Other Resources

Wildlife

Improvement of salmon spawning habitat should increase population levels and provide additional food for bald eagles and other fish and/or carrion eaters.

Human Community

Alternatives B, C, I, G-Modified, J (Preferred), and H, which provide for high levels of anadromous fish enhancement, will result in increased outputs for the Puget Sound fishery, and benefits to that sector of the economy.

American Indian Religious and Cultural Use

Fisheries habitat improvement structures can directly affect the natural and wild character of the streams. High levels of investment in fisheries habitat improvement in Alternatives A, H, J (Preferred), I, and B may conflict with spirit questing in some cases. This is less likely in Alternatives C and G-Modified due to restrictions on access and fewer potential habitat improvement locations. In sensitive areas, use of hand tools and proper timing of such construction can limit negative effects to religious use. However, habitat improvements will assure viable populations of fish needed to secure Treaty rights. Fish available to harvest would be most limited in Alternatives NC and A.

Archaeological and Historic Properties

There are no known indirect effects on Archaeological and Historic Properties from changes in fish and fish habitat in any of the alternatives.

Scenery

There are no known indirect effects on scenery from changes in fish and fish habitat in any of the alternatives.

Recreation

Changes in fish habitat improvements and maintenance can affect the recreation experience for all types of users by altering the number of fish available for viewing or catching. Effects from most alternatives are expected to be modest. In some cases, fish habitat improvements can be constructed in association with visitor interpretive facilities that explain the structures to the public. This type of facility would then increase the quality of the recreation experience for the forest visitor.

Trails

There are no known indirect effects on Trails from changes in Fish and fish habitat in any of the alternatives.

Wilderness

There are no known indirect effects on Wilderness from changes in Fish and fish habitat in any of the alternatives.

Research Natural Areas

There are no known indirect effects on Research Natural Areas from changes in Fish and fish habitat in any of the alternatives.

Roadless Areas

There are no known indirect effects on Roadless Areas from changes in Fish and fish habitat in any of the alternatives.

Wild and Scenic Rivers

The indirect effects are minor and not measurable.

Air

There are no known indirect effects on Air from changes in Fish and fish habitat in any of the alternatives.

Fire

There are no known indirect effects on Fire from changes in Fish and fish habitat in any of the alternatives.

Minerals

There is no measurable indirect effect on Minerals.

Land Ownership and Use

There are no known indirect effects on Land Ownership and Use from changes in Fish and fish habitat in any of the alternatives.

Roads

Fish habitat improvements and maintenance will have little effect on the road system except where these activities take place upstream from road drainage structures. During periods of high flow, some of these fish habitat improvements, such as small logs and other devices used to form pools, could be expected to wash out, move downstream, and block culvert and bridge openings. The result would be damage to the road and an increase in sedimentation in nearby streams. Alternatives B and I propose the largest number of fish habitat improvements upstream from roads and will have the greatest potential for affecting the road system.

Fish projects may include the replacement and/or removal of culverts.

Mitigation Measures for Fish

Mitigation measures for fish and fish habitat include all mitigation measures for water, as discussed in an earlier section of this chapter. In addition, there are other mitigation measures applied specifically to fish and fish habitat. Management requirements in the Forest-wide Standards and Guidelines include: water quality and fish passage requirements for various levels of fish habitat capability; high water-temperature concerns; large organic (woody) debris recruitment; bed load movement; stream channel and bank stability; other water quality parameters (ph, dissolved oxygen, heavy metals); and adequate flows. (Refer to the mitigation measures applicable to each Management Area, in Chapter II.)

Habitat work in upper channels would include installation of log-check dams and/or rock dams as energy dissipaters and sediment collectors. Streambank areas will be planted and seeded to help stabilize eroded sections. The overall mitigation strategy in these upper channel areas of watersheds is to maintain and increase sufficient amounts of structural components to provide channel and bank stability. Examples of this strategy can be found in portions of the Deer Creek watershed, and in Canyon Creek, a major sub-basin in the North Fork Nooksack River. In both of these watersheds, the Forest has begun to implement multi-year watershed rehabilitation-improvement plans to correct and mitigate upper channel areas impacted by a combination of natural events and past management practices.

Habitat channel work in lower channel areas would include installation of large structures (wood, native rock, or concrete) in the channels to restore or improve spawning and/or rearing habitat quality and quantity to re-create pools, or to improve pool quality increase stream channel and bank stability by deflecting or diverting stream-flow away from unstable, eroding bank sections. Examples of these structures providing high quality spawning, rearing, and adult rearing habitat can be found in the following watersheds: Canyon Creek & portions of the N.F. Nooksack River tributaries, S.F. Stillaguamish River tributaries, N.F. Skykomish River, Beckler River, Foss River, Miller River, Upper Green River, Greenwater River, Huckleberry Creek and the West Fork of the White River. Structures have been installed in these systems over the past nine years, and evidence and documentation demonstrates that these structures are effective in providing high quality habitat for salmon and trout juveniles and adults.

Other habitat work in lower channel areas can include improving or enhancing off-channel juvenile salmon and trout habitat by constructing either rearing channels or rearing ponds. These sites are designed to provide protected areas where fish can imprint, rear, or seek sanctuary from high flow or flood conditions in main channels. Examples of successful off-channel or pond construction include sites within the N.F. Nooksack River, the Suiattle and Sauk Rivers, S.F. Stillaguamish River, and in Huckleberry Creek.

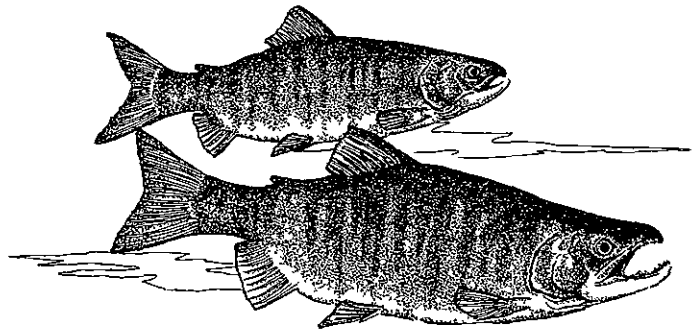
Where important fish habitat has been lost or displaced, additional mitigation will be required. This may involve restoring passage to previously accessible habitat, or restoring past spawning areas capable of producing fish. Other measures could include rehabilitating lost or reduced fish-rearing areas. These are covered in detail in the various fish-riparian management area prescriptions, found in Chapter II and Appendix D of the FEIS, and in the Forest Plan document.

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Fish

The State of Washington Department of Fisheries and Department of Wildlife both have in place, or in the development stage, management plans or programs for managing the anadromous and resident fish populations in the State. The Wildlife Department's Strategies for Washington's Wildlife (1982) contains a comprehensive program for habitat protection and improvement of the State's fishery resource values. This program details population and harvest objectives for game fish populations in 1989, and lists and prioritizes key elements needed to complete these objectives.

The Department of Fisheries is finalizing salmon management strategies by major river basins in the State. The river basins that will emphasize natural over artificial production of salmon including the following Puget Sound basin rivers: Skagit River and all its tributaries, the Stillaguamish River Basin, and the Snohomish River Basin. In order to achieve such an emphasis of natural production of salmon, a comprehensive program of habitat protection, restoration, and improvement will be required.

Alternative NC does not meet the MR level for anadromous fish. Both these alternatives would conflict with State Management plans. All other alternatives make significant investments in habitat protection, restoration, and improvement, resulting in higher populations of anadromous fish consistent with these state plans.



HUMAN COMMUNITY

Human Community - The Direct Effects of Each Alternative

General

The economic impacts, estimated using the Implan IO model and 1982 coefficients (see Appendix B, Chapter IV, Human Community), expressed by changes in area employment and income that would result from the implementation of alternative management plans, are shown in the Table IV-23. Alternative A (No Action) approximates the existing condition. For comparison, the jobs and income supported by average annual Forest outputs for two earlier periods are also shown. Alternative A in the first decade would support 1000-1300 fewer jobs than the 1977-88 or the 1985-88 periods. Alternative NC (No Change) would support 200-500 fewer jobs.

Table IV-23
Employment and Income, By Alternative

Outputs/Effects	Unit of Measure	NC 1/ (No Chg.)	A (No Act.)	I	B (RPA)	H	J (Pref)	C	G-Mod.
Jobs Supported by the Alts. Decade 1	Thousands of Jobs Per Year	30.1	29 3	29 1	29.1	28.9	28 8	28.0	28.4
For Comparison:		30.6 Thousand Jobs Supported by 1985-88 Average Forest Outputs							
For Comparison:		30.3 Thousand Jobs Supported by 1977-88 Average Forest Outputs							
Income Based On Projected Outputs for Alts. Decade 1	Mil.1982$ Per Year	559	537	532	531	526	522	501	512
For Comparison:		572 - Income Based on 1985-88 Average Forest Outputs							
For Comparison:		565 - Income Based on 1977-88 Average Forest Outputs							

1/ The Timber Management Plan upon which the No Change Alternative is based was developed in 1963. The plan was not an integrated resource plan, and consequently did not address all resource uses and outputs Alternative NC was not modeled in FORPLAN; information in this table was calculated outside of FORPLAN.

The economies of the five-county area of influence are among the most important in the State of Washington. The area is highly urbanized, the economies are diversified, and they constitute a large portion of the statewide economy. For these reasons, the Mt. Baker-Snoqualmie's contribution to the overall area economy is relatively small. Both directly and indirectly, the Forest generates only about three percent of the area's total employment, and just two percent of the area's total income (1982 data).

The effects, therefore, in either employment or income generated from the implementation of any of the alternatives will, at most, only decrease the total area employment and/or income by about 0.2 percent.

Even though the potential economic impacts in the form of employment and income, as shown in Table IV-23, reveal that alternatives which produce commodity based outputs will tend to have more positive impacts on the area's economy, it must be kept in mind that the input-output model used to derive figures is an accounting device. No attempt has been made in the above table, to value non-market attributes (such as those emphasized in Alternatives such as C and G-Modified) or to determine where employment gains or losses will occur.

Land allocation and resource management decisions affect people and communities in a variety of ways and through a variety of channels. An economic impact analysis can only reveal the "best" alternative if the goals of individuals, communities, or special groups are closely specified. Moreover, the conclusions drawn from the economic impacts are bound by the assumptions of the input-output models. Although these assumptions in general do not reduce the usefulness of the analysis, it is important to remember that the model and its outputs should not be applied mechanically.

As shown in Chapter II, Table II-9n, the dollars returned to the counties vary by alternative. The payments to counties in the first decade will be at levels experienced in the middle 1980's. In later decades they rise, as both ASQ levels and real prices increase.

Alternative A will vary the least from the current situation, being just slightly under a 10-year average of about $6.1 million in payments to the five counties. Alternative C will contribute the least - only $2,600,000 per year, or about $3.3 million less than Alternative A. This would affect King and Pierce Counties less than Whatcom, Snohomish, and Skagit Counties (the former have larger, more diverse economies and less National Forest land.) Alternative G-Modified will return about $3,800,000 per year to the counties. Both Alternatives H and J (Preferred) will return about $1 million less than Alternative A, while the others will return about $500,000 less that A. Alternative NC (No Change) would contribute almost 60 percent more than A.

The alternatives will have a direct effect on minorities and women through job opportunities, primarily jobs generated in the five-county area by Forest outputs (timber, recreation, fish, etc.) and expenditures.

Forest Service policies encourage employment and contracting opportunities for all. These policies will continue under any alternative, but the number of agency contracts will vary. Compared to the present, more contracts would probably be available under Alternatives NC and A. All others, especially C and G-Modified, would provide fewer contracts.

In the first decade, there will likely be no effects in any alternative on urban quality.

As the Puget Sound area is the largest, most diverse, and most urbanized in the Pacific Northwest, the effects of implementing any alternative are somewhat muted. Those groups and individuals who work in forest products, who live very near or within the Forest boundary, or who recreate in the Mt. Baker-Snoqualmie National Forest may be affected. Thousands of others in the greater Puget Sound region will not be impacted, one way or the other, by any alternative.

The spread of knowledge, technology, and new values has shifted the metropolitan part of the Puget Sound area away from an economy based on resource extraction to one based more on diversified manufacturing, trade, finance, tourism, and government. This same shift is now beginning to take place in the more rural portions of the area. The shift from resource extraction to services tends to place increasing emphasis on public goods such as developed and undeveloped recreation resources, clean air and water, and preservation of scenery (Bradshaw and Blakely 1979). This will not vary by alternative.

In the future, in all alternatives, the decline of the traditional rural community is expected to continue, though overall population will increase. The changing local population composition, including greater numbers of people over age 65, a diverse regional economic base, and growth of regional industrial areas is likely to change the occupational patterns and value structures of many smaller towns.

As this occurs, traditional lifestyles in the smaller rural communities will be more and more challenged by new, more urban values and lifestyles. The Forest can expect to see increasing demands for recreation-oriented outputs and increasing challenge to ground and vegetation disturbing management activities. The rate of change can be expected to be faster in towns closer to the metropolitan area, including Sedro Woolley, North Bend, and Enumclaw. Those towns further away, such as Darrington, will experience this change more slowly.

The diversity and quality of the developed and dispersed recreation program will have a noticeable impact on the quality of life enjoyed in communities in the Puget Sound basin. The Mt. Baker-Snoqualmie National Forest provides a recreation ground for the major population concentrations of both Washington and British Columbia. The Forest is the major supplier of several recreational opportunities, including alpine skiing and primitive and semi-primitive non-motorized uses. Outdoor activity is a vital part of the area's reputation and quality of life.

No effects specific to consumers, civil rights, minority groups, and women are expected from changes in the recreation program.

Direct Effects of Recreation on the Human Community

The size of recreation programs can have a real impact on the economy of small communities adjacent to National Forests. Communities like Glacier and Marblemount might qualify as recreation-dependent communities because their economies are largely based on tourism associated with federal lands.

Heavy use caused by the success of sites such as ski areas or lakeside resorts may generate special problems. These include large areas needed for parking, heavy traffic flow, law enforcement problems, and impacts on local communities. In short, these developed recreation areas create communities of several thousand people often without the benefits of needed community support services.

Ski areas, in particular, may have significant effects on the local economy. A service industry catering to skiers typically occurs on private lands leading to ski areas. As local logging becomes less significant, small rural

communities typically tend to depend more heavily on recreation for support. Consequently, developed sites can significantly affect local economies.

Developed site camping, by its nature, requires some specialized equipment, including campers, trailers, and tents. The manufacture, sale, and services of these products is a significant industry, employing many people in the area.

Motorized vehicle use can affect local economies indirectly through the sale of motorized vehicles and equipment, restaurants and motel use, and purchase of ORV permits. It can affect the state economy through license fees, gas taxes, and sno-park permits. It supports small business income and employment.

Alternatives that encourage high levels of recreation activity, either dispersed or developed, will result in the largest contribution to this segment of local and regional economies. Alternatives C and G-Modified would encourage the most dispersed unroaded recreation activity. Alternatives A, I and B emphasize dispersed roaded recreation, with less emphasis on unroaded dispersed recreation. Alternative I also encourages high levels of developed recreation. Alternative NC would be similar to A. Alternative G-Modified offers one area of ORV emphasis (Kelly Butte), but unroaded dispersed recreation is emphasized elsewhere. Alternative H would provide moderate developed and dispersed recreation. Alternative J (Preferred) would provide high levels of developed recreation opportunities and would emphasize unroaded recreation a little more and roaded recreation a little less than Alternative H.

Direct Effects of Wild and Scenic Rivers on the Human Community

Wild and Scenic Rivers contribute many amenity values. Alternative G-Modified has the largest allocation with 796 miles. Alternative A protects 287 miles. Alternative C recommends 606 miles, while Alternative H recommends 154 miles. No miles are recommended in Alternatives NC, B, and I. The Preferred Alternative J (Preferred) recommends 452 miles.

Direct Effects of Mining, Energy Development on the Human Community

The economic effects of minerals are unquantified because the timing of their development and the quantities that will be extracted are highly speculative. The Forest does have mineral resources, which if developed, could contribute significantly to the local economy - and less significantly to the regional and national economies. This contribution would be in the form of rental fees, royalty fees, salaries of employees, etc. However, future development will depend on outside influences, and, therefore, these effects will probably not vary appreciably by alternative. It can be assumed, however, that as the acres assigned to "highly" restrictive management areas increase, the potential for minerals to contribute to the economy decreases.

Direct Effects of Roads on the Human Community

The effects of road construction would have little if any measurable effect on the economy of any community within the Puget Sound area. Local jobs may be affected; this would vary by alternative. During the first decade, Alternative NC will construct the most miles each year: 28.6 miles. Alternative A would construct 18.8 miles per year in the first decade. In Alternative C, 10.3

miles would be built per year, and Alternative G-Modified would construct the fewest roads, 8.1 miles.

Human Community - The Cumulative Effects of the Alternatives

There are only minor measurable cumulative effects, primarily in terms of the employment and income changes discussed above.

Human Community - The Indirect Effects on Other Resources

American Indian Religious and Cultural Use

There are no measurable effects.

Archaeological and Historic Properties

There are no measurable effects.

Scenery

There are no measurable effects.

Recreation

There are no measurable effects.

Trails

There are no measurable effects.

Wilderness

There are no measurable effects.

Research Natural Areas

There are no measurable effects.

Roadless Areas

There are no measurable effects.

Wild and Scenic Rivers

There are no measurable effects.

Air

There are no measurable effects.

Fire

There are no measurable effects.

Minerals

There are no measurable effects.

Land Ownership and Use

There are no measurable effects.

Roads

There are no measurable effects.

Mitigation Measures for the Human Community

There are none planned.

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for the Human Community

There are no conflicts.

AMERICAN INDIAN RELIGIOUS AND CULTURAL USE

American Indian Religious and Cultural Use - The Direct Effects of Each Alternative

General

There are five categories of sites, as mapped and described in the 1981 Forest Inventory (Blukis Onat and Hollenbeck 1981): spirit quest sites, legend sites, cedar areas, ceremonial flora areas, and archaeological sites and cemeteries. Archaeological sites and cemeteries are addressed under Archaeological and Historical Properties, the next section of this chapter.

Table IV-24, below, shows the percent of inventoried use areas, by type of site, that will receive moderate to high protection in each alternative. Cemeteries will receive 100 percent protection in all alternatives; they are not discussed below.

High protection areas include lands where no timber harvest or road construction will occur and where expected frequency of human contact is low. Such lands include wilderness (except the transition class), research natural areas, old growth and mature wildlife habitat areas, and primitive recreation areas. Moderate protection areas include lands where no timber harvest or road construction will occur but where human encounters are more likely: semi-primitive nonmotorized recreation, wilderness (transition areas), threatened and endangered species habitat, and municipal watersheds where no timber harvest occurs.

Table IV-24
Inventoried American Indian Religious and Cultural Use Areas
Receiving High to Moderate Protection - Percent

Type of Site	NC (No Cng)	A (No Ac)	I	B (RPA)	H	J (Pref)	C	G (Mod)
Spirit Quest	NA 1/	40%	46%	50%	56%	59%	66%	65%
Legend Site	NA	18	32	44	51	57	68	65
Cedar Areas	NA	23	29	33	35	35	50	54
Ceremonial Flora	NA	52	57	63	70	71	82	81

1/ The TM Plan upon which Alternative NC (No Change) is based was developed in 1963. It was not an integrated resource plan and consequently did not address all resource uses and outputs. The missing information in this table cannot be reasonably estimated because the data was developed by overlaying inventoried use sites and areas with MA's; MA's were not assigned in Alternative NC.

Alternatives C and G-Modified allocate the most acres to some level of protection for American Indian religious and cultural uses. Alternatives NC, A, I and B allocate the least acres to protection.

While approximately 447,500 acres (excluding cemeteries) were identified as sites and areas important for religious and cultural practices, the 1981 Inventory stressed that religious and cultural significance was not limited to the identified areas. In other words, additional areas, yet to be specifically identified, may contain the environmental conditions suitable for religious practices and use. In the following discussion, the effects of the alternatives on lands inventoried as use sites and areas will be supplemented by estimates of the effects of the alternatives on the forested lands with environmental characteristics deemed important by local tribes.

These characteristics include unmodified streams, old-growth forest, cedar, ceremonial plants, and, for some practitioners, the additional qualities of isolation, privacy, and purity of the environment. Wilderness and unroaded areas come the closest to approaching most of these qualities.

Direct Effects of Timber Harvest on American Indian Religious and Cultural Use

Changes in diversity of vegetation in any of the alternatives are not expected to have significant effects on American Indian treaty rights. (See preceding discussions in the Wildlife and Fish sections of this chapter.)

There may be effects on American Indian religious and cultural uses from timber harvest. Consultation with Indian tribes about the effects of proposed activities would continue under any alternative. This consultation identifies where conflicts may exist. In some cases, modification of a proposed project will occur to the degree requested; in other cases, it will not be possible. In those situations, the environmental setting will be changed to the point that value as a religious or cultural use area will be reduced or lost. Such situations will be most common in Alternatives NC and A and least common in C and G-Modified.

The effects of timber harvest can be disturbing to religious use of spirit sites. Logging and ground disturbance provide conspicuous evidence of secular or commercial activities. The logged area has lost its purity, and the purity and isolation of surrounding areas is reduced. Cutting of cedar and old growth forest is perceived as irreparable destruction. Other forestry practices (site preparation, reforestation) contribute to further loss of the natural conditions of the environment.

Cedar is used for a variety of purposes and is an important component of the environmental setting for religious practices and uses. Old-growth cedar is used for canoes and longhouses. Not just old-growth cedar is important; when cedar is of "saw log" size (or about 17" DBH), its bark is most suitable for gathering and use in baskets and other items. Cedar of a variety of age classes from old-growth to saw-log size is more valuable than cedar of smaller sizes.

Through the consultation process, it appears that the importance of isolation, privacy, and purity in cedar gathering areas is somewhat less than that required for spirit quest sites, but may still be important. The following

discussion is limited to a description of direct effects on abundance and availability of cedar, and its permanency in the forest ecosystem.

Timber harvest has had and will continue to have the most direct effects on old growth cedar. Timber harvest will result in reduction of the availability of cedar of various ages for American Indian religious and cultural use.

All alternatives result in a substantial loss of cedar within the inventoried acres over five decades. Only Alternatives C and G-Modified will protect, over time, over 50 percent of the cedar areas. Over the Forest, as a whole, Alternatives NC, A, I, and B will result in the most extensive removal of old growth cedar. Alternatives H and J (Preferred) will result in slightly less removal. In cut-over areas, clearcuts will be frequent in the lower elevation forest zones where cedar grows. In intensively managed areas (with short rotations), cedar will be scarce. Forest-Wide Standards and Guidelines (see the Forest Plan) do provide for the replanting of cedar where it has historically occurred.

Alternatives G-Modified and C provide for retention of old growth at lower elevations and for the longer rotations approaching those necessary for cedar to reach maturity.

Over 75 species of medicinal and ceremonial plants have been identified in the Inventory (Blukis Onat and Hollenbeck 1981). Rights to gather some of these plants are provided for by both the American Indian Religious Freedom Act and Treaties of Point Elliot and Medicine Creek. Like cedar, the extent to which isolation, privacy, and purity are necessary may be less than for spirit quest sites, but undisturbed areas are preferred.

Timber harvest will have localized effects on those ceremonial plants growing in the area. Ceremonial shrubs and herbs can be physically destroyed during timber harvest or subsequent forestry practices (site preparation and reforestation). Trampling from pedestrian or vehicular use may also damage areas. The severity of effects to the setting will vary according to the type of plant and its intended use.

Clearcutting does increase the abundance of seral species used for ceremonial purposes: alder, vine maple, big huckleberry, bear grass, thimbleberry, blackberry, foxglove, blackcap, salmonberry, fireweed, and yarrow (Henderson, personal communication). However, the religious suitability of seral species when gathered in clearcuts is variable. For instance, huckleberries gathered from a clearcut may be acceptable, but vine maple must be gathered from locations which retain ritual purity (Snyder 1981).

Alternative C protects, from timber harvest, the largest percentage of inventoried ceremonial plant areas, followed by Alternatives G-Modified, J (Preferred), H, B and I. Alternatives NC and A allow the most harvesting in these flora areas.

Outside the inventoried areas, Alternatives NC, A, B, I, H, and J (Preferred) will result in reduced abundance of those plants dependent on habitats found only in old growth or mixed aged stands. These alternatives will result in increased abundance of seral species inhabiting clearcuts. In Alternatives C and G-Modified, ceremonial flora will be left undisturbed in most areas.

Changes in the diversity of plant communities may increase opportunities for cultural uses such as berry picking or the gathering of other foods and materials. These are normally enriched as old growth successional stages are converted to younger stages through timber harvest. These opportunities reverse the order described for protection, that is, Alternatives A and NC would offer the most opportunities, and C and G-Modified the least. However, existing evidence does not indicate that such increases are desired for traditional American Indian uses.

Fire suppression results in some localized damage of ceremonial flora, but this is overshadowed by long term protection of large areas where ceremonial plants grow. Indian use of fire is documented in the early historic period; the abundance of certain species was maintained through use of fire (Norton 1979).

Direct Effects of Archaeological and Historic Properties on American Indian Religious and Cultural Use

None of the alternatives would have significant effects arising from cultural resource management activities. Cultural resource inventory and protection can, in some instances, infringe on the privacy, isolation, and purity of the environment, and may disturb archaeological sites which American Indians would prefer to leave untouched. Such effects are most likely to result from archaeological excavation. Archaeological excavation will be most frequent under Alternatives NC, A, I and B, as a result of high levels of development activity. Hence the greatest chances of disturbance will occur under these alternatives. Archaeological disturbance will be relatively small-scale compared to the effects of the development activities.

Direct Effects of Recreation on American Indian Religious and Cultural Use

Because of the loss of privacy and isolation, use sites or areas located close to existing campgrounds have probably already lost their value. It is likely that expansion of existing recreation sites would, therefore, not affect American Indian sites further.

New recreation construction could destroy cultural resource sites or be used to protect sites. The builders of historic and prehistoric sites used criteria for locating their activities similar to those used by modern-day recreation planners, so sites often occur on the same location. Developed recreation acres, and hence potential for conflict, would be greatest in Alternative J (Preferred), and least in Alternative A, but are similar and relatively small in all alternatives.

The presence of dispersed recreationists intrudes on the privacy of a religious use site, and can be disturbing to the practitioners. The presence of others may also threaten the resting place for ceremonial articles left in the forest with the intention that they will be undisturbed by humans (Kent 1981).

In Alternatives NC, A, I, and B, and, to a lesser extent, Alternatives H and J (Preferred), it is expected that there will be increased competition between recreationists and Native American religious practitioners in wilderness areas. In these alternatives, there will be fewer opportunities for dispersed primitive and semi-primitive recreation outside of wilderness. Recreationists desiring these experiences will likely shift to wilderness.

At the other end of the spectrum, more opportunities for dispersed recreation in a primitive or semi-primitive setting will be present in Alternatives C and G-Modified. It is expected that opportunities for use, and the possibility of competing uses, would be much like it is today.

The effects of motorized dispersed recreation are damaging because of both the intensity (loud noises) and the extensive nature (over large distances) of the recreation. Alternatives NC and A, and to a lesser extent I, will result in greater capacity for motorized recreation and greater potential for disturbances to religious users. Alternatives B, H and J (Preferred) provide for moderate amounts of motorized recreation. Alternative C will provide the greatest protection to sites from motorized recreation; it provides the fewest acres in SPM and closes about 300 miles of roads. Alternative G-Modified, with its emphasis on primitive recreation, protection of low-elevation old growth, and closure of 65 miles of roads, will also provide high protection to inventoried sites and areas.

Recreation will have localized effects on those ceremonial plants growing in collecting areas. Trampling from pedestrian or vehicular use may damage areas. Consumptive uses (picking berries, wildflowers, pine cones, mushrooms, ornamental boughs, etc.) will compete with American Indian uses. The severity of effects to the setting will vary according to the type of plant and its intended use. Effects are likely to be greatest in the Alternatives with the most substantial allocations to dispersed recreation (NC, A, C and G) and least in Alternatives I and B. Alternatives H and J (Preferred) are intermediate in their effects.

Direct Effects of Trails on American Indian Religious and Cultural Use

Trail construction and maintenance will result in the limited removal of plants within and along the trail corridor. Trail construction and maintenance may reduce the purity, privacy, and isolation of some sites. Trail use results in an increase in potential encounters with others. Trails, however, also provide access to unroaded and unlogged areas of the forest.

Direct Effects of Wild and Scenic Rivers on American Indian Religious and Cultural Use

Recommending rivers for inclusion in the National Wild and Scenic River System may attract more recreationists and increase the disturbance to religious users along these rivers. Miles recommended by alternative are: Alternative G-Modified, 796 miles; Alternative C, 605 miles; Alternative J (Preferred), 452 miles; Alternative A, 287 miles; and Alternative H, 154 miles. Alternative B, NC and I recommend no rivers for designation.

On the other hand, some management activities that may be detrimental to religious and cultural uses would be reduced or eliminated (timber harvest and water diversions are examples) on those rivers recommended for designation.

Direct Effects of Mining, Energy Development on American Indian Religious and Cultural Use

The ground disturbance associated with mining results in loss of ritual purity in sensitive areas and in surrounding areas. The sights and sounds of mining can impact religious uses occurring within the vicinity.

The greatest potential disturbances to spirit and legend sites will occur in Alternatives NC, A, I and B, which allocate the fewest acres to prescriptions that restrict mineral activity. In Alternatives C and G-Modified, there will be the fewest conflicts, as more acres are restrictive to mineral development.

Mineral development can result in the localized removal of cedar and ceremonial plants, and reduction in the area of old growth and mixed-aged stands. The potential for reduction is highest in Alternatives NC, A, I and B and is lowest in C and G-Modified.

Any effects from other mineral related activities would be evaluated at the time mineral activity is proposed.

Small hydropower development can result in loss of the ritual purity of streams both up and down stream. The presence of power generating equipment and any changes in the physical properties of the water (rate of flow, turbidity, etc.) are damaging. Even if the water undergoes no observable physical changes, some practitioners believe that it will have lost its spiritual purity after passing through a generating facility. This development may occur in any alternative, but is most likely in alternatives that provide the most access and the Forest recommended Wild and Scenic Rivers: Alternatives A (NC would be similar to A), I, B, and H.

Direct Effects of Land Uses on American Indian Religious and Cultural Use

Land adjustments can result in the transfer of sites out of federal ownership. The new property owner may choose to deny access to newly acquired lands, as the American Indian Religious Freedom Act does not apply to private landowners. However, religious and cultural use sites will generally not be exchanged (see the prescription for Management Area 7 in the Forest Plan). The exceptions occur in municipal watersheds, where all alternatives except B would exchange some National Forest lands.

Utility corridors can disrupt the purity and isolation of religious use areas. Alternative G-Modified designates no new utility corridors; the remaining alternatives designate one new corridor.

Direct Effects of Roads on American Indian Religious and Cultural Use

Roads can disturb the qualities of isolation and privacy of sensitive areas. Roads can be a visual intrusion from a distance and a conduit of secular activity (traffic, noise, mechanized equipment, etc.). Roads also make lands more accessible to other Forest users, whose presence may intrude upon the privacy of a religious activity.

Road construction can result in the removal of cedar and the bisecting of old growth cedar stands. Alternatives C and G-Modified provide for the fewest roads and the greatest long-term abundance of cedar.

Alternatives A (NC is similar), I and B provide for the most road construction, reduced isolation of sites, and increased possibility of disturbance to sites. Alternatives H and J (Preferred) provide for moderate levels of road construction. Alternatives C and G-Modified would result in far fewer roads, with disturbances more at a level like that of the present. Alternatives C and

G-Modified also close miles of existing roads, which could increase solitude and privacy in some instances.

Construction permanently destroys all vegetation within the road prism. Alternatives A (NC is similar), I and B will construct the most miles of new roads, increasing the chance of ceremonial plant loss.

American Indian Religious and Cultural Use - The Cumulative Effects of the Alternatives

Traditional religion is a significant component of the social and community structure of Puget Sound tribes. The religion teaches good and correct character and behavior, contributing to the smooth operation of personal and group relationships. Further, proper religious practice ensures success in life. Those who are successful become role models and authority figures within the community. Loss of religious use areas can therefore destroy personal sense of worth and interfere with interpersonal relations and tribal leadership.

As a result of the development of state and private lands, the demand for suitable National Forest lands will increase. Cumulative effects from implementing the alternatives will occur in American Indian religious and cultural sites and areas located in virgin stands of trees on suitable lands. Besides wilderness, these areas hold the greatest amount of ritual purity and isolation. Timber harvest, road construction, mining, small hydropower development, and other major ground disturbing activities may damage both the resources and their setting. Spirit quest and legend sites will be most impacted.

Short rotations are insufficient to allow the growth of large-diameter, mature cedar trees. Timber harvest will result in reduction of the availability of cedar of various ages for American Indian religious use. While cedar will be present, the numbers and the average age of trees will be smaller. Standards and Guidelines for western red cedar will, upon Plan implementation, encourage regeneration of cedar where it has occurred in the past; however, rotation length will not allow trees to grow to large diameters.

Cumulative effects to ceremonial flora areas will be localized in extent, for the most part. None of the known ceremonial plants are threatened or endangered. While patterns of local availability, abundance, and accessibility will change, their overall presence on the forest will remain similar to the current situation. However, these changes may have more serious harmful effects to specific tribes, depending on their use of protected areas.

Alternatives NC, A, I and B will have the most serious effects on the availability of old growth cedar and ceremonial plants, and on the undisturbed natural setting required for spirit questing and other religious activities. These effects will occur in intensively managed areas in all alternatives. The greatest degree of protection of the resources and their setting, important in the practice of American Indian religion, will be provided in Alternatives C and G-Modified, while Alternatives H and J (Preferred) will provide a moderate level of protection.

Thirty-four percent of the identified American Indian religious and cultural use areas are located within wilderness. As such, they will be protected, in

perpetuity, from timber harvest, road construction, and those forest activities which have the most severe effects on the sites and areas themselves. Wilderness also protects, to some degree, isolation, purity, and privacy of the environmental setting. These religious use areas, however, will be subject to recreation uses which have the potential to reduce the isolation, privacy, and purity of the setting, and to disturb some American Indian religious and cultural activities.

Since many religious and cultural uses are dependent on the availability of old growth timber, readers are referred to the discussion of effects on Vegetative Diversity and Old Growth earlier in this chapter for further information.

American Indian Religious and Cultural Use - The Indirect Effects on Other Resources

Archaeological and Historic Properties

Changes in some cultural properties are of great interest to the American Indian community. There is extreme concern for the protection of archaeological sites, as they are part of the tribal heritage. Mitigation through excavation of archaeological sites may be encouraged by tribes in some cases, and discouraged in others. While American Indians do not want to see any archaeological sites damaged, they may also view excavation itself as a disturbance to sacred ground. When excavation may affect sites of interest to Indians, tribes will be notified of the planned activity. Opportunities for excavation may be foregone as a result of the resulting consultation.

In alternatives with high timber production (NC, A, I and B), there will be more frequent archaeological data recovery and greater involvement of the American Indian community. Data recovery will be less frequent in Alternatives C and G-Modified.

Scenery

There is no measurable effect.

Recreation

Protection for American Indian religious sites and areas may restrict or modify construction of developed recreation sites in those areas, as determined in project-level environmental analyses. The effects will not vary appreciably by alternative.

Trails

American Indian inventoried site management can affect trails when sites are in need of protection from destructive influences of visitors attracted by trails. Archaeological sites and American Indian religious and cultural use areas can attract collectors or vandals who may remove or destroy valuable property. Protection measures may require deterrence of trail users from passing into or near such sites for all or some portion of the year. The effects on trails in all alternatives is considered to be slight.

Wilderness

Increased American Indian religious use has the potential to compete with wilderness recreation use. Such competition can be expected in Alternatives NC, A, I and B, as opportunities to achieve privacy and isolation will occur primarily in wilderness. Fewer conflicts would be expected in the other alternatives. Effects on recreation activities are not expected to vary appreciably between alternatives.

Research Natural Areas

There is no measurable effect.

Roadless Areas

There is no measurable effect.

Wild and Scenic Rivers

Increased American Indian religious use has the potential to compete with recreation use of potential wild and scenic rivers, once designated. Such competition is expected to be the greatest in Alternatives NC, A, I and B, as use is focused on remaining areas with low or no development. Restrictions or alterations of recreation use may be developed on a case-by-case basis.

Air

There is no measurable effect.

Fire

There is no measurable effect.

Minerals

There is no measurable effect.

Land Ownership and Use

Avoidance of religious use areas in utility corridors might require the re-location of lines or the employment of non-standard construction techniques. The effects in all alternatives, except G-Modified, are slight and similar. Alternative G-Modified designates no new utility corridors.

Roads

Since the type of religious and cultural use sites varies widely, the degree and type of effects would also be expected to vary. The effects on roads could range from none, to seasonal closures, to precluding new road construction. Alternatives NC, A, I and B would have the greatest effects, by increasing pressure to close roads or preclude construction.

Mitigation Measures for American Indian Religious and Cultural Use

Recommendations in the Inventory of Native American Religious Use were consistent in stating that all categories of sites (spirit quest, legendary, ceremonial flora areas, cedar gathering areas, and cemeteries) be protected. Protection requires the maintenance of the site in a pure, private and isolated state - in other words, undeveloped.

It will not be possible to maintain all sites in an undeveloped state upon implementation of any Plan alternative. Alternative effects can be assessed by consulting Table IV-24, which shows the acreage of inventoried sites receiving high or moderate protection.

In cases where religious and cultural use sites are allocated in developed Management Areas, consultation with the affected tribes shall be undertaken to identify means of avoiding or mitigating the effects. Generally, these will mean reducing or minimizing the area, ground, or vegetation disturbance and separating them to the extent possible from Indian practitioners who may be present. Separation may be spatial or temporal, depending on the specific use of the area.

Closure of roads can be used to limit access of these routes to religious sites. This would reduce those disturbances which detract from the isolation, privacy, and purity of the sensitive area.

Seasonal trail closures might be used to protect sensitive areas from heavy recreation use. Use of hand tools in trail construction or fish and wildlife improvement projects will reduce the noise associated with these construction projects.

Various activities can be scheduled so as not to coincide with the season during which most of the religious activity occurs. However, there is evidence that some religious activity occurs throughout the year (Haeberlin and Gunther 1930).

Silvicultural practices can be modified to accommodate the long-term needs of American Indians for cedar. Extended rotations (a minimum of 250 years) could be employed in prime sites for cedar growth. This would allow the growth of mature cedar trees and other ceremonial plants which thrive in that habitat type. A Forest-Wide Standard and Guideline has been established to assure the regeneration of cedar where it has historically occurred.

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for American Indian Religious/Cultural Uses

No municipal, county, or state-level plans address American Indian religious and cultural use. The Bonneville Power Administration's Northwest Rivers Assessment may address such use but that study is not available at this time. The 15 American Indian tribes with which the Forest actively consults have expressed their views in person and in writing, but there are no known plans which address this issue.

ARCHAEOLOGICAL AND HISTORIC PROPERTIES

Archaeological and Historic Properties - The Direct Effects of Each Alternative

General

There is a wide range of archaeological and historic property on the Forest, as discussed in Chapter III. Included in the following discussion are the environmental effects on: 1) archaeological sites, 2) historic buildings and structural remains, and 3) linear cultural features, including trails, wagon roads, railroads, and historic districts (for example, the Stevens Pass Historic District).

Archaeological sites derive their significance from the data they contain. Potential negative effects on these sites include physical loss of artifacts and disturbance of sites which destroys the context of artifacts in the soil profile. This loss of stratigraphy, or the sequence of cultural and natural soil horizons, can mean loss of much of the scientific value.

Buildings, structures and many linear features derive their significance from their associations with important persons or events, or from their aesthetic value. Conditions which break the association, for example the removal of the work of a master builder, and conditions which change the aesthetics, can damage or destroy the significance of the building or feature.

Linear cultural features may consist of structures such as roads, or collections of buildings, structures, features and archaeological sites, connected by roads or trails. Negative effects can include the physical severance of the connecting link, the introduction of incompatible developments, and the full range of effects that may also impact archaeological sites, buildings and structures.

The alternatives do not differ significantly in management direction, which is governed by Sec. 106 of the National Historic Preservation Act of 1966. But in the management activities proposed in each alternative (especially timber harvest and road construction), there is a varying risk of impact and effect on archaeological and historic properties.

Direct Effects of Timber Harvest on Archaeological and Historic Properties

Ground disturbance associated with vegetation manipulation has the potential to affect archaeological and historic properties. The more extensive the ground disturbance, the greater the effect on these properties. However, such activities also provide the greatest opportunity to discover and interpret new sites. Through current standards and management practices, and in compliance with law, cultural resource inventories implemented as a result of proposed timber sale projects have resulted in most of the findings on the Forest. To date, funding for cultural resource inventories has come mostly from timber sale funds.

Considerable ground disturbance occurs in localized areas, such as landings, where heavy equipment runs repeatedly over a limited area of ground. Development of skid trails, ground scarification, yarding, and machine piling can result in displacement and crushing of archaeological materials (Bryant and others 1982, Gallagher 1977, Wildesen 1982). Impacts of different magnitudes

result from the use of different logging systems. Removal of vegetative ground cover and subsequent soil loosening and soil moisture changes can result in damage to archaeological sites and their contexts (Butzer 1982, Dancey 1969). The effects may be mitigated by recovering data before disturbance occurs, or by altering the extent, timing or method of vegetation removal.

Timber harvest can usually be designed to avoid historic buildings located within a timber sale area, but may change the association or aesthetics. In some cases it is impractical to avoid structures. In these cases, the surface disturbance caused by logging and associated activities can result in complete removal or irreversible damage to historic structures. Such adverse effects may be partially mitigated by documentation of structures to the standards of the Historic American Building Survey (HABS). Timber harvest can also result in the destruction of associated historic features and landscape modifications which provide important historic or aesthetic context for the structures themselves (Gallagher 1977).

The body of scientific knowledge will be increased, as funding for documentation and inventory of any buildings or structural remains is provided by the timber sale; the costs of timber harvest will also increase.

Timber harvest is most extensive in Alternatives NC and A. This will result in the greatest potential impacts. Fewer sites will be left undisturbed and in their original condition. Impacts may also be sustained in areas managed for timber production in all other alternatives. Alternatives C and G-Modified will result in the least amount of ground disturbance and the fewest losses. Alternatives I, B, H and J (Preferred) have intermediate levels of impact.

Timber harvest can severely affect linear cultural features. Use of heavy equipment, construction and use of landings, construction and use of spur roads, tree falling, ground scarification, and machine piling can destroy the original tread or grade of an historic route (Gallagher 1977). Potential effects, by alternative, follow the same pattern discussed above. Due to their extensive nature, mitigation of effects to linear cultural features is difficult to achieve. Partial mitigation (directional felling, restriction on the number of crossings, etc.) increases the costs of timber harvest as does documentation of the features. The greatest number of undisturbed linear cultural features will be retained in Alternatives C and G-Modified. As with other types of archaeological and historic property, the remaining alternatives have intermediate levels of impact.

Associated timber management activities, such as site preparation and reforestation, can have additional effects on archaeological sites. The impacts will be greatest in the alternative where site preparation is most extensive: Alternative NC. Alternatives A, I, B, H, and J (Preferred) have moderate impacts, and Alternatives C and G-Modified will have the fewest impacts. The mitigation of these impacts will add to the cost of these forestry practices.

Direct Effects of Fish and Riparian Habitat Improvement on Archaeological and Historic Properties

Ground disturbing fisheries habitat construction may have a direct effect on archaeological sites located adjacent to streams. Habitat improvement can result in the removal of vegetation and increase the visibility of historic

sites and structures. This can expose them to accelerated natural weathering and make them more visible to visitors. These impacts are most likely to occur in Alternatives A, I, B, H and J (Preferred).

Direct Effects of Recreation on Archaeological and Historic Properties

Because prehistoric humans were attracted to the same localities that modern recreationists find desirable, recreation developments and activities have a high probability of affecting archaeological and historic properties. Dispersed recreation causes much less damage than recreation developments and motorized recreation.

Recreation use can have direct effects; archaeological remains often attract collectors or "pot-hunters" who remove artifacts and destroy their context (Hedlund and others 1978, Wildesen 1982). Purposeful vandalism can also result in loss of a site's integrity. Inadvertent loss can be caused by heavy use from campers, hikers, stock animals, off-road vehicles, or bikes.

Alternatives that provide the most access, by road or trail, to areas likely to contain historic properties have the greatest potential for damage. Most cultural resource sites known to exist are located in areas that already have a well-established travelway development of both roads and trails (Madonna Moss, personal communication).

Alternatives A (NC would be similar) and I provides the greatest amount of roaded recreation. Alternatives B, H, J (Preferred) and G-Modified also provide moderate acres of semi-primitive motorized recreation (primarily for trail bikes) and roaded, natural-appearing recreation. Alternative G-Modified provides the lowest roaded recreation acres. Alternative C has no semi-primitive motorized recreation, but does have more acres of roaded, natural-appearing recreation than Alternative G-Modified.

Alternative J (Preferred) has the highest level of trail construction/reconstruction and Alternatives A and B the least. Alternatives I and G-Modified have high trail construction/reconstruction miles. Alternatives H and C have intermediate levels.

While potential effects cannot be quantified, Alternatives A (NC would be similar) and J (Preferred) are more likely to result in recreation impacts to archaeological sites. Alternatives C and G-Modified propose substantial miles of new trails, but have the fewest miles of road construction and resulting roaded recreation; recreation effects from C and G-Modified will likely be minimal.

Direct Effects of Trails on Archaeological and Historic Properties

Trail construction can result in greater accessibility and visibility of historic buildings and structures. By facilitating visitor use, the property becomes vulnerable to the effects of human use. Increased access can also have the effect of enhancing the recreation experience of the interested and sensitive visitor.

Alternatives G-Modified, I and J (Preferred) will construct the most miles of trails, followed by Alternatives C, H and A (NC would be similar to A). If trail construction is executed in a manner consistent with historic values,

these alternatives will provide the greatest opportunity for maintenance and interpretation of linear cultural features.

Off-road vehicle (ORV) use can cause significant resource damage through soil disturbance, artifact collection and vandalism. These effects will be greatest in Alternative I and least in Alternative C. Moderate to low impacts would result from the other alternatives.

Direct Effects of Research Natural Areas on Archaeological and Historic Properties

RNA designation generally discourages the retention of structures, including historic structures. They may be removed or allowed to deteriorate naturally. Opportunities for archaeological research are foregone. These effects will be greatest in Alternatives H, J (Preferred), C and G-Modified, and least in Alternatives NC, A and I. Because RNAs are frequently areas with little prior human use, these effects are expected to be limited in any alternative.

Direct Effects of Mining, Energy Development on Archaeological and Historic Properties

Mineral related activities affect cultural resources during exploration, development and extraction of minerals, when surface disturbing activities take place. These activities may provide opportunities to identify previously unknown cultural properties at some sites, while resulting in the damage to or destruction of historic values at other localities. The degree of effect varies by the commodity that is explored, developed, or mined. The type of mining operation, the degree of environmental alteration required, and the location of the development also are key factors.

Alternatives NC, A, I and B have the fewest acres in a highly restrictive category for mineral entry; implementation of these alternatives will most likely result in loss of the greatest number of historic sites. Partial mitigation will result in documentation of some of these sites, but many will not be retained in place. There will be fewer conflicts between historic preservation and mineral development in Alternatives C and G-Modified. More historic mining sites will be retained under these alternatives.

Alternatives NC, A, I and B also have the fewest restrictions on all types of energy development, resulting in a higher potential loss of historic structures.

In all alternatives, all lands not withdrawn from mineral entry will remain subject to exploration and development under mining and mineral leasing laws. For leasable minerals, all costs of site protection and salvage are borne by the operator; if at all possible, the resource is protected. If the impacts of mining cannot be satisfactorily mitigated, surface occupancy of the area is restricted.

Small hydropower developments can result in severe, localized damage. While stream locations are sensitive areas, many of the streams chosen for FERC licensing are smaller, lower-order streams with a steep gradients. These smaller streams have less potential for containing archaeological sites. The Alternatives that provide the most access and development (NC, A, I and B) will provide the most opportunities for small hydro development, hence the highest

likelihood of adverse effect. Alternatives C and G-Modified have the lowest likelihood of adverse effect.

Direct Effects of Land Uses on Archaeological and Historic Properties

Land adjustments can result in transfer of archaeological sites, historic buildings and structures, and linear features out of federal ownership. If sites are detected prior to land exchange, data from the sites can be recovered and can contribute to understanding of our cultural heritage. Transfer of unknown archaeological sites can result in their ultimate destruction by the new landowner's activities. On the other hand, valuable properties can also be acquired for federal protection.

Municipal watershed management can result in a variety of effects to cultural and historic properties as a result of policies toward land exchange. The probability of archaeological sites occurring within watersheds is relatively high, due to the tendency for sites to be located along streams and waterways. Closing watersheds to public use reduces the number of visitors to the area and the potential of vandalism to sites. It also reduces the possibility that sites will be investigated by scientific or educational organizations.

From the perspective of municipal watershed management, historic buildings and properties can be a nuisance, because they are potential sources of contamination, and they attract visitors. In watersheds closed to public use, historic buildings are more inaccessible to the public and less prone to vandalism.

Retention of National Forest land in the Cedar and Sultan River watersheds will result in the greatest chance of long-term protection (Alternative B). Where lands are managed for timber production, there will be more sites identified, and more impacts (Alternatives NC, A, I, H and J (Preferred)). Where old growth habitat is afforded protection, as in Alternative C, there should be fewer disturbances to archaeological sites. However, old growth maintenance will be at local discretion. Alternatives A, I, H, J (Preferred), G-Modified and, to a lesser extent, C would allow recreation use, resulting in a greater chance of human impacts on archaeological sites.

Alternative G-Modified precludes the construction of an additional utility corridor between Pyramid and Tacoma Pass. In all other alternatives, the potential exists for historic or cultural sites to be impacted by utility corridor construction.

Direct Effects of Roads on Archaeological and Historic Properties

Road construction probably results in the greatest amount of ground disturbance of any forest activity (Wildesen 1982). Areas selected for roads often follow the route of least topographic resistance and some locations, like relatively level benches or terraces above stream channels, have a high potential for archaeological and historic properties. Because of this potential for the co-occurrence of roads and sites and the magnitude of disturbance, it is expected that road construction has the greatest potential to damage sites. Site deposits may be damaged through physical loss of remains and/or mixing of site stratigraphy (Butzer 1982).

However, road construction also has the effect of providing the opportunity to identify previously undiscovered sites. This can provide opportunities for interpretation and an improved understanding of site distribution patterns.

Alternatives A (NC would be similar), I, and B will result in the greatest amount of road construction in the first decade, followed by Alternatives H and J (Preferred). The frequency of site discovery and mitigation of potential impacts will be greatest in these alternatives. Fewer sites will be left undisturbed. The greatest number of archaeological sites will likely be damaged through road construction in these alternatives. Similar impacts would be sustained on those areas developed in Alternatives C and G-Modified, but the number of cases would be smaller.

Archaeological and Historic Properties - The Cumulative Effects of the Alternatives

The cumulative effects of landscape modifications and private land developments have already destroyed much of the archaeological and historic record in Western Washington (Carter 1978). In all alternatives, but especially Alternative A (NC would be similar), as additional components of the network are destroyed, the information contained in these properties is destroyed.

Figure IV-3 in the Vegetative Diversity section earlier in this chapter shows the acres of timber harvest by alternative over the first five decades of the Plan. The acres harvested are much higher in Alternatives NC and A than in the rest of the alternatives. The cumulative effects of implementing these alternatives would be much greater. Acres harvested are high in Alternatives I, B and H (but less than NC or A), intermediate in J (Preferred), and lowest in C and G-Modified.

Cultural and historic properties contain information of a type that cannot be duplicated in any other form. For this reason, their loss is irreversible. The value of information contained in such sites is difficult to measure. These sites make up a finite resource which is becoming increasingly scarce. Their educational and public value can only increase with time. As discussed in Chapter III, the academic community, American Indians and the public at large is becoming more aware of the exceptional value of the cultural and historic properties located on National Forest land; many sites located within the Forest have escaped human caused disturbance, and they represent some of the most pristine examples of archaeological sites in the region. Their research value in reconstruction of prehistoric and historic lifeways is recognized (Blukis Onat 1980, Carter 1978), and there will likely be an increased demand for protection, preservation and study of these properties.

Cumulative effects on sites can be mitigated through scientific data recovery. Alternatives NC and A will result in the greatest number of sites discovered and from which data could be scientifically recovered. This could result in greater knowledge of the nature and distribution of sites in the Forest and the human behavior they represent. This knowledge may come at the price of site loss through development, increased vandalism, and evaluation itself. Alternatives NC and A will also result in the greatest number of sites damaged through ground disturbance.

In Alternatives C and G-Modified, there will be greater <u>in situ</u> (in place) preservation of sites, with less opportunity to find sites, record and study

them. If Alternative C or G-Modified were implemented, the sites themselves would be preserved for the future, but there will be fewer opportunities to understand and interpret the resource.

Cumulative effects on linear cultural features are unavoidable due to the extensive nature of these properties and their location along optimal travel routes. On-going management activities of many types (road construction and timber harvest having the most severe effects) will gradually reduce the integrity of these features and their associated information and interpretive values.

The extent and severity of effects on linear features will be greatest under Alternatives NC and A, less under Alternatives I, B, H and J (Preferred), and least under Alternatives C and G-Modified.

Archaeological and Historic Properties - The Indirect Effects on Other Resources

Scenery

Cultural properties often greatly enhance the natural forest setting. They provide the visitor with a tangible experience of the landscape as it may have looked in the past; they evoke a sense of history and stimulate questions as to how people adapted to the environment in the years gone by. Their loss can detract from the scenic quality of the forest environment.

In Alternatives NC, A, I and B, and in areas managed for timber production in the other alternatives, many of the historic structures and linear features will be permanently removed from the scenic landscape. The greatest number of undisturbed historic properties will remain in Alternatives C and G-Modified.

Recreation

Protection of cultural resource sites may reduce the number and size of developed sites. This can be offset by interpretation of the resource, which creates additional, if somewhat different, recreation opportunities. Opportunities for interpretation, arising from recreation development, will be greatest in Alternative J (Preferred), and least in Alternatives NC and A, but in any case, will be relatively similar from alternative to alternative.

The protection and mitigation of cultural resources may result in the restriction of dispersed use in some areas, if use would result in destruction or compromise of the cultural resource. The significance of this restriction depends on the location and the size of the area involved in protecting a cultural resource site. However, most sites are relatively small (under an acre), and total restrictions would be minor in any alternative.

Trails

Trails can be designed in such a way as to avoid or minimize damage to historic properties. Trail construction and maintenance can be used to restore and preserve some historic properties. Trail work can also make an area accessible to the public for cultural use and interpretation. These effects and opportunities will exist in proportion to the miles of trail constructed in each alternative.

Wilderness

Cultural resources are a unique and nonrenewable part of the wilderness resource and are recognized in the Wilderness Act. However, there is direction that the "untrammeled" character of the environment be preserved, and above-ground historic structures may be removed or left to deteriorate through natural processes. The effects are subjective. Depending on the observer, some would argue that the loss of historic structures detracts from the wilderness experience, while others feel that their elimination enhances that experience.

Where wilderness is most accessible (Alternatives NC, A, I, J (Preferred) and G-Modified), there will be more conflicts between those who would like to see historic structures and features preserved, and those who would like them removed. These conflicts can also be expected in those wilderness areas made accessible in other alternatives.

In any case, implementation of any of the alternatives will have a limited effect on cultural resources in wilderness, which achieves its character from an apparent absence of human modification. Removal or retention decisions will be made on a case-by-case basis with input from affected users, and will not differ significantly between alternatives.

Research Natural Areas

There is no measurable effect.

Roadless Areas

There is no measurable effect.

Wild and Scenic Rivers

Existing and recommended wild and scenic rivers and their tributaries contain numerous prehistoric and historic properties. Alterations and disturbances to these resources are very likely on the intermingled state and private lands. These losses affect the integrity of the network of historic properties which are located along the river. Those alternatives which designate the most miles of river (G-Modified and C) offer the most opportunities to coordinate state and private land management with federal protection efforts. Those alternatives which designate the fewest miles of river A, NC and I offer the fewest opportunities to coordinate management, and hence the highest likelihood of loss of archaeological and historic properties. Alternative J (Preferred) designates an intermediate mileage, with corresponding effects.

Air

There is no measurable effect.

Fire

There is no measurable effect.

Minerals

If obvious or suspected cultural resources are discovered during a mining operation, the operator must cease his activity and notify the Forest Service immediately. Protection or mitigation activities are undertaken. For leasable mineral activities all cost of protection and salvage are borne by the operator and, if at all possible, the resource is protected. For locatable mineral activities where a valid mining claim is involved, a plan of operation must be approved following compliance with Section 106 of the National Historic Preservation Act. This is true even where data recovery or adequate mitigation of cultural resource values is not possible.

Because of the relatively small size of most archaeological and historic properties, and because many activities to develop locatable minerals must be allowed even if cultural resources are present, the alternatives are not expected to differ appreciably in the impacts of cultural resource management on minerals and energy. Cultural resource mitigation activities for leasable minerals may increase the cost of mineral extraction, but not in a manner that differs predictably by alternative.

Land Ownership and Use

Protection of cultural resources may result in the deletion of lands from exchange programs. Decisions on deletion will be made on a case-by-case basis, incorporating the consultation procedures of 36-CFR-800.

Location of a cultural resource in an existing or proposed utility corridor, may require that facilities be redesigned, or that mitigation activities be undertaken, with consequent increases in construction costs. Effects will be similar in all alternatives except G-Modified, which proposes no new utility corridors.

Roads

Protection of cultural resource sites may affect road location and/or methods of construction, requiring re-routing or non-standard construction methods. These effects are expected to be similar for each alternative, with the potential for encountering sites increasing as miles of road construction increases. Alternatives NC, A, I and B would have a high probability of occurrence. Alternatives H and J (Preferred) would have a moderate probability of occurrence, with C and G-Modified having the least probability.

Mitigation Measures for Archaeological and Historic Properties

All ground disturbing activities, and building alterations, will include a professionally-supervised project-level inventory and evaluation, in compliance with the National Historic Preservation Act of 1966 (as amended 1980), and the Forest-Wide Standards and Guidelines. Protection or mitigation may be appropriate, depending on the cultural resource and activity. Inventory, evaluation and the development of protection and mitigation measures will be undertaken in consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation, as required by 36 CFR 800.

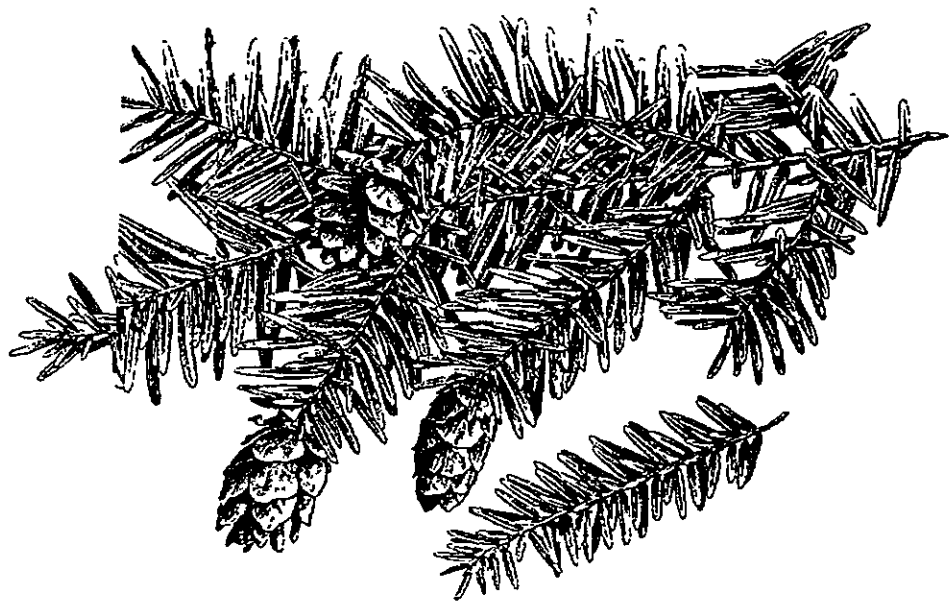
When any project may affect a cultural resource eligible for the National Register of Historic Places, the consultation will consider protection of the

resource or mitigation of the effects. In many cases, adverse effects to cultural and historic properties can be avoided through project re-design. Mitigation may be achieved through project implementation using special restrictions or advanced technology. Mitigation can also take the form of scientific investigations of the cultural or historic property. In the case of historic structures, it may also be possible to adaptively reuse buildings or relocate them to places where they can be reused. Effects to linear cultural features can be partially mitigated by such techniques as directional felling of trees away from the feature and limitations on the number of crossings across the feature. Typical measures are cited in 36 CFR 800, but others may be developed during consultation.

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Archaeological and Historic Properties

In general, the City and County Preservation programs share the same goals as the cultural resource program of the Forest Service. However, in many cases, the preservation community prefers in situ preservation of archaeological sites or historic buildings through avoidance or restoration/rehabilitation rather than mitigation through data recovery or documentation.

The Washington State Office of Archaeology and Historic Preservation (OAHP) has issued a State Heritage Plan I (1986). The Forest's cultural resource plan, in all alternatives, is compatible with the Plan; coordination with the State will be continued.



SCENERY

Scenery - The Direct Effects of Each Alternative

General

Scenic quality can be significantly affected by forest management practices and land development. The recreating public has expectations of a natural forest setting. These expectations have been inventoried through the Visual Management System (VMS). The forest plan alternatives have been formulated to show a range of forest management schemes, and therefore vary in their incorporation of VMS recommendations. In some management areas, higher visual quality standards are recommended, and in others, visual quality standards are reduced. A comparison of the alternatives showing gross acres that maintain a high degree of visual quality is shown in Table IV-25 (for all management areas) and in Table IV-26 (for scenic corridors). For a site specific comparison of alternatives refer to Tables IV-27 and IV-28, which show (1) the existing visual condition of each drainage, (2) the condition that would result from the visual management system, and (3) the condition that would result from each alternative.

A Forest-wide measurement of how the various alternatives affect scenery can be made by comparing acres assigned to the various Visual Quality Objectives. Table IV-25, below, shows this relationship. All acres in wilderness (721,716 acres) are assigned to preservation in all alternatives.

Table IV-25
Acres Assigned to Management Areas With a Visual Quality Objective of Partial Retention, Retention, or Preservation

Thousands of Acres

NC 1/	A	I	B(RPA)	H	J (Pref)	C	G-Mod.
NA	1,187	1,243	1,296	1,322	1,372	1,514	1,365

1/ The TM Plan upon which Alternative NC is based was developed in 1963; it was not an integrated resource plan. This information cannot be reasonably estimated as the original plan was based on yield tables and resource information that do not reflect the standards in NFMA or the latest scientific techniques and information.

The Forest-wide acres in Table IV-25 do not indicate how the more scenic portions of the Forest or the more heavily traveled corridors are affected by the alternatives. Table IV-26, below, indicates the acres assigned to scenic corridors (Management Areas 2A Scenic Viewshed, Foreground and 2B Scenic Viewshed, Middleground) for each alternative.

Table IV-26
Acres Assigned to Scenic Corridors
Thousands of Acres

	NC (No Change)	A (No Action)	I	B (RPA)	H	J (Pref)	C	G-Mod
2A Foreground	NA 1/	3.3	29.2	4.0	24.6	23.4	65.7	9.5
2B Middleground	NA	0	0	0	81.6	95.8	57.5	0

1/ As stated in the footnote above, this information cannot be reasonably estimated for Alternative NC.

In the preceding table, alternatives C, H, and J (Preferred), all have acres assigned to Scenic Viewshed, Middleground. Although Alternative C protects all of the inventoried viewsheds, it appears that less middleground is protected than in Alternatives H or J (Preferred). In Alternative C, some inventoried middleground will be managed for Primitive/Semi-primitive Nonmotorized Recreation, thus the acres are assigned to other management areas (1A,1B). *These MA's will provide a higher level of scenic protection than 2B.*

Direct Effects of Timber Harvest on Scenery

Timber harvest and associated access roads and landings can have a very significant effect on scenic quality in western Cascade landscapes. The most obvious impact is likely to occur on landscapes with steep, visible slopes having a solid texture of forest canopy. Clearcuts leave a very distinct contrast between forest and bare ground that can be a focal draw to an observer. The impact of timber harvest varies widely, depending on shape and scale of units, texture of edges, partial retention of established stand, and the amount of area in a disturbed state at one time.

The effects of timber harvest will occur primarily in the following management areas: 2A Scenic Viewshed, Foreground (Retention - alterations will not be evident); 2B Scenic Viewshed, Middleground (Partial Retention - alterations will remain subordinate); 14 Deer and Elk Winter Range (Partial Retention to Modification - varies from subordinate to dominant, based on the viewshed); 17 Timber Management Emphasis (Modification to Maximum Modification - alterations will be dominant); and in the MA 20-23 Municipal Watershed strategies that permit timber harvest (Maximum Modification - alterations will be dominant).

For management prescriptions where timber harvest is dominant, there will be long-term changes in what constitutes the "characteristic landscape". A mosaic of various sized timber stands will evolve, and within 15 to 20 years of each entry, units will introduce significant contrast in form, texture, and color.

For management prescriptions where timber harvest is subordinant, there will be a subtle evolution of the forest over time.

The most noticeable short-term effects of timber harvest are the highly visible contrasts between continuous textured mature timber stands and newly cutover

lands. The visual appearance of recently cutover lands with slash, stumps, and areas of exposed soil, is quite striking until cutover lands have "greened up" with grasses, shrubs, forbs, and young stands of trees. These effects can often be mitigated through unit design and long range planning.

Additional timber management activities occurring after harvest, such as site preparation, reforestation, and pre-commercial thinning, are secondary in their effect on scenery since the dominant activity (timber harvest) has already altered the landscape.

In all alternatives, the scenic appearance of lands adjacent to or intermingled with private timber lands will be dominated by the contrasting shapes and lines created by harvesting along property boundaries. In these situations, scenery can at best be "rehabilitated" to a Modification or Maximum Modification level.

The timber management plan upon which Alternative NC is based was not amended for the Alpine Lakes Management Plan or the Skagit Wild and Scenic River Management Plan. In all other alternatives there are three constants: (1) Stevens Pass (US 2) viewshed; (2) Snoqualmie Pass (I-90) viewshed; and (3) the Skagit Wild and Scenic River system. They will be managed as prescribed in these respective plans, and analysis is not repeated in the comments for each alternative that follows.

Alternative A (No Action) has conflicting targets for resource outputs. It is impossible to sustain the Visual Management System's inventoried visual quality levels with an emphasis on timber management at low elevations. These lands include many scenic roadsides. While there is a serious effort to meet Visual Quality Objectives, it will not always be possible with this management emphasis, and the cumulative effect will be significant, even in highly scenic areas. The impact is currently most apparent on steep middleground slopes below 4000 feet elevation, where management activities significantly alter the natural landscape. This will continue, and timber harvest will become increasingly apparent in foreground areas. The foreground of Mather Memorial Parkway is the only allocated scenic viewshed in Alternative A. In this alternative, there are 844,352 acres in management areas where timber harvest will not be evident (Retention or Preservation). Visual quality will gradually be reduced on all areas of the Forest with road access.

Alternative NC will have effects on scenery which are greater than Alternative A due to the greater amount of roading and harvest. Mather Memorial Parkway is designated as a scenic viewshed in Alternative NC.

Alternative B has high levels of timber harvest and road construction, with a majority of the tentatively suitable land available for timber management. In addition, only existing unroaded acres not suitable for timber management will remain roadless. Of the forest highway corridors, only the foreground of the Mather Memorial Parkway will be managed as a scenic area. In Alternative B, there are 1,011,566 acres in management areas where timber harvest will not be evident (Retention or Preservation). Visual quality will deteriorate over time for almost all of the lands accessible by road. Scenic enjoyment of the Forest will be significantly decreased.

Alternative C has low levels of timber harvest and road construction with the least acres of suitable lands managed for timber production. Nearly all existing unroaded areas will remain roadless and most primary and secondary

corridors will be managed as scenic viewsheds. In Alternative C, there are 1,366,248 acres in management areas where timber harvest will not be evident (Retention or Preservation). Visual quality will be retained in unroaded areas and retained or improved over time in the scenic corridors.

Alternative G-Modified would have lower levels of timber harvest. While scenic "corridors" are not specifically assigned, the foreground of several corridors would be protected, including the upper end of Mt. Baker Highway, portions of the Cascade River and North Fork of the Cascade, portions of the Mountain Loop Highway, the Upper Sauk, the lower Sultan, and the Mather Memorial Parkway. In addition, areas with old growth or wild and scenic rivers would be managed to retain their scenic quality. Middleground areas are not included; they would be managed at a modification level. In Alternative G-Modified, there are 1,308,216 acres in management areas where timber harvest will not be evident (Retention or Preservation). Scenic quality would be reduced moderately in several significant viewsheds, but would remain high in unroaded areas.

Alternative H has a moderate level of timber harvest, with 60 percent of the tentatively suitable acres available for timber harvest. However, foreground and middleground seen areas of heavily traveled highway corridors are managed for scenic quality. These include Mather Memorial Parkway, and the Mountain Loop, Mt. Baker, Baker Lake, and North Cascades Highways. There are five rivers recommended for wild and scenic designation. In Alternative H, there are 1,140,536 acres in management areas where timber harvest will not be evident (Retention or Preservation).

Alternative I maintains foreground corridors on the major highways, but does not include middlegrounds. In Alternative I, there are 931,908 acres in management areas where timber harvest will not be evident (Retention or Preservation). Over the long term, management would result in dominant timber harvesting in most currently scenic viewsheds.

Alternative J (Preferred) manages for a high level of scenic quality. Scenic corridors include the Mt. Baker Scenic Byway, Baker Lake Highway, North Cascades Highway, Cascade River Road, Mountain Loop Scenic Byway (proposed), North Fork Sauk Road, Whitechuck River Road, Crystal Mountain Road, and Suntop Road. The Mather Memorial Parkway and Heather Meadows have no programmed harvest. The Carbon River Road is designated as Roaded Natural. There are 30 rivers recommended for Wild and Scenic designation. In Alternative J (Preferred), there are 1,167,398 acres in management areas where timber harvest will not be evident (Retention or Preservation).

The above narrative summarized highlights of each alternative. The following two tables focus on the individual viewsheds of the Forest. Table IV-27 shows, by alternative, the visual condition of each viewshed - natural appearing, slightly altered, moderately altered, or heavily altered - at the end of the first decade. Table IV-28 shows the same information at the end of Decade 5. The analysis is based on recommended visual quality levels associated with each allocation and gives an average rating for the viewshed.

Table IV-27

Visual Resource Summary - Expected Visual Condition of Viewsheds - End of Decade 1

Viewshed Name	Acres	EVC	Expected Visual Condition									
			VMS	NC	A	B-RPA	C	G-Mod	H	I	J-Pref
North Fork Nooksack River	10,707	S	S	1/	M(-)	M(-)	S	M(-)	S	M(-)	S
Ruth Creek	1,035	N	S		M(--)	N	M(--)	S(-)	S(-)	M(--)	S(-)
Galena Creek	1,858	M	S		M	H(-)	S(+)	S(+)	S(+)	S(+)	S(+)
Canyon Creek	4,076	H	M		H	H	M(+)	H	H	H	H
Swamp Creek	1,521	M	M		H(-)	H(-)	S(+)	S(+)	M	M	S(+)
Wells Creek	3,527	H	M		M(+)	H	M(+)	M(+)	H	H	M(+)
Deadhorse/Cascade Creeks	1,288	H	M		H	H	M(+)	H	M(+)	H	M(+)
Glacier Creek	2,935	N	M		M(-)	M(--)	N	M(--)	M(--)	M(--)	S(-)
Sulphur Creek	4,414	M	S		H(-)	H(-)	M	H(-)	M	M	S(+)
Baker Lake	19,851	S	S		M(-)	M(-)	S	M(-)	S	M(-)	S
Anderson Creek	1,837	H	S		H	H	M(+)	H	M(+)	H	M(+)
Middle Fork Nooksack River	1,330	H	M		M(+)	M(+)	M(+)	M(+)	H	H	H
Loomis Mountain	5,026	H	M		H	H	M(+)	M(+)	H	H	M(+)
Shannon Creek	1,858	M	M		H(-)	H(-)	S(+)	H(-)	M	H(-)	M
Sauk Mountain	465	H	S		H	H	M(+)	H	H	H	M(+)
Skagit River	802	M	S		M	M	S(+)	S(+)	S(+)	M	S(+)
Bacon Creek	2,386	H	M		H	H	M(+)	H	H	H	M(+)
Cascade River	4,878	S	S		M(-)	M(-)	N(+)	M(-)	M(-)	M(-)	S
North Fork Cascade River	253	N	S		M(--)	M(--)	N(+)	N	N	M(--)	N
Sibley Creek	676	M	M		H(-)	H(-)	S(+)	H(-)	S(+)	H(-)	S(+)
Vee Creek	718	H	M		H	H	M(+)	H	H	H	M(+)
Illabot Creek	4,794	H	M		H	H	M(+)	M(+)	H	M(+)	H
Hilt Creek	443	H	M		H	H	M(+)	H	M(+)	H	H
North Fork Stillaguamish River	1,943	S	S		M(-)	M(-)	M(-)	M(-)	M(-)	M(-)	M(-)
Sauk River	12,967	S	S		M(-)	M(-)	S	M(-)	S	M(-)	S
Whitechuck River	3,780	M	S		H(-)	H(-)	S(+)	M	H(-)	H(-)	S
Suiattle River	8,025	M	S		M	M	S(+)	M	M	M	M
French Creek	443	N	M		M(--)	M(--)	S(-)	M(--)	M(--)	M	M
Green Mountain Pasture	1,056	H	M		H	H	M(+)	H	M(+)	H	M(+)
South Fork Stillaguamish River	9,672	S	S		M	H(--)	S	M(-)	S	M(-)	S
Green Mountain	10,749	H	M		H	H	M(+)	H	H	H	H
Bear Lake	1,457	H	M		H	H	M(+)	H	M(+)	H	M(+)
Deer Creek	1,035	M	M		H(-)	H(-)	S(+)	H(-)	S(+)	H(-)	S(+)
Beaver Creek	1,183	H	M		H	M(+)	M(+)	H	M(+)	H	M(+)
North Fork Sauk River	2,386	N	M		M(--)	S(-)	N	S(-)	N	M(--)	N
North Fork Skykomish River	6,167	M	S		H(-)	H(-)	M	M	M	M	M
Skykomish River (Highway 2)	25,616	M	S		M	M	M	M	M	M	M
Barclay Creek	739	H	M		M(+)	H	M(+)	M(+)	M(+)	M(+)	M(+)

1/ The TM Plans upon which Alternative NC is based were developed in 1963. They were not integrated resource plans and consequently did not address all resource uses and outputs. The missing information cannot be reasonably estimated.

Table IV-27

Viewshed Name	Acres	EVC	Expected Visual Condition - Decade 1 VMS	A	B-RPA	C	G-Mod	H	I	J-Pref
Upper North Fork Skykomish River	2,893	M	M	M	H(-)	S(+)	S(+)	S(+)	H(-)	S(+)
Rapid River	2,851	H	M	H	H	M(+)	M(+)	H	H	H
Beckler River	7,117	H	M	M(+)	H	M(+)	M(+)	H	H	H
Money Creek	2,661	M	S	S(+)	S(+)	S(+)	S(+)	S(+)	S(+)	S(+)
East Fork Miller River	2,788	M	S	S(+)	S(+)	S(+)	S(+)	S(+)	S(+)	S(+)
Foss River	2,344	S	M(-)	M(-)	M(-)	M(-)	M(-)	M(-)	M(-)	M(-)
Lennox Creek	2,745	M	M	M	M	M	M	M	M	M
Maloney/Evans Creek	781	H	M	H	H	H	H	H	H	H
Tonga Ridge	1,837	H	M	H	H	H	H	H	H	H
Taylor River	2,893	N	S	N	N	N	N	N	N	N
Middle Fork Snoqualmie River	8,701	M	S	S(+)	S(+)	S(+)	S(+)	S(+)	S(+)	S(+)
South Fork Snoqualmie River	8,468	M	S	M	M	M	M	M	M	M
White River	5,660	S	S	M(-)	M(-)	S	M(-)	S	M(-)	N(+)
Crystal Mountain	3,104	M	S	M	H(-)	S(+)	S(+)	H(-)	M	S
Greenwater River	2,576	H	M	H(-)	H(-)	M	M	H(-)	H	H
Suntop	1,077	H	M	H	H	M(+)	H	M(+)	H	M(+)
Cayada Creek	1,732	M	M	H(-)	H(-)	S(+)	M	H(-)	H(-)	S(+)
Corral Pass	887	M	M	H(-)	H(-)	S(+)	M	M	M	S(+)

EVC = Existing Visual Condition. NOTE: many of the acres currently in a heavily altered condition will remain that way for several decades

VMS = Visual Management System. The expected visual condition if attempts to achieve the inventoried visual quality objectives were implemented.

N = Naturally Appearing: Area appears untouched by man; changes are not visually evident. Corresponds to a visual quality objective of retention.

S = Slightly Altered: Changes may be noticed by the average visitor but do not attract attention. Natural appearance dominates. Corresponds to a visual quality objective of partial retention.

M = Moderately Altered: Changes are easily noticed by the average visitor and may attract attention. Disturbances are apparent. Corresponds to a visual quality objective of modification.

H = Heavily Altered: Changes are strong and obvious to the average visitor. Changes dominate the landscape but may resemble natural patterns when viewed from a distance of 3 to 5 miles. Disturbances are major. Corresponds to a visual quality objective of maximum modification.

(+) and (-) = These symbols indicate, by alternative, the change in a viewshed's condition from the level listed in the Existing Visual Condition. Example: Corral Pass is currently Moderately Altered. At the end of Decade 1, it will be Heavily Altered in Alternative A (a drop (-) of one level), in Alternative C, the condition has changed to Slightly Altered (an increase (+) of one level). If there is no (+) or (-), the condition is unchanged

Table IV-28

Visual Resource Summary - Expected Visual Condition of Viewsheds - End of Decade 5

Viewshed Name	Acres	EVC	VMS	NC	Expected Visual Condition A	B-RPA	C	G-Mod	H	I	J-Pref
North Fork Nooksack River	10,707	S	S	1/	H(--)	H(--)	N(+)	M(-)	S	M(-)	S
Ruth Creek	1,035	S	S		H(--)	N	N	S	S	M(-)	S
Galena Creek	1,858	M	S		M	H(-)	S(+)	S(+)	S(+)	S(+)	S(+)
Canyon Creek	4,076	H	M		H	H	S(++)	H	H	H	H
Swamp Creek	1,521	M	M		H(-)	H(-)	S(+)	S(+)	S(+)	M	S(+)
Wells Creek	3,527	H	M		M(+)	H	S(++)	S(++)	M(+)	H	M(+)
Deadhorse/Cascade Creeks	1,288	H	M		H	H	S(++)	M(+)	M(+)	H	M(+)
Glacier Creek	2,935	N	M		H(---	H(---	N	H(---	H(---	H(---	M
Sulphur Creek	4,414	M	S		H(-)	H(-)	S(+)	H(-)	M	M	S(+)
Baker Lake	19,851	S	S		H(--)	H(--)	N(+)	M(-)	S	H	S
Anderson Creek	1,837	H	S		H	H	S(++)	M(+)	M(+)	H	M(+)
Middle Fork Nooksack River	1,330	H	M		M(+)	M(+)	S(++)	S(^+)	H	H	H
Loomis Mountain	5,026	H	M		H	H	S(++)	M(+)	H	H	M(+)
Shannon Creek	1,858	M	M		H(-)	H(-)	S(+)	H(-)	M	H(-)	M
Sauk Mountain	465	H	S		H	H	S(++)	H	H	H	M
Skagit River	802	M	S		M	M	N(++)	S(+)	S(+)	M	S(+)
Bacon Creek	2,386	H	M		H	H	S(++)	H	M(+)	H	M(+)
Cascade River	4,878	S	S		H(--)	H(--)	N(+)	M(-)	M(-)	H	S
North Fork Cascade River	253	N	S		H(---)	H(---)	N(+)	N	N	H(---	N
Sibley Creek	676	M	M		H(-)	H(-)	S(+)	H(-)	S(+)	H(-)	S(+)
Vee Creek	718	H	M		H	H	S(++)	H	H	H	M(+)
Illabot Creek	4,794	H	M		H	H	M(+)	M(+)	H	M(+)	H
Hilt Creek	443	H	M		H	H	S(++)	H	M(+)	H	H
North Fork Stillaguamish River	1,943	S	S		M(-)	H(--)	M(-)	M(-)	H(--)	H(--)	H(--)
Sauk River	12,967	S	S		H(--)	H(--)	S	H(--)	S	H(--)	S
Whitechuck River	3,780	M	S		H(-)	H(-)	N(++)	M	H(-)	H(-)	S
Suiattle River	8,025	M	S		H(-)	H(-)	S(+)	H(-)	M	M	M
French Creek	443	N	M		H(---)	H(---)	S(-)	M(--)	M(--)	H	H
Green Mountain Pasture	1,056	H	M		H	H	S(++)	H	M(+)	H	M(+)
South Fork Stillaguamish River	9,672	M	S		M	H(-)	S(+)	M	S(+)	M	S(+)
Green Mountain	10,749	H	M		H	H	S(++)	H	H	H	H
Bear Lake	1,457	H	M		H	H	S(++)	H	M(+)	H	S(++)
Deer Creek	1,035	M	M		H	H(-)	S(+)	H(-)	S(+)	H-	S
Beaver Creek	1,183	H	M		H	M(+)	S(++)	H	S(++)	H	S(++)
North Fork Sauk River	2,386	N	M		M(--)	S(-)	N	S(-)	N	M(--)	N
North Fork Skykomish River	6,167	H	S		H	H	S(++)	M(+)	M(+)	M(+)	M(+)
Skykomish River (Highway 2)	25,616	M	S		M	M	M	M	M	M	M

1/ The TM Plan upon which Alternative NC is based was developed in 1963. It was not an integrated resource plan and consequently did not address all resource uses and outputs The missing information cannot be reasonably estimated.

Table IV-28

Viewshed Name	Acres	EVC	Expected Visual Condition - Decade 5							
			VMS NC	A	B-RPA	C	G-Mod	H	I	J-Pref
Barclay Creek	739	H	M 1/	M(++)	H	M(+)	M(+)	M(+)	M(+)	M(+)
Upper North Fork Skykomish River	2,893	M	M	M	H(-)	N(+)	S(+)	S(+)	H(-)	S(+)
Rapid River	2,851	H	M	H	H	S(++)	N(+)	H	H	H
Beckler River	7,117	H	M	M(+)	H	M(+)	M(+)	H	H	H
Money Creek	2,661	M	S	S(+)	S(+)	S(+)	S(+)	S(+)	S(+)	S(+)
East Fork Miller River	2,788	M	S	S(+)	S(+)	S(+)	S(+)	S(+)	S(+)	S(+)
Foss River	2,344	S	S	M(-)	M(-)	M(-)	M(-)	M(-)	M(-)	M(-)
Lennox Creek	2,745	M	M	M	M	M	M	M	M	M
Maloney/Evans Creek	781	H	M(+)	M(+)	M(+)	M(+)	M(+)	M(+)	M(+)	M(+)
Tonga Ridge	1,837	H	M(+)	M(+)	M(+)	M(+)	M(+)	M(+)	M(+)	M(+)
Taylor River	2,893	N	S	N	N	N	N	N	N	N
Middle Fork Snoqualmie River	8,701	M	S	S(+)	S(+)	S(+)	S(+)	S(+)	S(+)	S(+)
South Fork Snoqualmie River	8,468	M	S	M	M	M	M	M	M	M
White River	5,660	S	S	M(-)	M(-)	S	M(-)	S	M(-)	N(+)
Crystal Mountain	3,104	S	S	M(-)	H(--)	N(+)	S	H(--)	M(-)	S
Greenwater River	2,576	M	M	H(-)	H(-)	M	M	H(-)	H(-)	H(-)
Suntop	1,077	H	M	H	H	S(++)	H	M(+)	H	S(++)
Cayada Creek	1,732	M	M	H(-)	H(-)	S(+)	M	H(-)	H(-)	S(+)
Corral Pass	887	M	M	H(-)	H(-)	N(++)	M	M	M	S(+)

EVC = Existing Visual Condition. NOTE: many of the acres currently in a heavily altered condition will remain that way for several decades

VMS = Visual Management System. The expected visual condition if attempts to achieve the inventoried visual quality objectives were implemented.

N = Naturally Appearing: Area appears untouched by man; changes are not visually evident. Corresponds to a visual quality objective of retention.

S = Slightly Altered: Changes may be noticed by the average visitor but do not attract attention. Natural appearance dominates. Corresponds to a visual quality objective of partial retention.

M = Moderately Altered: Changes are easily noticed by the average visitor and may attract attention. Disturbances are apparent. Corresponds to a visual quality objective of modification.

H = Heavily Altered: Changes are strong and obvious to the average visitor. Changes dominate the landscape but may resemble natural patterns when viewed from a distance of 3 to 5 miles. Disturbances are major. Corresponds to a visual quality objective of maximum modification.

(+) and (-) = These symbols indicate, by alternative, the change in a viewshed's condition from the level listed in the Existing Visual Condition. Example: Corral Pass is currently Moderately Altered. At the end of Decade 5, it will be Heavily Altered in Alternative A (a drop of one level (-)); in Alternative C, the condition has changed to Naturally Appearing (an increase (++) of two levels). If there is no (+) or (-), the condition is unchanged.

Direct Effects of Recreation on Scenery

Developed recreation sites, such as campgrounds and picnic areas, generally occur on flat terrain, and their effect on scenery is limited to their immediate environment. Alternative A's (NC would be similar) emphasis would allow low future expansion of developed recreation sites. Alternatives C and H allow for moderate expansion of developed sites. Alternatives B and G-Modified have the lowest emphasis on developed recreation; some existing sites may be closed, and the effects on visual resources from developed recreation would be the lowest of all alternatives.

Developed ski areas can have a significant effect on scenery. Removal of vegetation for ski runs can have an effect similar to a clearcut if the forest canopy has a solid texture. All alternatives allow expansion of ski areas within current permit boundaries. Ski area development will allow the removal, modification, or addition of vegetation; the shaping of slopes; and the addition or modification of structures, but will be guided by Visual Quality Objectives.

Nonmotorized dispersed recreation will have an imperceptible impact on scenic qualities under any alternative. The effect of motorized recreation would also be very minor, due to the lack of opportunities for this type of recreation on the Forest.

Direct Effects of Wild and Scenic Rivers on Scenery

Another measure of the effects of the alternatives on scenery is the number of Wild and Scenic River recommendations that are included in a particular alternative. Table IV-29, on the following page, shows the number and lengths of rivers that would be recommended for Wild and Scenic River designation.

Table IV-29
Wild and Scenic Rivers Recommended for Designation
Number of Segments/Miles Inside the National Forest Boundary

Alternative	No. Segments	Miles
NC (No Change) 1/	0	0
A (No Action)	15	287
I	0	0
B (RPA)	0	0
H	5	154
J (Preferred)	30	452
C	47	606
G-Modified	47	796

1/ The TM Plan (developed in 1963), upon which the No Change Alternative is based was not an integrated resource plan. Not all resource uses and outputs were addressed. The missing data in this table cannot be reasonably estimated; refer to footnote in previous table.

Direct Effects of Air on Scenery

The clarity with which an individual is able to view scenic vistas is affected by the concentrations of aerosals and suspended particulates between the viewer and the scene. Prescribed burning is the variable included in the alternatives that will contribute to increased particulate concentrations. Alternatives vary in their effects on the ability to view scenery proportionally to the amount of prescribed burning being done. The relationships in Table IV-41 reflect this ranking as it is based on the expected particulate emissions associated with each alternative.

Direct Effects of Fire on Scenery

From a landscape perspective, historic wildfire occurrence contributes to diversity in the vegetative mosaic. In the foreground, periodic low intensity fire is responsible for an open appearance with little understory, or limited buildup of down material on the ground. Over time, prescribed burning can assume the same appearance as wildfire. Most of the impacts of fire are subtle and only noticeable to the trained eye. A more visible impact of fire is the appearance of areas immediately after a fire or prescribed burn. Fire may remove portions of the ground cover, kill or scorch understory vegetation, leave blackened debris, or expose mineral soil, all of which interfere with the appearance of the natural setting. The duration of these impacts is determined by the time it takes for vegetation to re-establish, the species involved, soil moisture levels, intensity of burn, and other variables.

The expected acres burned from wildfire is essentially the same under all alternatives; thus, similar effects could be expected in all alternatives. Prescribed burning may be used in all alternatives. The effects of the alternatives will be determined by the extent to which this practice is applied. The ranking of the alternatives based on air quality impacts (displayed in Table IV-41 in the Air section later in this chapter) can be used to compare the way each alternative affects scenery. (This table is based on the amount of burning expected under each alternative.)

Direct Effects of Mining, Energy Development on Scenery

Some level of mineral exploration and development may be expected but the magnitude of its effect on scenery is speculative since specific projects and their locations are unknown. If a large scale mineral development was to occur, land forms as well as vegetation could be altered; effects would last through the life of the project and the time needed for rehabilitation. Mineral exploration consistent with regulations would be allowed in all alternatives, but is subject to visual resource mitigation measures to minimize impacts. The level of restriction on mineral development is tied to the acres assigned in various management areas, which vary by alternative.

Since mineral operations involve a range of activities, the degree to which they affect scenery is strongly affected by the type and location of activity being conducted. Even though some areas would be managed primarily to protect recreational and visual resources, they may be affected by mining claimants, leases, or permittees exercising their statutory or exclusive right to explore, mine or remove minerals from public lands. In approving mining related activities within these areas, scenery will be protected to the extent practicable. However, in some cases, mitigation may be the only option.

To date, however, the effects mining has had on visual resources has been relatively minor and localized, and they would not increase appreciably under any of the alternatives. It can be assumed that the effects would vary slightly by alternative. As with the other resources, these effects would lessen as the area withdrawn or managed under "highly" restrictive management strategies increases.

Direct Effects of Land Uses on Scenery

Land exchange can have a significant effect on scenery, through the acquisition or disposition of sensitive landscapes. Exchanged landscapes may be unnaturally altered in the future, a result of another owner's management practices. If acquired lands are cut over, scenery may not appear as natural as surrounding areas and management practices may not be able to alleviate this effect for several decades. In either event, the future management of exchanged parcels will likely be different than under its current management. The immediate effect of land exchange may not be noticeable.

Generally, land withdrawals tend to leave scenery unaltered by limiting the kind of management activity that can take place on a particular piece of ground, but they do not ensure the preservation of scenery in an unaltered state.

Direct Effects of Roads on Scenery

Roads are the primary method used to access the National Forest. Roads across steep side slopes require cuts and fills that create unnatural straight lines across the landscape when screening vegetation is removed. These exposed slopes often create a permanent visual scar. Effects will be the greatest in those alternatives with the most miles of new road construction: NC, A, B, I, and H.

The forms of many utility structures are geometric, forceful, and large. They often contrast with and visually dominate the landscape. Right-of-way clearings, access roads, storage yards, and other utility support facilities alter the landscape. Requests for the use of National Forest lands for utilities will continue; however, specific projects and locations are not known. The introduction of utility structures is governed by the Visual Quality Objectives associated with each management area. Alternatives which do not emphasize high scenic quality in roaded areas (NC, A, B, I, and G-Modified) have the greatest potential impact.

Design techniques are available that lessen, but do not eliminate the effects of utility corridors. The one potential new corridor (Pyramid Peak-Tacoma Pass area) would be located entirely in checkerboard ownership. The visual condition of this landscape has been heavily altered by timber harvest. A proposal for a new power transmission line between Pyramid Peak and Tacoma Pass would be permitted in all alternatives except Alternative G-Modified. The need for this potential utility corridor is not anticipated in the next decade.

Scenery - The Cumulative Effects of the Alternatives

While the impact of one project may not seem significant, when carried out over time, the cumulative effects of continuous practices or additional activities

proposed by an alternative may change the character of the scenic setting by intensifying disturbance or healing through revegetation. Because much of our landscape is steep and readily viewed, it has low visual absorbtion capability. Recovery occurs in stages. In the middleground restablishment of a conifer stand after clearcutting takes about 15-20 years to eliminate soil color contrast. The contrasting height remains much longer but is more subtle. In the foreground, the age of the forest, composition of understory species, and remains of harvest activities, are much more noticeable. Timber harvesting in scenic viewsheds is planned at a rate that allows retention of a mature forest character. Alternatives and management allocations emphasizing commodity production (alternatives NC, A, I, B) will, in the long-term, result in a lower visual quality level and a more altered landscape than the non-market emphasis alternatives. Table IV-28 predicts the long term visual quality levels that would result under each alternative by viewshed.

Scenery - The Indirect Effects on Other Resources

General

The extended rotations planned to retain mature forest character results in reduced timber harvest levels in allocated viewsheds. Mitigation measures proposed to meet visual quality objectives may increase costs for planning and implementing projects.

Recreation

Alternatives which maintain or enhance visual quality along scenic highways (C, H, J (Preferred)) may gradually increase demand for driving for pleasure. These alternatives offer many opportunities for a Roaded Natural experience. Alternatives A, NC, B, and I would offer few or no Roaded Natural opportunities; they would be replaced by Roaded Modified. As more of the Forest is converted from an unroaded to a roaded condition (Alternatives NC, A, B, and I), access increases; however, the associated scenic quality will decline because the landscape will be more altered.

Alterations of the landscape may change use patterns of recreational activities simply because the "setting" has been altered. For example, the use of a trail may be displaced to another trail when a clearcut is harvested nearby; the management activity has altered the setting and the experience level, causing the use to be displaced to another area. The resulting ROS class would be the best measure of this change.

If primitive or semiprimitive recreation opportunities are desired, a naturally appearing landscape is required. These settings also best contribute to the conservation of natural biological diversity.

Trails

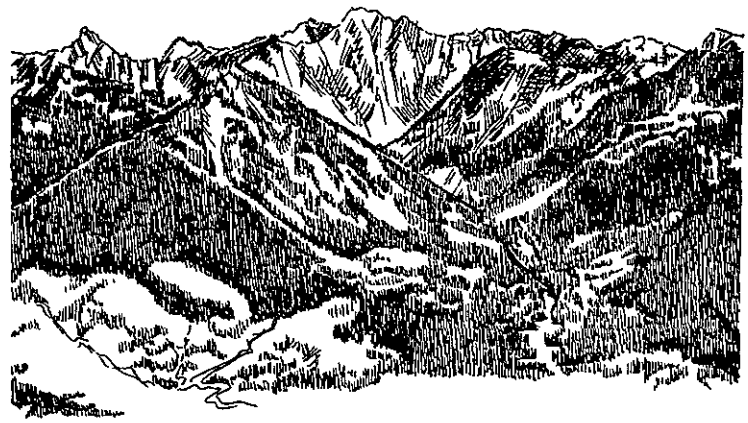
There are no measurable effects.

Wilderness

There are no measurable effects.

Research Natural Areas

There are no measurable effects.



Roadless Areas

There are no measurable effects.

Wild and Scenic Rivers

There are no measurable effects.

Air

There are no measurable effects.

Fire

There are no measurable effects.

Minerals

Mitigation measures may increase operation costs and may make some potential mineral sources uneconomic to develop. This will be the same for all alternatives.

Land Ownership and Use

There are no measurable effects.

Roads

Mitigation measures may influence road or utility facilities location and design. This will be greatest in Alternatives H, J (Preferred) and C; moderate in Alternative I; and lowest in Alternatives NC, A, B and G-Modified based on number of acres in scenic viewshed.

Mitigation Measures for Scenery

The effects of most management activities can be mitigated through design. The minimum standard for the Forest is Maximum Modification. Mitigation measures applicable to each management area are discussed in Chapter II. Design and selection of construction materials to blend with the natural landscape can mitigate impacts and are guided by the Standards and Guidelines.

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Scenery

National Park Service policy is to preserve landscapes in as near natural conditions as possible. Alternatives emphasizing commodity production on lands adjacent to North Cascades and Mt. Rainier National Parks would result in obvious visual contrasts.

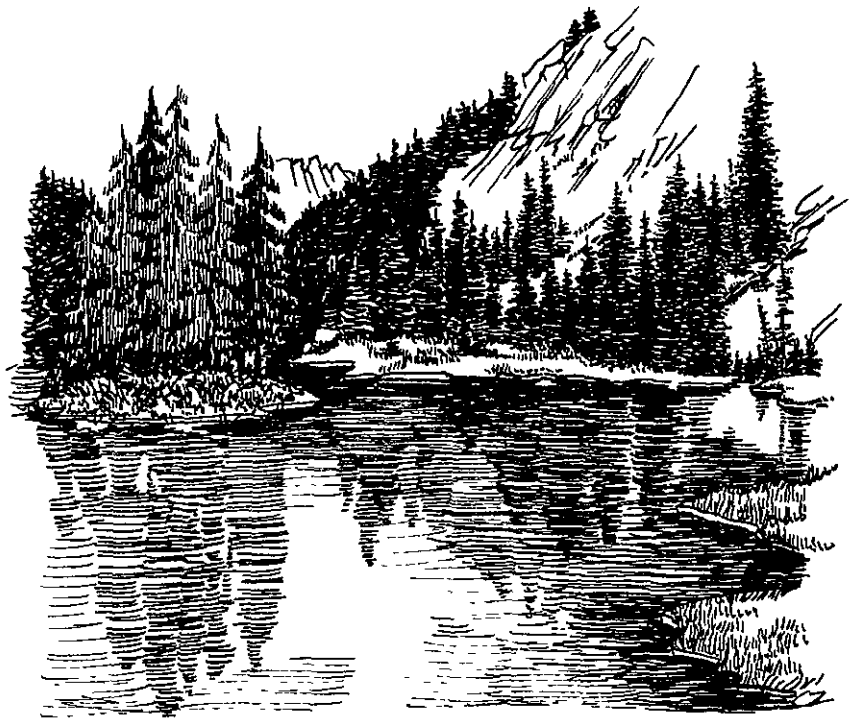
All alternatives would protect scenic quality along the foreground of the Mather Memorial Parkway leading into Mt. Rainier National Park; in addition,

Alternatives C, H, and J (Preferred) would maintain scenic quality in the middleground of this corridor.

The viewshed of the North Cascades Highway (Hwy 20) accessing the North Cascades National Park is predominately a middleground corridor. Scenery would be managed under a scenic corridor allocation in Alternatives C, H, and J (Preferred), and largely protected through semi-primitive or old growth allocations in Alternative G-Modified. In Alternatives NC, A, B, and I, scenic quality will be reduced.

The Cascade River Road is designated as a Scenic Viewshed in Alternatives C and J (Preferred).

No other specific inconsistencies or incompatibilities were identified in the review of other federal agencies', state and local governments', and Indian tribes policies' or plans.



RECREATION

Recreation - The Direct Effects of Each Alternative

General

Developed Recreation. The alternatives presented in this FEIS all have the potential to directly or indirectly affect the recreation associated with developed sites. Opportunities for developed site recreation (campgrounds and day-use) would remain about the same in all alternatives. Current developed site capacity is more than sufficient to meet projected demand in the near future. In all alternatives, emphasis will be on the maintenance and operation of existing sites in a cost efficient manner. Rehabilitation and expansion of deteriorated existing sites would occur before new facilities are constructed.

Although the number of developed recreation sites would not decrease under any alternative, the number of sites which would eventually be in a modified setting would vary by alternative. The differences relate to the amount of roading and vegetative manipulation which would occur on lands surrounding the sites. Timber management activities have a high potential to alter the recreation setting and the experiences offered at these sites. Timber harvest and other management activities tend to give the forest a cultured look as opposed to a natural setting. These activities reduce the primitive and remote feeling for many recreationists. On the other hand, the harvest of diseased or dangerous trees in campgrounds through timber sales improves safety at the site. Alternatives A, B, and I have the greatest effect on developed site settings. This information is displayed in the following table, Table IV-30.

Table IV-30
Developed Sites in a Modified Setting

Alternative	Trailheads	Campgrounds	Picnic Sites	Total	%
A (No Action)	2	11	3	16	21%
I	3	10	3	16	21%
B (RPA	3	8	1	12	16%
H	1	4	1	6	8%
J (Preferred)	1	1	0	2	3%
C	0	2	0	2	3%
G-Modified	0	8	1	9	12%

The developed recreation setting, particularly the social component, and developed recreation opportunities are directly affected by recreation visitor use. As recreation use of a site increases, the social setting changes along with the experience available to the users. Some people are not concerned with the changes, others are displaced and seek other less crowded areas on the Forest or in other sites off of the Forest. Crowding results in increased social interaction and conflicts, noise, dust and congestion, law enforcement problems, and increased demands on the sanitation and water systems.

Alternatives B and G-Modified have a decreased emphasis on new developed site construction and would offer fewer sites for public use. Even though in these alternatives, no new developed sites are constructed, there will be more than enough capacity to meet current demand. Social setting changes in these alternatives will occur sooner than in the other alternatives.

Alternatives that reduce the number of developed site opportunities will divert some use into roaded dispersed areas. Individuals who traditionally utilize the smaller more remote, non-fee campgrounds will gradually lose that camping opportunity and will most likely turn to motorized dispersed camping (Mitchell, 1989).

Alternatives NC, A, C, I, H, and J (Preferred) will increase the future developed site capacity, which could affect adjacent lands suitable for dispersed nonmotorized recreation. Adding new sites or upgrading existing sites to accommodate more use can change the number of encounters experienced in adjacent undeveloped areas. An increased number of dispersed campsites can result in less solitude. In addition, as more people visit an area, the type of experience that is available will change (Mitchell, 1989).

The amount of land available for dispersed recreation would not be substantially altered by the implementation of any alternative program for developed sites.

Dispersed Recreation. Management activities, especially timber harvest and road construction, can directly and indirectly affect dispersed recreation settings and change the nature of recreational experiences. When MA's prescribing timber harvest and road construction are applied to areas currently providing dispersed unroaded opportunities, those areas will change to dispersed, roaded types of recreation. The change is usually irreversible; the opportunity to provide unroaded dispersed recreation would be lost in those areas.

This shift from dispersed unroaded to roaded is the most severe of the effects of the alternatives on the recreational setting, as the Mt. Baker-Snoqualmie already cannot meet the demand for unroaded dispersed recreation. As use exceeds the practical capacity in an area, the user's experience becomes more like that of a roaded natural area, in terms of social and physical impacts.

A reduction in solitude and loss of primitive opportunities is the result of this reduction in the unroaded dispersed component of the recreation spectrum.

Alternatives C, and G-Modified emphasize unroaded recreation and would provide the greatest amount of Semi-Primitive Nonmotorized recreation.

Alternatives B and I retain the fewest acres in a roadless condition and provide the greatest road access potential. The majority of the roadless area acres suitable for harvest would be roaded and the timber harvested. Those recreationists who utilized unroaded dispersed areas for hiking, climbing, hunting, and fishing will find a declining number of acres of land available. Both the number of opportunities and the quality of those remaining opportunities would be reduced. Those recreationists relying on roaded settings would benefit from more opportunities under these alternatives. Access would be improved in these alternatives, making it more convienent for some segments of the public to use these areas.

Table IV-31, below, and Figure IV-6 on the following page, show the effects of implementing the various alternatives on the recreational opportunity spectrum. The ROS acres would be achieved by the end of the fourth decade of Plan implementation, but not sooner. As the land allocations for each alternative are implemented, the recreation setting will gradually change, resulting in the acres shown below by the end of Decade 4.

Table IV-31
ROS Acres Available, By Alternative - Fourth Decade

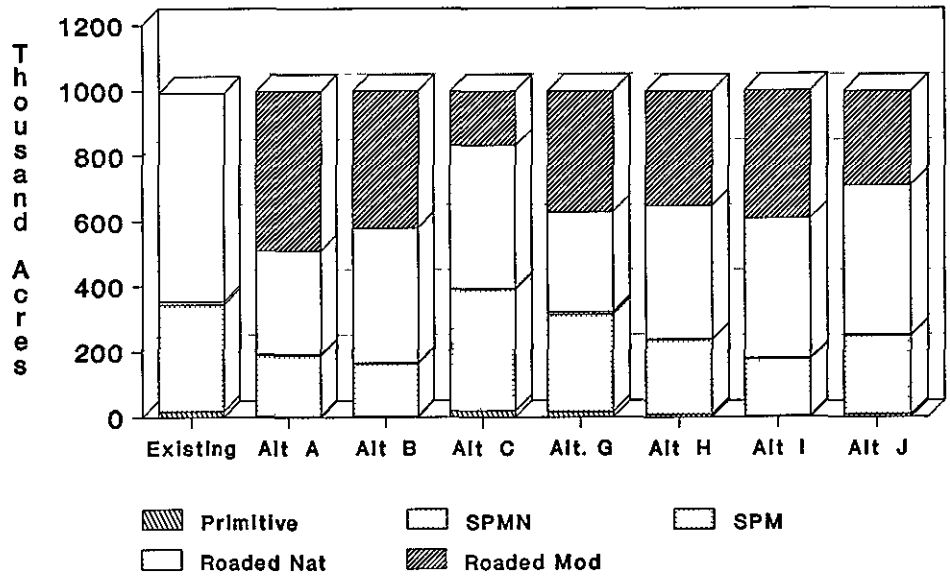
Alternative	Nonmotorized		Motorized		
	Primitive	SPNM	SPM	RN	RM
Existing	16,700	326,500	9,700	------638,600------	
NC (No Change)1/	.....Similar to A.....				
A (No Action)	3,700	184,700	2,600	317,600	489,800
I	3,400	170,700	4,400	429,500	391,100
B (RPA)	3,100	158,400	3,100	415,400	418,600
H	7,800	227,400	1,800	410,700	349,200
J (Pref)	8,000	238,800	3,300	458,900	289,300
C	19,400	371,700	700	439,300	167,200
G-Modified	15,000	297,200	8,300	308,000	369,000

1/ The No Change Alternative does not include ROS as management direction. However, it offers a mix of acres and uses similar to those in Alternative A.

The activities of people participating in recreation activities in the Semi-Primitive Nonmotorized zone can cause much change in this setting. The effects of use vary by numbers and activity (hiking, horse, etc.). Impacts to dispersed campsites include the establishment of additional sites; trampling of vegetation (leaving the site denuded and/or revegetated with more resistant[6] plant species); new or additional tree damage; and root exposure from horse use or intensive foot traffic. Even light use produces substantial unnatural change in these areas (Frissell and Duncan 1965, Merriam and others 1973).

Semi-Primitive Motorized recreation opportunities are very limited on the Forest, due to climatic and topographic constraints. The Mt. Baker-Snoqualmie cannot even meet current demand for this use. All alternatives will further reduce the acres in this ROS class, as they are converted to Roaded Natural and Roaded Modified conditions. This trend will cause increased potential conflicts between motorized and nonmotorized use, particularly in the unroaded areas. For some people, ORV use is a disruption of their recreation experience; they feel it creates noise, dust, and impacts to soils, vegetation,

Figure IV-6 ROS Acres Reached by Decade Four



Existing situation combines RN & RM; all alternatives have very few SPM acres

and wildlife. Others feel the recreation setting should be able to accommodate more ORV use and that the impacts are not significant.

Projections indicate that the overall future demand for dispersed roaded recreation can be met in all alternatives. Recreation opportunities associated with roads in Roaded Modified and Roaded Natural ROS settings would be plentiful. These include hunting, driving for pleasure, ORV use of roads, dispersed camping, and fishing.

The alternatives offer different mixes of recreation opportunities in a roaded setting. Alternatives NC, A, B and I have the highest miles of new road construction and provide the most roaded recreation opportunities. Alternatives H and J (Preferred) develop moderate amounts of new roads, while Alternative C and G-Modified have low new road mileage.

Alternatives C and G-Modified would be the most restrictive to future roaded dispersed recreation. About 300 miles of arterial and collector roads will be closed in Alternative C, to create more Primitive and Semi-Primitive Nonmotorized recreation opportunities. Alternative G closes 65 miles of roads, producing similar results. Both Alternatives C and G-Modified continue to produce more than enough dispersed roaded recreation opportunities to meet anticipated future demand for approximately forty years.

Direct Effects of Timber Harvest on Recreation

The most direct effect of timber harvesting on the recreation setting is the shift in acres from a Semi-Primitive Nonmotorized setting to the roaded ROS classes. This process is generally irreversible. Timber management activities reduce the natural appearance of the setting. These activities reduce the wild, primitive, and remote feeling for many recreationists and change their overall experience. The presence of roads encourages motorized use in these areas, reducing solitude and freedom from the sights and sounds of human activity. Although the roads could be closed to motorized use, their presence would change the natural, unmodified quality of the SPNM setting. The opportunity to provide for unroaded dispersed recreation would be lost in those areas. This will be the most pronounced in Alternatives NC, A, B, I and H. Only Alternative C offers an increase in number of acres and opportunities in the unroaded ROS classes.

On the other hand, timber sale activities may be designed to improve trailheads and trail locations, achieve vegetative diversity, and provide openings for viewing scenic panoramas.

Those alternatives which assign the most acres to timber harvest will result in the greatest effects on the trail system and trailheads, as harvest areas and access roads cause the relocation or reconstruction of trails. Temporary trail bypasses may be necessary during harvest activities unless the permanent trail is to be relocated outside of the harvest area. Alternatives A (20%), B (18%), and I (14%) will have the greatest percent of trails within timber management areas. Alternatives C and J (Preferred) will have five percent of their total trail mileage in intensive timber management allocations. Trails in these areas could be heavily impacted by harvest activity.

Some timber management activities and new access would increase the availability of areas for snowmobiling, cross-country skiing, mountain biking, and ORV/ATV use. This would be the greatest in alternatives A, NC, B, and I.

Developed site users may find their daytime use of surrounding dispersed recreation areas precluded or altered by nearby timber harvesting. The presence of, and intensity of trucks hauling logs by a campground will create noise and a potential safety hazard. This may be offset by increased ease of access. Consequently, alternatives that provide for a high level of timber harvest, such as Alternatives NC, A, B, I and H, will indirectly affect and ultimately reduce dispersed recreation opportunities for developed site users. This will be true for most summer camping experiences. However, this may not be the case for off-road vehicle use and for fall hunting, as these users are less affected by timber harvest activities (Clark and Stankey 1979).

Direct Effects of Wildlife Habitat Improvement on Recreation

Seasonal closures of roaded areas to recreational use (ORV's) may occur in areas managed for elk calving, for deer and elk winter range, or for mountain goat habitat. User restrictions or closures for wildlife purposes would influence where visitors go to participate in recreation activities or the quality of their experience.

Direct Effects of Archaeological and Historic Properties on Recreation

Protection of cultural resource sites may require redesign of proposed recreation sites, or alter the use of existing sites. Protection may include interpretation of the cultural resource, which will create new recreation opportunities. Effects will be similar in nature and extent in all alternatives, and will be evaluated through compliance with 36 CFR 800 and the environmental analysis process on a project-level basis.

Direct Effects of Trails on Recreation

Trail construction increases the opportunities for public use of many areas of the National Forest. Because many recreationists utilize a developed site for an overnight base and spend the day on hikes into the backcountry and wilderness, alternatives that result in increased construction and maintenance of the trail system would increase the opportunities and quality of experiences for these individuals. In the next decade, all alternatives would construct additional miles of trails, ranging from a low of 102 miles in Alternative B, to a high of 350 in Alternative G-Modified and C. (See Table IV-32.)

Table IV-32
Trail Construction and Reconstruction - Miles in Decades 1 & 2

	NC 1/	A (No Act.)	I	B (RPA)	H	J (Pref)	C	G (Mod)
Construction	Sim							
Wilderness	to	10	10	18	43	20	43	10
Non-Wilderness	A	130	340	84	135	200	135	340
Reconstruction (Decade 1)	"	120	236	140	240	493	160	236

1/ Similar to Alternative A.

Expanded trail construction and reconstruction can relieve heavy use trails by providing alternative travel opportunities and providing specialized trails for use by horses, motorized vehicles, and others.

Direct Effects of Fire on Recreation

The low frequency of wildfires on this Forest pose little threat to the safety of the recreating public or the facilities provided for their use. All alternative have the same potential for wildfire, and therefore, the same effects. The Standards and Guidelines provide direction for the use of prescribed burning in and around recreation sites. This will mitigate the differences between any alternatives for prescribed burning.

Direct Effects of Mining, Energy Development on Recreation

Oil, gas, and geothermal potential on the Forest in the vicinity of developed sites is extremely limited. The environmental analysis process will consider

these situations on a case-by-case basis. No development is anticipated in the first decade.

The most significant effect from oil, gas, and geothermal lease development on nonmotorized recreation would be the development of any long-term road access necessary to extract minerals. Road development would result in a change in the ROS class in the immediate area. Alternatives NC, A, B, and I will provide for greatest increased road access to the National Forest, which would make the development of oil, gas, and geothermal leases easier. Alternatives H and J (Preferred) provide for moderate access; Alternatives C and G-Modified with low road construction would tend to discourage this activity. The energy market will tend to be more of a driving force than planned land allocations.

Access roads built for mineral exploration and extraction can provide motorized use opportunities. They can also create safety problems between motorized users and mineral extraction vehicles during the period of extraction. Mineral and energy extraction could increase the acres of Roaded Natural on the Forest, thus providing more motorized recreation opportunities. However, given the kinds and amounts of mineral deposits on the Forest, the effects resulting from variations in minerals management of the different alternatives is expected to be slight.

Those areas being managed as unroaded will not be withdrawn from mineral entry. They will remain subject to exploration, mining claim location, leasing, permitting and development activities, and they will remain subject to the associated environmental effects. Since reasonable access for mining purposes on valid mining claims is a statutory right, mineral activities may result in roading of areas which are managed primarily for unroaded recreation. The activities could degrade the visual quality and recreation experience by introducing the sights and sounds of man to such an extent that the ROS class may be changed from Semi-Primitive to Roaded Natural. Displacement of users could be expected. Effects resulting from mineral activities conducted within these areas would include the improved access to remote areas which were previously inaccessible (due to lack of roads or poor road conditions).

Direct Effects of Land Uses on Recreation

Some land use grants and utility corridors provide opportunities for ORV use, in the powerline easements. (ORV use often occurs under the powerlines within the cleared right-of-way). These easements offer one of the most attractive locations for ORV and ATV use on the Forest. Only one potential utility corridor exists on the Forest, crossing the Cascades between Pyramid Peak and Tacoma Pass. This corridor would not be constructed in the first decade. Only Alternative G would preclude construction of this corridor. Construction in other alternatives would be contingent on meeting direction contained in the Management Prescriptions.

The public will use the utility corridors, particularly the high-voltage line right-of-ways for cross-country skiing and snowmobiling, and for summer ORV use.

Structures, such as powerlines would generally not be compatible with Primitive and Semi-primitive recreation opportunities. They would be compatible with

roaded recreation opportunities depending on the location and design of the structures.

Direct Effects of Roads on Recreation

The alternatives will affect dispersed recreation to the extent that they construct new roads and maintain existing ones. During the first decade, Alternative NC will construct the most miles each year at 28 miles; Alternative A is the next highest at 18.8, and Alternative G-Modified, the least at 8.7. The other alternatives fall between.

The primary effect of alternatives with more extensive road construction will be to modify the overall recreational setting. A shift will take place from Semi-Primitive Nonmotorized and Motorized ROS classes to Roaded Natural and Roaded Modified. A loss of more primitive settings will result in displacement of users into remaining roadless areas, wilderness, or adjacent National Parks.

Besides the decrease in the acres of roadless lands, the remaining roadless acres will be more accessible due to the number and proximity of adjacent roads. These effects will be most noticeable in alternatives with high road mileage and high development of the roadless areas. Alternatives NC, A, B, I. Alternatives C and G-Modified have the most acres dedicated to a roadless status (and also proposed road closures to expand primitive and semi-primitive dispersed areas), so fewer acres will be affected by the existence of adjacent roads in these alternatives.

The road system is used by many ORV enthusiasts, much as they would use an ORV park like Evans Creek. Thus, ORV recreationists would be better served by alternatives that construct more roads (Clark and others 1984).

A road network also enhances other dispersed recreation opportunities by providing motorized access for hunting; for the collection of such forest products as firewood, berries, and Christmas trees; or for dispersed camping and hiking.

Road maintenance requirements will vary in proportion to total visitor use and the miles of new roads constructed.

Some developed recreation sites, such as ski areas, can become so successful that they outgrow their local support systems. For example, a highway that can carry 2,000 skiers per day to a ski area may become dangerous when traffic levels reach 5,000 skiers per day. The potential for this exists at Crystal Mountain and Mt. Baker Ski Areas.

Recreation - The Cumulative Effects of the Alternatives

The Mt. Baker-Snoqualmie National Forest has a broad diversity of recreation settings and opportunities with recreation occurring in almost all areas of the Forest at some time of the year. Because of the proximity of the Forest to the large populations in the Puget Sound area, recreation is a major Forest program. The quality of the setting is an extremely valuable amenity, and the maintenance of a variety of settings is very important to the public. The recreation setting is easily managed and has not been, for the most part, subject to permanent degradation. However, major changes due to a combination of factors, including road construction, alteration of vegetation, construction

of facilities and the effects of fire, insects, and disease in forested areas, can produce long term impacts requiring up to 100 years to repair. The scope of these effects includes all lands in the Forest.

Cumulative effects on the recreation setting can be on the basis of change in visual qualities of an area, both foreground and background, the feeling of remoteness or wildness of the area, the natural-appearing qualities of the area, and the social conditions. The social conditions include the presence or absence of other people, the interaction or conflicts between users, and the type of facilities and developments provided for users.

On the Mt. Baker-Snoqualmie, the cumulative effects of the alternatives on recreation would primarily be reflected in the development of areas currently offering unroaded dispersed recreation opportunities. Those alternatives which assign the roadless areas to timber harvest and roading could be expected to gradually reduce opportunities for recreation in an unroaded setting. The Forest is the primary supplier for unroaded recreation in the Puget Sound Basin; use is already above the capacity expected in a Semi-Primitive ROS setting. Any reduction of unroaded dispersed recreation area would only further worsen this situation and contribute to a regional decline in the availability of this form of recreation. The alternatives which emphasize development of the Forest resources and have the greatest acres assigned to intensive management allocations are A, NC, B, and I. These alternatives may substantially alter the environment, present a risk of long term modification of the recreation setting, and may have cumulative impacts. Alternatives H and J (Preferred) present a moderate risk of long term modification of the recreation setting and may also have cumulative effects. In Alternatives C and G-Modified, the lower acreages in intensive management present the least potential for cumulative effects on the recreation setting.

There are few apparent cumulative effects on developed recreation. A possible cumulative effect for developed sites could occur if funding is not available to maintain these facilities to a standard service level. If forced to operate at below standard levels, effects would be continued soil erosion, degradation of facilities, closure of already degraded sites, loss of vegetation, and water quality problems.

Recreation - The Indirect Effects on Other Resources

Trails

See previous discussion of the Direct Effects of Trails on Recreation.

Wilderness

Developed recreation sites often serve as a base for trips of one or more days into wilderness. Consequently, wilderness may receive a greater number of visits because of a nearby developed recreation site. The possible effects of this are that the quality of the recreation experience for the developed site user could be improved, and some areas in wilderness may be significantly over-used.

Semi-primitive nonmotorized areas are able to absorb higher levels of impact than is allowed in wilderness. Some uses of wilderness can be shifted to non-wilderness, taking some of the pressure off wilderness. This becomes

increasingly important as wilderness near the conditions described by the Limits of Acceptable Change.

Alternatives A, NC, B, I, and H reduce the semi-primitive nonmotorized area appreciably. This will reduce the opportunity for these areas to absorb non-wilderness activities. With few areas allocated to unroaded status, pressure will increase to use wilderness and the remaining semi-primitive nonmotorized areas.

Research Natural Areas

As has been the case for many years at the established Lake Twenty-two RNA, the potential Green Mountain and Perry Creek RNAs have highly-used trails and popular destination points within their boundaries. This use is allowed by the management area prescriptions so long as the objectives for that RNA can be met. While this is currently the case, possible future changes that could affect recreation include:

1. If recreational use becomes so great that the RNA objectives are being compromised, closure, or a permit system to enter, would need to be implemented to prevent damage.

2. Trail condition will likely deteriorate, as the trail system will be managed only to the level needed for research access, not for public use.

These changes would apply to the established Lake Twenty-two RNA in all alternatives, and to the Green Mountain and Perry Creek potential RNAs in Alternatives C, G-Modified, H, and J (Preferred).

Roadless Areas

There are no known indirect effects on Roadless areas from changes in Recreation in any of the alternatives.

Wild and Scenic Rivers

No indirect effects from changes in Recreation to Wild and Scenic Rivers from implementing alternatives are anticipated.

Air

No indirect effects from changes in Recreation to Air from implementing alternatives are anticipated.

Fire

Special protection needs of developed recreation sites have created isolated enclaves requiring more intensive fire protection programs than are required for the areas surrounding them. To insure that protection goals for these special areas are met, it has been necessary to design protection strategies that over protect some of the area surrounding these sites. The Alternatives (A, B and I) which include the highest level of recreation facility development have the highest protection needs. Since this is a very small part of the total fire protection program on this forest, the variation between alternatives does not reflect differences in total protection investments.

Since a majority of human caused fires on the Forest are associated with recreation use, it could be assumed that alternatives which result in the greatest recreation use in the summer will have the greatest number of fires to suppress. Past trends in human caused fire frequency have shown little relationship to recreation use. In fact, recreation related fire occurrence has been somewhat constant over the past 30 years (Annual Fire Reports for the MBS), while recreation use has increased significantly. Fire protection needs associated with recreation use are assumed to be equal under all alternatives.

Minerals

If potential developed sites are withdrawn from mineral entry, any mineral values they contain will be unavailable for human use.

Recreation sites will bring many people into an area who would not otherwise be there. If mineral extraction is located near a developed recreation site, there could be conflicts between the miner and the recreation visitors.

Alternative G-Modified would manage for small developed recreation sites, spread throughout the National Forest, increasing the likelihood of mining/recreation conflicts (although mineral development potential has been low on the Forest). Alternatives B and I provide for high levels of ORV use. Alternatives C and G-Modified would have low levels of motorized use and thus less opportunities for conflict.

Land Ownership and Use

No indirect effects from changes in Recreation to Land Ownership and Use from implementing alternatives are anticipated.

Roads

Roads require maintenance if they are to remain open. However, increased use will also increase the need for maintenance on roads and trails.

The indirect effect of dispersed recreation on roads will vary among alternatives. Those alternatives with high levels of motorized dispersed use and low level of nonmotorized dispersed use will require more roads be kept open for public use than those alternatives which have the reverse relationship. (See Table IV-33.)

Changes in the density and location of roads on the periphery of the semi-primitive areas can increase the number of vehicles accessing these areas.

Facilities

Developed recreation services and facilities, and services permitted on National Forest land but administered by the private sector can have similar but additional effects. Private sector developments include lodges, resorts, ski areas, organization camps, summer homes, and other similarly developed sites. In addition to those effects resulting from attracting and concentrating recreationists, these sites tend to occupy large tracts of land and can affect trails by disruption of travel routes. Private sector recreation development can cause trails to be displaced and relocated.

Table IV-33
Recreation Use Relative To Roads, During Decade 1

Alternative	Unroaded Recreation Use (M) RVD's 1st Decade	Roaded Recreation Use (M) RVD's 1st Decade	Miles New Road 1st Decade
NC (No Change)	.....Similar to A.....		288
A (No Action)	201	1,854 to 2,266	188
I	208	"	171
B (RPA)	200	"	161
H	205	"	141
J (Preferred)	208	"	134
C	222	"	103
G-Modified	218	"	81

Mitigation Measures for Recreation

Numerous mitigation measures would be applied to lands capable of providing Semi-primitive or Roaded Natural recreation opportunities, but not allocated to Semi-primitive or Roaded Natural management areas. These mitigation measures would reduce the impacts of other management activities upon scenic quality, wildlife habitat, and recreation opportunities. These measures would include varying the size and location of harvest units to blend with the landscape, properly locating range improvements, providing adequate cover/forage ratios for big game, leaving sufficient standing dead trees for nesting/roosting habitat, and providing informational signing for users. These measures, however, would not reduce the loss of Semi-primitve or Roaded Natural recreation opportunities. Thus, the only mitigation measure that would prevent the loss of these settings would be allocation to Semi-primitive or Roaded Natural Dispersed Recreation.

Potential conflicts between users would be mitigated by working with the affected user groups. Visitor control measures such as signs, permits, and restrictions would be used where necessary. In some situations, separation of activities may be required, but would be used as a last resort.

Expansion of existing sites or construction of new sites would be programmed where necessary to meet demand for developed recreation opportunities.

Conflicts Between Effects of Alternatives and Other's Plans and Policies for Recreation

National Forest developed sites are used as a base for users of the two National Parks adjacent to the Mt. Baker-Snoqualmie. In some cases, they are a base for a significant amount of National Park use. National Park Service management plans assume this will continue. Most alternatives maintain or increase developed site capacity, but closure of some campgrounds that serve as base camps for use of National Parks may reduce use, or increase pressure on sites within the National Park, thus conflicting with National Parks Service plans. Also, the shift in ROS classes toward the developed end of the spectrum may result in an

increasing displacement of recreationists into National Parks and into other National Forest wilderness areas.

Several communities adjacent to the National Forest are engaged in recreational promotions to increase tourism and to stimulate local economies. Some of these plans are dependent on National Forest developed sites as an attraction to visitors. For example, communities may provide food and lodging for skiers to a ski area located on National Forest land. The same community may promote summer camping, day use, rafting, and pack trips to provide year-round economic activity. All alternatives except G-Modified reduce small developed site opportunities while concentrating management efforts and funds on larger sites that could compete with private sites located off of National Forest land. Some developed sites (campgrounds and day-use sites) may be closed in all alternatives, which could conflict with the plans of these communities. Alternative G-Modified would reduce or prevent the expansion of resorts and thus may be contrary to these community plans.

Some developed sites, especially resorts and ski areas, can develop large traffic volumes for short periods of time. The necessary expensive road maintenance to handle these traffic volumes may not be part of the state or county plans for management of these roads. The opposite may also be true in situations where the local agencies may plan on a road standard higher than that desired for dispersed recreation management of an area, thus leading to overuse of the area.

TRAILS

Trails - The Direct Effects of Each Alternative

General

Use of the Forest trail system is one of the largest dispersed recreation uses on the Forest. Trails are located in roaded and unroaded settings; over 42 percent of the current inventory (1,384 miles) is located in wilderness.

Varying miles of trails are constructed and reconstructed in the alternatives to meet the objectives of each alternative. The estimated miles of construction and reconstruction are shown, by alternative, in Table IV-33a.

Table IV-33a
Trail Construction and Reconstruction Miles - Decades 1 & 2

	NC (No Chg.)	A (No Act.)	I	B (RPA)	H	J (Pref)	C	G(Mod)
Construction	1/							
Wilderness	1/	10	10	18	43	20	43	10
Non-Wilderness	1/	130	340	84	135	200	135	340
Reconstruction	1/	120	236	140	240	493	160	236

1/ Similar to Alternative A.

Direct Effects of Timber Harvest on Trails

Trails in management areas which allow timber harvest are subject to relocation and other impacts associated with roading and timber harvest. Effects on trails include segmentation, where the trail is crossed several times in a short stretch by roads. The net effect is a loss of total trail mileage. Clearcuts along and across trails change the character of the recreation setting; they can open distant views, or create unnatural openings. The setting will generally appear heavily modified when viewed in the foreground from the trail.

Direct Effects of Recreation on Trails

Motorized trail use occurs in all alternatives. However, in some management areas, motorized trail use is prohibited, including: 1A (Primitive Dispersed Recreation), 1B (Semi-Primitive Dispersed Recreation), 4 (Mt. Baker National Recreation Area - allows winter motorized use), 5C (Potential Wild River), 10 (Wilderness), 11 (core acreage of SOHA's), and 18 (RNA). In addition, ORV use may be restricted in the following management areas: 7 (American Indian Religious and Cultural Use Areas); 8 (Special Areas); and 11, 12, 14, and 15 (Wildlife MR's and habitat improvement areas).

It is anticipated that additional miles of trail could be closed to prevent resource damage and to minimize user conflicts. Examples of closures could include seasonal closures on deer and elk winter range; closures to reduce user conflicts between hikers, horse use, and trailbikes; closures on all trails leading to wilderness; and closures around Spotted Owl Habitat Areas.

Alternative C and G-Modified are the most restrictive towards trailed ORV use. The allocation to Semi-Primitive Motorized Dispersed Recreation in Alternative I is very misleading. While a large number of acres are allocated, most of these acres will remain in a SPNM ROS setting; SPM ROS in this alternative equals 4,400 acres. It is on these acres that non-roaded motorized use will occur. Alternative G-Modified contains the largest assignment to Semi-Primitive Motorized Dispersed Recreation, with concentrated ORV use in the Kelly Butte Area; but over much of the rest of the Forest, use is restricted.

Alternatives H and J (Preferred) restrict trailed ORV use on any trail leading to wilderness or terminating on a hiker-only trail. Alternatives A (NC is similar) and I retain the most trailed ORV opportunities. The other alternatives fall in the moderate range.

Direct Effects of Roads on Trails

Construction of additional roads may result in a loss of trail miles as new roads are added to the system. New roads generally replace trails as main access routes into areas when commodity production is undertaken. This will be most noticeable in alternatives NC, A, I, and B where the largest number of suitable acres are found. Alternative C and G-Modified, which have the fewest number of suitable acres, will have the lowest number of new roads built and will have the lowest impact on the trail system in the managed forest.

Trails - The Cumulative Effects of the Alternatives

Activities that destroy trails by obliteration or bi-section without relocation or replacement mitigation measures have the greatest cumulative effect on trails. System trail mileage on the Mt. Baker-Snoqualmie National Forest has decreased over the years to the current inventory level of 1,384 miles. The decrease in mileage is mostly a result of road development and lack of funding for trail maintenance and construction. The cumulative loss of trail mileage is inversely proportional to the cumulative gain of road mileage (USDA Forest Service Trail and Road Inventory Reports).

The greatest cumulative effect from road construction and subsequent trail displacement is the elimination of trailed recreation opportunities. Where areas have been roaded extensively, trail users seek other unroaded areas where trails exist to hike (Anderson and Brown 1984, Clark and Stankey 1979). Development of hiker trails in heavily roaded areas is relegated to a much lower priority in Forest management, due to user preference for trails in unroaded areas that offer a higher degree of solitude. The roaded areas on the Forest are generally at the lower elevations, which provide users a longer season of use, compared to the shorter use season at higher elevations. Demand exists for lower elevation trails to provide user opportunities when higher trails are snow-covered. This preference has been expressed during public input phases of several planning efforts - 1977 Trail Plan, Skagit Wild and Scenic River Plan, 1981 Alpine Lakes Plan, and in response to the FEIS of this

Forest Plan. Public comments on trails and their management were one of the major issues identified by respondents to the Draft Plan.

An additional cumulative effect of trail loss or relocation through replacement by roads is the concentration of users on fewer and fewer trail miles. This is compounded by increased trail use, as each year, recreationists seek new and more challenging hiking experiences (Schreyer and others 1984). This situation may conflict with management attempts to limit a trail user's encounters with other trail users and maintain a defined recreation experience on a particular trail. Overcrowding of trails results in secondary impacts to trails such as litter, sanitation, and trail tread deterioration (USDA Forest Service 1986).

Trails - The Indirect Effects on Other Resources

Wilderness

Some roads would be closed in Alternatives C and G-Modified to increase Primitive and Semi-primitive Nonmotorized opportunities. This would help minimize impacts on wilderness by lengthening wilderness access trails. Several alternatives greatly increase the non-wilderness trail mileage; allowing alternative recreation opportunities and alternate use areas to wilderness areas. Alternatives G-Modified and I build 350 miles of new trails, 340 outside of wilderness, and 10 within. These alternatives reconstruct 236 miles of existing trail in Decade 1.

Alternative J (Preferred) takes a different approach, building 220 miles of new trails (200 non-wilderness and 20 wilderness), and reconstructing 493 miles of existing trail. The focus in this alternative is on reconstruction of existing trails, while Alternatives I and G-Modified focus on new trail construction.

Research Natural Areas

There are no measurable effects.

Roadless Areas

There are no measurable effects.

Wild and Scenic Rivers

There are no measurable effects.

Air

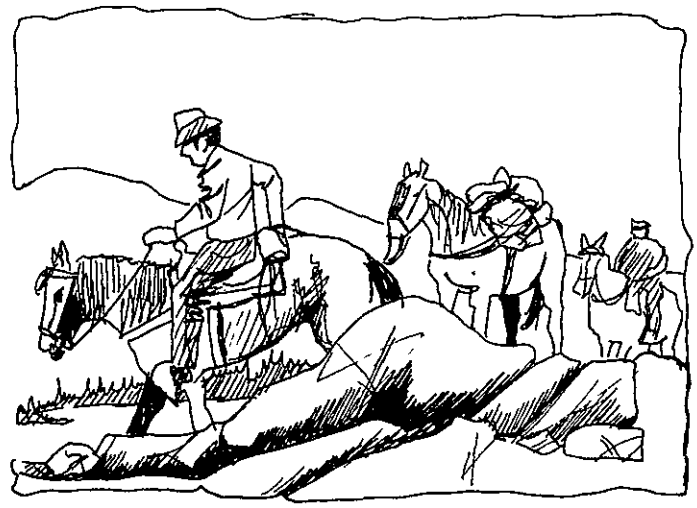
There are no measurable effects.

Fire

There are no measurable effects.

Minerals

There are no measurable effects.



Land Ownership and Use

There are no measurable effects.

Roads

There are no measurable effects.

Mitigation Measures for Trails

Many of the potential impacts caused to soils by trails are mitigated by location of trails on stable, well drained soils, and construction and maintenance that includes good drainage and surfacing.

For a complete discussion of mitigation for trails, refer to Chapter II and to the Forest-wide and individual management area Standards and Guidelines (Appendix D and the Forest Plan Document).

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Trails

National Park Service plans and programs indicate considerable concern regarding external threats to the parks. Trails constructed and maintained within National Forest land that provide and encourage access into National Park areas that are particularly sensitive to user impacts could be considered incompatible with National Park plans.

This concern will be greatest in Alternatives C, G-Modified, and J (Preferred) where major portions of the roadless areas remain undeveloped and trail construction adjacent to Mt. Rainier National Park and some portions of North Cascades National Park could be greatest.

National Forests have historically provided the majority of trails in the west, especially the larger trail segments in natural environments. If a large number of trails are replaced by roads, combined with low new construction, displacement of trail users from National Forests to National Parks could occur. Alternatives A, (NC is similar), B, and I, would have the greatest potential for this displacement.

The Sixth Edition of the State Comprehensive Outdoor Recreation Plan identifies several state districts, coincident with this Forest, that have shortages of trails in semi-primitive motorized and semi-primitive nonmotorized categories. Alternatives that maintain large roadless acreage and expand the trail system in roadless areas would be compatible. Alternatives C, J (Preferred), and G-Modified would provide the greatest SPNM and P acreage and would allow construction of the most trails within these allocations.

WILDERNESS

Wilderness - The Direct Effects of Each Alternative

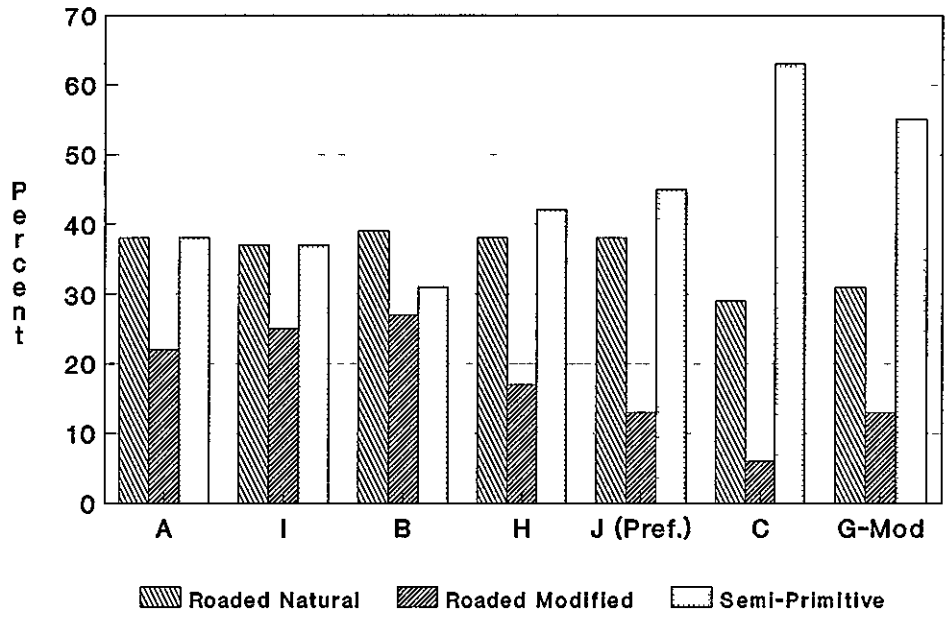
General

The eight wilderness areas on the Mt. Baker-Snoqualmie National Forest are described in Chapter III. The amount of wilderness acres will remain constant in all alternatives at 721,718 acres. While the physical size and physical attributes of the wilderness will remain unchanged by the alternatives, several factors will affect the social setting or experiences the wilderness visitor can expect. Impacts to the wilderness resource will vary through the range of alternatives.

One foremost principle of wilderness management is that "the management of wilderness must be viewed in relationship to the management of adjacent lands" (Hendee, Stankey, and Lucas, 1978). The greater the intensity of resource management activities adjacent to the wilderness and the greater the ease of access, the greater the effects upon wilderness resources. Management activities in areas adjacent to the wilderness that may be seen or heard by recreationists will affect the quality of wilderness experiences. Proposed activities adjacent to the wilderness are evaluated at the site-specific project level and appropriate measures are taken to mitigate potential effects.

Figure IV-7, which follows, indicates the relationship of unroaded and roaded recreation settings of the lands adjacent to the wilderness areas. Alternatives C and G-Modified have the least external effect on the wilderness, while Alternatives A, B and I have the greatest effect due to potential adjacent management activities.

Figure IV-7 Percent of Lands Adjacent to Wilderness
Allocated to Roaded and Unroaded Management



Another agent affecting wilderness is the alternative prescriptions with varying degrees of use and management in the wilderness. These will vary based on the number of acres assigned to each prescription within each wilderness area. Management activities proposed within any alternative will be implemented using the LAC standards under each prescription.

Those alternatives which assign more acres to the Transition WROS class than are assigned in Alternative A will generally provide for increased wilderness use by allowing more people per acre on average. (See Table IV-34.)

Table IV-34
Wilderness Recreation Opportunity Spectrum
Acres 1/ - All Decades

Alt.	Transition	Trailed	General Trailless	Dedicated Trailless	Special Management
NC (No Chg)2/	.....Similar to Alternative A.....				
A (No Action)	12,067	44,356	585,326	80,000	0
I	21,878	49,628	643,495	0	6,715
B (RPA)	14,402	39,686	543,881	121,409	2,238
H	7,982	46,734	437,931	219,292	9,777
J (Pref.)	15,078	49,015	457,000	191,606	9,017
G-Modified	7,644	52,669	444,688	207,930	8,785
C	7,032	45,700	272,679	383,992	9,313

1/ Acres depicted are from R-2 Map and may not agree with other wilderness acres in this document.
2/ The TM Plan upon which Alternative NC is based was developed in 1963. It was not an integrated resource plan and consequently did not address all resource uses and outputs.

Increases in average numbers of people per acre in a wilderness area will result in some degradation of naturalness and loss of opportunities for at least a degree of solitude. Several alternatives reduce the amount of Transition WROS (C, G-Modified, and H) from the existing situation, either by road closures which lengthen the access, or by changing the limit of acceptable change an area. The wilderness in these alternatives will offer a more natural setting with fewer opportunities for social interaction.

Another important indicator of the WROS's effect on wilderness is the amount of Dedicated Trailless allocated in any alternative. Alternative C, with a large amount of this class will be the least affected by human use since this is the most pristine of the wilderness allocations, allowing the least amount of change to the ecosystem. Alternatives G-Modified, J (Pref.), and H offer a moderate amount of Dedicated Trailless, while Alternatives B, I and A allocate the least to this class. Alternative I allocates no acreage to this WROS class and thus would be the alternative resulting in the most change within the wilderness. Alternative NC (No Change) would be similar to A.

Another way to view the effects of implementing alternatives on wilderness is to examine the wilderness capacity which results from the allocation of acres portrayed in Table IV-35. This table shows essentially the same effects discussed above, only the effects are expressed in terms of recreational visitor days.

Implementation of Alternative I would allow use far in excess of the levels that current Forest Service policy allows, and thus, would necessitate a change in agency wilderness policy.

Table IV-35
Wilderness Capacity - RVD's

Alt.	Transition	Trail	General Trailless	Dedicated Trailless	Special Management	Total
NC (No Chg) 1/	.....Similar to Alternative A.....					
A (No Action)	181,005	166,335	146,331	6,240	2/	499,911
I	328,170	186,105	160,873	0	2/	675,148
B (RPA)	216,030	149,197	135,970	9,469	2/	510,666
H	119,730	175,252	109,482	17,104	2/	421,568
J (Pref.)	226,170	183,806	114,250	14,945	2/	539,171
G-Modified	114,660	1975083	111,172	16,218	2/	439,558
C	105,480	171,375	68,169	29,951	2/	374,975

1/ The TM Plan upon which Alternative NC is based was developed in 1963. It was not an integrated resource plan and consequently did not address all resource uses and outputs.
2/ To be determined.

Estimating a carrying capacity for wilderness has a somewhat limited value in describing effects of alternatives. The coefficients used to produce these estimates are included in Appendix B. Total use is a measure somewhat related to wilderness condition for management purposes. Mode of travel, spacial and temporal aspects of use, and visitor behavior are often more significant (Washburne 1982).

Direct Impacts of Recreation on Wilderness

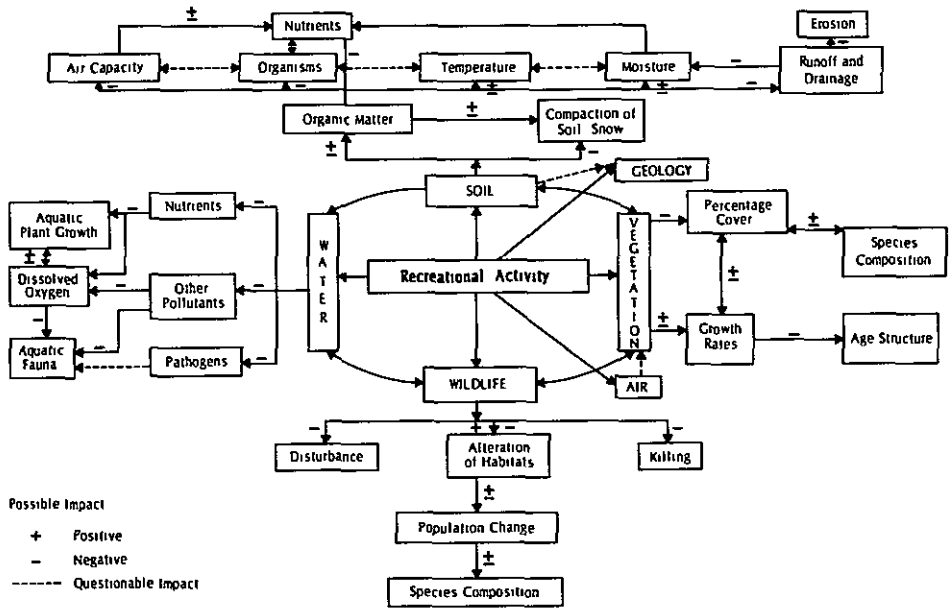
Almost all human activities disturb natural ecosystems. Although the specific impacts associated with recreational activities differ to some extent, they all potentially can affect soil, vegetation, wildlife and water. These affects and their relationships are laid out in the following chart.

Impacts to soils start with the destruction of surface organic matter and the compaction of soil or snow. Each of these changes alters basic soil characteristics related to aeration, temperature, moisture, nutrition, and the organisms that live in the soil. These changes, which adversely affect the ability of the soil to support plant life, are most visible in the barren, compacted soils of campsites. Compaction reduces water infiltration rates,

increases runoff, and increases erosion. Erosional impacts are most severe on trails.

Most of the changes in soil condition inhibit the establishment of new plants and adversely affect the growth of existing vegetation. Existing plants are injured or killed by the trampling of feet and horse hooves. Plant cover, growth rates, and reproductive capacities are all diminished. For trees, in particular, this alters the age structure of the population. On many campsites, for example, tree populations consist entirely of middle-aged and older trees; reproduction is totally lacking. Even these older trees are often scarred by ax marks, saw cuts, and nails. Understory vegetation varies greatly in its ability to tolerate recreational impact. Since more tolerant species are more likely to survive on recreation sites, changes in species composition shift toward these more tolerant species. An ability to grow close to the ground is one important survival mechanism that partially explains the reduced height of most vegetation on recreation sites.

Figure IV-8
Ecological Impacts of Wilderness Recreation



Although the indirect effects of soil impacts on vegetation are obvious, they are also reversible. Loss of vegetation cover exacerbates such impacts as loss of organic matter and increased erosion. It is also related to wildlife impacts, especially through the alteration of habitats. For large mammals the most serious impacts of recreation are direct, either outright killing or

unintentional disturbance and harassment. Disturbance can reduce reproduction (as when a disturbed bird leaves her nest), lead to migration to more remote areas, or result in adaptation (as when bears rely on garbage dumps for food). Smaller animals are more affected by habitat alterations. For example, soil impacts, such as loss of organic matter, remove a home and food source for many insects; vegetation impacts, such as a chopped-down tree snag, eliminate homes of cavity nesting birds. Many of these animals have important effects on soils and vegetation from there roles as decomposers and grazers and their place in the nutrient and energy cycles. Altered population structures, distribution and abundance will therefore, have an impact on soil, vegetation, and water.

Direct Effects of Trails on Wilderness

Of all the management activities, wilderness is affected most by changes in the trail system. While the trails themselves have only a minor effect on wilderness, the indirect effect of human visitation in the wilderness is the primary impact. Indirect impacts include loss of vegetation at new campsites, new social trails, and potential increases in encounters at or between campsites. (See the previous discussion on the Direct Effects of Recreation on Wilderness.)

Trail construction and/or reconstruction can influence or interfere with wilderness management depending on where and to what standard the trails are constructed or reconstructed. Experience has shown that when a new trail is constructed, the use significantly increases and environmental damage is increased. When an old trail is reconstructed to the same standard, the use will not significantly increase (example: Melakwa Lake, Alpine Lakes Wilderness). Thus, construction of a new trail is more detrimental to wilderness than reconstruction of an existing trail.

The majority of new trail construction in all alternatives occurs outside of wilderness. Alternatives A, NC, C, I, and G-Modified construct the fewest miles of new wilderness trails; Alternatives B, H, and J (Preferred) construct the most.

Alternatives G-Modified, I, and J (Preferred), construct the greatest miles of trail outside of wilderness which could have the advantage of dispersing use and increasing opportunities in locations other than the wilderness. Alternatives A, B and I have the greatest mileage of trail located within management areas emphasizing timber management. This may make these trails less desirable than trails in more primitive locations.

Alternatives A, B, H, and C provide for the least non-wilderness trail construction. Thus, these alternatives offer the fewest alternate recreation opportunities.

Direct Effects of Roadless Areas on Wilderness

Although not measurable, roadless areas provide alternatives for the wilderness user and reduce the effects of people using a wilderness area. Alternatives which develop the roadless areas are also likely to increase recreation use of wilderness, as dispersed recreationists will seek opportunities that are no longer available outside of wilderness. More importantly, development of roadless areas adjacent to wilderness also increases access to wilderness. Alternatives B and I would have the greatest potential effect on wilderness by

eliminating alternative sites for primitive or semi-primitive nonmotorized recreation. Alternatives C and G Modified would retain the greatest percent of unroaded area.

Direct Effects of Air on Wilderness

All alternatives contain some management practices which generate air pollution. Some are within the wilderness, some adjacent to them. The most likely source of pollution is particulates and smoke from prescribed burning and wildfire suppression activity. The effects on wilderness vegetation, soils, fish and wildlife, and visibility are discussed elsewhere in this chapter. Standards and Guidelines establish procedures which will ensure that the impacts are acceptable.

The most likely air quality related impacts on wilderness are from sources outside of the Forest. These would be the same for all alternatives as they are not a function of the alternatives. The Federal Clean Air Act requires that proper consideration be given to wilderness values and impacts during the permit review processes for new air pollution sources. The Standards and Guidelines reinforce this process.

Direct Effects of Fire on Wilderness

There have been historic occurrences of fire in the wilderness for hundreds of years. The existing vegetative pattern is a product of periodic, high intensity, but infrequent fires. Standards and Guidelines for wilderness management are designed to allow these natural processes to continue to the extent that they are compatible with other activities within and adjacent to the wilderness.

Direct Effects of Mining, Energy Development on Wilderness

The 1964 Wilderness Act specifies that no new claims may be located in wilderness after December 31, 1983. Wilderness areas are subject to valid existing rights perfected prior to withdrawal. These areas may be impacted by mining related activities conducted under such rights. The effects on wilderness values of solitude, pristine nature and unmodified environment could be severe. If production results, the landscape modification needed for production facilities, as well as the facilities themselves, will remain highly visible for the life of the project. None of the alternatives will have an affect on the number, type or location of activities conducted under valid existing rights. Valid existing rights, however, will be determined before approving any such activity. If those rights exist, activities will be controlled, but not precluded, to ensure no undue degradation of the wilderness characteristics of the area occurs.

Development of valid claims in wilderness is largely a matter of mineral markets and other factors independent of these alternatives. Each operating plan, including appropriate planned access and support facilities, will be dealt with on a case-by-case basis through the environmental analysis process.

The effects that mining would have on existing wilderness areas would not vary by alternative.

The potential for energy and geothermal activity in wilderness is limited on this Forest and has been restricted by Congress in recent years. Implementation of any of the alternatives will have an insignificant effect on energy and geothermal development. The major impacts will result from the development of favorable markets and Congressional activity.

Direct Effects of Land Uses on Wilderness

Generally, the only special use allowed in wilderness are outfitter guides. In all alternatives, these permits will continue to be allowed and the resulting environmental and social impacts will vary depending on actual numbers of permits issued.

Land ownership patterns within and adjacent to wilderness can be an important factor in preserving wilderness values. Acquisition by the Forest Service of private property located adjacent to wilderness will generally lessen the potential of negative impacts on wilderness. The acres involved in all alternatives are minimal.

Direct Effects of Roads on Wilderness

Road construction outside of wilderness can have a substantial effect on the wilderness resource. Building roads to the edge of a wilderness can dramatically affect the amount and character of wilderness use by making access easier and changing the WROS zoning (for example by changing a trailed overnight area into a transition day-use area). Experience has shown that new road construction adjacent to wilderness often encourages increased use of nearby focal points, especially lakes, and also encourages the establishment of unplanned substandard user-built trails.

Alternatives NC, A, I, H could have the greatest impacts in terms of easier access to, and thus greater impacts on wilderness. Some of these impacts can be minimized through the environmental analysis process for individual projects and the establishment of suitable road management objectives for new roads.

Alternatives C and G-Modified would construct the least roads and would create the fewest road-related impacts.

Experience has shown that if a road is closed for a good distance from the wilderness boundary, an "over used" area will not only experience less use but will revegetate and regenerate itself. (An example is Snoqualmie Lake in the Alpine Lakes Wilderness Area.) Alternatives that propose road closures are C (approximately 300 miles), G-Modified (about 65 miles), H (about 20 miles), and J (Preferred) (25 miles).

Wilderness - The Cumulative Effects of the Alternatives

Long-term timber harvest and related road construction in adjacent areas will have the greatest effect on the wilderness resource. The cumulative effects of each alternative are directly related to the amount of road access, timber harvest and development adjacent to wilderness areas. Harvest and road construction results in easier access and can attract more visitors to the wilderness setting. The greater the number of visitors to wilderness, the greater the impact on the social and environmental features of wilderness.

Under all alternatives, long-term increases in demand for wilderness settings would result in higher use levels in wilderness. Managerial controls would be required to minimize environmental impacts and to protect primitive opportunities offered in wilderness areas.

One long-term effect of providing fewer opportunities for wilderness recreation would be the displacement of users into the National Parks or other lesser used areas.

Wilderness - The Indirect Effects on Other Resources

Vegetative Diversity

Designated wilderness contributes to the conservation of diversity because these areas are protected against most forms of development. Wilderness can withstand large scale natural disturbances and is capable of sustaining populations of certain wildlife species with large home ranges (Wilcove, 1988). Under all alternatives, the wildernesses would continue to contribute to the conservation of diversity.

All alternatives would provide habitat for sensitive plant species.

Wildlife

All alternatives would provide for maintaining animals and fish indigenous to the wilderness and would provide protection for populations of threatened and endangered species and their habitats.

Fish

All alternatives would provide for maintaining fish indigenous to the wilderness and would provide protection for populations of threatened and endangered species and their habitats.

Research Natural Areas

There are no known indirect effects on Research Natural Areas from changes in Wilderness in any of the alternatives.

Roadless Areas

There are no known indirect effects on Roadless Areas from changes in Wilderness in any of the alternatives.

Wild and Scenic Rivers

There are no known indirect effects on Wild and Scenic Rivers from changes in Wilderness in any of the alternatives.

Air

There are no known indirect effects on Air from changes in Wilderness in any of the alternatives.

Fire

There are no known indirect effects on Fire from changes in Wilderness in any of the alternatives.

Minerals

There are no known indirect effects on Minerals from changes in wilderness in any of the alternatives.

Land Ownership and Use

There are no known indirect effects on Land Ownership and Use from changes in Wilderness in any of the alternatives.

Roads

There are no known indirect effects on Roads from changes in Wilderness in any of the alternatives.

Mitigation Measures for Wilderness

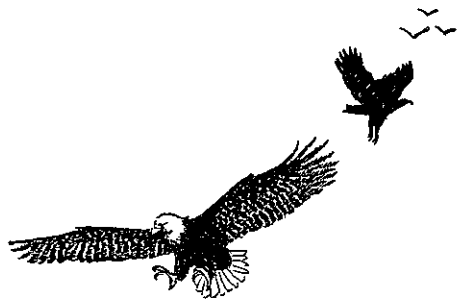
Potential effects of visitor use would be mitigated by keeping the type and amount of use within limits of acceptable change by utilizing visitor information and education and by implementing indirect and direct visitor management techniques where necessary.

New trail construction would generally be confined to relocation of trails not currently in the proper location. This would reduce adverse effects to soils, water, vegetation and wildlife. Trails not needed to meet wilderness objectives would be allowed to brush in or returned to as near a natural condition as possible.

Potential effects of management activities outside of wilderness could be mitigated by constructing lower standard roads or by closing roads to public use at the end of a project.

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Wilderness

The Forest Service wilderness philosophy, which remains unchanged by any alternative, may occasionally conflict with the plans and philosophy of fisheries management enhancement of the Washington State Department of Wildlife. Conflicts with the Environmental Protection Agency and the U.S. Geological Survey may also arise occasionally regarding water sample collection and mineral surveys.



RESEARCH NATURAL AREAS

Research Natural Areas - The Direct Effects of Each Alternative

General

Research Natural Areas are representative ecosystems where natural processes dominate. Designating the new areas as RNA's would augment the baseline ecological data presently provided by the Pacific Northwest Region RNA program. By designating the proposed areas to RNA status, ecosystems not currently represented in the existing program would become represented. In alternatives where the potential RNA's are allocated to other uses, the opportunity for research and establishment of baseline data on plant communities available through the RNA program could be lost. Designation to RNA or Botanical Area status would preclude use for timber management or mining exploration and development. All of the alternatives would recommend proposed RNA's be withdrawn from entry under the Mining Laws.

The three currently established RNA's described in Chapter III would be maintained in all alternatives.

Five candidate RNA's have been identified by the Regional Research Natural Area Committee. Four are totally or partially located within wilderness. Alternatives C, G-Modified, H, and J (Preferred) would recommend designation of four new Research Natural Areas plus an addition to the existing North Fork Nooksack area. Alternatives NC, A, B, and I would recommend no new RNA's. (See Table IV-36.)

Designation would occur after the Record of Decision for the Forest Plan is released, and after an establishment report is prepared and approved by the Chief of the Forest Service.

Table IV-36
Potential Research Natural Areas Recommended By Alternatives

Area	Alternatives							
	NC (No Chg)	A (No Ac)	I	B (RPA)	H	J (Pref)	C	G (Mod)
N. F. Nooksack Addition 1/					x	x	x	x
Lily Lake 1/					x	x	x	x
Perry Creek					x	x	x	x
Green Mountain 2/					x	x	x	x
Chowder Ridge 1/					x	x	x	x

1/ Within wilderness.
2/ 80% within wilderness.

Perry Creek and a portion of the Green Mountain area (296 acres) are located totally outside of wilderness. Alternative A allocates the non-wilderness acres of Green Mountain to management area 1E (General Dispersed Recreation); minimal change would occur under this allocation. Alternative A allocates 13% of Perry Creek to management area 17 (Timber Management) and the remainder to General Dispersed Recreation.

In Alternative B, all of the non-wilderness portion of Green Mountain and most of Perry Creek are allocated to Management Area 1B. The goal of this management area is to provide dispersed recreation in a semi-primitive nonmotorized setting.

Alternative I allocates the non-wilderness portion of Green Mountain to management area 19 (Mountain Hemlock), and 85% of Perry Creek is allocated to management area 1C (Semi-Primitive Motorized). The potential for change or adverse impacts to the non-wilderness portions of the potential RNA's is the greatest in Alternative I.

Research Natural Areas - The Cumulative Effects of the Alternatives

Nonrecommendation of a candidate RNA reduces the land base available for the study of undisturbed ecological processes. Reductions would be greatest under Alternatives NC, A, B, and I and least under Alternatives C, H, G-Modified and J (Preferred). Nonrecommendation of a candidate RNA also may reduce biological diversity by not providing protection for populations of rare plants. RNA designation will result in curtailment of commodity resource activities for those sites established. The cumulative effects of designation also result in preservation of natural genetic diversity in commercially valuable conifer species.

Research Natural Areas - The Indirect Effects on Other Alternatives

Vegetative Diversity

RNA's serve as important reservoirs of biological diversity (Wilcove, 1988).

Allocation of these areas to something other than RNA's or Botanical Areas could slightly increase the timber volumes the Forest. This would be the greatest in alternatives NC, A, B, and I as there are no NRA's proposed in these alternatives.

Wildlife

RNA's also serve as important reservoirs of biological diversity (Wilcove, 1988). Designating RNA's maintains current wildlife habitat helps sustain population levels of wildlife using these areas. Alternatives H, J(Preferred), C, and G-Modified would provide for more diversity because of the number of NRA's proposed in each.

Roadless Areas

There are no known indirect effects on Roadless Areas from changes in Research Natural Areas in any of the alternatives.

Wild and Scenic Rivers

There are no known indirect effects on Wild and Scenic Rivers from changes in Research Natural Areas in any of the alternatives.

Air

There are no known indirect effects on Air from changes in Research Natural Areas in any of the alternatives.

Fire

There are no known indirect effects on Fire from changes in Research Natural Areas in any of the alternatives.

Minerals

Research Natural Areas are withdrawn from mineral entry; this would be most evident in Alternatives H, J(Preferred), C, and G-Modified. Allocation of these areas to something other than RNA's or Botanical Areas could slightly increase minerals accessibility on the Forest. This would occur in Alternatives NC, A, I, and B.

Land Ownership and Use

There are no known indirect effects on Land Ownership and Use from changes in Research Natural Areas in any of the alternatives.

Roads

Designation of an RNA precludes future roading and utility corridors. Existing trails may remain, and new trails must conform to the objectives of the RNA. These effects would be the same in all alternatives.

Mitigation Measures for Research Natural Areas

Refer to the Standards and Guidelines for Management Area 18, Research Natural Area (Chapter IV, Forest Plan).

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Research Natural Areas

There are none.

ROADLESS AREAS

Roadless Areas - The Direct Effects of Each Alternative

General

The environmental consequences of the alternatives on roadless areas are summarized below. For a detailed and site-specific analysis of environmental effects see Appendix C of the FEIS.

Direct Effects of Timber Harvest on Roadless Areas

All of the alternatives call for some degree of timber management in roadless areas. The undeveloped character of those areas scheduled for entry would be altered as road construction and timber harvesting occurs.

The following table, Table IV-37, shows the amount of the roadless areas that would be developed or remain undeveloped in the various alternatives by decade. Alternatives A and I retain the fewest roadless acres as undeveloped, 73 percent and 78 percent, respectively, of the total 402,930 acres. Alternative C retains 96 percent as undeveloped, and Alternative G-Modified retains 93 percent. Alternative J (Preferred) retains 86 percent of the area in an undeveloped character by the end of the fifth decade.

No alternative develops more than approximately one-third of the total roadless acres due to the large amount of land unsuitable for timber harvest found in these areas.

Table IV-37

Acres of Roadless Areas Remaining at End of Decades 1, 2, and 5, by Alternative

Alternative	Acres Remaining End of Decade 1	2	5	Percent Remaining
A	361,665	329,773	293,305	73%
B	371,619	347,041	317,728	79%
C	397,854	393,564	387,257	96%
G	392,421	383,715	375,470	93%
H	377,058	354,602	328,498	82%
I	370,878	344,998	313,914	78%
J	382,587	365,565	344,730	86%

Direct Effects of Trails on Roadless Areas

Trails will be constructed and reconstructed within the roadless areas in all alternatives, but will have only minor effects. Some vegetation will be lost by the development of new trail corridors.

Improved access is another result of trail development. Those alternatives which construct a large number of trails in roadless areas, such as Alternatives G-Modified, I, and J (Preferred), will provide greater access to roadless areas and an increase in dispersed recreation capacity. There will be an attendant loss of solitude in these areas.

Direct Effects of Wilderness on Roadless Areas

Though additional wilderness is not recommended in this plan, areas left roadless would maintain their wilderness character for future consideration. All alternatives would foreclose these options to varying degrees. The wilderness characteristics of those roadless areas allocated to development would be largely foregone, primarily because the imprint of human activity would be noticeable. These imprints could consist of logging slash, skid trails, log landings, roads or any combination of these factors. Trail systems which currently provide access for recreational enjoyment into some of these areas would be disrupted. Alternatives B and I would have the greatest number of acres developed; Alternatives C and G-Modified would protect the most acres for future wilderness consideration.

Table IV-38 shows how the roadless areas are allocated, by management area, in each alternative. Total acres vary by alternative due to R2-map rounding. (Refer to Chapter II for descriptions of the management areas.)

Direct Effects of Mining, Energy Development on Roadless Areas

Roadless areas are not withdrawn from mineral entry; exploration and development is permitted under current mineral laws. During development and operation, the roadless characteristics will be changed. Such changes will be mitigated to the extent possible, based upon a site specific operating plan.

Those alternatives with the greatest amount of roading and development within the roadless areas allow the easiest access for mineral exploration and development. Such development would lead to a reduction in roadless character, solitude, and opportunities for primitive recreation. Alternatives A, I, B, and H have the greatest potential to effect the roadless character due to mineral entry. Alternatives C, G-Modified, and J (Preferred) the least.

Roadless Areas - The Cumulative Effects of the Alternatives

Each time a roadless area is developed, there is a cumulative impact, in that development contributes to an overall reduction in roadless acres from either a local, regional or national perspective. It not only affects unroaded areas per se (in terms of the amount of semiprimitive environment available) but also affects wilderness on the Forest, and roadless areas/wilderness off the Forest. This results in a shift in current or future use to alternate areas.

Long term timber harvest, road construction, and commodity development will reduce the roadless area resource. The effect of each alternative is directly

Table IV-38

Management Area Allocations of Roadless Area by Alternatives

Management Area	Alt. A	Alt. I	Alt. B	Alt. H	Alt. J (Pref)	Alt. C	Alt. G Mod
1A -Prim	0	0	0	4,054	43,165	15,902	6,504
1B- SPNM	0	0	126,942	222,861	201,194	318,675	302,794
1C- SPM	0	132,221	4,202	2,407	2,914	0	0
1D- RN Rec	0	5,723	15,923	5,279	6,187	2,639	0
1E-	249,470	0	0	0	0	0	0
1F-	5,955	0	0	0	0	0	0
Disp. Rec. Alps	1,288	1,288	1,288	1,288	1,288	1,288	1,288
2A-Scenic Foreground	401	3,885	844	2,872	3,611	3,970	1,900
2B-Scenic Middle	0	0	0	26,144	28,657	7,137	0
3A-Dev Rec	147	147	147	147	147	147	147
3C-Dev Rec	190	527	549	464	591	359	274
3D-Dev Rec	21	21	21	21	21	21	21
5A-R Riv	211	0	0	84	274	63	485
5B-S Riv	2,280	0	0	232	1,478	2,259	570
5C-W Riv	359	0	0	0	232	105	21
6-Skagit	2,914	2,597	971	2,597	2,597	2,597	2,111
8-Spec	0	0	0	0	1,393	0	16,345
11-SOHA	21,371	53,218	43,630	24,412	17,084	5,068	16,049
12-PM/PW	5,110	14,022	10,685	6,842	6,145	2,407	3,590
14-Deer	0	17,654	27,348	3,653	3,801	1,964	464
15A-Goat	0	14,846	11,403	7,074	7,898	3,759	2,259
15B-Goat	0	0	10,706	0	0	253	0
16-T&E	1,731	1,731	1,731	1,731	1,731	211	211
17-Timber	102,508	103,627	79,489	49,649	36,830	5,596	25,679
18-RNA	1,351	1,414	1,414	4,223	4,287	4,287	5,195
19-M.Hem.	0	36,703	53,999	22,237	21,794	9,439	13,832
22A-Sultan	0	0	0	0	0	2,935	0
22B-Sultan	443	0	0	2,935	0	0	865
22C-Sultan	0	2,576	3,252	0	2,893	0	0
23A-Other Water	7,222	10,770	8,405	11,762	6,778	0	2,132
22B-Other Water	0	0	0	0	0	11,889	0

related to the amount of development, with Alternatives NC, A, B, and I having the most development. Alternatives C and G-Modified retain the most acreage in roadless status.

Roadless Areas - The Indirect Effects on Other Resources

Vegetative Diversity

Roadless areas contribute to the conservation of diversity because these areas generally receive lower levels of development; can generally withstand large scale natural disturbances and are generally capable of sustaining populations of certain wildlife species with large home ranges. As these areas are entered for development, diversity changes. Alternatives C, G-Modified, and J (Preferred) best contribute to the conservation of natural diversity. Alternatives B and I cause the greatest potential impact on natural diversity.

American Indian Religious and Cultural Use

Roadless areas are often important to American Indian religious and cultural use and the development of currently roadless lands will result in fewer sites and areas available for these practices. Alternatives C and G-Modified have the most acres remaining in a roadless condition, followed by Alternative J (Preferred). Alternatives NC, A, B, I, and H develop more acres of roadless lands.

Recreation

Research has shown that recreationists will substitute one environmental setting for another if their expectations can no longer be met (ORRRC, 1962; O'Leary, 1974; Bryan, 1982). As the roadless areas on the Forest are developed, recreational uses formally occurring in roadless areas would be displaced to the Forest's wilderness areas. This displacement of recreation use may result in conflicts among the various visitors deriving different expectations and satisfactions from the same environmental setting. For example, those visitors who visit the wilderness to experience solitude, isolation, and freedom from the sights and sounds of other recreationists would not experience such qualities because of increased contacts with other visitors, many of whom may not consider these values important (Lime, 1971; Stankey, 1971). This could have serious effects on the wilderness resource since capacity has almost been reached for the wilderness areas on the Forest.

The depletion of roadless areas over time could also result in the displacement of roadless recreation use to other undeveloped Forest lands, such as areas allocated to provide old growth habitat. This shift in recreation use would affect old growth dependent species such as pine marten and spotted owls through harassment and loss of solitude. Changes in wildlife species and number would be dependent upon the amount and location of timber harvest and roading activities.

Wild and Scenic Rivers

There are no known indirect effects on wild and scenic rivers from changes in roadless areas in any of the alternatives.

Air

There are no known indirect effects on air from changes in roadless areas in any of the alternatives.

Fire

There are no known indirect effects on fire from changes in roadless areas in any of the alternatives.

Minerals

There are no known indirect effects on minerals from changes in roadless areas in any of the alternatives.

Land Ownership and Use

There are no known indirect effects on wild and scenic rivers from changes in roadless areas in any of the alternatives.

Roads

Road miles will not increase in those alternatives (C and G-Modified) that have a large acreage of roadless areas allocated to non-development in management areas 1A, 1B, 1C, 8, 10, 11, 12, 15A, 16, 18, and parts of 27.

Mitigation Measures for Roadless Areas

Numerous mitigation measures can be applied to reduce changes in the soil, water, and wildlife habitat characteristics of roadless areas allocated to development. These measures are described in the various other resource sections of this chapter. Such mitigation measures cannot eliminate or avoid the alteration of the natural integrity and basic character of the roadless area.

The allocation of roadless areas to Semi-Primitive and Primitive Dispersed Recreation management is a mitigation measure designed to offset the overall reduction of roadless areas on the Forest and to preserve some undeveloped roadless area for future consideration as wilderness.

Several measures can be applied to minimize impacts where Roadless Area size has been reduced:

1. Road closures along the periphery of such areas reduce the sights and sounds of people and help maintain a Semi-Primitive setting within the roadless area.

2. Existing trails may be restored or relocated within the developed portions of roadless areas.

3. Smaller undeveloped areas may be retained to protect important natural features.

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Roadless Areas

There are none.

WILD AND SCENIC RIVERS

Wild and Scenic Rivers - The Direct Effects of Each Alternative

General

Skagit Wild and Scenic River. The Skagit River system, which is currently the only component of the National Wild and Scenic River System on the Forest, will be managed in accordance with the Skagit River Management Plan (Vol. II, 1984). Management plans for the river system will not be affected through the range of alternatives.

Land allocations on the periphery of the wild and scenic river corridor, however, have a potentially significant impact on wild and scenic river attributes. Depending on the land allocations within the alternatives, the potential for adverse effects varies greatly. The allocations can affect the quality of the recreation experiences (Clark, 1984). Timber harvest and related road construction are the management activities within any one of the alternatives that would have the greatest effect on the quality of the river experience. The degree of visual protection offered in the viewsheds adjacent to the rivers becomes the means to evaluate acceptable levels of activities in the various management areas. Resource activities are mitigated through the use of Standards and Guidelines applicable to the visual resource.

Recommended Wild and Scenic Rivers. There were 795.9 miles of rivers and streams in 47 segments studied for possible inclusion in the National Wild and Scenic River System. The direct effect of implementing any one of the alternatives will be a decision to recommend or not recommend designation of a river for inclusion in the National System. If a river is recommended, then management will be oriented toward protecting the features of the river system which would be important under the National Wild and Scenic River Act; no activities would be allowed which could preclude future designation. Management will protect all eligible rivers until Congress acts on the Forest's recommendation.

The Forest Service has no authority to control development of private lands along eligible rivers. Thus, extensive development of the shoreline could downgrade the classification of a river segment prior to Congressional action.

Table IV-39 shows the rivers recommended for designation in each alternative. Eligible river segments crossing the Mt. Baker-Snoqualmie National Forest vary by alternative. For a more detailed discussion, see the FEIS, Appendix E. The number of rivers and streams found suitable for inclusion in an alternative varies from none in Alternatives NC, B and I to 47 in Alternatives C and G-Modified. Alternative A contains 15 rivers and Alternative J (Preferred) has 30 suitable rivers.

Table IV-40 indicates the percent of each potential Wild and Scenic River Corridor assigned to a management area in which no development (timber harvest or roads) would occur for each alternative. In other words, Table IV-40 shows the level of protection a river will receive even if not formally designated as a wild and/or scenic. For example, in Alternative H, Diobsud Creek is not a Designated River, but is still afforded 99% protection from future development by it's management area assignment. Under Alternative I, 90% of Diobsud Creek would be assigned to MA's restricting development.

Table IV-39
Wild and Scenic Rivers Recommended For Designation

Alternatives	No. of Rivers	Total Miles Recommended
NC	0	0
A (No Action)	15	287
I	0	0
B (RPA)	0	0
H	5	154
J (Preferred)	30	452
C	47	606
G-Modified	47	796

(Refer to Appendix E for further discussion on the effects of implementing any of the alternatives on potential Wild and Scenic Rivers.)

Direct Effects of Wilderness on Wild and Scenic Rivers

Within wilderness, water developments may be sanctioned only by the President (Sec. 4 (9)(4) of the Wilderness Act). Such authorization would be exceptionally rare; it has never been exercised in the past. Wild and Scenic River designation within wilderness would prohibit dam construction and other water development projects.

Direct Effects of Mining, Energy Development on Wild and Scenic Rivers

Because mining and exploration often involve the use of heavy equipment, the removal of vegetation, the excavation and washing of gravel deposits, and the diversion of water, such activities would have the potential to significantly impact the outstanding values of a river. Wild and Scenic Rivers are not automatically withdrawn from mineral entry.

Wild and Scenic Rivers - The Cumulative Effects of the Alternatives

All eligible rivers are protected from degradation of their outstandingly remarkable values, thus there will be no adverse cumulative effects. For rivers not found eligible, the cumulative effects of management activities may change the values and characteristics necessary for wild and scenic river classification and preclude such designation at any future date.

After Congressional action, the greatest cumulative effects would occur in Alternatives NC, B and I, which recommend no rivers for designation. Any dams built on rivers within the Forest can, over time, result in reduced opportunities for dispersed recreation associated with free-flowing rivers (such as fishing and rafting). Additional effects of hydroelectric development on anadromous fisheries include reductions in regional fish production, when portions of a river may become unavailable for spawning and rearing.

Table IV-40 - Percent of Potential Wild and Scenic River Corridors Allocated to Non-Development Management Strategies by Alternative 1/

Rivers	A	I	B(RPA)	H	J(Pref)	C	G-Mod
Silesia Creek	100	100	100	100	100	100	100
Baker River	39	37	39	80	83	76	91
NF Nooksack	15	32	33	31	33	33	62
Wells Creek	55	70	68	72	79	82	82
MF Nooksack	54	39	39	45	39	39	78
Diobsud Creek	93	90	95	99	99	100	100
Noisy Creek	83	83	88	93	96	100	96
Bell Creek	62	72	68	81	70	74	100
SF Nooksack River	27	26	26	30	33	43	52
NF Stillaguamish	35	38	38	38	38	38	57
North Branch Ck.	24	58	58	58	58	58	68
Deer Creek	67	46	46	45	46	53	63
Boulder River	95	95	96	95	95	95	98
Downey Creek	94	94	94	94	94	95	96
Buck Creek	95	94	95	95	95	95	99
Illabot Creek	47	48	48	55	51	54	85
SF Stillaguamish	45	27	25	28	28	36	56
SF Canyon Creek	65	43	43	44	44	51	56
Canyon Creek	63	63	63	68	68	63	82
NF Sauk Ex.	100	100	100	100	100	100	100
White Chuck River	58	56	56	58	56	75	81
SF Sauk Ex.	68	43	50	51	53	66	94
Rapid River	58	54	58	58	57	98	71
Tye River	2	1	1	1	1	1	9
NF Skykomish	42	40	42	77	74	67	69
West Cady Creek	46	59	59	82	74	98	42
Beckler River	0	0	0	0	0	2	0
Troublesome Crk	96	91	91	100	100	100	100
SF Skykomish	2	0	0	4	0	1	2
Deception Crk	97	99	99	99	99	99	100
Foss River	16	16	16	16	16	16	16
EF Foss River	93	93	93	93	93	93	94
WF Foss River	91	91	91	91	91	97	91
Miller River	3	6	6	6	6	6	58
EF Miller River	49	63	61	63	63	63	98
WF Miller River	95	95	95	95	95	95	100
MF Snoqualmie	37	42	42	41	42	42	82
Taylor River	64	64	64	64	64	64	75
Lennox Creek	36	25	24	25	25	27	73
NF Snoqualmie	28	36	36	36	36	36	73
Tolt River	60	60	60	60	60	60	60
Pratt River	27	28	28	28	28	28	97
SF Snoqualmie	32	31	31	31	31	31	36
Greenwater River	66	64	65	65	72	65	89
White River	17	1	1	11	90	3	20
Clearwater River	88	99	99	99	99	100	100
Carbon River	8	0	0	0	0	38	15

1/ Calculated on non-wilderness Forest Service ownership only.

No cumulative effects would occur, at least within National Forest boundaries, in Alternatives C and G-Modified.

Wild and Scenic Rivers - The Indirect Effects on Other Resources

Air

There are no known indirect effects on Air from changes in Wild and Scenic Rivers in any of the alternatives.

Fire

There are no known indirect effects on Fire from changes in Wild and Scenic Rivers in any of the alternatives.

Minerals

The allocation of Wild and Scenic Rivers in any alternative could cause restrictions in mineral exploration and/or development if the river corridor were to be withdrawn from mineral entry.

Land Ownership and Use

Those rivers recommended to Congress for designation in an alternative would retain their free-flowing character; any developments affecting future classification would be delayed until Congressional consideration.

The potential for hydroelectric energy would be limited. Values associated with the natural free-flowing characteristics of the stream would be favored. For example, existing scenic values, white water recreation, and anadromous fishery values would be retained or enhanced. Such activities as timber harvest and management of deer and elk habitat would have to be conducted in a manner consistent with meeting Wild and Scenic River objectives. These objectives vary by classification. For example, a Wild classification retains the most natural river environments, while a Recreational classification allows for more development. Maintaining wild and scenic eligibility for these rivers will have a slight indirect effect on vegetation, as timber harvest activities are modified. This would be most evident in alternatives G-Modified, C, and J (Preferred).

Those rivers not found eligible are available for hydroelectric development. Such development could have the effect of eliminating their free-flowing character. Other attributes such as fisheries and water quality could be adversely affected by dams. Recreation activities, such as rafting and kayaking, normally associated with moving water, might be reduced or eliminated. *This would be most likely in Alternatives NC, I, and B.*

Roads

There are no known indirect effects on Roads from changes in Wild and Scenic Rivers in any of the alternatives.

Mitigation Measures for Wild and Scenic Rivers

The values and characteristics important for classification of rivers as wild and/or scenic will be protected until Congressional action. Management activities which would adversely affect these values and characteristics would be deferred.

Little opportunity exists for mitigating activities which affect the free-flowing character of those rivers not chosen. If a project is developed which affects streamflow, a project environmental assessment would be written. The mitigating effects, such as fish ladders, etc., would be addressed in the project environmental assessment.

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Potential Wild and Scenic Rivers

Regional and state energy plans may address energy potentials from rivers recommended for Wild and Scenic River classification.

The analysis and classification of Wild and Scenic Rivers requires coordination with state, county, and other administrative jurisdictions and ownerships through which these rivers flow.

AIR

Air - The Direct Effects of Each Alternative

General

Air quality over the National Forest is affected by a combination of the gaseous and particulate emissions generated by management practices and activities within the Forest and from urban and industrial sources outside of the Forest. The extent air quality over the Forest will be effected varies with the mix of management practices applied under the different alternatives and the rate of urban and industrial development adjacent to the Forest.

Procedures outlined in the Federal Clean Air Act insure federal land manager involvement in developing emissions control requirements for new or modified point sources having the potential to impact air quality related values of the Forest. The 1988 emissions inventory from the Puget Sound Air Pollution Control Agency indicates that point sources contribute considerably less pollutants than do area sources. The largest area sources are transportation and residential heating. Slash burning is a small contributor to the inventoried emissions within the agency's jurisdiction. Area sources of pollutant generation are included in all activities presented, though most impacts are not measurable due to low frequency, duration, or scope of application.

Of the regulated pollutants identified in the Federal Clean Air Act, only Total Suspended Particulates (TSP) are generated in any measurable quantity by the management practices included in the plan. Effects of the alternatives relative to TSP generation are presented in Table IV-41 by the sources of emissions. Of the chemical pollutants, carbon monoxide and NOx emissions are the greatest but are very low. Generation of these pollutants are evaluated by comparison with other sources.

The primary Forest sources of gaseous and particulate emissions are from wildfires and the prescribed burning activities included in all alternatives. Human health impacts of the pollutants emitted from prescribed burning activities have been addressed in the Vegetation Management EIS and Record of Decision approved by the Regional Forester, Nov., 1988. Wildfire effects are expected to be about the same.

Impacts of pollutants, mainly suspended particulates, on visibility is another important air quality impact. Suspended particulates in the 0.3 to one micron diameter range are the principle source of visibility impairment. Sandberg and Martin (1985) report that as much as 80% of the particulate mass in wood smoke is less than one micron in diameter. EPA data indicates that concentrations as low as two micrograms per cubic meter of air produce a perceptible reduction in clarity as seen by the human eye. Fine particulates tend to be transported long distances and remain suspended for long periods of time under light and variable wind conditions. Table IV-41 displays the level of TSP generated by each of the various management practices under each alternative.

Table IV-41
Generation of Total Suspended Particulates (TSP)
Expected Average Production by Source and Alternative
Expressed in Tons Per Year

Sources	Emission Factor	Alternatives NC	A	I	B	H	J Pref	C	G Mod
Broadcast Burning	30# / Ton	127	122	98	97	91	86	69	56
Pile Burning	20-36# / Ton	307	280	226	221	211	200	162	131
Burning Live Veget.	60# / Ton	--	85	85	245	85	85	109	85
Wildfires	60# / Ton	150	106	106	106	106	106	106	106
Burning Const. Debris	36# / Ton	105	105	94	90	80	77	51	55
Campfires	36# / Cd	78	78	78	78	78	78	78	78
Firewood Burning	28# / Cd	135	135	135	135	135	135	135	135
Total TSP Produced (Tons)		902	900	822	962	786	767	710	646

Note: An Emission Factor is the rate of particulate emission per ton of fuel consumed. It varies due to differences in combustion efficiency. These factors are not well defined for many of the activities. The Pacific Northwest Forest and Range Experiment Station has developed factors for broadcast burning and pile burning (Hardy 1988). Firewood burning factors are from work by Duncan and others in 1979. Emission factors for other activities are best estimates based on known relationships and characteristics.

The Washington State Implementation Plan required by the Federal Clean Air Act includes strategies to reduce the amount of TSP generated by prescribed burning activities on the National Forests by 35% by the year 1990. The base line for calculating improvement was the average of the 1976-1979 period. For the Puget Sound area, this amounted to 155,900 tons of suspended particulates per year. (Final EIS of Pacific Northwest Regional Guide - Table 4-8.) Of that total, 57,000 tons were attributable to the prescribed burning programs of the Mt. Baker-Snoqualmie Forest. Table IV-41 data shows that all alternatives clearly meet this goal.

TSP emission levels are expected to decline slightly over the first decade then level off as the amount of prescribed burning activities stabilizes. By the end of the fifth decade of plan implementation, emissions from prescribed burning of logging residue will be near zero for all alternatives, while wildfire and other prescribed burning activity emissions will remain near current levels.

Pollutants in the form of carbon monoxide and other gaseous emissions are produced at varying levels under each of the alternatives. The scattered

locations of most of the sources and the low emission rates prevent concentrated buildup of these pollutants. Isolated areas where measurable concentrations may accumulate are possible, but they are expected to be well below any level of concern for human health or biological impacts. The highest concentrations are expected to occur along the major highway corridors through the Forest such as Interstate 90. Since no actual monitoring data is known to exist for this section of I-90, a comparison to data measured on I-5 is presented. (It should be noted, the volume of I-90 traffic is no more than 10% of the volume of I-5 in the metropolitan Seattle.)

The Puget Sound Pollution Control Agency monitors carbon monoxide emissions along Interstate 5 at Northgate, just north of Seattle. Monitoring data indicates that on three days in 1988, the eight-hour average exceeded nine ppm, which is the state and national standard for carbon monoxide. The highest eight-hour value recorded in 1988 at the Northgate site was 11 ppm. One hour averages were well below the national standard of 35 ppm. The highest one-hour concentration value measured was 15 ppm. This is a worst case comparison as the Northgate site also has many other sources of carbon monoxide that are not present along the portion of I-90 that crosses the Forest. Carbon monoxide emissions associated with the various alternatives and use of the Forest are expected to be no higher than 0.1 of those measured in the urban setting, well below any known threshold of human health or biological impact. Other gaseous pollutants associated with Forest use or activities are expected to have similar levels.

State and local control strategies, such as auto emission checks and elimination of led from fuels, are expected to keep concentrations well within state and federal standards.

Noise. Noise on the Forest occurs at various intensities and is transient in nature. It is generated to some extent by management activities, vehicles, aircraft, users, and even natural events.

There is little objective data available relative to the noise levels currently experienced on the Forest. Since there are no new activities or management practices proposed in any of the alternatives, there will be no new sources of noise within the Forest. Shifts in frequency, location and duration of noise emitting activities will occur within the range of alternatives.

Noise generated by automobile use, aircraft and human activity will likely be similar in all alternatives except Alternatives C and G-Modified where noise levels on the forest are expected to be lower than current levels. Noise generated by heavy equipment operations associated with timber harvest, log transport and road construction will likely be the greatest in those alternatives with the highest levels of timber harvest activity and road construction.

Direct Effects of Timber Harvest on Air

Management practices associated with road construction, site preparation, and disease control include prescribed burning. The Standards and Guidelines for these activities will insure that impacts are acceptable. Alternatives (NC, A, I and B) have the highest levels of harvest activity and road construction would have the greatest impact on air and noise.

Direct Effects of Mining, Energy Development on Air

The interaction between minerals extraction and air quality is not unique to the Mt. Baker-Snoqualmie National Forest. As with all surface disturbances, exploration, mining, milling and benefaction activities can result in increased particulate levels in the immediate area. In addition gaseous emissions in the form of carbon monoxide, hydrocarbons, sulfur dioxide, and nitrogen oxides are emitted from internal combustion engines used in the various phases of mining operations. Similarly, the equipment typically used in mining operations does produce localized noise levels that may be heard for some distance from the actual operation itself. Federal and state regulations ensure these impacts are minimized. This would be the same throughout all of the alternatives.

Complying with the regulations increases capitalization costs, development costs and operating costs. As a consequence, overall production cost is higher, and interest in mineral development may be decreased. Because operators must comply with federal and state air quality and noise abatement requirements, the effects that mineral related activities have on air would vary only slightly by alternative. It can be assumed, however, that the effects would lessen slightly as the area managed by "highly" restrictive management strategies increases.

Direct Effects of Roads on Air

There is a short term increase in noise and particulate levels associated with road construction. These drop off after construction and are limited to vehicle use and wind. These events are limited in extent and of short duration. Surfacing and maintenance standards minimize the generation of particulates from road use. These effects would be greatest in Alternatives NC, A, I and B; moderate in Alternatives H and J (Preferred); and lowest in Alternatives C and G-Modified

Air - The Cumulative Effects of the Alternatives

Cumulative effects on air are apparent by changes in visibility and in concentrations of particulates and gaseous emissions monitored in and adjacent to the Forest. Of the regulated pollutants, total suspended particulates (TSP) generated by prescribed burning activities will be the most likely to accumulate over time. These will be of short duration as normal weather patterns tend to dissipate any extensive buildup. The contribution of management practices to any measurable change in average annual concentration of TSP will be negligible.

As discussed above, TSP generation is expected to decline over time for all alternatives.

Air - The Indirect Effects on Other Resources

Fire

The management emphasis in all alternatives is to encourage the utilization of harvest residue for firewood. This will affect air quality through an increase in TSP and gaseous emissions associated with home heating. This will be felt heaviest in the urban areas during cold, winter months when air dispersion conditions are poor or limited. Due to the abundance of firewood from other

sources and the limited contribution that the National Forest makes to the total supply, variation in availability between alternatives will not effect the amount of firewood consumed and emissions generated.

Minerals

There are no known indirect effects on Minerals from changes in Air in any of the alternatives.

Land Ownership and Use

There are no known indirect effects on Land Ownership and Use from changes in Air in any of the alternatives.

Roads

There are no known indirect effects on Roads from changes in Air in any of the alternatives.

Mitigation Measures for Air

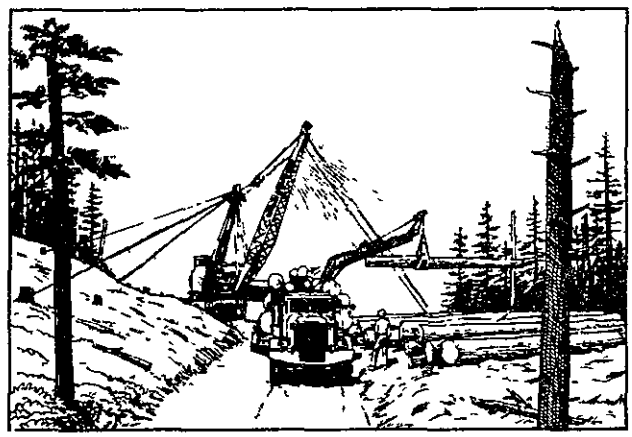
Prescribed burning on National Forest land is accomplished within the guidelines of the Washington State Smoke Management Plan, a part of the State Implementation Plan required by the Federal Clean Air Act. This plan is administered by the Washington State Department of Natual Resources. The potential for smoke from a prescribed burn to dissipate along the direction of plume travel and the number of projects proposed for an area are evaluated before approval is granted to burn. Though some prescribed burning is done throughout the year, most occurs in the spring, before July 1, or in the fall, after October 1. This concentrates the impact on visibility to periods when the fewest visitors are likely to be in the Forest or when weather (cloudy conditions) is likely to preclude good visibility anyway.

Roads may receive dust abatement (water or other) treatments to control dust during summer months.

(Also, refer to mitigating measures applicable Forest-wide and to each management area in Chapter II.)

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Air.

There are none.



Chapter IV
Fire

FIRE

Fire - The Direct Effects of Each Alternative

General

There is a theoretical relationship between the intensity of management activities, public use of the Forest, and the number of human-caused forest fires. However, on the Mt. Baker-Snoqualmie, based on the past thirty years of record, this relationship does not hold true. There does not appear to be any direct correlation between the number of forest visitors and the number of recreation related fires in a given year. The annual fire frequency appears to be more dependent on the weather severity during the fire season than on the number of summertime recreation visitors. Likewise, the number of industrial related fires also appears to be more a function of weather than of the level of timber harvest activity.

Based on (1) the historic relationships between fire frequency and human activity levels, (2) the direction in the Forest-wide Standards and Guidelines, and (3) the ranges of timber harvest and summertime recreation use included in the alternatives, there are no differences anticipated in fire frequency between the various alternatives presented in this plan.

Lightning fire frequency has shown a downward trend over the past thirty years but this is felt to be due to natural climatological factors rather than management activities. The frequency of these naturally occurring fires will remain at past historic levels under all alternatives.

All protection planning is accomplished using the National Fire Management Analysis System model and is based on the frequency and intensity of fire occurrence experienced in the 1970 decade. This is felt to be representative of what will occur in the first decade of plan implementation. If anything, it may be a liberal estimate based on what has occurred in the 1980 decade, though significant variation is expected between decades due to weather patterns and lightning occurrence.

Wildfire intensity is directly related to the volume of dead woody fuel available on the ground. Under normal conditions present on the Forest, weather influences will keep the intensity of fires occurring in naturally generated fuels (dead woody material) low, allowing easy containment. Though the volume of natural fuel falling to the forest floor is high, depth accumulation is slow due to the rapid rates of decomposition in the forests of western Washington, especially at the lower elevations. The various management practices associated with alternatives will not alter this fact. Therefore, there will be no measurable differences in potential fire intensity in natural fuels between alternatives presented in this plan.

Fire Protection Standards. Each management area has its own unique fire protection needs to ensure that the goals and outputs for the area are achieved. Since each management area may be broken into several parcels and scattered across the Forest, it is not practical to have a different protection standard for each area. For ease of implementation, Management Areas with similar basic protection goals have been combined into Fire Protection Groups. Table IV-42 displays how the various Management Areas are combined into Fire Protection Groups.

Table IV-42
Crosswalk of Management Areas to Fire Protection Groups

Fire Protection Group	Applicable Management Areas
Group A	2A-B, 3A-D, 7, 8, 11, 12, 16A, 23, 25A, 25B
Group B	4, 10A-E
Group C	1A-D
Group D	5, 6, 13
Group E (1)	14, 15, 17, 19, 21
Group E (2)	17, 21, 22
Group E (3)	17, 21

Note: Management Areas 18, 20 and 27 have their own unique protection requirements or are covered by other plans.

It is not economically practical to plan to eliminate fire completely from a Management Area, therefore each Fire Protection Group has an expected fire loss and maximum fire size for the first decade of the plan. These values have been determined from historic occurrences and the goals and Standards and Guidelines for each area. The expected burned acreage and maximum fire sizes for each Fire Protection Group are displayed in Table IV-43.

Direct Effects of Timber Harvest on Fire

Activities which involve cutting of live vegetation such as timber harvest, commercial and precommercial thinning, and clearing for roads, trails, buildings and other facilities, accelerate the accumulation of dead woody debris. These increased loadings can increase fire intensity. Alternatives which include the largest amounts of the above-mentioned activities will impact the protection program the most. However, differences of up to 1,000 acres between alternatives on a forest the size of the Mt. Baker-Snoqualmie, which has a relatively low fire incidence, will not influence the size of the protection organization needed. Standards and Guidelines are designed to mitigate the impacts of this debris on fire protection needs.

Direct Effects of Roads on Fire

In addition to woody material created during road construction, road and trail systems tend to provide increased access and improve opportunities for easier control of wildfires. On the opposite side, they also tend to increase the potential to spread forest visitor use over a larger area which can complicate prevention activities and suppression response. The low incidence of fire starts on the Forest and the relatively small increases in additional miles of

Table IV-43
Expected Burned Area and Maximum Fire Size
by Fire Protection Group - First Decade

Fire Protection Group	Flame Length	FIL	Max. Fire Size Acres	Expected Acres Burned by Fire Size Class per Decade A-B 0 - 10 ac	C 10 - 100 ac	D 100 - 300 ac	E+ 300 + ac	10 yr Total
	0-2	1	5 ac	10 ac				10 ac
Group A	2-4	2	2 ac	2 ac	10 ac			12 ac
	4+	3-6	1 ac	1 ac	15 ac			16 ac
	0-2	1	N/A	25 ac	30 ac	---	---	55 ac
Group B	2-4	2	N/A	10 ac	120 ac	---	---	130 ac
	4+	3-6	N/A	5 ac	100 ac	150 ac	700 ac	955 ac
	0-2	1	400 ac	45 ac	75 ac			117 ac
Group C	2-4	2	300 ac	7 ac	20 ac			47 ac
	4+	3-6	200 ac	--	--	150 ac	--	150 ac
	0-2	1	5 ac	19 ac				19 ac
Group D	2-4	2	5 ac	2 ac				2 ac
	4+	3-6	5 ac	---				---
	0-2	1	50 ac *	15 ac				15 ac
Group E	2-4	2	50 ac *	13 ac	20 ac			33 ac
(1)	4+	3-6	50 ac *	12 ac	40 ac			52 ac
	0-2	1	25 ac*	12 ac	10 ac			22 ac
Group E	2-4	2	25 ac*	6 ac	30 ac			36 ac
(2)	4+	3-6	25 ac*	---	---			---
	0-2	1	**	19 ac	35 ac			54 ac
Group E	2-4	2	**	15 ac	165 ac			180 ac
(3)	4+	3-6	**	15 ac	140 ac	125 ac		280 ac
Expected Decade Total				238 ac	810 ac	425 ac	700 ac	2168 ac

Footnote *- 10 ac when threatening private land or areas with tighter control objectives.

**- Maximum fire size is variable. See Standards and Guidelines

roads and trails makes the differences in fire protection needs between alternatives insignificant.

The presence of scenic corridors in some alternatives does create increased protection needs and limits suppression options. Fire occurrence is very low in these areas and differences in total protection program needs is insignificant.

Fire - The Cumulative Effects of the Alternatives

The discussion of the Direct Effects of Each Alternative on Fire describes the minimal impact expected to occur on fire protection programs. The only activity that is expected to be cumulative in any form is the increase in acreage where harvest and silvicultural activities have created modified fuel bed conditions in terms of fuel loading and dryness. Since the acreages involved are significantly lower than historic levels, the cumulative effects of the alternatives will be an improvement over what has historically occurred. In this respect fire protection needs in future decades will be lower than in past decades.

Fire - The Indirect Effects on Other Resources

Minerals

There are no known indirect effects on Minerals from changes in Fire in any of the alternatives.

Land Ownership and Use

There are no known indirect effects on Land Ownership and Use from changes in Fire in any of the alternatives.

Roads

There are no known indirect effects on Roads from changes in Fire in any of the alternatives.

Mitigation Measures for Fire

Seasonal closures of specific areas, operational shutdowns, and restrictions on public activities will be used to reduce the risk of fire starts during periods of extreme fire weather. This will be the same in all of the alternatives. (Refer to Forest-wide mitigation measures in Chapter II and to the Fire Prevention Plan in the Forest Plan document.)

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Fire

There are none.

MINERALS

Minerals- The Direct Effects of Each Alternative

General

The manner in which lands are to be managed under each alternative will have an effect on the availability of those lands for mineral entry; it will also have an effect on the cost of conducting exploration, development, and reclamation activities. Under the various alternatives, certain lands are recommended for withdrawal from mining activity. Not only might implementation of the Forest Plan preclude future exploration and development in areas recommended for withdrawal, but management prescriptions may affect exploration for mineral resources in some areas. Alternatives C, G-Modified, H and J (Preferred) will have the most restrictions on mineral entry. While alternatives B, I, A, and NC will have the least amount of restrictions to mineral activity.

In most cases, the value of mineral resources is not well quantified, and therefore, it is difficult to quantify the effects on minerals from each alternative. The consequences are best shown by analyzing how acre assignments to management areas (MA's) may limit the availability of lands for minerals exploration and development or constrain proposed mineral activities.

Demand for access to National Forest System lands for the purpose of mineral exploration and development is expected to continue to increase over the long term. This will not change as a result of implementing any of the alternatives. Operating plans will continue to be submitted for approval and the regulations under which those operating plans are processed will not change as a result of implementing any of the alternatives. Mineral commodities, deposit locations, and deposit characteristics will not vary by alternative, and the demand for mineral commodities is expected to increase regardless of the alternative selected. As described in Chapter III, minerals are classified as locatable, leasable, or salable, and the laws by which each type is governed will not change by alternative. Those lands that are not withdrawn from mineral entry will remain subject to exploration and development under the mining and mineral leasing laws.

The management areas have been grouped by restrictive categories, Table IV-44. MA's requiring complete withdrawal of lands from mineral entry (such as Developed Recreation sites and Wilderness) are the most restrictive because withdrawals usually preclude mineral entry. The only mineral activities allowed in these areas will be those conducted on mining claims, leases, or permits having valid existing rights established prior to the date of withdrawal. Prospecting, leases, and mineral permits may be allowed in some circumstances.

The next group, which is considered to be "highly restrictive" towards minerals, include special management area categories such as Scenic Viewsheds and Old Growth Habitat Areas. Special provisions will be required to ensure management objectives are met. These provisions may increase costs and/or operating season restrictions. Alternatives J (Preferred), H and C will have the most acres in these categories.

The least restrictive management areas are those which include timber harvest and roading in their management prescriptions: 1D, 1F, 17, 19, 24, and 27.

In all categories except withdrawal, mineral activity is not restricted beyond reasonable precautions for environmental protection and compliance with management objectives.
The public has a right to explore for leasable minerals and to produce both leasable and salable minerals from public lands if they hold a valid lease or permit. Specific leasing decisions will be made when proposals to lease are received. When claimants have a right to mine or produce minerals, they are also guaranteed reasonable access for mining purposes. The same rights apply to withdrawn areas if valid rights were perfected prior to the withdrawal.

The effect that the highly restrictive management strategies will have on mineral resources cannot be accurately quantified in terms of tons at a certain grade or in dollars. However, Figures IV-9 through IV-14 and Tables IV-45 and IV-46 show the relatively restrictive effect that implementing the various alternatives would have.

Table IV-44 lists MA's by restrictive category and describes each category's restrictions. The overall effect on mineral activity for each alternative is summarized in Table IV-45. Less than one percent of the Forest area is prescribed to be withdrawn in addition to existing withdrawals for wilderness. Fifty-eight percent remains open for mineral entry. Of the area available for mineral entry, a range from 13% in Alternative A, to 68% in Alternative C have highly restrictive management area prescriptions. Only 33% of the available Forest in Alternative B is available for mineral entry, while the numbers are 40% and 49% in Alternatives I and J (Preferred), respectively.

The overall effect can be further described by comparing the percentage of acres of potential mineral resource development (for locatable and energy minerals) that would be either withdrawn or highly restrictive to mineral activity by the MA prescriptions under each alternative.

In all alternatives, except Alternative G-Modified, the management area prescribes withdrawals on 42 acres identified as having a high potential for locatable mineral resources. In Alternative G-Modified, there are 232 acres withdrawn. These withdrawal areas do not include any area classified as a "known" geothermal mineral energy resource in any alternative.

Common variety minerals, by contrast, occur throughout the Forest, and it appears that none of the alternatives will significantly affect the availability of that resource.

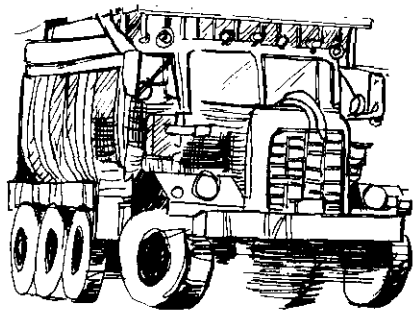


Table IV-44
Management Areas By Restrictive Categories 1/

Withdrawal

3 - All developed recreation sites
4 - Mt. Baker National Recreation Area (Geothermal withdrawal)
5C - Wild portion of Potential Wild and Scenic Rivers
8 - Special Areas
10 - Wilderness
16 - T & E Species
18 - Research Natural Area
20 - Cedar River Municipal Watershed
21 - Green River Municipal Watershed
26 - Administrative Areas
27 - Alpine Lakes Special Areas

Highly Restrictive

1A-C- Dispersed Recreation
4 - Mt. Baker National Recreation Area (locatable and saleable minerals)
5A-B- Recreation and Scenic segments of Potential Wild and Scenic Rivers
6 - Skagit Wild and Scenic River
7 - American Indian Religious and Cultural Uses
11 - Old Growth Habitat Emphasis (MR)
12 - Mature and Old Growth Wildlife Habitat (MR)
13A-D- Riparian and Fish Habitat Emphasis
14A - Deer and Elk Winter Range Habitat (MR)
15A - Mt. Goat Habitat (MR)
22 - Sultan River Municipal Watershed
23 - Other Municipal Watersheds
25 - Special Use Sites (Utilities and Electronic Sites)

Moderately Restrictive

1E - General Dispersed Recreation
2 - Scenic Viewshed
27 - Alpine Lakes Scenic
27 - Alpine Lakes Dispersed Recreation

Low Restrictions

1D - Roaded Natural Dispersed Recreation
1F - Mt. Baker Recreation Area
17A-F- Timber Management Emphasis
19 - Mt. Hemlock Zone
24 - Minimum Management Emphasis
27 - Alpine Lakes General Forest

1/ Refer to Chapter II for brief descriptions of the management areas.

Figure IV-9

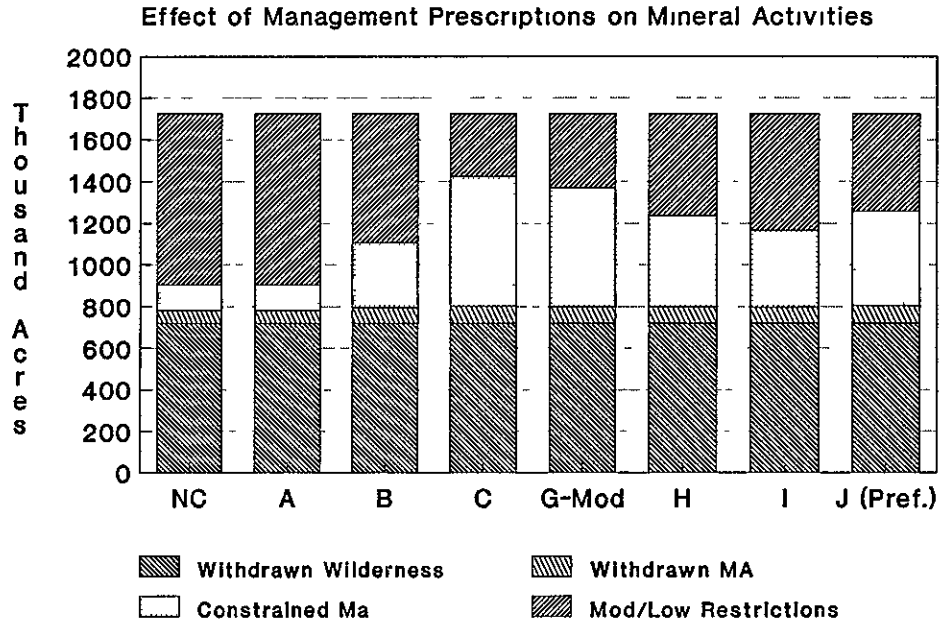


Table IV-45
Acres And Percentages Of The Forest Withdrawn Or Highly Restricted

Alternative	Area Other Than Wilderness Where MA Prescriptions Specify Withdrawal	Area Highly Restricted By MA Prescriptions 1/	% of Forest available for mineral entry - in Highly Restricted MA Prescriptions Category
NC (No Chg) 2/	Similar to A	Similar to A	Similar to A
A (No Action)	58,708 acres	124,429 acres	13%
I	75,162 acres	370,267 acres	40%
B (RPA)	74,231 acres	310,692 acres	33%
H	79,638 acres	437,423 acres	47%
J (Preferred)	83,797 acres	453,558 acres	49%
C	79,638 acres	624,468 acres	68%
G-Modified	78,3708 acres	569,603 acres	62%

1/ Includes Mt. Baker National Recreation Area (8,743 acres), which is withdrawn from geothermal entry.
2/ No actual acres can be estimated for Alternative NC, as management areas were not assigned in that alternative.

Figure IV-10

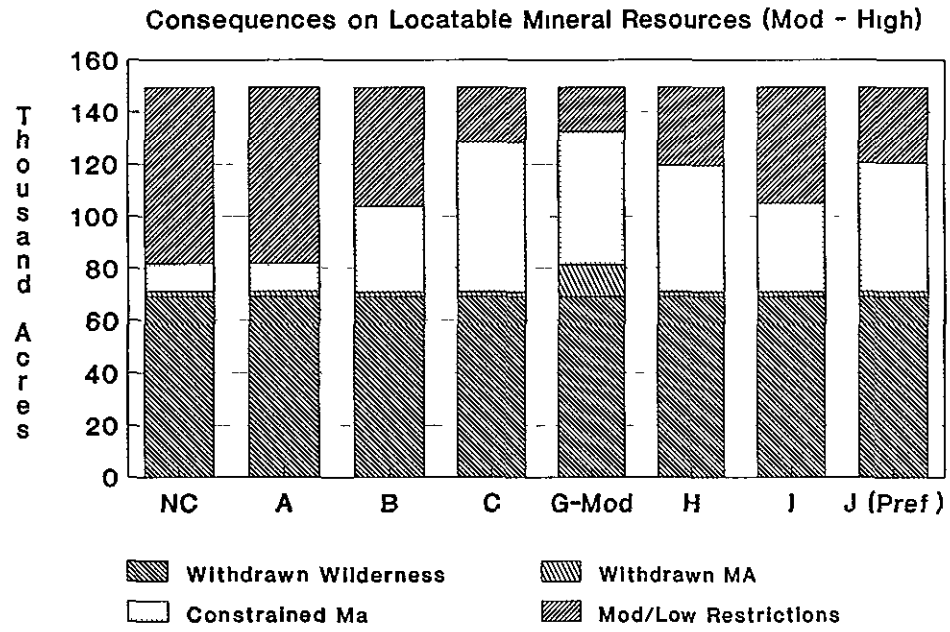


Figure IV-11

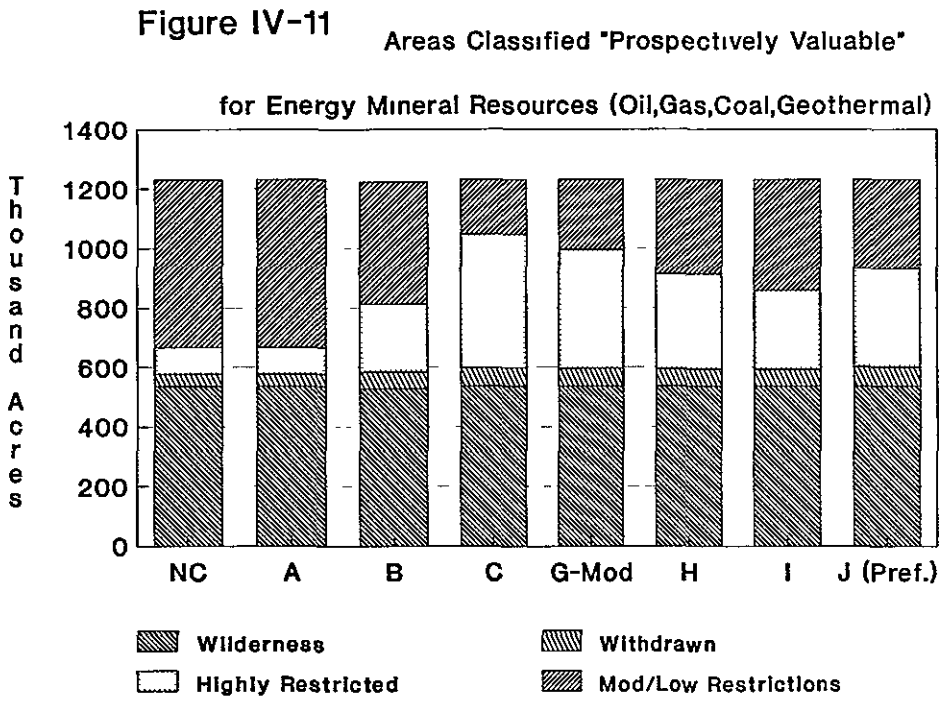


Figure IV-12 Consequences in Areas "Prospectively Valuable" for Oil and Gas Resources

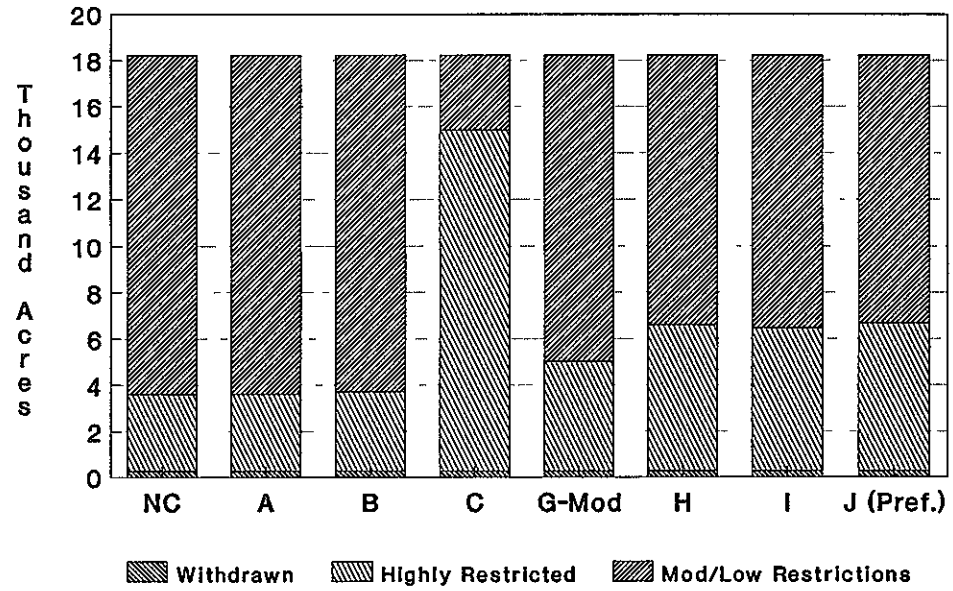


Figure IV-13 Consequences in Areas "Prospectively Valuable" for Coal Resources

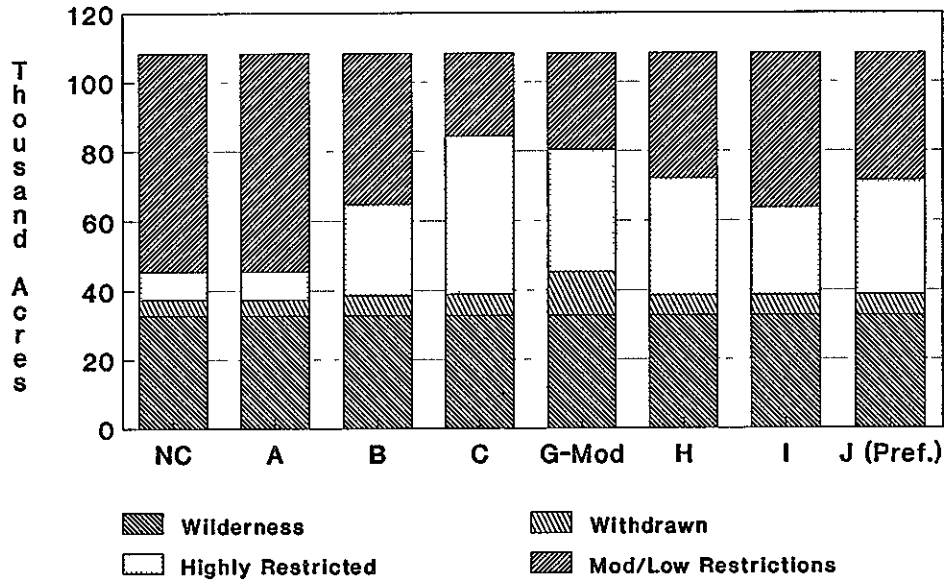
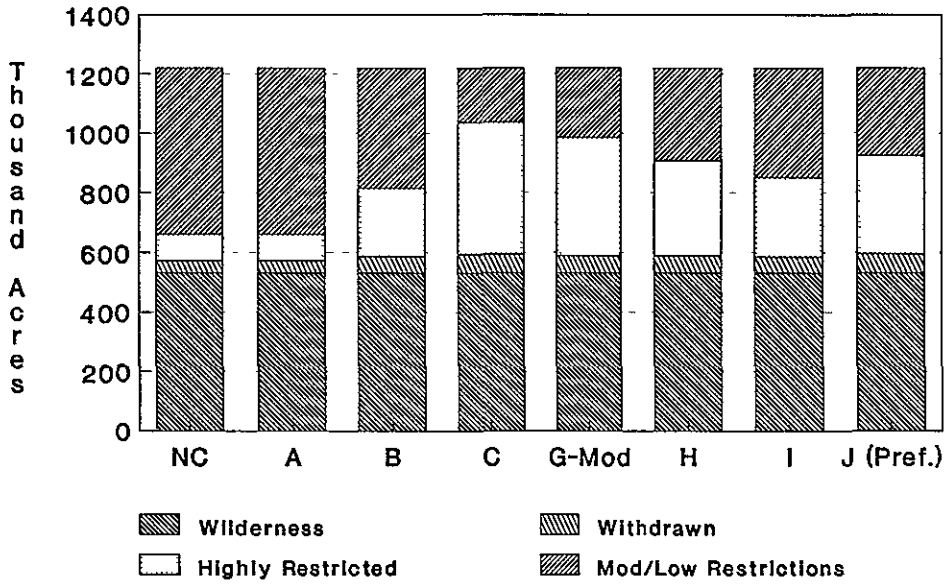


Figure IV-14 Consequences in Areas "Prospectively Valuable" for Geothermal Resources



Direct Effects of Wilderness on Minerals

In all alternatives, the acres of wilderness (721,718 or 42 percent of the Forest) have already been withdrawn. The only mineral operations allowed within these areas will be those authorized by valid existing rights perfected prior to the area's withdrawal as wilderness. The quantified effect of wilderness withdrawals has not been determined.

Direct Effects of Research Natural Areas on Minerals

The potential for major direct effects on minerals can occur in these areas. Because of the potential conflict with sensitive plants and unique plant communities, this allocation imposes high restrictions relative to access and development. If protection could not be assured during mining, the need for withdrawal will be considered through an environmental analysis of specific operating plans.

Existing RNA's are withdrawn from mineral entry. Impact on the non-wilderness potential areas will vary by alternative and by area depending on mineral potential. Alternatives H, J (Preferred), C, and G-Modified will be the only ones to have any additional effects. The same number of Research Natural Areas are proposed in each of these four alternatives.

Table IV-46 **MINERAL INTENSITIES BY ALTERNATIVE 1/**

LOCATABLE MINERAL RESOURCES	ALT A	ALT B	ALT C	ALT G	ALT H	ALT I	ALT J
Acres of "high" potential- wilderness	7180	7180	7180	7180	7180	7180	7180
Acres of "high" potential- withdrawn	42	42	42	232	42	42	42
Acres of "high" potential- highly restricted	4160	8257	17465	17824	14529	7476	13157
Acres of "high" potential- moderately restricted	14762	8806	6906	4308	5343	8722	6610
Acres of "high" potential- low restrictions	7624	9482	2175	4224	6673	10348	6779
Acres of "moderate" potential- wilderness	61961	61961	61961	61961	61961	61961	61961
Acres of "moderate" potential- withdrawn	1943	1732	1732	12016	1732	1732	1964
Acres of "moderate" potential- highly restricted	6589	24561	40019	33219	33958	26609	36007
Acres of "moderate" potential- moderately restricted	34423	8299	5280	2957	5639	5470	4857
Acres of "moderate" potential- low restrictions	10707	19070	6631	5470	12333	19851	10834
Acres of "low" potential- wilderness	652577	652577	652577	652577	652577	652577	652577
Acres of "low" potential- withdrawn	56723	72457	77864	66122	76470	73388	81791
Acres of "low" potential- highly restricted	113680	277874	566984	518560	388936	336182	404394
Acres of "low" potential- moderately restricted	345453	224128	146730	62785	168693	149222	183327
Acres of "low" potential- low restrictions	406970	348368	131250	275362	288730	365135	253314
ENERGY MINERAL RESOURCES							
Acres of "known" geotherm resource area- wilderness	3421	3421	3421	3421	3421	3421	3421
Acres of "known" geotherm resource area- withdrawn	0	0	0	0	0	0	0
Acres of "known" geotherm resource area- high restricted	0	0	0	0	0	0	0
Acres of "known" geotherm resource area- mod restricted	0	0	0	0	0	0	0
Acres of "known" geotherm resource area- low restricted	0	0	0	0	0	0	0
Acres of "pros valuable" for geotherm- wilderness	531252	531252	531252	531252	531252	531252	531252
Acres of "pros valuable" for geotherm- withdrawn	41117	55583	62277	59277	58983	54590	64030
Acres of "pros valuable" for geotherm- high restricted	88443	226388	442238	394321	316247	264907	327229
Acres of "pros valuable" for geotherm- mod restricted	296481	169813	106013	57821	125422	115264	142612
Acres of "pros valuable" for geotherm- low restricted	262965	237222	78476	176993	188354	254244	155134
Acres of "pros valuable" for coal- wilderness	32775	32775	32775	32775	32775	32775	32775
Acres of "pros valuable" for coal- withdrawn	4688	5786	6124	12396	5786	5786	5807
Acres of "pros valuable" for coal- high restricted	7961	26355	45510	35162	33557	25194	33093
Acres of "pros valuable" for coal- mod restricted	36514	15839	10918	7391	12376	12819	12692
Acres of "pros valuable" for coal- low restricted	26377	27559	12988	20591	23821	31741	23947
Acres of "pros valuable" for oil & gas- wilderness	0	0	0	0	0	0	0
Acres of "pros valuable" for oil & gas- withdrawn	253	253	253	253	253	253	253
Acres of "pros valuable" for oil & gas- high restricted	3336	3463	14741	4773	6357	6229	6441
Acres of "pros valualbe" for oil & gas- mod restricted	3675	3527	1499	401	2239	1289	3421
Acres of "pros valuable" for oil & gas- low restricted	10960	10982	1732	12798	9376	10454	8109
ENERGY MINERAL RESOURCES							
Acres of "PROS VALUABLE" for oil,gas,geo,coal-withdrawn	41117	55583	62277	59870	58093	54590	64030
Acres of "PROS VALUABLE" for oil,gas,geo,coal-hi restricted	89203	230337	447560	399347	320597	268286	331326
Acres of "PROS VALUABLE" for oil,gas,geo,coal-mod restricted	299057	171101	106182	57821	125950	116151	143034
Acres of "PROS VALUABLE" for oil,gas,geo coal-low restricted	265119	237475	78476	177458	188966	255469	156105

1/ Mineral resources grouped to eliminate overlaps between resource areas

Direct Effects of Wild and Scenic Rivers on Minerals

Allocations to or designations of Wild, Scenic, or Recreation Rivers could have a significant direct effect on mineral activities due to high or withdrawn access restrictions. Allocations to Wild River will generally result in the withdrawal of land from mineral activities within 1/4 mile either side of the river. In some cases, withdrawal may be recommended in Scenic Segments. Protection of visual resources on lands adjacent to the 1/4 mile corridor (i.e. within the viewshed) may impact mineral activities on a much larger area due to public demand for protection of those areas. Development of reservoirs and powerlines, and other types of intensive use, are generally not permitted on Wild and Scenic Rivers. Removal of sand and gravel will usually be prohibited. Alternatives G-Modified, C and J (Preferred) will have the greatest effects while Alternatives NC, I, and B will have no effects at all. There will be some effects in Alternatives A and H, but they will be minimal due to the few rivers and/or miles recommended.

Direct Effects of Roads on Minerals

In general, the relationship between the Forest's road system and mineral resources is a positive effect. Common variety mineral resources provide the materials from which roads are constructed and maintained, whereas the road system provides access for mineral exploration, development and production activities. On the Forest, the dominant market for construction materials is in support of the timber management program. Future demand will continue to reflect the level of road building and maintenance needed for timber harvesting activities. It appears that the need for new roads will not be influenced significantly by mineral-related activities unless on-going and future exploration leads to larger scale development.

Minerals - The Cumulative Effects of the Alternatives

Even though an area has a high or moderate potential for the occurrence of mineral resources, it is of little value if the area is withdrawn for mineral exploration and development or highly restricted by management area prescription.

The cumulative effects of the existing withdrawals and any new withdrawals resulting from the Forest Plan, are increased by those withdrawals made when a new application for a power project is received. Not only is the site automatically withdrawn from mineral entry when the application is received, but it remains withdrawn; there is presently no mechanism for revocation. Since it is not known where, when, or what type of hydroelectric project might be applied for in a given area, it is not possible to quantify the anticipated impact that future proposals of this nature will have on minerals availability.

Minerals - The Indirect Effects on Other Resources

Trails

Mining activities could influence the location of proposed new trails. Existing facilities would be protected through mining operation plans. Alternatives that have the largest number of trails (I, G-Modified, and J (Preferred)), will have the greatest risk of conflict.

Land Ownership and Use

There are no known indirect effects on Land Ownership and Use from changes in Minerals in any of the alternatives.

Roads

In general, existing Forest roads and trails on the Mt. Baker-Snoqualmie National Forest have been adequate to satisfy the access requirements for the level of exploration activity conducted during the past 10 years. Whether the system remains adequate will depend on the results of recent and future exploration. In most cases, when access is needed for mineral-related activities, it can be developed so that it is compatible with the Forest Service road system. However, the holder of a valid mining claim has a statutory right of appropriate access to the claim. The claimant's road needs may not always be compatible with planned or existing systems. In such cases, the incompatibility will be mitigated to a reasonable extent through an approved plan of operation, while recognizing the rights of the mining claimant. This is constant through all of the alternatives.

Mineral exploration and extraction, and geothermal exploration can result in damage and/or obliteration of existing roads if sites are adjacent to or within roadways. If a significant ore body were discovered, a large increase in use of the affected road system would result. The actual amount of development is beyond the control of any alternative, as existing mining laws and regulations take precedence. However, the alternatives vary in their degree of restrictions, and the alternatives that have the most highly restrictive acres would be the least favorable to development. Alternatives C, G-Modified, H, and J (Preferred) will have the most restrictions on mineral entry and development, while Alternatives B, I, A, and NC will have the fewest restrictions.

Mitigation Measures for Minerals

Under all alternatives, threatened and endangered plant and wildlife species would be protected to the extent required by law, as would flood plains and wet lands. Potential damage to archaeological and/or historic sites would require mitigation or avoidance by the prospector or miner. Protection of surface and subsurface waters from contamination would be required, as would maintenance of air quality. For each mining development, a Plan of Operation would be prepared and submitted to the Forest Service for approval. The Plan of Operation would incorporate these requirements and others as needed, as well as identify how each requirement would be met. All mitigation costs would be borne by the proponent.

Proposals for mineral exploration and development are negotiated on a case-by-case basis. When a proposal is received, the Forest Service can work with a proponent and other agencies to minimize or mitigate adverse impacts on those resources requiring some degree of protection. Only reasonable restrictions to mining can be legally imposed on areas not withdrawn.

Examples of possible mineral activities might include proposals to test drill for ore in wilderness, wild and scenic rivers, or semi-primitive nonmotorized dispersed recreation areas. If roads were needed to transport the drilling

equipment and a site needed to be leveled and cleared in order to operate, the integrity of these areas could be compromised. To mitigate these impacts, the operator may be required to build roads with costlier standards or in less-than-optimum locations, or drilling equipment and personnel may need to be flown in. Hence, the economic viability of an operation may be reduced.

Another example might be a proposal to test drill in a Research Natural Area, Botanical Area, or Special Area. Sensitive plants are known to inhabit such ares. In order to protect the plants, the operator may be required to slant drill from an off-site location.

Other mitigation could be required if valuable deposits were found in a dedicated wildlife habitat area. The proposal might threaten to drive the animals from the site and make it unusable. To mitigate this impact the proposal could be scaled down. In addition, restrictions would be placed on operations during the mating, birthing, and rearing seasons for the species.

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Minerals

Mining and minerals are important to county, state and national plans at all levels of the economy. The effects of implementing any alternative many conflict with their objectives and federal mining laws. The U.S. Mining Laws Act of 1872 predates all other laws that govern Forest Service activity. Because of this, frequent conflicts arise between administration of mining and other resources such as visuals, wilderness, water, sensitive wildlife and plants, and recreation.

ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

General

Table IV-47 shows the net energy balance calculated for each Forest Plan alternative. The net Forest resource energy balance is the difference between the energy produced and the energy expended in utilizing a resource or service. The Methods for Evaluating Energy Effect of Forest Management Alternatives, Volume 1, written by Gideon Schwartzbart and Patrick L. Schmidtz was used as a reference for energy formula formats and coefficients.

Energy considerations for each resource activity include the following:

	Energy Consumption
Water:	Construction and maintenance of hydroelectric facilities.
Timber:	Extraction, transport, processing, road construction and maintenance.
Recreation:	Recreation transportation, campground and resort construction and maintenance.
Wildlife:	Not considered.
Range:	Not considered.
Minerals:	Not considered.
Fire Management:	Prevention and suppression.
	Energy Yield
Water:	Energy production at existing sites only.
Timber:	Savings over other construction material, heating value.
Recreation:	None
Wildlife:	Harvest of game.

Due to the minor amount of minerals development and the minor nature of the range program, these were not considered in the energy balance calculations. The potential geothermal and potential hydroelectric power development were not quantified. These sources will probably add to the long-term energy output of the Forest in any alternative selected.

Table IV-47
Net Energy Balance For All Resource Activities
Figures in billions of British Thermal Units (BTU's)

Alternative	1986	2000	2030
NC	11,998	11,707	11,471
A (No Action)	11,980	11,542	11,116
I	12,259	11,971	11,509
B	12,286	14,975	11,520
H	12,416	12,149	12,250
J (Preferred)	12,518	12,267	11,797
C	13,062	12,859	12,488
G-Modified	12,790	12,603	12,352

LAND OWNERSHIP AND USE

Land Ownership and Uses -The Direct Effects of Each Alternative

None of the alternatives propose adding or deleting land uses from the current situation; however, all alternatives will affect future adjustments in the land base. All alternatives maintain approximately the same total number of National Forest acres, but consolidate ownership into different configurations to reduce operation and maintenance costs, respond to issues, or continue current plans.

Land Ownership and - Use The Cumulative Effects of the Alternatives

There are none.

Land Ownership and Use - The Indirect Effects on Other Resources

Roads

There are no known indirect effects on Roads from changes in Land Ownership and Use in any of the alternatives.

Mitigation Measures for Land Ownership and Use

During land exchanges, title to rights-of-ways needed to access other National Forest land will be held. (Refer to the discussion of mitigation measures, Chapter II.)

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Land Ownership and Uses

There are none.

ROADS

Roads - The Direct Effects of Each Alternative

General

Roads, in particular new construction and reconstruction, have significant effects on nearly all of the environmental components discussed in this chapter. A multitude of direct, indirect, and cumulative effects on various resources are associated with roads.

The effects of the alternatives on roads is linked directly with the level of timber harvest. Alternatives (NC, A, I, and B) with the highest amounts of timber harvest construct the most miles of new roads.

Construction of new arterial and collector roads occurs in all alternatives and will take place primarily in the roadless areas released by the Washington Wilderness Act of 1984. Alternatives with high timber harvest levels will build up to 28 miles of arterials and collectors in Decade 1. Alternatives with low timber harvest levels build as few as six miles of these roads. The estimated miles of arterial, collector, and local road construction and reconstruction under each alternative are shown in Table IV-48 and Figure IV-15.

Table IV-48
Road Construction and Reconstruction

	Decade 1		Decade 1	Decade 5
	..... Construction.....		..Reconstruction...	Construction
Alternative	Arterial/ Collector (miles/year)	Local (miles/year)	Local (miles/year)	Local 1/ (miles/year)
NC (No Change)	8.2	20.4	72.0	6.1
A (No Action)	1.4	17.4	55.8	10.8
I	1.8	15.3	47.7	9.3
B (RPA)	1.5	14.6	47.1	8.9
H	0.6	13.5	43.1	8.4
J (Preferred)	0.8	12.6	40.1	7.9
C	0.7	9.6	24.7	5.4
G-Modified	0.6	7.5	32.8	5.7

1/ All new arterials and collector road construction will be completed prior to Decade 5.

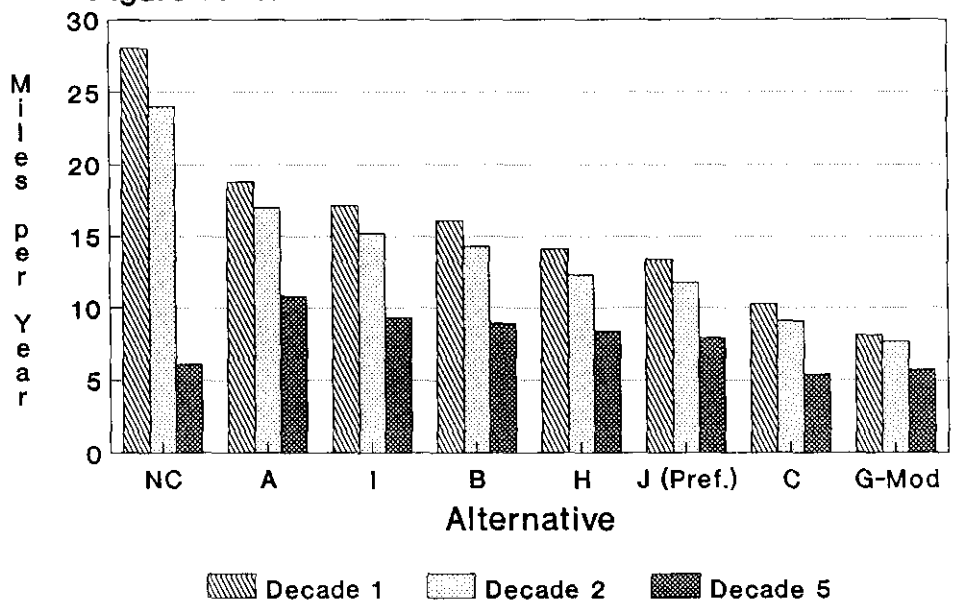
All alternatives purpose local road construction that is proportional to timber harvest activity. For the first decade, local road construction ranges from a total of 75 miles in Alternative G-Modified to 204 miles in Alternative NC.

Reconstruction of local roads for timber management will consist principally of the reopening of temporary roads, replacing sections destroyed by fill failure or slides, and minor improvements to drainage and surfacing. Miles of local

road reconstruction in the first decade vary from 247 miles in Alternative C to 720 miles in Alternative NC.

Road management of the local roads will be consistent across the Forest within a given management area. Therefore, overall differences in road management between the alternatives is a function of the acres assigned to each management area. Many of these roads will be designed to make them unattractive for use by passenger cars.

Figure IV-15 Average Annual Road Construction



The construction of a road over the Cascade Crest in the vicinity of Naches Pass could occur in Alternatives NC, A, I, B, H, and J (Preferred).

Direct Effects of Trails on Roads

Construction of additional new trails may result in a need for additional signing, trailheads, and parking areas adjacent to roads. It may also require the construction and maintenance of short access roads to these new facilities. These effects will vary with the amount of new trail construction in each alternative. Increased use of both the existing trail system and new trails to be constructed could result in higher levels of use of the roads accessing the trails.

Trail maintenance would have little effect on roads except in those situations where reduction of trail funding would cause some trails to deteriorate to a point where they would be unusable. When this happens, the signing needs and road access needs for trail use will also be less.

Direct Effects of Mining, Energy Development on Roads

The construction, operation, and maintenance of small hydroelectric facilities may require the construction of both permanent and temporary roads by the developers for access. These effects vary by alternative, based on the number of FERC projects which could be developed under the management area assignments of that alternative. For these estimates, see the section on Water earlier in this chapter.

Roads - The Cumulative Effects of the Alternatives

In general, the effects of management activities increase as the road mileage increases and as the intensity of each management activity increases. In addition to the total miles of road, the cumulative effects that would vary by alternative include changes in levels of road use by timber purchasers and recreationists; maintenance standards (smoothness and type of road surface); miles of roads closed for game management, economic, and recreation needs; and miles of roads reconstructed.

Roads - The Indirect Effects on Other Resources

Refer to the previous Chapter IV discussions of Soils and Water, Vegetative Diversity, Old Growth, Wildlife, Fish, American Indian Religious and Cultural Use, Archaeological and Historic Properties, Scenery, Recreation, Wilderness, Research Natural Areas, Roadless Areas, Wild and Scenic Rivers, Air, Fire, and Minerals and Landownership for additional information.

Trails

Road construction historically has had the greatest effect on trails primarily by replacement. Roads have tended to replace trails, rather than be built as additions to the transportation network because (1) roads often have the same destination as trails and (2) the most favorable locations for proper road grade and alignment have followed the same routes as trails. This trend has been most pronounced in the lower elevation commercial forest land, where roads have served predominately as the means to remove harvested timber from the Forest. In these lower elevations of the Forest, the primary road system has been built, and most of the once-existing trails have long been obliterated or bisected to the point that they receive little or no use.

The actual effect of any alternative on trail system mileage will be a function of (1) the miles of trail needing relocation due to new road construction; (2) miles of trail reconstructed; and 3) miles of trail maintained or abandoned.

Although it cannot be predetermined how many actual miles of trails would be replaced and relocated by road development in any of the alternatives an idea of impacts can be assessed by reviewing the of miles of the trail system located in areas were timber management would occur.

Alternative A would have a high risk of trail loss as there 166 miles of the trail system in timber management allocations where severe impacts to these trails may be expected.

Obliteration, bisection, relocation, and reduction of recreational experience will be higher in Alternative NC than in Alternative A due to its higher degree of roading.

In Alternative I, high levels of road construction in the roadless areas would result in a high number of trail miles obliterated, severely impacted, or bisected. As large areas of the unroaded lands become roaded, there would be fewer practical locations for relocation of affected trails. Lands allocated to timber management contain 158 miles of system trail in this alternative, resulting in a high level of impact to the system. Roads constructed close to the wilderness would tend to attract trail users, make access easier, and (as has happened in the past) encourage creation of multiple user-made trails. While loss of trail mileage would be somewhat mitigated by trail relocation, the loss of wilderness values (naturalness and solitude) would be accelerated (Hendee and others, 1978). Motorized trail use would decline, and motorized ORV use on closed roads would increase.

Alternatives B would be similar in effects to Alternative I. Alternative B has the greatest risk of change to the trail system, with 191 miles of trail within timber management allocations.

In Alternative G-Modified roads do not replace trails. This alternative has 100 miles of trails within timber management areas, but these trails will be protected in this alternative.

In Alternative J (Preferred) trails may be bisected or relocated, but the total mileage on the Forest will not be decreased. Only 74 miles of trail occurs within timber allocations in this alternative.

Alternative C causes the least impact to the existing trail system with only 57 miles of trail in timber allocations.

Signing will be needed to inform users of trail relocations. Additional roads bisecting trails will make the trail more attractive to motorized off-road users. With an increase in ORV use, trail width, and tread erosion will increase unless major reconstruction measures are taken.

In general, opportunities for off-road motorized use of trails would decline as the miles of road constructed increases. Segments of trail remaining will tend to be in the "most difficult" category and would not be suitable for motorized use. Conversely, those alternatives which would construct the most road will, in general, provide the greatest opportunities for "snow trails" for cross-country skiing and snowmobiling.

Mitigation Measures for Roads

The potential for adverse impacts can be reduced by minimizing road widths, minimizing total road miles, and using good locations. Much of the severe soil impact of mass wasting can be prevented by locating roads where soils and bedrock are stable. Where it is necessary to cross unstable soils, use of specialized structures such as binwalls and lightweight sawdust fills will help mitigate effects. The potential for erosion and mass wasting on fill slopes is reduced by end hauling excavation waste when constructing on steep slopes. Experience with these methods has shown them to be effective.

Cuts and fills are stabilized by grass seeding and/or brush plantings. The potential damage incurred by disrupting the natural surface and subsurface drainage patterns on the slope is mitigated by constructing the road with drainage dips and/or culverts and cross drains. At some stream crossings where there is a high potential for culvert blockage and subsequent road washout, impacts are mitigated by installing specialized overflow type structures.

Maintenance can mitigate potential impacts by cleaning ditches, opening up culverts, and repairing portions of the road before damaging failures occur.

To mitigate the effects on the environment of an expanded road system, selected road closures would be implemented, and trails would be relocated or reconstructed to meet the objective of no cumulative lose of trail mileage.

Some roads are closed to meet resource management objectives. Closures are used to discourage or eliminate all use by motorized vehicles over 40 inches in width. Road closures may eliminate traffic altogether where resource sensitivity is of particular concern. The purposes for closures include providing for water quality, erosion control, public safety, reduction of road user conflicts, reduction of maintenance costs, legal mandates, managing recreation opportunities, and protection/management of wildlife and wildlife habitat. Road closures can result in reduced disturbance to big game and to help meet the demand for quality hunting experiences. Closures may be permanent or periodic. Road closures are authorized in the Code of Federal Regulations, Title 36, part 261.

Permanent road closures would occur in Alternatives C (about 300 miles), G-Modified (about 65 miles), and H (about 20 miles), with the roadbeds being allowed to revert to a natural condition.

Other mitigation measures are discussed in Chapter II.

Conflicts Between the Effects of the Alternatives and Others' Plans and Policies for Roads

The City of Seattle and the Forest Service currently have an agreement whereby the Forest has not acquired public access rights over private road systems that access public land in the Cedar River watershed. Alternative B will pursue acquisition of public rights on roads leading to these public lands.

Some counties have approved subdivision plats and developments on private lands adjacent to National Forest System roads. Although the Forest has a responsibility to provide access to individual landowners whose properties are entirely surrounded by NFS lands, the Forest has no responsibility to provide access to subdivisions and developments. Counties are responsible for overseeing such access. If the counties continue to approve such subdivisions, additional conflicts over road responsibilities will develop.

E. RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The relationship between short-term uses of the environment and the maintenance and/or enhancement of long-term productivity is complex. Short-term uses refer to those that would occur within the life of this plan, generally 10 years or less, but a maximum of 15 years. Long-term productivity refers to the capability of the land and water to produce a continuous supply of resources and values for future generations. Soil and water are the primary factors of productivity and represent the measurement of the relationship between short-term use and long-term productivity.

Some short-term uses can be detrimental to long-term productivity, particularly if effective mitigation measures are not implemented. Surface mining can leave an area with greatly diminished productivity for growing vegetation if the top soil is removed and not replaced. This adverse effect can be mitigated effectively by requiring stock piling and spreading of topsoil. Introduction of sediments into a stream on a continuous basis could adversely effect the future long-term productivity of that stream for production of fish. This potential adverse effect can be effectively mitigated by elimination of sediment sources or trapping sediment before it reaches the stream by maintaining vegetation along stream banks.

Some short-term uses also have the potential to increase long-term productivity. Harvest of old-growth timber stands and establishment of young faster growing stands increases the long-term productivity of the land to produce wood fiber. The current productivity of the Mt. Baker-Snoqualmie National Forest in terms of net timber growth is approximately 34 cubic feet per acre per year (1976 Timber Inventory). Harvest of these old growth stands can increases average annual growth on the Forest up to 90 cubic feet per acre per year.

The Multiple-Use Sustained-Yield (MUSY) Act of 1960, one of the principal laws relating to the Forest Service activities, requires the management of the various resources in such a manner that the productivity of the land will not be impaired. This law along with Forest Service Policy that was in effect prior to the MUSY Act have provided the basic frame work for development of management activities that are centered around maintaining the long-term productivity of the National Forests.

Many of the mitigation measures described in detail in Chapter II, Mitigation Incorporated in Alternatives, are designed specifically to maintain or enhance long-term productivity as short-term uses (projects) are designed and implemented.

In all resource ares, long-term productivity of soil and water will be maintained or enhanced as a result of implementing the alternatives.

Implementation of the Forest Plan, which accompanies this FEIS, includes a monitoring plan. This monitoring plan will provide the data necessary to determine if the prescribed mitigation measures are effective in maintaining long-term productivity.

F. IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

An "irreversible commitment of resources" results from decisions to use or modify resources or environmental components of the Forest that cannot be renewed, or are renewable only over long periods of time. Examples are: old growth, soil productivity, minerals, cultural resources, scenery, and roadless areas. Once these resources are used or modified, they are irreversibly lost.

Soil productivity can be irreversibly lost or reduced by dedicated uses of the land. Examples of these uses would be arterial and collector roads, administrative sites, and developed recreation sites. Soil erosion, as a result of management activities, is an irretrievable loss because once the soil particles are removed from the site and deposited into a stream or river, they are no longer available. Accelerated erosion rates can reduce soil productivity and also reduce the water-holding capacity of the soil.

Removal of mineral or energy resources is an irreversible commitment of resources. The removal and utilization of rock resources for road construction would be an example of a common use on the Forest.

Reductions in habitat capability for old-growth-dependent species due to timber harvesting involve an irreversible and irretrievable commitment of resources.

The development of roadless areas would mean an irreversible loss of the characteristics which qualify these areas for Wildernesses or Roadless Areas. Development could also mean an irreversible loss of natural scenery and, in some cases, old-growth habitat.

Archaeological resources may be damaged by ground-disturbing activities; Irreversible information loss can result. Even when mitigation occurs prior to the activity, future study with more advanced techniques is precluded.

For American Indian religious use, land development removes the spiritual influence on the environment; this irreversibly removes the opportunity to conduct religious activities.

An "irretrievable commitment of resources" refers to a resource that is lost because of land use decisions or designations and/or scheduling decisions. These are opportunities foregone for the period of time that the resource cannot be used. Timber stands in management areas where timber harvest is not permitted represent an irretrievable loss of growth increases that could be made if the stands were being actively managed for timber production. Although the lost growth is irretrievable, the decision is not irreversible, since the stands could be managed at a later date in the future.

G. PROBABLE ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

Implementation of Alternative J (Preferred) will result in some adverse environmental effects that cannot be avoided. The identification of an "adverse effect" is somewhat subjective, depending upon an individual's point of view. There are some effects considered to be adverse, by general agreement. The following effects are associated with implementation of Alternative J (Preferred). Although many of these effects can be reduced through the use of mitigation measures, they cannot be completely eliminated.

Timber harvest and associated road construction will result in adverse effects on scenery, water quality, soils, American Indian religious and cultural use areas, and dispersed recreation use in a non-motorized environmental setting.

Harvest of old-growth timber stands will reduce the amount of habitat available for old-growth dependent species and reduce their populations.

Ground-disturbing management activities and facilities management will probably result in inadvertent destruction or displacement of archeological and historical resources. Even when mitigation occurs, future study and interpretation are precluded.

Any mineral extraction activities that occur will result in destruction of vegetation, production of sediments, and effects on scenery.

Development and use of recreation facilities will result in compaction of soil, loss of vegetation, water pollution, dislocation of wildlife and disturbance of their habitat, noise and dust production in small areas, and localized air pollution from campfire smoke and vehicle exhaust.

Air quality will be degraded on a localized and short-term basis from prescribed fire and activities that generate dust from unpaved roads.

Any of the proposed small hydroelectric projects that reach the construction stage will result in adverse impacts on soil, water, and vegetation to some degree. These would generally be on a localized area. Construction techniques and mitigation measures can minimize most impacts and limit them to the construction effects on the visual resource. Some projects will also have long-term impacts on wildlife, American Indian religious and cultural use (see below), and recreation.

Development, especially timber harvest and hydroelectric projects, will create features and habitats out-of-keeping with traditional Indian religious use, and will reduce the availability of some plant materials, such as cedar.

H. ENVIRONMENTAL CONDITIONS UNCHANGED BY ALTERNATIVES

Some environmental conditions and resource uses are essentially unchanged by any of the alternatives. These are resources which are often protected by law and are managed consistently in all alternatives. They include:

The wilderness acres are unchanged in any of the alternatives (refer to Chapter II, Alternatives Considered but Eliminated for Detailed Study). The acres assigned to each wilderness ROS class vary between alternatives, but total wilderness acreage does not.

Management of the Skagit Wild and Scenic River is unchanged across all alternatives. The existing management plan for this river system (which is incorporated into this Forest Plan) will provide the same set of environmental conditions in each alternative (refer to Chapter II, Alternatives Considered but Eliminated from Detailed Study).

The basic land allocations established through implementation of the Alpine Lakes Area Land Management Plan (1981) are the same in all alternatives (refer to Chapter II, Alternatives Considered But Eliminated from Detailed Study).

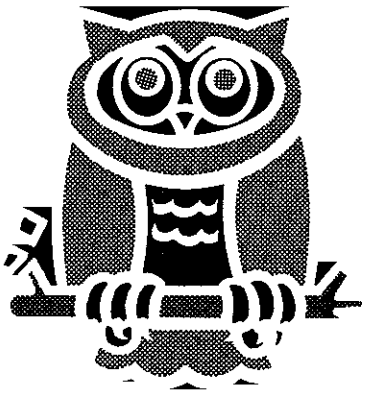
The Mt. Baker National Recreation Area, size and management, is unchanged in any of the alternatives.

Management of the North Fork Nooksack, Lake Twenty-two, and Long Creek Research Natural Areas will remain the same in all alternatives. Although the alternatives recommend different numbers of new research natural areas for designation, the existing ones remain unchanged.

None of the alternatives result in any environmental consequences on prime farmlands, prime rangelands, or prime forestlands. None of these prime lands would be converted to other uses as a result of the implementation of any of the alternatives.

None of the alternatives results in any change in Indian Treaty Rights.

List of Preparers



LIST OF PREPARERS

Interdisciplinary team participants in the preparation of this Draft Environmental Impact Statement include: the Forest Management Team, consisting of the Forest Supervisor, District Rangers, and Forest Staff Officers; the Forest Planning Team; and other members of the IDT who provided analysis and support.

Forest Management Team

The primary role of this group was to help identify major Forest Issues, Concerns, and Opportunities (ICO's); develop Forest-wide Standards and Guidelines; develop alternative management schemes, and assist the Regional Forester in identifying a preferred alternative.

J. D. MACWILLIAMS	Forest Supervisor - B.S. Forest Management, Oregon State College, 1960 - 31 years experience with the USDA Forest Service.
BERNARD WEINGARDT	Deputy Forest Supervisor - B.S. Forest Management Science, Colorado State University, 1973 - 18 years experience with USDA Forest Service.
RUDY EDWARDS	North Bend District Ranger - B.S. Biology, Jackson State University, 1969; M.S. Soil Science, Tuskegee Institute, 1975, - 2 years experience with the Peace Corps in Swaziland 16 years experience with the USDA Forest Service.
PHYLLIS GREEN	Skykomish District Ranger - B.S. Forest Management, Oregon State University, 1974; M.B.A. Oregon State University, 1975 - 14 years experience with USDA Forest Service.
FRED HARNISCH	Darrington District Ranger - B.S. Forest Management, Purdue, University, 1963 - 27 years experienc with the USDA Forest Service.
LARRY HUDSON	Mt. Baker District Ranger - B.S. Forest Science, Colorado State University, 1971 - 19 years experience with USDA Forest Service.
TED LEWIS	White River District Ranger - B.S. Forest Management, Pennsylvania State University, 1960 - 30 years experience with USDA Forest Service.
*MIKE COOLEY	Recreation, Cultural, and Visual Resources Staff Officer - B.S. Forest Management, Oregon State University, 1966 - 26 years experience with USDA Forest Service.
RONALD DeHART	Public Affairs Officer - B.A. Communications, University of Minnesota, 1974 - 15 years experience, USDA Forest Service.
RICHARD DEARSLEY	Soils, Range, Water, Fish & Wildlife Staff Officer - B.S. Forest Management, Michigan State University, 1957 - 30 years with USDA Forest Service, 3 years with Environmental Protection Agency.

ROBERT DUNBLAZIER Planning Staff Officer - B.S. Forest Management, University of Michigan, 1963; M.L.A., University of Michigan, 1971 - 17 years experience with USDA Forest Service.

BOYD LEONARD Administrative Officer - B.A. Accounting, Eastern Washington State, 1961 - 28 years experience USDA Forest Service.

BRUCE MATEER Timber Staff Officer - B.S. Forest Management, University of Michigan, 1960; M.F. University of Michigan, 1963 - 31 years experience with USDA Forest Service.

SAMUEL NAGEL Lands and Minerals Staff Officer - B.S. Forest Management, Iowa State University, 1958 - 33 years experience with USDA Forest Service

WALT WEAVER Forest Engineer - B.S. Civil Engineering, Iowa State University, 1961 - 27 years experience with USDA Forest Service.

Past Management Team Members

*JOSEPH ASTLEFORD, Deputy Forest Supervisor - B.S. Forestry, Pennsylvania State University, 1959 - 30 years experience with USDA Forest Service.

*LYLE E. JACK Planning Staff Officer - B.S. Forestry, Iowa State College, 1955 - 35 years experience with USDA Forest Service. (Retired)

*ARNOLD MASONER, Administrative Officer - Attended Fresno State, Business Major - 26 years experience with USDA Forest Service.

Forest Planning Team

The primary role of this group was to develop a proposed Forest Land Management Plan, along with a Draft Environmental Impact Statement. The Team developed a computer model of the Forest to help in assessing the effects of implementing each alternative.

*DON CULVER Interdisciplinary Planning Team Leader - A.A.S. Forestry, Paul Smith's College, 1952; B.S. Forest Management, University of Maine, 1957 - 34 years experience with USDA Forest Service. (Retired)

ROBERTA B. ESTES Geographer, Cartographic Technician - A.A.S. Forestry Technology, Green River Community College, 1983; B.A. Geography, University of Washington, 1990 - 12 years experience with USDA Forest Service.

CHRISTOPHER S. HANSEN Economist - B.A. Political Science, University of Colorado, 1968; M.A. Political Science/Economics, University of Colorado, 1969; PhD. Natural Resources/Economics, University of Michigan, 1977 - 13 years experience with USDA Forest Service.

PAULA JAMES Cartographic Technician - Attended Oregon Institute of Technology - 18 years experience with USDA Forest Service.

JAMIA MURRAY	Social Scientist, Writer-Editor - B.A. Political Science, University of Washington, 1976 - 15 years experience with USDA Forest Service.
DAVID REDMAN	Geographer, Recreation Planner - B.A. Geography, University of Washington, 1970; graduate study in Forestry and Geography, University of Washington, 1973 - 17 years experience with USDA Forest Service, 4 years private business.
MICHAEL T. WILSON	Forester, Resource Planning Specialist - B.S. Forest Management, University of Wisconsin, Stevens Point, 1974 - 4 years experience with USDA Bureau of Indian Affairs, 12 years experience with USDA Forest Service.
FRANK VELLA	Operations Research Analyst - B.S. Forest and Range Management, Colorado State University, 1982; M.S. Economics, Colorado State University, 1986 - 6 years experience with USDA Forest Service.
WILLIAM WAGSTAFF	Computer Analyst - B.A. Psychology, Pennsylvania State University, 1970; B.S. Forest Management, University of Washington, 1980 - 10 years experience with USDA Forest Service.
CHERI ZIEBART	Visual Information Specialist - Attended Montana State University, 1968-71 Graphic Design; Art Instructor and Substitute Teacher, Baker Mont Public School System - 4 years, 15 years experience with USDA Forest Service.

Past Planning Team Members

*PAUL FRANKENSTEIN	Recreation and Wilderness Specialist - B.S. Forest Management, University Michigan, 1949 - 33 years experience with USDA Forest Service. (Retired)
*DEBORAH GAY	Wildlife Biologist - B.S. Wildlife Management, Humboldt State University, 1976 - 8 years experience with USDA Forest Service, 2 years Plant Protection Service, 1/2 year National Park Service.
RICHARD KANG	Computer Programmer, Analyst - B.S. Forest Planning, University of Washington, 1980; graduate study in Public Administration and Forest Planning, University of Washington, 1982 - 10 years experience with USDA Forest Service.
*JAMES SCHMIDT	Economist - B.S. Economics, University of Santa Clara, 1972; M.F. Forest Management, Oregon State University, 1977; graduate study in Resource Economics, University of California, Riverside, 1973-74 - 13 years experience with USDA Forest Service.
*ROCKY SPENCER	Wildlife Biologist - A.A. Forest Science, Lower Columbia College, 1974; B.S. Wildlife Science/Ecology, Western Washington University, 1978 - 1 1/2 years experience with USDA Forest Service, 8 years experience with Washington Department of Game.

*DEWEY TATE — Data Manager - A.A. Forest Management, Wenatchee Community College, 1972; B.S. Forest Management, University Washington, 1976 - 17 years experience with USDA Forest Service.

*ROBERT E. TAYLOR — Forester, Resource Planner - B.S. Forest Management, University of Idaho, 1950 - 36 years experience with USDA Service. (Retired)

ID Team, Providing Substantial Contributions

The primary role of this group was development and analysis of inventory data, development of alternatives, analysis of effects, and contribution to preparation of the documents.

*JAMES BARTELME — Forester, Timber Budgeting and Analysis, W.O. - B.S. Forest Management, Washington State University, 1970 - 20 years experience with USDA Forest Service.

LEE BOECKSTIEGEL — Silviculturist - B.A. Forestry, University of Missouri, 1955; M.A. Forest Resources, University of Idaho, 1982 - 35 years with USDA Forest Service.

JAMES BRAIN — Assistant Fire Staff Officer - B.S. Forest Management, University of Washington, 1963 - 27 years experience with USDA Forest Service.

*WILLIAM BUTLER — Darrington District Ranger - B.S. Forestry, University of California, 1959 - 28 years experience with USDA Forest Service. (Retired)

LARRY DONOVAN — Resource Assistant - B.S. Forest Management, University of Minnesota, 1972 - 17 years experience wit the USDA Forest Service.

JAMES DOYLE — Fisheries Biologist - A.A.S. Professional Forestry, Paul Smith's College, 1965; B.S. Wildlife Management, Utah State University, 1967, graduate study Fisheries/related aquatic sciences American University and University of Washington - 3 years Research Zoologist, Defense Nuclear Agency, 14 years experience with USDA Forest Service.

GERALD E. HAZEN — Logging System Specialist, Timber Sale Planner - B.S. Forest Management, University of Montana, 1962 - 29 years of experience with USDA Forest Service.

CAROLYN HOLBROOK — Landscape Architect - B.L.A. Virginia Polytechnic Institute and State Unversity, 1976 - 13 years experience with USDA Service, 8 months USDI Bureau of Land Management.

SANDRA KNIGHT — Wildlife Biologist - B.A. Psychology, Washington University, St. Louis, Missouri, 1972; M.S., Wildlife Biology, Utah State University, 1978 - 11 years of experience with USDA Forest Service, 4 years experience wildlife research, Utah State University and USDI Fish and Wildlife Service.

GEORGE LARSEN	Civil Engineer - B.S. Civil Engineering, University of Washington, 1961; M.S. Civl Engineering, University of Washington, 1974; Professional Engineer Registered in Washington since 1965 - 26 yrs experience USDA Forest Service.
*DAN MESCHTER	Mining Engineer - B.A. Geology, Darmouth College, 1950; graduate study Geology, Washington University, Missouri - 11 years experience with USDA Forest Service, 20 years experience with U.S. Geological Survey, Atomic Energy Commission, Bureau of Land Management, and Private Industry. (Retired)
JAMES MCDONALD	Archaeologist - B.A. Archaeology, Yale University, 1973; M.A. Archaeological Resource Management, University of Arizona, 1975 - 13 years experience with USDA Forest Service.
*MADONNA MOSS	Archaeologist - B.A. Anthropolgy, William and Mary, 1976; M.A. Anthropolgy, University of California at Santa Barbara, 1982; PhD. Anthropology, University of California at Santa Barbara, 1989 - 7 years experience with USDA Forest Service.
*SID NERDAHL	Engineering Staff Officer - B.S. Agricultural Engineering, North Dakota State University, 1959 - 27 years experience with USDA Forest Service. (Retired)
DALE POTTER	Recreation Planner - Graduate, New York State Ranger School, 1962; B.S. Forest Management, University of Idaho, 1968; M.S. Outdoor Recreation, University of Washington, 1970; PhD. Candidate Outdoor Recreation, Wildlife Management, and Research Methods, University of Washington, 1974 - 26 years experience with USDA Forest Service.
JONI SASICH	Forester, Special Uses and Minerals - B.S. Soil Science, Montana State University, 1981 - 10 years of experience with the USDA Forest Service, 2 years experience as a consultant with the Montana Department of Natural Resources.
PATRICIA SERAFINI	Assistant Lands and Minerals Staff Officer - B.S. Forest Resources, University of Washington, 1982 - 10 years experience with the USDA Forest Service.
JOHN SIMMONS	Geologist,Area Mining Engineer - B.S. Geology, Western Washington State University, 1973; graduate study Geology Western Washington State University, 1974; Additional study Geology and Mining at the Colorado School of Mines, Mackay School of Mines, and University of Nevada, Reno - 7 years experience USDA Forest Service, 6 years experience with Bureau of Land Management.
*BERNARD A. SMITH	Mt. Baker District Ranger - B.S. Biological Sciences, California Polytechnic, 1967; M.S. Forestry, Utah State University, 1969 - 16 years experience USDA Forest Service.

ROBERT SNYDER	Soils Scientist - B.S. Soil Science, Washington State University, 1964 - 26 years experience with USDA Forest Service.
KEN WHITE	Trails, Winter Sports Specialist - Attended Oregon State University, Forest Management - 33 years exerience with USDA Forest Service.
*ALAN WOLFSON	Marketing Specialist - A.A. Political Science, Kendall College, 1967; B.S. Forest Management, Utah State University, 1970; M.F. Forest Ecology, Oregon State University, 1971; Graduate, Washington Agriculture and Forestry Education Foundation Rural Leadership Program, 1984 - 16 years with USDA Forest Service.

Additional Analysis/Support

Carol Aubry, Forester, Geneticist
Debbie Austin, Wildlife Biologist
Jamie Bumgardner, Computer Assistant, Word Processor
James Chu, Forester, Silviculture
Paul Clemens, Mailing List
Gail Curry, Cartographic Assistance
Melissa Dahl, Public Affairs Specialist
Kathy Duyungan-Albert, Public Affairs Specialist
Penny Faulkner, Recreation Specialist
* Diana Fletcher, Special Uses, Minerals
* Lisa Freedman, Lands Specialist
*Joel Freudenthal, Biologic Technician
* Valerie Gordon, Word Processor
Gary Gretencort, Civil Engineer
Susan Hada, Mailing List
Toby Hastie, Archeologist
Jan Henderson, Ecologist
*Frederick Henley, Landscape Architect (Retired)
* Deborah Holbert, Economist
Jan Hollenbeck, Recreation Planner
Susan Key, Cartographic Assistance
* Robert LaRock, Hydrologist
Matt Longenbaugh, Fisheries Biologist
Dedra Mast, Word Processor
Dennis McCarthy, Systems Analyst
*Vern Melcher, Forester, Timber Sales (Retired)
Karen Nolan, Forester, Timber Management
Dave Odahl,Forester
Debbie Redman, Word Processor
Rick Reitz, Forester
Mike Schone, Information Systems Manager
Doug Schrenk, Forester, Timber Management
Ruth Siguenza, Management Analyst, Planning
Pauline Valenzuela, Word Processor
Everett White, Forestry Technician - Land Acquisition
Kathy Weiss, Accountant
Bruce Wolfe, Forester
Arlene Yamada, Word Processor

* No longer on the Mt. Baker-Snoqualmie National Forest.

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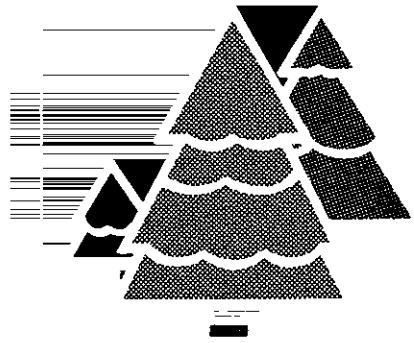

LIST OF AGENCIES, ORGANIZATIONS, AND INDIVIDUALS TO WHOM THE DOCUMENT WAS SENT

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Advisory Council On Historic Preservation
Department of Agriculture
- Animal & Plant Health Inspection Service
- Forest Service
- All Regional Offices
- Columbia River Gorge National Scenic Area
- Mount St. Helens National Volcanic Monument
- National Forests
  - Colville
  - Deschutes
  - Fremont
  - Gifford Pinchot
  - Malheur
  - Mt. Hood
  - Ochoco
  - Okanogan
  - Olympic
  - Rogue River
  - Siskiyou
  - Siuslaw
  - Umatilla
  - Umpqua
  - Wallowa-Whitman
  - Wenatchee
  - Willamette
  - Winema
- Pacific Northwest Forest & Range Experiment Station
- FS-INFO-NW
- Office of Equal Opportunity
- Rural Electrification Administration
- Soil Conservation Service

Department of Commerce
- National Marine Fisheries Service
- National Oceanographic & Atmospheric Administration

Department of Defense
- Deputy Assistant Secretary of Defense (Environment)
- Deputy Assistant Secretay of the Air Force
- Explosives Safety Board
- U.S. Army Engineering & Housing Support Center
- Chief of Navy Operations

Department of Energy
- Bonneville Power Administration
- Office of NEPA Project Assistance

Department of Interior
- Bureau of Indian Affairs
- Bureau of Land Management
- Burea of Mines
- Office of Environmental Affairs
- Fish & Wildlife Service
- National Park Service
  - Pacific Northwest Region
  - Mt. Rainier National Park
  - North Cascades National Park

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- Assistant Secretary for Mine Safety & Health
- Assistant Secretary for Occupational Safety & Health

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- Environmental Division
- Office of Pipeline Safety

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General Services Administration
Environmental Staff
Health and Human Services
Office of Special Programs Coordination
Housing and Urban Development
Environmental Officer, Region X
Interstate Commerce Commission
Chief, Section of Energy and Environment
Labor Department
Mine Safety & Health
Occupational Safety & Health
Federal Highway Administration
Region 10

Elected Officials

U.S. Senator Brock Adams
U.S. Senator Slade Gorton
U.S. Speaker of the House Tom Foley
U.S. Representative Rod Chandler
U.S. Representative Norm Dicks
U.S. Representative Jim McDermott
U.S. Representative John Miller
U.S. Representative Sid Morrison
U.S. Representative Al Swift
U.S. Representative Jolene Unsoeld
Governor Booth Gardner
King County Council
Pierce County Council
Skagit County Commissioners
Snohomish County Council
Whatcom County Council
Councilman Paul R. Mosher, Snoqualmie
Hon. Norm Rice, Mayor of Seattle

State Agencies

Washington Department of Ecology
Washington Department of Highways
Washington Department of Natural Resources
Washington Natural Heritage Program
Washington Department of Wildlife

County

King County Parks, Planning & Resources Department
King County Planning Department
Pierce County Planning and Natural Resources Department
Skagit County Planning Department
Snohomish County Planning Department
Whatcom County Planning Department

Municipal

Glacier Water District #4
Seattle City Light
Seattle Water Department

Tribal Governments

Columbia River Intertribal Fisheries Commission
Duwamish Tribe
Lummi Indian Business Council
Marietta-Nooksack Tribe
Muckleshoot Tribal Council
Nisqually Indian Community Council
Nooksack Tribal Council
Northwest Indian Fisheries Commission
Puyallup Tribal Council
Samish Tribe
Sauk-Suiattle Tribal Council
Small Tribes of Western Washington
Snohomish Tribe
Snoqualmie Tribal Council
Stillaguamish Board of Directors
Swinomish Tribe
Tulalip Board of Directors
Upper Skagit Tribal Council

Businesses

Don Baack & Associates
Georgia Pacific Corporation
Shapiro & Associates
The Campbell Group
The Oeser Company
Timber Data Company

Organizations and Associations

American Fisheries Society
American Forestry Assn.
American Rivers, Inc.
American Water Resources Assn.
Assn. of Consulting Foresters
Audubon Society
    National Audubon Society
    North Cascades
    Pilchuck
    Tahoma
    Seattle
Backcountry Horsemen of Washington
Friends of the Earth
Mountaineers
National Forest Products Assn.
National Wildlife Federation
Natural Resources Defense Council
Nature Conservancy
North Cascades Conservation Council
Northwest Forestry Assn.
Northwest Mining Assn.
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Timberland Regional Library
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Whatcom County Library
Wilkeson Branch Library

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Bellevue Community College
Edmonds Community College
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Evergreen State
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North Seattle Community College
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Seattle Central Community College
Seattle Pacific University
Seattle University
Shoreline Community College
Skagit Valley College
South Seattle Community College
Tacoma Community College
University of British Columbia
University of Puget Sound
University of Washington
Washington State University
Western Washington University
Whatcom Community College

Individuals

Abbott, B.W. & Teresa
Adams, Thomas C.
Ahlf, Vernon
Allen, Frank
Almack, Jon
Alverson, Ed
Ancock, Frank
Anderson, Carol
Anderson, Susan
Anderson, Ted
Angstrom, Dean
Armstrong, Jim
Arnold, Bob
Arola, Marvin V.
Arrington, Albert E.
Arthur, Bill
Arum, John
Asplund, Tricia
Badda, Richard R.
Balke, Jenny
Baltic, Tony
Barta, Howard J.
Bassett, Ken
Bauman, Larry
Baxter, Ed
Beckett, Bruce
Beebe, Chuck
Bell, Dale M.
Bell, Mike
Bergman, Margaret
Berquist, Bo
Beyers, William B.
Bigelow, Denise
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Blakley, Timothy J.
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Brennan, Mike
Brinton, Russ
Brokofsky, Janette
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Brown, Jovana J.
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Bryant, Dale
Buchanan, Victor
Buckley, Delrene K.
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Bush, Kelly
Camp, Edward
Campin, Bill
Campion, Tom
CdeBaca, Claire
Chapanis, Roger
Chapman, James L.
Chase, Craig
Chase, Gene L.
Claer, Patsy & Gary
Clark, Gerald
Coffman, Dave
Cohrs, Vern R. & Victor W.
Collins, Janet
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Cook, George
Coonts, Ed
Corrigan, Thomas F., M.D.
Currie, Lois Y.
Dalton, Brian & Debbie L.
Davenport, Nicholas
Davis, Gary
Day, Dr. Chad
Dayton, Don
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Doughton, Sandi
Draffan, George
Drew, Joseph L.
Dunbar, Richard
Dunshee, Hans
Durand, Arlene & Paul
Durning, Jean
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Eckert, Dennis
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Edwards, Tom E.
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Fiddler, Richard
Finsrud, Orville E.
Fleege, Dr. Patrick A.
Fluharty, David
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Harlan, Harold M.
Harper, Pat
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Henson, Royce H.
Hillesand, Scott
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Distribution

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Jasniewski, Susan
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Kral, Henry
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Langdon, J.
Larsen, David
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Louisignau, Ronald J.
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Moller, J. Christian
Monasmith, Brian & Phillip
Moore, Linda
Morgenthaler, Elrae & R.D.
Moriarty, Gerald
Morrison, Carol
Morrison, Jack R.
Moss, Madonna
Nafziger, Rich
Nagley, Robert
Naslund, Dave
Neelley, Ann
Nettleton, Donald
Nichols, Joan
Nicholson, Jill
Nixon, Nicole
Nonemaker, Sam
Novak, Jim
O'Mahony, Tim
Odell, Lee
Olsen, Walter H.
Osborn, Cynthia & Robert
Osbourn, Jim
Pankiewicz, Sharon & Teresa
Parker, Gareth
Parks, Donald
Pedersen, Dale
Pellham, Jack D.
Peterson, Don A.
Pfan, Michael E.
Pfeifer, Bob
Phillips, Jean
Pike, Greg
Platz, Bob
Pokrandt, Ronald C.
Pollmar, Albert M.
Potter, Ann
Price Jr., Allyn M.
Pringle, Patrick
Proehl, Thomas
Pryszlak, Gina
Psaradelis, Jean
Putnam, Robert
Quick, Robert
Rain, Jeffrey
Raines, Charlie
Rea, Joel
Reece, Clayton & Mildred
Reed, Steve
Reininger, Becky
Reusser, David
Reynolds Jr., Shirley W.
Riley, Alan
Risser, Jack
Roe, Michael
Roessel, Gary
Rogalski, Ray
Rommel, Scott
Roper M.D., John W.
Russer, David
Rutz, Richard
Saperstein, Ralph
Schaad, Sandra
Schaefer, Susie
Schein, Edward W.
Schmaltz, David M.
Schroeder, Richard
Scott, William
Seibert, Debbie & Ken
Shattuck, Dennis A. & Lola
Shea, Mike
Shecton, Alan
Sherman, David
Sherpinski, Charles
Sherwood, Debbie & Keith
Shoemaker, Randy
Shon, Fay
Siebert, Lee
Sisco, Chuck
Smallidge, Jerald E.
Smith, Dr. David
Smith, Larry J.
Smith, Reiley
Smith, Ron
Smith, Dr. J. Harry G.
Sobierlski, William
Somers, Elaine L.
Somers, Dave
Sommarstrom, Allan
Sonneson, Delmis L.

Southard, Daniel
Southworth, Rosemarie
Spence, Robert L.
Spencer, Rocky
Spencer, Terri
Spirit Eagle
Spring, Ira L.
Stahl, Andy
Stevenson, Patrick
Stone, R.P.
Strand, Kurt
Stricker, Paul
Stroh, Dan
Swanson, John R.
Swanson, Nolan
Sweeney, Steven
Tall, Joseph B.
Taylor, Rob
Taylor, Robert E.
Thaler, Toby
Theis, Jerry
Theoe, Don
Therrell, Lisa
Thomas, Jeffrey
Thompson, Dr. John L.
Thompson, James & Judith
Thompson, Janet
Thompson, Thor
Thorpe, Sylvia A.
Thorud, David B.
Tiger, Ruth
Tornberg, Larry
True, Todd
Tune, Gene
Turner, Darrell & Joy
Tyler, Thomas C.
Udd, Dr. Edward
Ushakoff, Vladimir
Vail, Dr. W. Banning
Van Epps, Charles P.
Vance, Mark
Vandling, Jim
Vidic, Jim
Waddell, Donald E.
Watanabe, Pat
Wattnem, Ron
Weir, Lynn
Wessman, George
Whitlock, Ron
Whitmore, Dick
Wickersham, Dale
Widmer, Dan
Wiggins, Tim
Wilbert, Loretta
Wilcox, Kenneth
Williams, Larry E.
Wilson, Harry
Wilson, Harry C.
Winn, Tom
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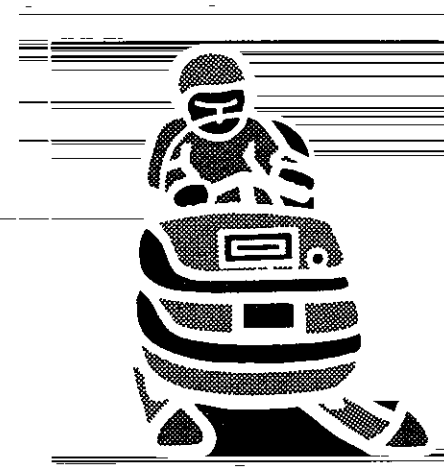

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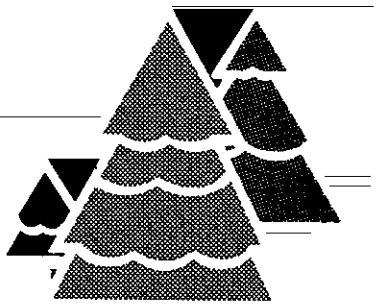
Glossary



Abbreviations Used In The Documents

AASQ - Average Allowable Sale Quantity

AMS - Analysis of the Management Situation

AQRV - Air Quality Related Value

ASQ - Annual Allowable Sale Quantity

BD - Brush Disposal

BLM - Bureau of Land Management

BMP - Best Management Practices

BSS - Base Sale Schedule

CEQ - Council on Environmental Quality

CF - Cubic Foot

CFL - Commercial Forest Land

CFR - Code of Federal Regulations

CMAI - Culmination of Mean Annual Increment

DBH - Diameter at Breast Height

DEIS - Draft Environmental Impact Statement

DNR - Department of Natural Resources, Washington State

DOE - Department of Ecology, Washington State

EIS - Environmental Impact Statement

EPA - Environmental Protection Agency

EVC - Existing Visual Condition

FEIS - Final Environmental Impact Statement

FERC - Federal Energy Regulatory Commission

FS - Forest Service

FSH - Forest Service Handbook

FSM - Forest Service Manual

FVC - Future Visual Condition

FWS - Fish and Wildlife Service, U.S. Department of the Interior

ICO - Issues, Concerns, Opportunities

ICOR - Interagency Committee for Outdoor Recreation, Washington State

IDT - Interdisciplinary Planning Team

KV - Knutsen-Vandenberg Fund

LAC - Limits of Acceptable Change

LTSYC - Long-Term Sustained Yield Capacity

MAI - Mean Annual Increment

MBNRA - Mt. Baker National Recreation Area

MBS - Mt. Baker-Snoqualmie National Forest

MIS - Management Indicator Species

MBF - Thousand Board Feet

MMBF - Million Board Feet

MCF - Thousand Cubic Feet

MMCF - Million Cubic Feet

MR - Management Requirement

MSF - Mt. Baker-Snoqualmie National Forest

NDY - Non Declining Yield

NEPA - National Environmental Policy Act

NF - National Forest

NFMA - National Forest Management Act

NFS - National Forest System

NPB - Net Public Benefit

PAOT - Persons-At-One-Time

PSD - Prevention of Significant Deterioration

OFM - Office of Financial Management, Washington State

ORV - Off-Road Vehicle

PCT - Precommercial Thin

PNV - Present Net Value

PNW - Pacific Northwest Region, USDA Forest Service

PNW - Present Net Worth

RARE II - Roadless Area Review and Evaluation

RIM - Recreation Information Management

RM - Roaded Modified

RN - Roaded Natural

RNA - Research Natural Area

ROS - Recreation Opportunity Spectrum

RPA - Forest and Rangeland Renewable Resources Planning Act

RVD - Recreation Visitor Day

SCORP - State Comprehensive Outdoor Recreation Plan

SEIS - Draft Supplemental to the Environmental Impact Statement for an Amendment to the Pacific Northwest Regional Guide - Spotted Owl Guidelines, 1986

SMU - Streamside Management Unit

SOHA - Spotted Owl Habitat Area

SPM - Semi-Primitive Motorized

SPNM - Semi-Primitive Nonmotorized

TSPQ - Timber Sale Program Quantity

TRI - Total Resource Inventory

TSE - Timber Stand Examination

TSI - Timber Stand Improvement

USDA - United States Department of Agriculture

USDI - United States Department of Interior

USFWS - United States Fish and Wildlife Service

VAC - Visual Absorbtion Capacity

VQL - Visual Quality Level

VQO - Visual Quality Objective

WFUD - Wildlife Fish User Day

WMU - Wetland Management Unit

WROS - Wilderness Recreation Opportunity Spectrum

Acquired Lands - Lands added to the National Forest system by purchase, transfer, or donation under authority of the Weeks Law or related acts. Also, lands obtained by the Forest Service by exchange for other acquired lands.

Acre Equivalent - Used to adjust actual acres of habitat improvement or improvement structures to reflect overall habitat benefits derived. It reflects the zone of influence of the habitat improvement for the target species. For example, a single water development for upland game birds has an acre equivalent of 160, whereas a single water structure for big game has a value of 640 because it has a larger zone of influence for the more mobile big game animals.

Acre-foot - A measure of water or sediment volume, equal to the amount which would cover an area of one acre to a depth of one foot (i.e., 43,560 cubic feet or 325,851 gallons).

Activity - Actions, measures, or treatments that are undertaken that directly or indirectly produce, enhance, or maintain forest and rangeland outputs or achieve administrative or environmental quality objectives An activity can generate multiple outputs Forest Service activity definitions, codes, and units of measure are contained in the Management Information Handbook (FSM 1309.11).

Administrative Unit - An area under the administration of one line officer, such as a District Ranger, Forest Supervisor, or Regional Forester.

Air Quality Related Value (AQRV) - Any physical, chemical, or biological component of an ecosystem that can be affected by changes in air pollutant levels. As an example: visual range as measured from a vista may be shortened by the presence of fine particulates in the air. Similarly a threatened or endangered plant species may be sensitive to sulphur dioxide levels.

Airshed - A geographical area that, because of topography, meteorology, and/or climate, shares the same air.

Age Class - An interval, usually 10 to 20 years, into which the age ranges of vegetation are divided for classification or use.

Allocation Zone - Geographic subdivisions of the Forest delineated for the purpose of controlling land allocations, so the FORPLAN Model could select only from a set of spacially feasible land allocations and harvest schedules. In addition, outputs and costs portrayed by zones would be more meaningful than portrayed by Forest-wide analysis areas.

Allowable Sale Quantity (ASQ) - The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the plan This quantity is usually expressed on an annual basis as the "Average Annual Allowable Sale Quantity." For timber resource planning purposes, the allowable sale quantity applies to each decade over the planning horizon and includes only chargeable volume Consistent with the definition of timber production, fuelwood and other non-industrial wood shall not be included in the allowable sale quantity.

Alternative - One of several policies, plans, or projects proposed for decision making.

Amenity - An object, feature, quality, or experience that gives pleasure or is pleasing to the mind or senses. Amenity value is typically used in land use planning to describe those resource properties for which market values (or proxy values) are not or cannot be established (such as clean air and water, scenic quality, etc.).

Anadromous Fish - Those species of fish that mature in the sea and migrate into streams to spawn. Salmon, steelhead, and shad are examples.

Analysis Area - A grouping of homogeneous land areas, formed from the land and resource inventory data comprising the data base. Similarities are in terms of common capabilities to produce resources and susceptibility to impacts. Analysis areas need not be contiguous areas of land.

Analysis of the Management Situation (AMS) - A determination of the ability of the planning area to supply goods and services in response to society's demand for those goods and services.

Animal Unit Month (AUM) - The amount of forage required by one mature (1,000 lb) cow or the equivalent for 1 month, based on an average of 26 lbs. of dry forage per day.

Aquatic Ecosystems - Stream channels, lakes, marshes or ponds, and the plant and animal communities they support.

Aquifer - An underground geological formation or structure that contains water in sufficient quantity to supply needs for water development.

Arterial Roads - See "Road, Arterial."

Average Annual Allowable Sale Quantity (AAASQ) - See "Allowable Sale Quantity."

Background - The viable terrain beyond the foreground and middleground where individual trees are not visible, but are blended into the total fabric of the stand. Includes the view beyond 3-5 miles from the observer and as far as the eye can see. (See "Foreground" and "Middleground.")

Basal Area - The area of the cross-section of a tree stem near the base, generally at breast height and inclusive of bark.

Base Sale Schedule (BSS) - A timber sale schedule formulated on the basis that the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade, and this planned sale and harvest for any decade is not greater than the long-term sustained yield capacity. This definition expresses the principle of non-declining flow.

Bedload - The sediment that moves by sliding, rolling, or bounding on or very near the streambed; sediment moved mainly by tractive or gravitational forces or both but at velocities less than the surrounding flow.

Benchmark - 1) The analytical basis from which the alternatives were developed. The use of assessed land capability as a basis from which to estimate the effects of alternative patterns of management on the land 2) Reference points that define the bounds within which feasible management alternatives can be developed. Benchmarks may be defined by resource output or economic measures

Benefit/Cost Ratio - The ratio obtained by dividing the anticipated benefits of a project by its anticipated costs (or realized benefits by realized costs) to obtain a measure of expected (or realized) benefits per unit of cost--a common exercise in cost-benefit analysis which gives a measure of economic efficiency.

Best Management Practices (BMP's) - A practice or combination of practices that is determined by a State (or designated area-wide planning agency) after problem assessment, examination of alternative practices, and appropriate public participation, to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals (Federal Register, Volume 40, No. 230 dated 11/28/75).

Big Game - Those species of large mammals normally managed for sport hunting. Big Game Summer Range - A range, usually at higher elevation, used by deer and elk during the summer Summer ranges are usually much more extensive than winter ranges.

Big Game Winter Range - A range, usually at lower elevation, used by migratory deer and elk during the winter months; usually more clearly defined and smaller than summer ranges.

Biological Growth Potential - The average net growth attainable in a fully stocked natural forest stand

Biological Potential - The maximum production of a selected organism that can be attained under optimum management.

Biomass - The total quantity at a given time of living organisms of one or more species per unit of space (species biomass), or of all the species in a biotic community.

Board Foot - The amount of timber equivalent to a piece of wood one foot square and one inch thick, being the unit in board foot measure.

Board Foot/Cubic Foot Ratio - A ratio expressing the number of board feet in a cubic foot of timber. Varies with tree species, diameter, height, and form factors.

Broadcast Burn - Allowing a prescribed fire to burn over a designated area within well-defined boundaries for reduction of fuel hazard or as a silvicultural treatment, or both.

Browse - Twigs, leaves, and young shoots of trees and shrubs on which animals feed, in particular, those shrubs which are used by big game animals for food.

Brush - A growth of shrubs or small trees, usually of a type undesirable to livestock or timber management.

Brush Disposal (BD) - A term commonly used to refer to disposal of slash. See "Slash," "Broadcast Burn," and "Residue Utilization."

Bureau of Land Management (BLM) - An agency within the Department of the Interior, with land management responsibility for the Public Domain lands.

Canopy - The more-or-less continuous cover of branches and foliage formed collectively by the crown of adjacent trees and other woody growth.

Capability - The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at given levels of management intensity Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology, as well as on the application of management practices, such as silviculture or protection from fire, insects, and disease

Capital Investment - An input that increases the value of natural or manmade resources (assets) needed to maintain or increase the flow of outputs in the future Benefits resulting from capital investments are normally recouped in excess of 1 year

Carrying Capacity - 1) The number of organisms of a given species and quality that can survive in, without causing deterioration of, a given ecosystem through the least favorable environmental conditions that occur within a stated interval of time 2) In recreation management, the level of recreational use that a site can provide without deterioration of the quality of the recreation experience of the resource.

Cavity Excavators - The hollow excavated in trees by birds or other natural phenomena; used for roosting and reproduction by many birds and mammals.

Cedar - Areas that have been sources of various cedar products, or are at least identified as significant stands of cedar Cedar is used in everything from smokehouse construction to spirit dancer costumes to basketry and other utilitarian items. Of all forest products it may be the most significant to the Indians of today, although it cannot survive without a total appropriate environment, most of which was used by the Indians in the past

Cemetaries & Archaeological Sites - Villages, camps, and burial areas (not in most instances known to be cemetaries) Other sites are ethnographically and/or historically known cemetaries Some are maintained and still used, others are not

Ceremonial Flora - Locations known to contain certain plants that have ritual or healing properties. Some areas so designated are large and may contain several such plant species, others are small and may possess only a few. Often areas containing specific flora are considered as ceremonially, ritually, and/or religiously powerful.

Channel or Stream Scour - Erosion of the channel bottom caused by high flows of water, loss of channel stability, or debris torrents.

Chargeable Volume - All volume that is included in the growth and yield projections for the selected management prescriptions used to arrive at the allowable sale quantity, based on Regional utilization standards.

CHUNK Study - An economic-efficiency study of the developed campgrounds on the Forest, completed in 1984. Refer to Chapter III, DEIS, Recreation.

Class I Stream - Perennial or intermittent streams (or segments thereof) that have one or more of the following characteristics: provide a direct source of water for domestic use; are used by large numbers of fish for spawning, rearing, and/or migration; and/or are major contributors to the quantity of water in a Class I stream. See "SMU."

Class II Stream - Perennial or intermittent streams (or segments thereof) that have one or more of the following characteristics: are used by moderate though significant numbers of fish for spawning, rearing and/or migration, and/or flow enough water to be moderate or not clearly identifiable contributors to the quantity of water in a Class I stream, or are major contributors to a Class II stream. See "SMU."

Class III Stream - All other perennial streams or segments thereof not meeting higher class criteria. See "SMU."

Deeply Incised - A stream channel with perennial stream flow, steep deep streambanks, and unstable sideslopes that can generate slumps and slides resulting in debris torrents. Class III channels incised more than 10 feet and having one or more unstable soil types qualifies as a deeply incised Class III stream. On this Forest, 70% of the Class III streams are deeply incised; they represent 66% of the total Forest stream miles.

Lightly Incised - Class III channels incised less than 10 feet, and in some cases, possessing unstable soil types, qualifies as a lightly incised Class III stream. For this Forest, 30% of the Class III streams are lightly incised; this represents 27% of the total Forest stream miles.

Class IV Stream - All other intermittent streams not meeting higher class criteria. See "SMU."

Clearcutting - A silvicultural system in which all trees on an area are harvested in one cut for the purpose of regenerating a new, even-aged stand. The area harvested may be a patch, strip, or stand large enough to be mapped or recorded as a separate class in planning for sustained yield

Climax - The culminating stage in plant succession for a given site where the vegetation has reached a highly stable condition.

Climax Species - Those species that dominate a climax stand in either numbers per unit area or biomass.

Code of Federal Regulations (CFR) - A codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government.

Collector Roads - See "Road, Collector."

Commercial Forest Land (CFL) - See "Timber Resource Land Suitability Classification."

Commercial Thinning - Any type of tree thinning that produces merchantable material at least equal in value to the direct costs of harvesting.

Commodity - A transportable resource product with commercial value; all resource products that are articles of commerce.

Compaction - The packing together of soil particles by forces exerted at the soil surface, resulting in increased soil density.

Concern - A point, matter, or question raised by management and/or the public that must be addressed in the planning process.

Concession - A commercial public service enterprise which operates on National Forest land under a "Special Use Permit" for the purpose of providing goods and services to the public.

Condition Class - A descriptive grouping into 10 classes of the existing forest vegetation based on age, tree size, maturity, species mix, and accessibility by road. Condition class is an important component of the Forest Model structure. See "Forest Model" and Appendix B.

Congressionally Classified and Designated Areas - Areas that require congressional enactment for their establishment, such as National Wilderness Areas, National Wild and Scenic Rivers, and National Recreation Areas.

Connecting Habitat - Areas which serve as travel corridors or habitat connections, provide for the dispersal and interaction of indicator species, and avoid the isolation of habitat into geographic islands. These areas provide species access across and/or along drainages and elevation gradients (ridgeline to valley floor). Connecting habitat can be provided in several ways:

1. Utilize natural land forms, such as riparian areas along creek drainages, or the areas adjacent to avalanche chutes, where possible.

2. Maintain areas in blocks of land that generally are one or more logical harvest units in size. This will provide the option of rotating the designation of connecting habitat to adjacent areas, as the adjacent harvested areas mature or develop the desired habitat structure.

Constraint - A confinement or restriction on the range of permissible choices.

Consumptive Use - A use of resources that permanently reduces the supply, such as mining. (See also Non-consumptive Use.)

Core Area - (As related to a Spotted Owl Habitat Area) An area encompassing at least 300 contiguous acres of old growth suitable for nesting and reproduction. Centering on a reproductive site or a site of concentrated pair use where such information is available. See "Spotted Owl Habitat Area "

Corridor - A linear strip of land identified for the present or future location of transportation or utility rights-of-way within its boundaries.

Costs:

1. **Direct cost** - a cost that directly contributes to the production of the primary outputs of an activity, project, or program.

2. **Economic cost** - total fixed and variable costs for inputs, including costs incurred by other public parties and, if appropriate, opportunity costs and cost savings.

3. **Fixed cost** - a cost that is committed for the time horizon of planning or the decision being considered. Fixed costs include fixed ownership requirements, fixed protection, short-term maintenance, and long-term planning and inventory costs.

4. **Investment cost** - a cost of creating or enhancing capital assets, *including costs of administrative or common-use transport facilities and* resource management investments.

5. **Joint cost** - a cost contributing to the production of more than one type of output.

6. **Non-Forest Service cost** - a cost of investment and operating activities *paid by cooperators or other non-Forest Service agencies which are part* of Forest Service management programs, or which contribute to the outputs included in the analysis.

7. **Opportunity cost** - the value of a resource's foregone net benefits in its most economically efficient alternative use.

8. ***Unit cost or cost per unit*** - *total cost of production divided by the* number of units produced.

Cost Efficiency - The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs, including environmental, economic, or social impacts, are not assigned monetary values, but are achieved at specified levels in the least costly manner. Cost *efficiency is usually measured using present net value, although use of* benefit-cost ratios and rates-of-return may be appropriate.

Cost Share - A term referring to investment sharing provided under Public Law 88-657 (16 U.S.C 535) whereby forest development roads may be financed cooperatively with public or private agencies or persons. Investment sharing may be accomplished in several ways. Road right-of-way construction and use agreements (referred to as cost share agreements) are a common method used in this Forest where there are large areas of intermingled landownership.

Council on Environmental Quality (CEQ) - An advisory council to the President established by the National Environmental Policy Act of 1969. Reviews federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters. (Abstracted from NEPA.)

Cover/forage Ratio - The mixture of cover and forage areas on a unit of land, expressed as a ratio.

Created Openings - Openings in the forest created by the silvicultural practices of: shelterwood regeneration cutting at the final harvest; clearcutting; seed tree cutting; or group selection cutting.

Crop Tree - Any tree forming or selected to form, a component of the final crop. Generally a tree selected in a young stand or plantation for carrying through to maturity.

Crown Height - In a standing tree, the vertical distance from ground level to the base of the crown, measured either to the lowest live branch whorl, or to the lowest live branch (excluding shoots arising spontaneously from buds on the stem of a woody plant), or to a point halfway in-between.

Cubic Foot - A unit of quantity for lumber or timber equal to a cube 1x1x1 foot.

Cull Material - Timber which does not meet the specified utilization standards (usually in a timber sale contract) for size and percent of sound wood. See "Utilization Standards."

Culmination of Mean Annual Increment (CMAI) - The age at which the average annual growth is greatest for a stand of trees. Mean annual increment is expressed in cubic feet measure and is based on expected growth according to the management intensities and utilization standards assumed in accordance with 36 CFR 219.16(a)(2)(i) and (ii) Culmination of mean annual increment includes regeneration harvest (cutting) yields and any additional yields from planned intermediate harvests (cuttings).

Cultural Resource - The physical evidence of our Nation's heritage. Included are: archaeological sites; historic buildings, structures, and districts; and localities with social significance to the human community. In the plan, they are classified as archaeological and historical properties, and American Indian religious and cultural use areas

Cumulative Effects or Impacts - The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR 1508.7 - these regulations use effects and impacts synonymously.)

DBH (d.b.h.) - Diameter at breast height, measured at 4 feet 6 inches from the ground.

Debris Slide - A shallow landslide of soil, rock, and organic material that occurs on steep slopes.

Debris Torrent - A large debris slide that is charged with water and confined to a steep stream channel. Debris torrents may travel several thousand feet

Decision Space - Decision space defines the outer limits past which it is not physically, biologically, or economically possible to produce a feasible combination of Forest goals and services, and land allocations.

Demand - The amount of an output that users are willing to take at a specified price, time period, and condition of sale

Departure - A sale schedule that deviates from the principle of non-declining flow by exhibiting a planned decrease in the sale schedule at any time during the planning horizon. A departure can be characterized as a temporary increase, usually in the beginning decade(s) of the planning horizon, over the base sale schedule that would otherwise be established, without impairing the future attainment of the long-term sustained yield capacity.

Developed Recreation - Recreation that requires facilities that, in turn, result in concentrated use of an area. Examples of recreation areas are campgrounds and ski areas, facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings. See "Recreation Development Scale (Level)."

Dispersed Recreation - A general term referring to recreation use outside a developed recreation site, such as scenic driving, hiking, fishing, cross-country skiing, horseback riding, snow mobiling, hunting, backpacking, and recreation in primitive environments.

Diversity - The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan. See also "Edge," "Horizontal Diversity," and "Vertical Diversity."

Douglas-fir Type - An association of tree species in which Douglas-fir is recognized as one of the principal seral species.

Draft Environmental Impact Statement (DEIS) - The draft statement of environmental effects which is required for major federal actions under Section 102 of the National Environmental Policy Act, and released to the public and other agencies for comment and review.

Duff - Organic matter in various stages of decomposition on the floor of the forest.

Early Forest Succession - The early stage or condition of a plant community that occurs during its development from bare ground to climax.

Economic Efficiency - The usefulness of inputs (costs) to produce outputs (benefits) and effects when all costs and benefits that can be identified and valued are included in the computations. Economic efficiency is usually measured using present net value, though use of benefit-cost ratios and rates-of-return may sometimes be appropriate.

Economic Impacts:

1. **Direct economic impact** - effects caused directly by forest product harvest or processing or by forest uses.

2. ***Indirect economic impact*** - *effects that occur when supporting* industries sell goods or services to directly affected industries.

3. **Induced economic impact** - effects that occur when employees or owners of directly or indirectly affected industries spend their income within the economy.

Ecosystem - An interacting system of organisms considered together with their environment; for example, marsh, watershed, and lake ecosystems.

Edge - An interfacial area where plant communities meet or where successional stages or vegetative conditions within plant communities come together. See also "Diversity," "Edge Contrast" and "Horizontal Diversity."

Edge Contrast - A qualitative measure of the difference in structure of two adjacent vegetated areas; for example, "low," "medium," or "high" edge contrast.

Effects - Environmental consequences as a result of a proposed action. Included are direct effects, which are caused by the action and occur at the same time and place, and indirect effects, which are caused by the action and occur later in time and/or further removed in distance, but which are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air, water, and/or other natural systems, including ecosystems.

> Effects and impacts as used in this statement/plan are synonymous. Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic quality, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effects will be beneficial (40 CFR 1508.8).

Electronic Sites - Areas designated for the operation of equipment which transmits and receives radio signals (excluding television aerials and antennas) for individual pickup of programming, and passive reflectors

Endangered Species - Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the Endangered Species Act of 1973, as amended.

Ending Inventory Constraint - The standing volume left in the inventory at the end of the planning horizon. The constraint insures that there is enough standing inventory at the end of the planning horizon to perpetuate long-term sustained yield capacity harvest levels on a nondeclining flow basis.

Environmental Analysis - A process associated with the preparation of an environmental assessment or environmental impact statement. An analysis of alternative actions and their predictable short- and long-term environmental effects, including physical, biological, social, and economic.

Environmental Assessment - A concise public document, providing sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.

Environmental Impact Statement (EIS) - A statement of the environmental effects of a proposed action and alternatives to it Required for major federal actions under Section 102 of the National Environmental Policy Act (NEPA), and released to the public and other agencies for comment and review. A formal document that must follow the requirements of NEPA, the Council on Environmental Quality (CEQ) guidelines, and directives of the agency responsible for the project proposal. See DEIS and FEIS

Environmental Protection Agency (EPA) - An agency of the Executive Branch of the Federal Government which has the responsibility for environmental matters of national concern.

Erosion - 1) The wearing away of the land surface by running water, wind, ice, or other geologic agents, including such processes as gravitation creep; or 2) detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

Even-Aged Management - The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of stands of varying ages (tree sizes) throughout the forest area. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands. (36 CFR 219.3)

Even-aged Stands - Stands in which all trees are of about the same age. (A spread of 10 to 20 years is generally considered one age class.) Cutting methods producing even-aged stands are clearcut, shelterwood, or seed tree systems.

Existing Visual Condition (EVC) - The "Existing Visual Condition" of the Forest was prepared in 1979. See "Visual Condition."

Final Environmental Impact Statement (FEIS) - The final version of the statement of environmental effects required for major federal actions under section 102 of the National Environmental Policy Act. A revision of the draft environmental impact statement to include public and agency responses to the draft.

Final Harvest - Synonomous with "regeneration cutting" (harvest) in the clearcutting silvicultural system.

Fisheries Habitats - Streams, lakes, and reservoirs that support fish populations.

Floodplain - The lowland and relatively flat areas adjoining inland and coastal waters including, at a minimum, those areas subject to a 1-percent or greater chance of flooding in any given year (100-year recurrence).

Flood Proof - Using special measures during road construction to insure that flood occurrences will not cause road damage.

Forage - All browse and nonwoody plants that are available to livestock or game animals and used for grazing or harvested for feeding.

Forb - Any herb other than grass.

Foreground - A term used in visual management to describe the portions of a view between the observer and up to 1/4 to 1/2 mile distant. The stand of trees immediately adjacent to a high-value scenic area, recreation facility, or forest highway. See "Background," "Middleground."

Forest or Forest Land - 1) Forest is used in the text as a proper noun to substitute for Mt. Baker-Snoqualmie National Forest. 2) See "Timber Resource Land Suitability Classification."

Forest Model - An idealized (simplified) representation of the real life Forest system, developed from a set of simplifying assumptions. The "Forest Model" serves as a format to structure Forest management resource data, i.e. yields (activities and outputs) over time, acres, and management constraints. The "Forest Model" developed by the interdisciplinary team was incorporated into the computer program model FORPLAN for use in this planning effort. See "FORPLAN." See Appendix B for more detail.

Forest Service Handbook (FSH) - For Forest Service use, directives that provide detailed instructions on how to proceed with a specialized phase of a program or activity

Forest Service Manual (FSM) - A system of manuals which provides direction for Forest Service activities.

Forest Types - A classification of forest land based upon the tree species presently forming a plurality of basal area stocking in live trees

FORPLAN - Acronym for Forest Planning Model. A linear programming system used for developing and analyzing forest planning activities. Can be used to simulate management practices while at the same time optimizing for any given desired objective. As a manageable representation of reality, it can be used to manipulate information and look at alternative approaches to management, calculating tradeoffs and opportunity costs. See "Forest Model." See Appendix B for more detail.

Fuel Management - The practice of planning and executing the treatment or control of living or dead vegetative material in accordance with fire management direction

Fuel Treatment - The rearrangement or disposal of natural or activity fuels (generated by management activity, such as slash left from logging) to reduce fire hazard. Fuels are defined as both living and dead vegetative materials consumable by fire.

Fuels - Combustible wildland vegetative materials. While usually applied to above ground living and dead surface vegetation, this definition also includes roots and organic soils such as peat

Game Species - Any species of wildlife or fish for which seasons and bag limits have been prescribed and which are normally harvested by hunters, trappers, and fishermen under state or federal laws, codes, and regulations.

Genetic Integrity - Refers to a normal, healthy genetic pool within a biological population to provide for long-term maintenance and survival of the species. Of specific concern in management direction is the prevention of loss of genetic variance and the avoidance of inbreeding. See the Draft SEIS, Spotted Owl Guidelines for more detail.

Genetic Seedlings - Tree seedlings from a genetically superior seed source. The seeds are collected from trees displaying exceptional form and raised in nurseries before outplanting. The seedlings usually have faster growth rates than naturally regenerated seedlings.

Geothermal - Of or pertaining to the internal heat of the earth.

Glaciolacustrine - Soil materials transported by glaciers and deposited by glacial meltwater in glacier lakes.

Goal - A concise statement that describes a desired condition to be achieved sometime in the future. It is normally expressed in broad, general terms with no specific completion date. Goal statements form the principal basis from which objectives are developed.

Goods:

1. **Nonmarket good** - an output that is not normally exchanged for money in a market. Usually no market has evolved because ownership of the good is not clear, exclusive use is not possible under current laws, or it is not possible to consistently define good.

2. **Public good** - an output for which it is impractical to impose a charge, either because it must be supplied to all if it is supplied to one or *because the costs of collection and control exceed likely revenue.*

Goods and Services - The various outputs, including on-site uses, produced from forest and rangeland resources.

Grass/forb - An early forest successional stage where grasses and forbs are the dominate vegetation.

Group Selection Cutting - Removal of tree groups ranging in size from a fraction of an acre up to about 2 acres. Area cut is smaller than the minimum feasible under even-aged management for a single stand.

Growing Season - That part of the year when temperature and moisture are favorable for vegetation growth.

Growing Stock Trees - Live trees, meeting specified standards of quality or vigor, that are included in growth and yield projections to arrive at the allowable sale quantity.

Guideline - An indication or outline of policy or conduct that is not a mandatory requirement (as opposed to a standard, which is mandatory).

Habitat - The place where a plant or animal naturally or normally lives and grows.

Habitat Capability - The estimated ability of an area, given existing or predicted habitat conditions, to support a wildlife, fish or plant population. Measured in tems of potential population numbers.

Habitat Diversity - The distribution and abundance of different plant and animal communities and species with a specific area.

Hardwood - A broad-leaved flowering tree.

Harvest Cutting Method - A combination of interrelated actions whereby forests are tended, harvested, and replaced. The combination of management practices used to manipulate the vegetation results in forests of distinctive form and character. Harvest cutting methods are classified as even-aged and uneven-aged. See "Silvicultural System "

Harvest Dispersion (factor) - The dispersion of cutting units over the land base in order to meet clearcut size limitations, or other resource constraints. An example of a harvest dispersion constraint is. no more than 25 percent of an analysis area may be harvested in one decade

Headwaters - The upper tributaries of a river.

Herbaceous - An adjective describing seed-producing plants that do not develop persistent woody tissue, but die down to ground level at the end of the growing season.

Hiding Cover - Any vegetation used by wildlife for security or to escape from danger. For example, hiding cover is capable of hiding 90 percent of an adult deer or elk from the view of a human at a distance of 200 feet or less.

Historic Site - Site associated with the history, tradition, or cultural heritage of national, state, or local interest, and of enough significance to merit preservation or restoration.

Horizontal Diversity - The distribution and abundance of plant and animal communities or successional stages across an area of land; the greater the number of communities, the higher the degree of horizontal diversity (or richness). This concept is similar but not identical to "even-aged management." Application of even-aged management, for example, can be designed to accomplish horizontal diversity objectives. See also "Vertical Diversity."

Hydrology - The scientific study of the properties, distribution, and effects of water in the atmosphere, on the earth's surface, and in soil and rocks.

ID Team - See Interdisciplinary Team

Impacts - See Effects.

IMPLAN - A computer-based system used by the Forest Service for constructing nonsurvey input/output models to measure economic input. The system includes a data base for all countries in the U.S. and a set of computer programs to retrieve data and perform the computational tasks for input/output analysis.

Indicator Species - Species identified in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish including those that are socially or economically important. See Management Indicator Species.

Instream Flows - A prescribed level (or levels) of streamflow, usually expressed as a stipulation in a permit authorizing a dam or water diversion, for the purpose of meeting National Forest System management objectives.

Integrated Pest Management - A process for selecting strategies to regulate forest pests, in which all aspects of a pest-host system are studied and weighed. A basic principle in the choice of strategy is that it be ecologically compatible or acceptable. (36 CFR 219.3)

Intensive Forest Management - A high investment level of timber management that envisions initial harvest, regeneration with genetically improved stock, control of competing vegetation, fill-in planting, precommercial thinning as needed for stocking control, one or more commercial thinnings, and final harvest.

Interdisciplinary Approach - Using individuals representing two or more areas of knowledge and skills focusing on the same tasks, problem, or subject.

Interdisciplinary Team (ID Team) - A group of individuals with different training assembled to solve a problem or perform a task The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately assess the situation.

Intermediate Cutting - Any removal of trees from a regular crop or stand between the time of its formation and the harvest cutting (final harvest). Generally includes cleaning, thinning, liberation, and improvement cuttings, increment fellings, and sometimes even salvage and sanitation cutting.

Intermingled Ownerships - Lands within the National Forest boundaries or surrounded by National Forest lands owned by private interests or other government agencies. Because of early land grants, these lands frequently are in a checkerboard ownership pattern.

Intermittent Stream - A stream that runs water in most months, but does not run water during the dry season during most years.

Irretrievable - Applies to losses of production, harvest, or use of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sports site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

Irreversible - Applies primarily to the use of non-renewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity, that are renewable only over long time periods. Irreversible also includes loss of future options.

Issue - A point, matter, or question of public discussion or interest to be addressed or decided through the planning process.

J-8 - A map code used on this Forest to designate unsuitable forest land not managed for timber production because there is no reasonable assurance that these lands can be adequately restocked within 5 years after harvest. This is based on existing technology and knowledge as reflected in current research and experience. See "Timber Resource Land Suitability Classification, 3.(d)."

Knutsen-Vandenberg Fund (KV) - Authorization to withhold a portion of timber sale receipt funds for reforestation of harvested areas, rehabilitation of streams and habitat affected by timber sales, etc.

Lacustrine - Refers to material deposited in lake water and later exposed either by lowering of the water level or by the elevation of the land.

Land Allocation - The assignment of a particular land area(s) to a specific "Management Area."

Landing - Any place where round timber is assembled for further transport, commonly with a change of method.

Landownership Classification Groups - All National Forest land and land in other ownerships within the Forest boundary will be classified in one of five landownership classification groups. This classification system identifies opportunities to acquire, retain, exchange, or relinquish lands to facilitate administration of the Forest (FSM 1920.42, 1982 or as revised).

Group I - Lands where Congress has either directly or indirectly instructed the Forest Service to retain ownership and acquire non-Federal lands for a designated purpose.

Group II - Retain National Forest ownership and acquire private land as the opportunity and/or need occurs.

Group III - Lands are available for land adjustment and usually will provide most of the land considered in exchange projects.

Group IV - Lands normally made available to acquire private lands in Groups I, II, or III.

Group V - More intensive study and planning are necessary before landownership decisions are made.

Lands Not Appropriate for Timber Production - Includes lands that: 1) are proposed for resource uses that preclude timber production, such as Wilderness; 2) have other management objectives that limit timber production to the point where management requirements set forth in CFR 219.27 cannot be met; or 3) or are not cost efficient over the planning horzon in meeting forest objectives including timber production.

Lands Not Suited (Unsuitable) for Timber Production - Includes lands that: 1) are not forest land as defined in CFR 219 3; 2) are likely, given current technology, to suffer irreversible resource damage to soils productivity, or watershed condition; 3) cannot be adequately restocked as provided in 36 CFR 219.27; or, 4) have been withdrawn from timber production by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service. In addition, Forest lands other than those that have been identified as not suited for timber production shall be reviewed and assessed prior to formulation of alternatives to determine the costs and benefits of a range of management intensities for timber production.

Legendary - Locations that may have, or may have had, spiritual significance. They appear also to be areas which are significant to the cosmology of the Indian groups in the project area. They are significant in mythology having to do with the origin and development of the area and of the people of that area.

Limits of Acceptable Change (LAC) - Maximum limit of human-caused change allowed in wilderness. Each WROS Class has a set of limits which presupposes that certain areas of wilderness (trails) will be allowed to receive higher levels of use than other areas (trailless), and thus will receive more change or resource impact. LAC's are not a management objective, but a maximum limit. See "Wilderness Recreation Opportunity Spectrum."

Local Roads - See "Road, Local."

Logging Systems - See "Yarding."

Tractor - Use of tracked or rubber-tired vehicle to skid logs to a central loading point. This method is typically used on dry, gently sloping ground; it is infrequently used on this Forest.

Highlead - A cable system operated from a tower or spar-tree, which drags logs to a central loading site. One end of a log may be lifted off the ground for short distances. Used most often in moderately steep terrain over relatively short distances.

Skyline - The log yarding cable is attached between a tower or spar-tree and an elevated point in the distance. Logs are transported partially or completely suspended above the ground with a movable carriage on the cable. Used in steep or unstable terrain with minimal impacts on the land, this method can reach for long distances.

Helicopter - Use of helicopter to lift logs from a logging site to a nearby central loading point. Most economical on relatively remote and difficult to reach sites. Avoids road building where roading is inappropriate because of steep terrain, unstable soils, visual consideration, etc.

Long-Term Sustained-Yield Capacity (LTSYC) - *The highest uniform wood yield* from lands being managed for timber production that may be sustained under a specified management intensity consistent with multiple-use objectives.

Macropore Space - Space in soil composed of larger pore spaces. See "Pore space," "Porosity," and "Soil."

Management Area - *An area or non-contiguous areas of the Forest assigned to a* specific management strategy (the management strategy then becomes the management prescription for the area(s)).

Management Concern - An issue, problem, or condition which constrains the range of management practices identified by the Forest Service in the planning process.

Management Direction - A statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them.

Management Emphasis - The major resource uses, outputs, and activities emphasized in a management area.

Management Indicator Species (MIS) - A species selected because its welfare is presumed to be an indicator of the welfare of other species using the same habitat. A species whose condition can be used to assess the impacts of management actions on a particular area. See "Indicator Species."

Management Intensity - A management practice or combination of management practices and associated costs designed to obtain different levels of goods and services.

Management Practice - A specific activity, measure, course of action, or treatment.

Management Prescription - Management practices and intensity selected and scheduled for application on a specific area to attain multiple-use and other goals and objectives.

Management Requirement (MR) - Minimum standards for resource protection, vegetation manipulation, silvicultural practices, even-aged management, riparian areas, soil and water diversity, to be met in accomplishing National Forest System goals and objectives.

Management Strategy - A specific set of management practices appropriate for application to Forest lands or resources. The management strategy should define the management goals or objectives, resource priorities, and intensities to be considered. See "Management Area" and "Management Prescription."

Marginal Component - The portion of the regulated commercial Forest land on which it is presently not feasible (economically or technologically) to manage for timber crops because of soil constraints, difficulties in establishing tree regeneration or excessive development costs.

Market Resources - Products derived from renewable and nonrenewable resources that have a well-established market value for example, forage, timber, water, and minerals.

Market Value - The unit price of an output normally exchanged in a market after at least one stage of production. Market value is expressed in terms of prices as evidenced by market transactions

Mass Movement - A general term for any of the variety of processes by which large masses of earth material are moved downslope by gravitational forces - either slowly or quickly.

Mass Wasting - All landslide events, the detachment and movement of soil or surface mantle material. Landslides may fall in a single mass or single event, moving downslope to cause debris slides and avalanches, or they may detach and move slowly downslope over a period of years.

Maximum Modification - See "Visual Quality Objectives."

May (or Can) - Verb used in the Management Prescriptions, Proposed Forest Plan. Action is optional.

MBF - One thousand board feet Lumber or timber measurement term.

MCF - One thousand cubic feet. Lumber or timber measurement term.

Mean Annual Increment (MAI) - The total increment up to a given age divided by that age.

Mesotrophic - Habitats, particularly soil and water, of moderate nutrient capacity.

Middleground - The visible terrain beyond the foreground where individual trees are still visible, but do not stand out distinctly from the stand. See "Foreground" and "Background."

Mineral Entry - The filing of a mining claim upon public domain or related land to obtain the right to any minerals it may contain.

Mineral Soil - A soil consisting predominantly of, and having its properties determined predominantly by, mineral matter. It usually contains less than 20% organic matter but may sometimes contain an organic surface layer up to 30 centimeters thick. Mineral soil is the soil where surface erosion of individual soil particles can take place, not the loose unconsolidated organic surface layer.

Mineral Withdrawal - The exclusion of mining locations and mineral development work on areas required for administrative sites by the Forest Service and other areas highly valued by the public.

Minerals -

1. **Common** - mineral deposits which do not possess distinct, special economic value, such as common varieties of sand, stone, gravel, pumice, pumicite and cinders. They may have value for use in trade, manufacture, science, or in the mechanical or ornamental arts.

2. **Leasable** - federally owned minerals which are disposed of under the Mineral Leasing Act of 1920, as amended. These include coal, oil, gas, phosphate, sodium, potassium, oil shale, and in some states sulphur and geothermal steam.

3. **Locatable** - federally owned minerals which can be located and patented under the 1892 Mining Law, as amended. In general, the locatable minerals are those hardrock minerals which are mined and processed for the recovery of metals. They also may include certain nonmetallic minerals and uncommon varieties of mineral materials, such as valuable and distinctive deposits of limestone or silica.

4. **Valuable Deposit** - where minerals have been found and the evidence is of such a character that a person of ordinary prudence would be justified in further expenditure of his labor and means with a reasonable prospect of success in developing a valuable mine.

Minimum Streamflows - A specified level of flow through a channel that must be maintained by the users of streams for biological, physical, or other purposes.

Minimum Viable Population - The low end of the viable population range.

Mining Claim - A portion of the public lands which a miner, for mining purposes, takes and holds in accordance with mining laws.

Mining Claim, Perfection - All steps legally required to give a secured party an interest in subject property have been met. One cannot perfect a mining claim without actual discovery of minerals in place. Perfection occurs when a discovery of a "valuable" mineral deposit has been made within the boundaries of a mining claim which has been located on public lands in conformance with State and Federal statutes. Once the claim has been perfected, the claim has the effect of a grant by the US of the right of present and exclusive possession and the claimant may receive patent. Discovery normally precedes location, but (US v. Carlile 67 I.D 417,420 (1960)) discovery may follow location and give validity to a previously located claim as of the time the discovery was made. When such occurs, the claim has been perfected.

Mining Claim, Validity - Synonymous with perfection when exclusive rights against the government are concerned. For a claimant to establish exclusive rights against the government, the claim must be located on public lands in conformance with State and Federal statutes and a discovery of a valuable mineral deposit must have been made within the boundaries of the claim.

Mitigation - Avoiding or minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the effected environment; reducing or eliminating the impact by preservation and maintenance operations during the life of the action.

MMBF - Million board feet. Lumber or timber measurement term.

MMCF - Million cubic feet. Lumber or timber measurement term.

Model - See "Forest Model."

Modification - See "Visual Quality Objectives."

Monitoring - A process to collect significant data from defined sources to identify departures or deviations from expected plan outputs.

Multiple Use - The management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some lands will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

Municipal Supply Watershed - A watershed that provides water for human consumption, where Forest Service management could have a significant effect upon the quality of water at the intake point, and that provides water used by a community, or any other public water system that regularly serves at least 25 individuals at least 60 days out of the year or that provides at least 15 service connections. In addition to cities, this includes campgrounds, residential developments, and restaurants.

Must (or Shall) - A verb used in the Management Prescriptions, in the Proposed Forest Plan. Action is mandatory.

National Environmental Policy Act (NEPA) of 1969 - An act to declare a National policy which will encourage productive and enjoyable harmony between humankind and the environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, to enrich the understanding of the ecological systems and natural resources important to the Nation, and to establish a Council on Environmental Quality. (The Principal Laws Relating to Forest Service Activities, Agriculture Handbook No. 453, USDA, Forest Service, 359 pp.)

National Forest Management Act (NFMA) of 1976 - A law passed as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring the preparation of Regional Guides and Forest Plans and the preparation of regulations to guide that development.

National Forest System (NFS) Land - Federal lands that have been designated by Executive order or statute as National Forests, National Grasslands, or Purchase Units, and other lands under the administration of the Forest Service, including Experimental Areas and Bankhead-Jones Title III lands.

Natural Forest - The Forest that would occur on the planning area if natural processes were allowed to function without man's influence.

Natural Regeneration - Reforestation of a site by natual seeding from the surrounding trees. May or may not be preceded by site preparation.

Net Public Benefits - An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs), whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index. The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield.

Net Receipts - Net receipts are the total cash receipts received by the Forest Service less budget costs.

Nitrogen-Fixing (Nitrogen Fixation) - Conversion of free nitrogen into combined forms useful in nutrient cycles and other functions in the biosphere.

Noncash Benefits - These are benefits or values that people derive from the good or service being provided, but where there is no market in which to exchange that good or service for cash, i.e. the person benefitting does not pay any of the actual value received.

Nonchargeable Volume - All volume that is not included in the growth and yield projections for the selected management prescriptions used to arrive at the allowable sale quantity (FSH 2409.13)

Non-consumptive Use - That use of a resource that does not reduce its supply, for example, non-consumptive uses of water include hydroelectric power generation, boating, swimming, and fishing.

Non-declining Flow - Where the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade, and this planned sale and harvest for any decade is not greater than the long-term sustained yield capacity.

Non-forest Land - Lands that never have had or that are incapable of having 10 percent or more of the area occupied by forest trees; or lands previously having such cover and currently developed for nonforest use.

Nongame - Species of animals not managed for sport hunting.

Non-market - Products derived from National Forest resources that do not have a well-established market value for example, recreation, wilderness, wildlife.
Not Appropriate Land - See 36 CFR 219 4 and FSH 2409.13-23. See "Timber Resource Land Suitability Classification, Unsuitable."

No-Trace Camping - A concept of recreation use in wilderness which encourages the recreation user to leave "No-Trace" of a visit to aid in protection of the wilderness resource.

Not Suited Lands - See 36 CFR 219.14. See "Timber Resource Land Suitability Classification, Unsuitable."

Objective - A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals.

Off-Road Vehicle (ORV) - Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain. The term excludes any registered motorboat, any military, fire, emergency, or law enforcement vehicle when used for emergency purposes, and any vehicle whose use is expressly authorized by the respective agency head under a permit, lease, license, or contract. (Executive Order 11644)

Old-Growth Stand - Any stand of trees 10 acres or greater generally containing the following characteristics: 1) stands contain mature and overmature trees in the overstory and are well into the mature growth stage; 2) stands will usually contain a multi-layered canopy and trees of several age classes; 3) standing dead trees and down material are present; and 4) evidence of human activity may be present, but does not significantly alter the other characteristics and would be a subordinate factor in a description of such a stand

Opportunity Cost - The dollar-quantifiable net loss resulting from a less efficient course of action

Optimal Cover - a forest stand with: 1) four layers (overstory canopy, sub canopy, shrub layer, and herbaceous layer); and 2) an overstory canopy which can intercept and hold substantial amount of snow yet has dispersed (<1/8 acre) openings. These criteria are generally achieved when the dominant trees average 21 inches dbh or greater, have 70 percent or greater crown closure, and are in the large saw timber or old-growth condition.

Optimum Density - For wildlife, the maximum rate of animal stocking possible without inducing damage to vegetation or related resources, may vary from year to year because of environmental and/or population factors.

Organization Camp - A privately-operated facility providing lodging, meals, social, and educational recreation opportunities in a forest environment. An organization camp is operated on National Forest land under "Special Use Permit."

Output - The goods, end products, or services that are purchased, consumed, or used directly by people. Goods, services, products, and concerns produced by activities that are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. A broad term for describing any result, product, or service that a process or activity actually produces.

Overmature - The stage at which a tree declines in vigor and soundness, for example past the period of rapid height growth.

Overstory - That portion of the trees, in a forest of more than one story, forming the upper or uppermost crown canopy.

Ozone - An allotropic triatomic form of oxygen that is normally a faintly blue irritating gas with a characteristic pungent odor. A predominant compound in a layer of the Earth's atmosphere (the ozone layer) which plays a key role in filtering the Sun's radiation.

Partial Retention - See "Visual Quality Objectives."

Particulate (Concerning air quality) - Minute separate particle of matter suspended in air. Particulate as a measure of air quality condition or standard is expressed in microns per cubic meter.

Penstock - A sluice or gate for regulating a flow (as of water); or a conduit or pipe for conducting water.

Perennial Stream - A stream that flows year round.

Persons-At-One-Time (PAOT) - The number of people in an area or using a facility at the same time. May be used as "maximum PAOT" to indicate the capacity of an area or facility to support peak usage within established user density standards and without degradation to biophysical resources.

Planning Criteria - Criteria prepared to guide the planning process. Criteria applied to collection and use of inventory data and information, analysis of the management situation, and the design, formulation, and evaluation of alternatives.

Planning Horizon - The overall time period considered in the planning process. Spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions which would influence the planning decision.

Planning Period - One decade. The time interval within the planning horizon that is used to show incremental changes in yields, costs, effects, and benefits.

Planning Records - The body of information documenting the decisions and activities which result from the process of developing a Forest Plan, revision, or significant amendment.

Pore Space - Total space not occupied by soil particles in a bulk volume of soil, commonly expressed as a percentage.

Porosity - The degree to which the total volume of a soil, sediment, or rock is permeated with pores or cavities, generally expressed as a percentage of the whole volume unoccupied by solid particles.

Potential Yield - Sustainable output of wood fiber available after the yield foregone for the management opportunities of other resources has been deducted from the biological potential.

Precommercial Thinning (PCT) - The practice of removing some of the trees less than merchantable size from a stand so that the remaining trees will grow faster.

Prescribed Fire - A wildfire burning under specified conditions that will accomplish certain planned objectives. The fire may result from either planned or unplanned ignitions. Use of unplanned ignitions must have prior approval by the Regional Forester.

Present Net Value (PNV) - The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area. (36 CFR 219.3)

Preservation - See "Visual Quality Objectives."

Presuppression - Activities organized in advance of fire occurrence to ensure effective suppression action

Primary Cavity Excavators - Wildlife species that excavate cavities in wood, for food and shelter Example woodpeckers

Primitive - See "Recreation Opportunity Spectrum (ROS) "

Program Element - Forest Service areas of responsibility, such as "Wildlife", "Recreation", "Timber" based upon the National Forest budgeting process. Used in this Forest Plan to organize the management area standards and guidelines and tie to budgeting

Programmed Harvest - The amount of timber on the Forest that is scheduled for harvesting The programmed harvest is based on current demand, funding, and multiple-use considerations

Project - An organized effort to achieve an objective identified by location, timing, activities, outputs, effects, accountability, and control of a project

Public Issue - A subject or question of widespread public interest relating to management of National Forest System. (36 CFR 219.3)

Puddling - Soil puddling is a physical change in soil properties due to shearing forces that destroy soil structure and reduce porosity. Detrimental puddling can be observed as vehicle tracks when soil is molded and when depth of rutting has reached 6 inches or more.

Purchaser Credit - Credit earned by the purchaser of a National Forest timber sale by construction of contract-specified roads. Earned purchaser credit may be used by the purchaser as payment for National Forest timber removed.

Range - Land producing native forage for animal consumption, and lands that are revegetated naturally or artificially to provide forage that is managed like native vegetation.

Raptors - Predatory birds, such as falcon, hawks, eagles, or owls

Real Dollar Value - A monetary value which compensates for the effects of inflation.

Reasonable Assurance - for the purposes of regeneration suitability decisions in the Forest planning process, "reasonable assurance" is provided when:

1) One or more reforestation projects are known to exist on NFS or non-NFS lands within the subject ecosystem or land stratum, which have succeeded in meeting Regional standards for adequate restocking (as defined in a subsequent portion of the direction), and either

2) The practices used in achieving the regeneration success are known and are accepted by experts in the field of reforestation as being generally applicable to the ecosystem or land stratum being examined.

3) Research results exist which are applicable to the subject ecosystem or land stratum and which provide the means to prescribe treatment(s) that will lead to successful reforestation.

Where a successful regeneration project cannot be found, or applicable research does not exist to demonstrate that a prescription can be written to accomplish reforestation; reasonable assurance of regeneration has not been provided. The stratum or ecotype, therefore, will be classed as not suited for timber production due to regeneration difficulty.

Management prescriptions rely on existing technology. Existing technology includes all techniques that have been proven in research or demonstrated successfully on the ground. Cost of practices will not be a criterion for excluding lands from the suitable land base at this stage in the planning process. For this round of planning, irrigation, exotic-species, and soil importation practices will not be considered as existing technology.

In determining whether or not natural regeneration may be reasonably assured, a certified silviculturist must be able to write a prescription that will provide for successful reforestation within a 5-year period following clearcutting, or a 10-year period following the seed cut when using the shelterwood method of regeneration cutting. The regeneration period is considered to start when the trees in a harvest unit are felled, and ends when the unit is adequately restocked.

Explanatory Notes: the phrase "reasonable assurance" is a subjective expression and is, therefore, not completely definable by precise objective and quantitative terms. By its very nature, the phrase recognizes the necessity of arriving at a decision through judgemental (subjective) processes rather than through precise quantitative analysis (objective) procedures based on measurable data with known statistical reliablility.

Receipts - Those priced benefits for which money will actually be paid to the Forest Service. recreation fees, timber harvest, mineral leases and special use fees.

Record of Decision - A document separate from but associated with an Environmental Impact Statement which states the decision, identifies all alternatives, specifying which were environmentally preferable, and states whether all practicable means to avoid environmental harm from the alternative have been adopted, and if not, why not.

Recreation Capacity - The number of people that can take advantage of the supply of a recreation opportunity during an established use period without substantially diminishing the quality of the recreation experience or the biophysical resources.

Recreation Development Scale (Level) - This is a scale of the level of recreation site modification and development coordinated with the ROS classes. The five development scales are described below. See "Recreation Opportunity Spectrum," and "Recreation Development."

Recreation Information Management (RIM) - A computer-oriented system for the organization and management of information concerning recreation use, occupancy, and management of National Forest lands.

Recreation Opportunity - The availability of choices for users to participate in the recreational activities they prefer within the settings they prefer

Recreation Opportunity Spectrum Class	Development Scale	Level of Site Modification
Primitive	1	Minimum site modification. Rustic or rudimentary improvements designed for protection of the site rather than comfort of the users. Use of synthetic materials excluded. Minimum controls are subtle. No obvious regimentation Spacing informal and extended to minimize contacts between users. Motorized access not provided or permitted.
Semi-primitive	2	Little site modification. Rustic or rudimentary improvements designed primarily for the protection of the site rather than the comfort of the users. Motorized access provided or permitted.
Nonmotorized		Use of synthetic materials avoided Minimum controls are subtle. Little obvious regimentation. Spacing informal and extended to minimize contacts between users. Primary access over primitive roads. Interpretive services informal, almost subliminal.

Roaded Natural	3	Site modification moderate. Facilities about equal for protection of site and comfort of users Contemporary/rustic design of improvements is usually based on use of native materials. Inconspicuous vehicular traffic controls usually provided. Roads may be hard surfaced and trails formalized. Development density about 3 family units per acre. Primary access may be over high standard roads. Interpretive services informal, but generally direct.
Rural	4	Site heavily modified. Some facilities designed strictly for comfort and convenience of users Luxury facilities not provided. Facility design may incorporate synthetic materials. Extensive use of artificial surfacing of roads and trails. Vehicular traffic control usually obvious. Primary access usually over paved roads Development density 3-5 family units per acre. Plant materials usually native. Interpretive services often formal or structured.
Urban	5	High degree of site modification. Facilities mostly designed for comfort and convenience of users and usually include flush toilets; may include showers, bathhouses, laundry facilities, and electrical hookups. Synthetic materials commonly used. Formal walks or surfaced trails. Regimentation of users is obvious Access usually by high-speed highways. Development density 5 or more family units per acre. Plant materials may be foreign to the environment. Formal interpretive services usually available. Designs formalized and architecture may be contemporary. Mowed lawns and clipped shrubs not unusual.

Recreation Opportunity Spectrum (ROS) - A conceptual framework for defining types of recreation opportunities, physical settings, and experiences a visitor can expect. It is an inventory system and a management tool. There are six ROS classes. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs, based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use. The six classes are:

1. Primitive--Area is characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.

2. Semi-primitive nonmotorized--Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum onsite controls and restrictions may be present, but would be subtle. Motorized recreation use is not permitted.

3. Semi-primitive Motorized--Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum onsite controls and restrictions may be present, but would be subtle. Motorized recreation use of local primitive or collector roads with predominantly natural surface and trails suitable for motor bikes is permitted.

4. Roaded Natural--Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment Conventional motorized use is allowed and incorporated into construction standards and design of facilities

5. Rural--Area is characterized by a natural environment that has been substantially modified by development of structures, vegetative manipulation, or pastoral agricultural development. Resource modification and utilization practices may be used to enhance specific recreation activities and to maintain vegetative cover and soil Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people Facilities are often provided for special activities Moderate user densities are present away from developed sites Facilities for intensified motorized use and parking are available.

6. Urban--Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are often used to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans are predominant on site Large numbers of users can be expected both on site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

Recreation Residence - A privately owned structure, authorized on National Forest land under a "Special Use Permit."

Recreation Visitor Day (RVD) - A measure of recreation use Twelve visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons.

Reforestation - The natural or artificial restocking of an area with forest trees; most commonly used in reference to artificial restocking.

Regeneration - The actual seedling and saplings existing in a stand; or the act of establishing young trees naturally or artificially.

Regeneration Cutting (Harvest) - Any removal of trees intended to assist regeneration already present or to make regeneration possible.

Region - An area covered by a Regional Guide. See FSM 1221.3 for organizational definitions.

Regional Forester - The Forest Service official responsible for administering a single Region.

Regional Guide - The guide developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended. It guides all natural resource management activities, and establishes management standards and guidelines for the National Forest System lands within a given Region. It also disaggregates the assigned Regional RPA objectives to the Forests within that Region.

Regulations - Generally refers to the Code of Federal Regulations, Title 36, Chapter II, which covers management of the Forest Service.

Rehabilitation - Action taken to restore, protect, or enhance site productivity, water quality, or other resource values over a period of time.

Release - Freeing trees from competition for light, water, and nutrients by removing or reducing the vegetation growth that is overtopping or closely surrounding them.

Released Roadless - See "1) Unroaded," and "Roadless Areas."

Renewable Resources - Resources that are possible to use indefinitely, when the use rate does not exceed the ability to renew the supply.

Research Natural Area (RNA) - In USDA Forest Service usage, RNAs are areas designated to ensure representative samples of as many of the major naturally-occurring plant communities as possible. An area established specifically to preserve a representative sample of an ecological community, primarily for scientific and educational purposes.

Residual Stand - The trees remaining standing after some event such as selection cutting.

Residue Utilization - Removal and use of forest residue (such as slash, litter, brush, dead trees, and snags) for energy production, home heating, or wood products.

Resource - Anything which is beneficial or useful - be it animal, vegetable, mineral, a location, a labor force, a view, an experience, etc. Resources, in the context of land use planning, thus vary from such commodities as timber and minerals to such amenities as scenery, scenic view points, or recreation opportunities.

Resource Use and Development Opportunities - A possible action, measure, or treatment and corresponding goods and services identified and introduced during the scoping process, which subsequently may be incorporated into and addressed by the Forest Land and Resource Management Plan in terms of a management prescription.

Retention - See "Visual Quality Objectives."

Riparian - Pertaining to areas of land directly influenced by water Riparian areas usually have visible vegetative or physical characteristics reflecting this water influence. Stream sides, lake borders, or marshes are typical riparian areas.

Riparian Area - A geographically delineated area with distinctive resource values and characteristics that is comprised of aquatic and riparian ecosystems. This includes floodplains, wetlands, and all areas within a horizontal distance of approximately 100 feet from the normal line of high water of a perennial stream channel or from the shoreline of other bodies of water

Riparian Ecosystem - A transition between the aquatic ecosystem, and the adjacent upland terrestrial ecosystem. Identified by soil characteristics and distinctive vegetation communities that require free or unbound water.

Road:

1. **Arterial** - A road that serves a large land area and usually connects with a public highway or other arterial road to form an integrated network of primary travel routes. The location and standard are often determined by a demand for maximum mobility and travel efficiency rather than specific resource-management service They are usually developed and operated for long-term land and resource management purposes and constant service.

2. **Collector** - A road that serves a smaller land area than an arterial road and is usually connected to an arterial road or public highway They collect traffic from local roads or terminal facilities. The location and standard are influenced by both long-term multi-resource service needs, as well as travel efficiency. Collector roads may be operated for either constant or intermittent service, depending on land use and resource management objectives for the area served by the facility (FSM 7700).

3. **Local** - A road that connects terminal facilities with a collector road, arterial road, or public highway. The location and standard are usually determined by that required to serve a specific resource activity, rather than travel efficiency. Local roads may be developed and operated for either long- or short-term service.

Roaded Natural (RN) - See "Recreation Opportunity Spectrum."

Roaded Modified (RM) - A classification of the Recreation Opportunity Spectrum that characterizes a predominately altered environment, allowing for noticeable to strongly-evident management activity.

Roadless Area Review and Evaluation (RARE II) - A comprehensive process directed by the Secretary of Agriculture to identify roadless and undeveloped land areas in the National Forest system and to determine their uses for either wilderness or other resource management and development and to determine areas that would require further planning to make such a decision.

Roadless Areas - These lands, inventoried in the Roadless Areas Review and Evaluation (RARE II), were not designated wilderness by the Washington State Wilderness Act of 1984. See "Released Roadless," and Unroaded."

Rotation - The number of years required to establish, including the regeneration period, and grow timber crops to a specified condition or maturity for regeneration harvest. Rotation age is based on the selected management prescriptions in a Forest Plan Alternative.

RPA - The Forest and Rangeland Renewable Resources Planning Act of 1974. Also refers to the National Assessment and Recommended Program developed to fulfill the requirements of the act. The most recent recommended program was completed in 1985.

S-8 - A map code used to designate unsuitable forest land that is not managed for timber production because technology is not available to prevent irreversible damage to soils productivity, or watershed conditions. See "Timber Resource Land Suitability Classification, (3)C."

Sale Schedule - The quantity of timber planned for sale and harvest, by time period, from the area of suitable land covered by the Forest Plan. The first period, usually a decade, of the selected harvest schedule provides the allowable sale quantity. Future periods are shown to establish that sustained yield will be achieved and maintained.

Salvage Cutting (Harvest) - The exploitation of trees that are dead, dying, or deteriorating before their timber becomes worthless. Cutting done essentially to prevent the spread of pests or pathogens is termed "Sanitation Cutting."

Sanitation Cutting - See "Salvage Cutting."

Saprophyte - A plant living on dead or decaying organic matter.

Saturation Density - (Same as tolerance density.) Intraspecific tolerance permits no future increase. Is most marked in territorial species. Space is the limiting factor to the further increase of this population density.

Sawtimber - Trees containing at least one 12-foot sawlog or two noncontiguous 8-foot logs, and meeting regional specifications for freedom from defect. Softwood trees must be at least 9 inches in diameter and hardwood trees 11 inches in diameter at breast height.

Scarified - Land in which the topsoil has been broken up or loosened in preparation for regenerating by direct seeding or natural seedfall. Also refers to ripping or loosening road surfaces to a specified depth for obliteration or "putting a road to bed".

Scenic Areas - Places of outstanding or matchless beauty which require special management to preserve these qualities. They may be established under 36 CFR 294.1 whenever lands possessing outstanding or unique natural beauty warrant this classification.

Scenic River Areas - See Wild and Scenic River.

Scheduled Timber Harvests - Volumes and acres programmed for harvest which are within the allowable sale quantity. This does not include salvage and sanitation harvesting.

Scion - A detached shoot or twig containing buds from a woody plant and used in grafting.

Scoping Process - A part of the National Environmental Policy Act (NEPA) process; early and open activities used to determine the scope and significance of the issues, and the range of actions, alternatives, and impacts to be considered in an Environmental Impact Statement.

Second Growth - Forest growth that has come up naturally after some drastic interference (for example, wholesale cutting, serious fire, or insect attack) with the previous forest growth.

Sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface.

Sedimentary - Rock formed of sediment, such as conglomerate, sandstone, or shales, formed of fragments of other rock transported from their sources and deposited in water. Also, rocks formed by precipitation from solution, as, rock salt and gypsum, or from secretions of organisms, as most limestone.

Seedlings and Saplings - Live trees less than five inches in diameter at breast height. (See also Size Class.)

Selection Cutting - The annual or periodic removal of trees (particularly mature), individually or in small groups ("Group Selection"), from an uneven-aged forest to achieve the balance among diameter classes needed for sustaining yield and to establish a new crop of irregular distribution representative of age and/or size classes.

Semi-primitive Motorized ROS Class - See "Recreation Opportunity Spectrum."

Semi-primitive nonmotorized ROS Class - See "Recreation Opportunity Spectrum."

Sensitive Species - Plant or animal species which are susceptible or vulnerable to activity impacts or habitat alterations. Those species that have appeared in the Federal Register as proposed for classification and are under consideration for official listing as endangered or threatened species, that are on an official State list, or that are recognized by the Regional Forester as needing special management to prevent their being placed on Federal or State lists.

Sensitivity Analysis - A determination of the effects of varying the level of one or more factors, while holding the other factors constant.

Sensitivity Levels - These levels represent an evaluation of public use and concern for the scenic quality of the National Forests. In Region 6 sensitivity levels will be reviewed every 5 years, and revised as necessary. There are three sensitivity levels, each identifying a different level of user concern for the visual environment:

1. Level 1 - Highest Sensitivity Level - An example would be seen areas from Interstate and U.S. Highways.

2. Level 2 - Average Sensitivity - (Also termed "Moderate Sensitivity") Examples are seen areas from county and Forest system roads not meeting the criteria for Level 1 sensitivity.

3. Level 3 - Lowest Sensitivity - An example would be seen areas from a local road in a Management Area where timber production is emphasized.

Seral - A biotic community that is a developmental, transitory stage in an ecological succession.

Series - A level of vegetation classification that is identified by the most common species found in the tree, shrub, and/or herbaceous layer of a plant community. Series is a subdivision of a subformation.

Shall - See "must."

Shelterwood - The cutting method that describes the silvicultural system in which, in order to provide a source of seed and/or protection for regeneration, the old crop (the shelterwood) is removed in two or more successive shelterwood cuttings. The first cutting is ordinarily the seed cutting, though it may be preceded by a preparatory cutting, and the last is the final cutting. Any intervening cutting is termed removal cutting. An even-aged stand results.

Should (or ought) - Verb used in the Management Prescriptions, Proposed Forest Plan. Action is required unless justifiable reason exists for not taking action.

Silviculture - The theory and practice of controlling the establishment, composition, constitution (the distribution and representation of age and/or size classes), and growth of forests.

Silvicultural System - A process that applies silvicultural practices, including the tending (thinning, pruning, etc.), harvesting, and replacing, to a stand in order to produce a crop of timber and other forest products. The system is named by the cutting method with which the regeneration is established, e.g. clearcutting, shelterwood, selection and group selection. See "Harvest Cutting Methods."

Site Index - A numerical evaluation of the quality of land for plant productivity, ... based on the height of dominant trees in a stand at an arbitrarily chosen age.

Site Preparation - 1) An activity (such as prescribed burning, disking, and tilling) performed on a reforestation area, before introduction of reforestation, to ensure adequate survival and growth of the future crop; 2) manipulation follows harvest, wildfire, or construction in order to encourage the growth of favored species. Site preparation may include the application of herbicides; burning, or cutting of living vegetation that competes with the favored species; tilling the soil; or burning of organic debris (usually logging slash) that makes planting or seeding difficult.

Site Productivity - Production capability of specific areas of land.

Size Class - For purposes of Forest planning, size class refers to the intervals of tree stem diameter used for classification of timber in the Forest Plan data base.

seedling/sapling = less than five-inch diameter
pole/sapling = five-inch to nine-inch diameter
sawtimber = greater than nine-inch diameter

Skidding - A general term for hauling loads by sliding, not on wheels as developed originally, from stump to roadside, deck, skidway, or other landing.

Skyline Deflection - The distance a skyline cable drops below line of sight during the yarding operation

Skyline Logging - See "Logging Systems."

Skyline Tailhold - Anchors consisting of stumps, trees, deadmen, or rock bolts to hold the end of the skyline yarding cable that is opposite the yarding machine.

Slash - The residue left on the ground after timber cutting or other vegetation disturbing activity and/or accumulating there as a result of storm, fire, or other damage. It includes unused logs, uprooted stumps, broken or uprooted tree stems, branches, twigs, leaves, bark, and chips.

Slope Class - See "Topographic Class."

Small Game - Birds and small mammals typically hunted or trapped.

Snag - A standing dead tree.

SOHA (Spotted Owl Habitat Area) - A habitat area designated to support one pair of owls. See the Final SEIS for the Pacific Northwest Regional Guide.

Special Component - The portion of the regulated commercial forest land that needs specially designed treatment of the timber resource to achieve landscape or other key resource objectives.

Special Use Permit - The most common permit authorizing use of Forest lands by individuals and public agencies. Examples of use authorized are: recreation residence, pasture, power or telephone line, water transmission pipeline, powerplant, and electronic site.

Soil Stability Classes - A grouping of soil types on the Forest with respect to their tendency to erode or move from natural conditions or land use activities. The three soil stability classes used in the Forest are: 1) Stable soils; 2) Moderately unstable; and 3) Highly unstable soils. See "Topographic Classes."

Spirit Sites - Locations where an individual may seek a personal spirit power. The areas are isolated, include fresh running streams or lakes, or are near some stands of cedar. They may also be areas that are considered inbued with a power of their own.

Stand (Tree Stand) - An aggregation of trees occupying a specific area and sufficiently uniform in species, composition, age arrangement, and condition as to be distinguishable from the forest in adjoining areas.

Standard - A statement which describes a condition when a job is done properly. Standards show how well something should be done, rather than what should be done.

Standards and Guidelines - Principles specifying conditions or levels of environmental quality to be achieved.

Standard Component - The portion of the regulated commercial forest land on which crops of industrial wood can be grown and harvested with adequate protection of the forest resources under the usual provisions of the timber sale contract.

Stream Class - See Class I,II,II, and IV Streams.

Streamflow - The flow of water, generally with its suspended load, down a well-defined water course.

Streamside Management Unit (SMU) - The stream and an adjacent area where practices that might affect water quality, fish, and other aquatic resources are modified, as necessary, to meet water quality goals for each class of stream. The width of the area will vary with the management goals for each class of stream, characteristics of the stream and surrounding terrain, and type and extent of the planned activity. In the Mt. Baker-Snoqualmie National Forest, the area adjacent to wetlands and other bodies of water is termed a Wetland Management Unit (WMU). See "Class I, II, III, and IV streams."

Stream Structure - The arrangement of logs, boulders, and meanders which modify the flow of water, thereby causing the formation of pools and gravel bars in streams. Generally, there is a direct relationship between complexity of structure and fish habitat Complex structure is also an indication of watershed stability.

Stocking - The degree of occupancy of land by trees as measured by basal area or number of trees and as compared to a stocking standard, that is, the basal area or number of trees required to fully use the growth potential of the land.

Stumpage (stumpage value) - The value of timber as it stands uncut, in terms of an amount per unit of volume.

Substantive Comment - A comment that provides factual information, professional opinion, or informed judgement germane to the action being proposed.

Successional Stage - A stage or recognizable condition of a plant community that occurs during its development from bare ground to climax.

Suitable - See "Timber Resource Land Suitability Classification."

Suitable Forest Land - Land to be managed for timber production on a regulated basis. See Timber Resource Land Suitability Classification.

Suitability - The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices

Suppression - The process of extinguishing or confining a fire.

Surface Erosion - The detachment and transport of individual soil particles by wind, water, or gravity. Surface erosion can occur as the loss of soil in a fairly uniform layer across the land surface or in many small rills.

Sustained Yield of the Products and Services - The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest System without impairment to the productivity of the land

Talus Slope - A collection of fallen disintegrated material which has formed a slope at the foot of a steeper descending slope.

Tentatively Suitable - See "Timber Resource Land Suitability Classification."

Thermal Cover - Cover used by animals to lessen the effects of weather; for elk, a stand of coniferous trees 40 feet or more tall with an average crown closure of 70 percent or more

Thinning - See "Intermediate Cutting" and "Precommercial Thinning."

Threatened Species - Those plant or animal species likely to become endangered species throughout all or a significant portion of their range within the foreseeable future.

Till - Nonsorted, nonstratified sediment carried or deposited by a glacier.

Timber Resource Land Suitability Classification - National Forest System lands are classified according to the following definitions:

1. **Non-forest** - Land that has never supported forests and land formerly forested where use for timber production is precluded by development or other uses.

2. **Forest** - Land at least 10-percent stocked (based on crown cover) by forest trees of any size, or formerly having had such tree cover and not currently developed for non-forest use.

3. **Unsuitable Forest Land (Not Suited)** - Forest land that is not managed for timber production because (a) the land has been withdrawn by Congress, the Secretary, or the Chief; (b) the land is not producing or capable of producing crops of industrial wood; (c) technology is not available to prevent irreversible damage to soils, productivity, or watershed conditions; (d) there is no reasonable assurance that lands can be adequately restocked within 5 years after final harvest, based on existing technology and knowledge, as reflected in current research and experience, (e) there is at present, a lack of adequate information to responses to timber management activities; or (f) timber management is inconsistent with or not cost efficient (not appropriate) in meeting the management requirements and multiple-use objectives specified in a Forest Plan land management alternative.

4. ***Tentatively Suitable Forest Land*** - *Forest land that is producing or is* capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary, or the Chief; (b) existing technology and knowledge is available to ensure timber production *without irreversible damage to soils, productivity, or watershed* conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

5. **Suitable** - Tentatively suitable forest land identified as appropriate for timber production in a Forest Plan land management alternative.

6. **Commercial Forest (CFL)** - Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary of Agriculture, or the Chief of the Forest Service, (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; and (c) where existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvesting.

Timber Production - The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use other than for fuelwood.

Timber Sale Program Quantity (TSPQ) - The volume of timber planned for sale during the first decade of the planning horizon. It includes the allowable sale quantity (chargeable volume) and any additional material (nonchargeable *volume) planned for sale. The timber sale program quantity is usually* expressed as an annual average for the first decade.

Timber Stand Improvement (TSI) - Measures such as precommercial thinning, pruning, release cutting, prescribed fire, girdling, weeding, or poisoning of unwanted trees aimed at improving growing conditions for the remaining trees.

Topographic Class (Slope Class) - Divisions of the Forest important primarily for determining soil sediment outputs, tendency for soil erosion and slope failure, and difficulty in road construction and timber harvesting activities. The three classes defined in the Forest to reflect these concerns are:

A - Gentle topography, less than 35% slope.
B - Somewhat uneven topography with rock outcrops in less than 35% of the area. Steep slopes (35% to 80%).
C - Rugged highly dissected topography with rock outcrops in 35% - 100% of the area Steep slopes (50% to 90%) Stream density greater than 5 miles per section.

See "Soil Stability Class." The latter (three classes) were used in combination with each topographic class to develop coefficients such as soil sediment output caused by management activities.

Tree Line - A loose term for the limit beyond which trees cannot or do not appear. The limiting factor is most commonly altitude or geographical latitude. A distinction may be drawn between tree line and timber line, the latter being roughly the limit of timber rather than isolated trees.

Turbidity - The cloudy condition caused by suspended solids in a liquid See "Sediment."

Understory - The trees and other woody species growing under a more-or-less continuous cover of branches and foliage formed collectively by the upper portion of adjacent trees and other woody growth

Undeveloped Area - Portion of the National Forest that is essentially unroaded.

Uneven-Aged Management - The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection. (36 CFR 219.3)

Unroaded - 1) RARE II roadless areas released by the Washington State Wilderness Act of 1984 from being considered for designation as wilderness during development of the initial Forest Plan, 2) In the Forest's FORPLAN Model, an analysis area identifier which includes roadless areas defined in "1" above in addition to other unroaded areas in the Forest containing tentatively suitable forest land, 3) A term used to equal the sum of recreation use or carrying capacity from the primitive, semi-primitive nonmotorized, and semi-primitive motorized recreation opportunity spectrum areas outside wilderness.

Unsuitable Lands - See CFR 36 219.14. See "Timber Resource Land Suitability Classification, Unsuitable "

Utility and Transportation Corridors - A strip of land designated for the transportation of energy, commodities, and communications. Examples are power transmission lines, pipelines, penstocks, water lines, etc. Transportation of minor amounts of power for short distances are not treated in the Forest Plan.

Utilization Standards - Standards guiding the use and removal of timber, which is measured in terms of diameter at breast height, top diameter inside the bark, and percent "soundness" of the wood.

Variety Class - A measure of visual diversity or inherent capability of the land to produce attractive scenery. There are three variety classes. See "Character Type."

Class A - Distinctive - Refers to areas where features of the landscape are of unusual or outstanding visual quality. They are usually not common in the character type.

Class B - Common - Refers to areas where features contain variety in form, line, color, texture, or combinations thereof, but which tend to be common throughout the character type. These landscapes are the benchmark from which distinctive and minimal can be judged.

Class C - Minimal - Refers to areas where features have little change in form, line, color, or texture. Includes all areas not found under Classes A and B.

Vegetation Leave Area - Area of land in which vegetation is left undisturbed in order to provide shade and organic debris to streams, or to prevent the acceleration of natural erosion processes. No regulated timber harvest is planned in these areas.

Vegetative Management - Activities designed primarily to promote the health of the crop forest cover for multiple-use purposes.

Vertical Diversity - The diversity in a stand that results from the complexity of the aboveground structures of the vegetation; the more tiers of vegetation and/or the more diverse the species makeup, the higher the degree of vertical diversity. This concept is similar but not identical to "uneven-aged management;" each may influence the other. Application of even-aged management, for example, can be designed to accomplish vertical diversity objectives. See also "Horizontal Diversity."

Viable Population - The number of individuals of a species required to ensure the long-term existence of the species in natural, self-sustaining populations adequately distributed throughout their region.

Viewshed - (Sometimes termed "Viewshed Corridor" or "Visual Corridor") Viewsheds are the "seen" landscape visible to most Forest visitors from roads, trails, rivers, and recreation areas. Most are corridors, one-quarter to two miles wide. Viewsheds viewed from primary travel routes and use areas are "Sensitivity Level 1." Viewsheds viewed from secondary travel routes and use areas are "Sensitivity Level 2."

Visual Absorption Capacity (VAC) - An estimate of the relative ability of a landscape to accept management manipulations without significantly affecting its visual character, or the relative capacity of the land to absorb visual change. Rated as low, moderate, and high.

Visual Condition - The visual appearance of a landscape described in terms of the degree of alteration of the natural appearing landscape. Descriptive degrees of alteration are:

1. Natural Appearing - Area appears untouched by man; changes are not visually evident.

2. Slightly Altered - Changes may be noticed by the average visitor but do not attract attention. Natural appearance dominates minor disturbances.

3. Moderately Altered - Changes are easily noticed by the average visitor and may attract attention. Disturbances are apparent.

4. Heavily Altered - Changes are strong and obvious to the average visitor. Changes dominate the landscape but may resemble natural patterns when viewed from a distance of 3 to 5 miles. Disturbances are major.

Visual Corridor - See "Viewshed."

Visual Quality Levels (VQL) - An inventoried measure of acceptable levels of modification of the visual resource. VQL's are used in Forest planning as an indicator of social (visual) acceptability and as an input for management decisions. VQL's become Visual Quality Objectives in the approved Forest Land Management Plan.

1. Preservation--Allows ecological changes only.

2. Retention--Human activities are not evident to the casual Forest visitor.

3. Partial Retention--Human activity may be evident, but must remain subordinate to the characteristic landscape.

4. Modification--Human activity may dominate the characteristic landscape, but must, at the same time, follow naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.

5. Maximum Modification--Human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

6. Enhancement--A short-term management alternative which is done with the express purpose of increasing positive visual variety where little variety now exists.

Visual Quality Objectives (VQO) - See "Visual Quality Levels."

Visual Resource - The composite of basic terrain, geologic features, water features, vegetative patterns, and land-use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

Wetlands - Areas that are inundated by surface water or groundwater with a frequency sufficient to support, and under normal circumstances does or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction (Executive Order 11990).

Wetland Management Unit (WMU) - See "Streamside Management Unit."

Wilderness - Areas designated by congressional action under the 1964 Wilderness Act. Wilderness is defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature, with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or for a primitive and confined type of recreation; include at least 5,000 acres or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition, and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest.

Wild and Scenic Rivers - Those rivers or sections of rivers designated as such by congressional action under the 1968 Wild and Scenic Rivers Act, as supplemented and amended, or those sections of rivers designated as wild, scenic, or recreational by an act of the Legislature of the State or States through which they flow. Wild and Scenic Rivers may be classified and administered under one or more of the following categories:

1. Wild River Areas--Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

2. Scenic River Areas--Those rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

3. Recreational River Areas--Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Wilderness Recreation Opportunity Spectrum - See "Recreation Opportunity Spectrum." Wilderness ROS and their standards apply to all designated wilderness on the Forest. For specific direction regarding Alpine Lakes, consult the Alpine Lakes Area Land Management Plan.

Within each WROS Class there are Limits of Acceptable Change (LAC). LAC is a maximum limit of change allowed. Managers try to achieve the best conditions possible rather than allowing conditions to deteriorate until the threshold is reached. See "Limits of Acceptable Change."

1. Transition - This trailed class includes system trails that have a travelway worn to mineral soil over long distances, and is characterized by having a large proportion of day-users, often mixed in with overnight and long distance travelers. This area is usually adjacent to trailheads and extends into the wilderness a distance that is typically traveled in one day by a hiker. This class includes areas accessed by trail, around lakes, or other attractions used by people or pack stock, within the day-use influence area. The class extends at least 500 feet on either side of a trail; it may be wider around lakes or heavily used areas. The length of this trail class will be established for each trail depending on ease of travel, distance from trailhead outside wilderness, and destination attractions inside wilderness. Length will generally be 3 to 5 miles inside the wilderness boundary. If the day-use activity occurs entirely outside wilderness, the trail will have no Transition Class.

2. Trailed - This class includes all managed system trails. It extends beyond the Transition Class. This class extends at least 500 feet on either side of the trail but may be wider around lakes or heavily used areas.

3. General Trailless - This class includes areas not falling into the other classes. It attracts very low use because of a relative lack of trails or destination spots. The area is unmodified; user-made trails are not encouraged, but they may exist. If obvious user-made trails become well established, or are causing resource damage, consideration will be given to their reconstruction in order to protect the wilderness resource from further damage. Reclassification from general trailess to railed requires a supplement of the Forest Plan, which shall include full public involvement. This class is available for new trail construction or relocation of existing trails to protect resources or meet objectives by dispersing use. If this should occur, the trail will only be constructed to no higher than "more difficult or "most difficult" standards.

4. Dedicated Trailless - This class is managed forever trailless; user-made trails are not permitted. It may include popular attractions accessed only by cross-country travel. Human impact and influence is, by design, minimal; therefore user restrictions may be necessary to insure that trailless experiences remain. Dedicated Trailless areas should be of a size that will allow for a meaningful experience and can be reasonably protected for the experiences and remoteness identified. Generally the class is at least 1,000 acres in size and contain whole drainages or basins out of sight and sound of trails or areas outside the wilderness.

5. Special Areas - The intent of this class is to provide for significant changes in standards or other management guidelines for unique areas. Areas that qualify for Special Area designation include congressionally acknowledged areas, areas of significant cultural or historic value, areas with special considerations, and areas with limited management options to deal with unique situations. Areas do not qualify for this class for administrative convenience in dealing with overuse. The class is rare and will not exist in many wildernesses.

Wildfire - Any wildland fire that is not a prescribed fire.

Wildland - Uncultivated land, other than fallow, virtually uninfluenced by human activity. It may be neglected altogether or maintained for such purposes as wood or forage production, wildlife habitat, recreation, or protective plant cover.

Wildlife Fish User Day (WFUD) - One WFUD consists of 12 hours of recreation that is the result of fish or wildlife, such as hunting, fishing, birdwatching, etc.

Will - Verb used in the Management Prescriptions, Proposed Forest Plan. Is not restrictive; applies only to a statement of future condition or an expression of time. Not used in the place of "shall."

Windfall - A tree thrown or the stem or other parts (such as branches, foliage, or fruit) broken off or blown down by the wind.

Wood Residue - The residual wood remaining as a result of timber cutting, other vegetation disturbing activity, storms, fire, or other natural event. It includes any unutilized woody material. See "Slash" and "Residue Utilization."

Yarding - The moving of logs from the stump where cut to a central concentration area or landing. See "Logging Systems."

Yield Tables - Tables that estimate the level of outputs that would result from implementing a particular activity. Usually referred to in conjunction with FORPLAN input or output. Yield tables can be developed for timber volumes, range production, soil and water outputs, and other resources.

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Appendices A-

Final Environmental Impact Statement

Land and Resource Management Plan

Mt. Baker-Snoqualmie National Forest

APPENDIX A
ISSUE, CONCERN, AND OPPORTUNITY IDENTIFICATION PROCESS

INTRODUCTION

This appendix displays the process used to identify public issues, management concerns, and resource opportunities (ICO's), including the public involvement activities and contacts and consultation with others throughout the planning process. The tie between the ICO's and the alternatives is also discussed.

Changes Between DEIS and FEIS - ICO's

Several changes have been made to the list of issues, concerns, and opportunities since the Draft Environmental Impact Statement (DEIS) was released in December, 1987. All are based on public response to the draft. Once the analysis of public comment was completed, the Forest Supervisor and planning team members met with the Regional Forester to review the major issues identified by the public and set a course of action, moving toward preparation of a Final Environmental Impact Statement (FEIS) and Forest Plan.

Some key issues identified by the public in response to the DEIS included:

- a number of technical issues related to the timber supply ICO;
- need for a hydrologic cumulative effects analysis;
- several facets of fisheries habitat management;
- wild and scenic rivers, specifically concern about the eligibility analysis done and the lack of a suitability analysis;
- management direction in the Cedar River watershed;
- and need for new or modified alternatives.

The resolution of these issues are discussed throughout the final documents, especially Chapter II, Appendix B, new Appendix H (documentation of developing a management requirement for hydrologic cumulative effects), and in Appendix J, Forest Service responses to substantive comments. Modifications made to the ten major issues, concerns, and opportunities listed in the DEIS, as a result of public response are discussed in this appendix.

In brief, the list of ICO's was reorganized, to reflect more recent public concern. Several draft document ICO's were retitled, also to reflect changing conditions and to respond to public comments, especially in the key areas mentioned above. The transportation issue and wood residue management opportunity were incorporated as facets of other major ICO's and dropped as separate issues. Wild and Scenic Rivers is now addressed as a major issue; it had been a facet of the recreation ICO. **The major issues and concerns addressed in this FEIS are:**

- **Development versus Nondevelopment of the Forest**
- **Timber Supply**
- **Old Growth Ecosystems and Fish, Wildlife, and Plant Diversity**
- **American Indian Religious and Cultural Use**
- **Recreation Opportunities**
- **Wild and Scenic Rivers**
- **Management of Municipal Watersheds**
- **Effects of Timber Management and Related Activities**
- **Adjacent and Intermingled Lands**

The last section of this appendix discusses these changes in detail The major ICO's, the conflict involved, major groups interested, and indicators of response and their measurements are described in in Chapter I of this FEIS.

PROCESS FOR IDENTIFYING ISSUES, CONCERNS, AND OPPORTUNITIES

In June 1979, the Forest Supervisor notified the public that the Mt. Baker-Snoqualmie National Forest was beginning the preparation of a comprehensive land and resource management plan. Notification was accomplished through the news media and a Forest mailing to 3,300 persons and organizations. The notice included an announcement that workshops were scheduled for the purpose of identifying Issues, Concerns, and Opportunities (ICO's) that should be addressed in the Forest Plan.

To facilitate interest in the workshops and provide the public with examples of ICO's that might be addressed, the notice also included a preliminary list of 70 ICO's. These were developed from input to earlier planning efforts, letters to the Forest, newspaper articles, and the Management Team's knowledge gained through day to day contacts with forest users and the interested public.

This first phase of pubic involvement took place at workshops in Bellingham, Mt. Vernon, Seattle, and Tacoma. The Tacoma and Seattle workshops were held in conjunction with the Wenatchee National Forest. Some 160 people attended the meetings. In addition, 19 people provided written comments in later correspondence. Comments tended to focus on issues and/or concerns regarding management of the National Forest as perceived by those members of the public participating in the workshops and responding by letter

Consultation with Others, Prior to Issuing the DEIS

Agencies

In October 1980, the Forest conducted a briefing for various agencies and levels of government that were believed to have an interest in the Forest Planning process. Two objectives were accomplished at this meeting:

1. Participants were informed that the Forest would be preparing a land management plan, the major steps in the planning process were described and the estimated schedule was presented.

2. Most of the agencies designated a contact person that would serve as a liaison with the planning team. Agencies also indicated the "level" of participation in the planning process they estimated would be appropriate for their agency.

Contacts were established with the following agencies and government entities:

U.S. Government: Bonneville Power Administration; Bureau of Indian Affairs; Department of Energy; Environmental Protection Agency, Fish and Wildlife Service, National Marine Fisheries Service; and National Park Service.

State of Washington: Departments of Commerce and Economic Development, Ecology, Fisheries, Game, Natural Resources, Social and Health Service, and

Transportation; Energy Office, Interagency Committee for Outdoor Recreation; and Parks and Recreation Commission.

Counties: King County Planning; Skagit County Planning

Municipalities: Tacoma City Water.

Within the first year of the planning process, contacts were also made with additional county and local government bodies. These are identified in Appendix G, with their plans and policies.

Washington State Department of Game: From the outset of the planning process, wildlife has been recognized as one of the key forest resources Long standing agreements between the Forest Service and the State have further recognized that the Forest Service had primary responsibility for the habitat used by wildlife, whereas the State retained responsibility for the wildlife itself. Therefore they are mutually dependent upon each other.

The MBS and the Washington State Department of Game (WDG) mutually felt that it would be beneficial to both agencies if a WDG wildlife biologist were assigned to the Forest Planning Team as a full-time Interdisciplinary Team member. This was formally accomplished with the execution of an Intergovernmental Personnel Agreement (IPA) between the two agencies. The purpose of the Agreement was to involve a wildlife biologist associated with the WDG in the development of the Forest Land and Resource Management Plan The benefits to the Forest Service included: gaining the commitment of the Department of Game to the Forest Plan, improving the relationship between the organizations; and, strengthening the credibility of the Plan with external environmental groups. The benefits to the Department included: direct access and impact on the development of the Forest Plan; experience with a complex, long-range planning process; protection of sensitive animal needs; and, increasing credibility with external environmental groups.

Indian Tribes

As the planning process proceeded, it became increasingly evident that the Forest needed to address issues and concerns expressed by several of the Indian Tribes that use the Forest. In order to assess the type and amount of use on the Forest by Indians, the Forest entered into a contract with an archeologist consultant, Astrida Onat, to contact the various tribes and obtain the necessary data needed to address Indian concerns. A condition of the contract stipulated that site specific information was to be kept confidential; therefore, that information is not available for public review. (Non site-specific information has been made available to the public.) This effort resulted in the issuance of an inventory 1/ which documents the sites and uses of the Indian Tribes on the Forest This report has been one of the primary sources of information and data used in the Forest Planning process.

Meetings have occurred at various levels with the Indians and the Forest Service. In many cases, site-specific concerns are discussed at the Ranger District level, with consultation between the Forest Service and the tribe(s) using the area. In most cases, consultation to date has surfaced Indian concerns about harvesting old growth timber and road construction.

1/ Blukis Onat, Astrida and Hollenbeck, Jan L. (ed), Inventory of Native American Religious Use, Practices, Localities and Resources; Study Area on the Mt. Baker-Snoqualmie National Forest; April 1981.

Most of the briefings and resulting involvement in Forest Planning have usually been with representatives of several tribes (Lummi, Nisqually, Nooksack, Samish, Sauk-Suiattle, Swinomish and Tulalip Tribes). A concern at these meetings has been that any protection provided to inventoried religious, ceremonial, and cultural use sites through the Forest Planning process would not provide for any permanency since they (Indians) would have to fight the same battles every time the Plan was revised.

Additional American Indian involvement during the planning process included involvement during the Washington State wilderness bill proceedings. Some of the Tribes were very active in providing input that resulted in some areas being designated as wilderness in 1984.

Other Consultations

Three public liaison groups have participated in the Forest Planning process since 1980. A wide breadth of special interests are represented in the three groups. The three groups selected their own names: The Timber Industry Liaison Group, the Conservation Liaison Group, and the Recreation Liaison Group. Those participating on a regular basis are:

Timber Industry Liaison Group: Northwest Forestry Association (formally Industrial Forestry Association and Northwest Pine Association), Northwest Independent Forest Manufacturers, Western Forest Industries Association, plus several companies that purchase national forest timber.

Conservation Liaison Group: Alpine Lakes Protection Society (ALPS), Audubon Society, Mountaineers, North Cascades Conservation Council (NCCC), and Sierra Club.

Recreation Liaison Group: Backcountry Horsemen of Washington, Inc., National Campers and Hikers Association, Pacific Northwest 4-Wheel Drive Association, Tacoma Water Department, Travel Trailer Clubs of Washington, and Washington State Snowmobile Association.

The liaison groups act as sounding boards to keep the Forest Service informed about the general interests, concerns, and reactions of people in their special interest areas to the various aspects of the planning process. The liaison groups have also been willing to relay information gained in working with the planning team to those forest users with similar interests.

The liaison groups are small, for workability, and have no advisory or decision making authority. Liaison group members are people who have a strong interest in the management of the Mt. Baker-Snoqualmie and want to be involved in the technical details of the process.

Since continuity is a must for the success of these liaison groups, members committed to work with the Forest Planning team through the planning process, including committing a minimum of one day (or equivalent) every three months on the Forest Planning effort. Meeting agendas, dates, and activities were set by the groups, with the planning team providing, to the extent possible, any information requested. The groups meet at two-three month intervals during the planning process; less frequently after the draft was released. The groups choose not to meet together.

The planning team received specific input and suggestions on planning processes and methodology. The Conservation Group prepared a 100+ page alternative for

the draft EIS; the timber industry group provided information on assumptions and setting constraints for benchmark runs. The recreation group has provided information on horse and motorized use on the Forest, and provided trail information post-DEIS.

During preparation of the draft plan, a number of common concerns were identified by both the conservation and timber industry groups: determination of productive forest lands; development of yield tables; constraints; model formulation; economic efficiency; development of management requirements; and commodity and amenity values.

There was no intent that liaison groups replace public participation in the planning process. Hopefully the groups provide more insight and awareness of concerns that various users have regarding management of the MBS.

SELECTED ISSUES, CONCERNS, AND OPPORTUNITIES (ICO's)

Criteria and Screening Process Used

In order to determine which of the many issues and concerns could be realistically addressed in the Forest Planning process, criteria were developed to help narrow the scope of the ICO's.

The number of times an issue or concern was mentioned by either the public or the Forest Management Team provided the initial screen to narrow the number. It was assumed that the number of times an issue was mentioned reflected the degree of concern for that issue.

Scoping also included redefining the issues into broad terms and identifying the sub-issues or facets which would be considered as part of a major issue. Many of the preliminary 70 issues and additional ones mentioned frequently by the public and Forest Management Team became facets of major issues. Some issues were dropped because they did not meet the criteria listed below.

A major issue or facet of a major issue:

- ranks as a top 20 issue for either the public or the Forest Management Team or, is required by NFMA planning regulations;
- is not project (District or specialized) level planning;
- is not beyond control of Forest Service;
- and, is not an inherent part of actual planning process. (Example: public involvement is not an issue since it is part of the process.)

The following table illustrates the disposition of the 70 preliminary issues and the additional concerns identified by the Forest Management Team:

Appendix A

Table A-1 Disposition of Preliminary Issues, Management Concerns and Additional Public Issues

Preliminary Issue No.	Issue Subject	Disposition of Issue	Deferred, Resolve Outside Forest Plan Process
1	General Visual Resource Management	Facet of Major Issues 1, 2, 3, 4, 5, and 8	
2	Visual Resource Mgt. In Special or Scenic Areas	Facet of Major Issues 1, 2, 3, 4, 5, and 8	
3	Visual Resource Rehabilitation	Facet of Major Issues 4 and 5	
4	Visual Resource Mgt. Effect on Other Resources	Facet of Major Issues 1, 2, 3, 4, 5, and 8	
5	Wildlife and Fish "Essential" Habitats	Facet of Major Issues 5, 8, and 9	
6	Wildlife, Plant Diversity	Major Issue 7	
7	Threatened and Endangered Species	Facet of Major Issues 2 and 7	
8	Backcountry & Wilderness Fisheries	Not a Major Issue	X
9	Old Growth Timber	Facet of Major Issues 1, 2, 3, 5, 6, 7, and 9	
10	Anadromous Fish Habitat	Facet of Major Issues 5, 6, 7, 8, and 9	
11	Landownership Adjustment	Facet of Major Issue 1	
12	Utility Corridors	Facet of Major Issues 2 and 8	
13	Electronic Sites	Facet of Major Issues 2 and 8	
14	Public Access to Forest Service Trails	Not a Major Issue	X
15	Effects of Intermingled Ownership on Natl. Forest	Major Issue 1	
16	Recreation/Resource Conflicts	Major Issue 4	
17	Dispersed Recreation Opportunities	Facet of Major Issues 2, 3, 4, 5, and 8	
18	Developed Recreation Opportunities	Facet of Major Issues 2, 4, 5, and 8	

Preliminary Issue No.	Issue Subject	Disposition of Issue	Deferred, Resolve Outside P.Process
19	Future Recreation Demand	Facet of Major Issues 2 and 4	
20	Range Opportunities	Facet of Major Issue 7	
21	Role of Fire	Facet of Major Issues 5 and 7	
22	*Timber Harvest Residues*	*Opportunity 10*	
23	Fire Prevention & Insect & Disease Control Cost/ Benefit	Facet of Major Issues 5 and 7	
24	Public Control to Reduce Fire Risks	Not a Major Issue	X
25	Cultural Resources	Facet of Major Issues 1, 4, 5, and 9	
26	Clean Air Act	Facet of Major Issue 5	
27	Use of Chemicals	Facet of Major Issues 3, 5, 6, 7, and 8	
28	National, Regional, and Local Needs	Required by NFMA & Part of Planning Process	
29	Effect of Forest Service on Community Lifestyles	Facet of Major Issues 2 and 4	
30	Ethnic Groups Opportunities	Facet of Major Issues 3, 4, and 9	
31	Public Transportation for Low Income Use of Forest	Not a Major Issue	X
32	Public Involvement	Required by NFMA & Part of Planning Process	
33	Adjacent Land Development	Facet of Major Issue 1	
34	Community Dependence on National Forest Timber	Facet of Major Issue 3	
35	Timber Mgt. on Lands Previously Termed "Marginal"	Facet of Major Issue 3, 5, 7, 8, and 10	
36	Wood Residue Utilization	Facet of Opportunity 10	
37	Non-Tmbr Resource Impact on Timber Harvest Level	Facet of Major Issues 2, 3, 4, 6, 7, and 9	
38	Adjacent Land Management	Facet of Major Issue 1	

Appendix A

Preliminary Issue No.	Issue Subject	Disposition of Issue	Deferred, Resolve Outside P.Process
39	Hardwood Conversion	Facet of Major Issues 7, 9, and 10	
40	Timber Harvest Level	Major Issue 3	
41	Intensive Timber Management	Facet of Major Issues 3, 5, 6, and 7	
42	Tentatively Suitable Forest Land Allocation to Other Uses	Facet of Major Issues 2, 3, 6, and 7	
42a	Clear Cut Size	Major Issue 5	
42b	Logging Practices	Major Issue 5	
43	Wilderness User Conflicts	Facet of Major Issues 4 and 8	
44	Administrative Use of Motorized Equipment in Wilderness	Facet of Major Issues 4 and 8	
45	Wilderness Over-Use	Facet of Major Issues 2 and 4	
46	Mineral Development in Wilderness	Not a Major Issue	X
47	Dispersed Recreation Facilities	Not a Major Issue	X
48	Road Openings & Closings	Facet of Major Issues 4 and 8	
49	Pacific Crest Trail Management	Facet of Major Issues 2 and 4	
50	Pollution Abatement	Facet of Major Issue 6	
51	Naches Pass Road	Facet of Major Issues 4 and 8	
52	Transportation System	Major Issue 8	
53	Natl. Forest Water Needs	Facet of Major Issue 6	
54	Water Quality	Major Issue 6	
55	Floodplains & Wetlands	Facet of Major Issue 6	
56	Sensitive Soils Identification	Facet of Major Issue 6	

Preliminary Issue No.	Issue Subject	Disposition of Issue	*Deferred, Resolve* Outside P.Process
57	Definition of "Unacceptable" Soil Damage	Facet of Major Issue 6	
58	Location of Productive Soils	Facet of Major Issue 6	
59	Soil Resource Protection	Facet of Major Issues 5, 6, and 8	
60	Soil Restoration	Not a Major Issue	X
61	*Soil Problems in Watersheds*	*Facet of Major Issue 6*	
62	Geothermal Development	Not a Major Issue	X
63	Rock, Sand & Gravel Mgt.	Not a Major Issue	X
64	Mineral Resource Potential	Facet of Major Issue 2	
65	Mineral Resource Availability	Not a Major Issue	X
66	Management of Non-Wilderness Roadless Areas	Major Issue 2	
67	Further Planning of Designated Roadless Areas	Major Issue 2	
68	Entry of Roadless Areas for Timber Management	Facet of Major Issues 2, 3, and 9	
69	Research Natural Areas	Facet of Major Issues 2 and 7	
70	Management Problems Research	Required by NFMA & Part of Planning Process	
70a	Planning Concerns	Most Concerns Covered by NFMA Requirements	
70b	Social, Economic, and Environmental Interrelationships	Facet of Major Issues 3, 5, and 8	
70c	Multiple Use/Single Use	Facet of Major Issues 2, 3, and 7	
	Forest Management Team Concerns		
M1	Roadside Revegetation	Not a Major Issue	X

Preliminary Issue No.	Issue Subject	Disposition of Issue	Deferred, Resolve Outside P.Process
M2	Soil & Water Monitoring	Facet of Major Issue 6	
M3	Cost Effective Paved Roads	Project Level Planning	X
M4	Coordinated Planning	Required by NFMA & Part of Planning Process	
M5	Second Entry Logging	Project Level Planning	X
M6	Summer Staffing Needs	Project Level Planning	X
M7	Use of Past Planning	Part of Plan Process	
M8	Calculation of Amenity Values	Part of Plan Process	
M9	Water Monitoring	See Issue M2	
M10	Ski Area Administration	Project Level Planning	X
M11	Departure from Non-Declining Flow	Facet of Major Issue 3	
M12	Present Timber Mgt. Plan	See Issue M7	
M13	Cost/Benefit of Alternatives Planning Process	Required By NFMA & Part of Planning Process	
M14	Land Allocation	See Issue 70a	
M15	Forest Boundary Establishment	Project Level Planning	X
M16	Funding & Personnel Requirements	Project Level Planning	X
M17	Energy and Capital Investment	Project Level Planning	X
M18	Heavy Canadian Visitation	Facet of Major Issue 4	
M19	Integration of All Plans	See Issue M7	
M20	Energy Needs	Not a Major Issue	X
M21 M22	Role of Fire	See Preliminary Issue 21	
M23	Range of Recreation Opportunities	Facet of Major Issues 2, 4, and 6	
M24	Coordination of Recreation Opportunities	See Issue M4	

Preliminary Issue No.	Issue Subject	Disposition of Issue	Deferred, Resolve Outside P.Process
M25	Recreation Demands and Opportunities	Facet of Major Issues 2, 4, and 6	
M26	Trail Systems	Facet of Major Issues 4 and 8	
M27	Land Allocation	See Issue 70a	
M28	Forest Plan Priority	See Issue M4	
M29	Data Use and Collection	See Issue 70a	
M30	Forest Plan Funding	See Issue 70a	
M31	Forest Plan Changes	See Issue 70a	
M32	Scenic Quality of Forest	See Preliminary Issue 1	
M33	Use of Regional Commercial Forest Land Stds.	See Issue 70a	
M34	Usefulness of Plan	See Issue 70a	
M35	Flood Proofing Road-Stream Crossing Structures	Project Level Planning	X
M36	Reforestation	See Issue 42c	

1979 Initial List of Major Issues, Concerns, and Opportunities

In the fall of 1979, the Forest Supervisor with the Regional Forester's approval, selected the following major issues and management concerns to be used as a basis for developing the Forest Plan. These are not listed in order of importance.

1. Adjacent And Intermingled Lands

Not all land owners have the same land management objectives. In areas of mixed ownership, however, objectives and subsequent land practices of all owners affect the management of adjacent lands. Non-Federal lands affect management of National Forest lands and management of the National Forest affects adjacent non-Federal land owners.

- o How should national forest lands adjacent to non-Federal land owners be managed?
- o What management activities should be conducted on national forest lands that are located near private developments?

2. Allocation of Areas Designated For Further Planning in RARE II

The RARE II process designated the Eagle Rock (06054) and Glacier Peak (L6031 Monte Cristo) areas to further planning. The Eagle Rock area contains 34,100

acres and the Glacier Peak parcel contains 57,320 acres. The National Forest Management Act regulations direct that the Forest Plan address such areas.

- How will the land be allocated and the resources managed in areas designated for further planning in RARE II?

3. Effects Of Timber Management And Related Activities

The Forest is managed for a mix of land uses including timber, recreation, water, wildlife, scenery, etc.. The mix of these uses and how each activity is carried on has an impact on other resources. Timber harvesting and road construction are important activities on the MBS which impact other resources.

- What management direction is needed for timber harvest and road construction activities to benefit or maintain the quality of other resources?

4. Management of Non-Wilderness Areas Allocated in RARE II

The RARE II process allocated 20 areas or parcels totaling over 631,000 acres to non-Wilderness use on the MBS. Many of these areas possess outstanding scenic attractions. They also contain other high amenity and high commodity values. The commercial forest land within these area is calculated in the Forest annual allowable harvest totals; however, this timber was not available for harvest during RARE I or II. Consequently, timber harvesting in the roaded portions has proceeded at a faster rate, making it more difficult to meet environmental quality objectives.

- Within non-Wilderness areas, to what mix of uses will lands be allocated and how will the resources be managed?
- At what rate should the Forest Service enter non-Wilderness areas for management of the various resources?

5. Recreation Impacts and Conflicts

The outstanding scenic quality of the MBS coupled with its proximity to a large metropolitan area results in a strong demand for developed and dispersed recreation opportunities. Some recreation uses are incompatible with each other and some recreation activities cause resource damage because of the level of use or type of use

- To what extent can the Forest provide recreation opportunities and how should they be managed?

6. Timber Harvest Level

Concerns continue about the amount of timber available for harvest and how this affects inflation, jobs, energy, and the environment. The availability of timber from the National Forest is one of many complex social, economic, and environmental factors in western Washington. An understanding of the interrelationship of these factors and the weight or value attached to each varies among the public.

- What is the capability and suitability of the MBS to produce timber?

- What should the timber harvest level be considering all resources on the Forest and their relationship to social, economic, and environmental factors including local, regional, and national demands?

7. Water Quality

The Forest has 18 watersheds covering 128,178 national forest acres that are used by the public for domestic and industrial purposes. Many Puget Sound Area cities, towns, and communities are consumers of water originating on the Mt. Baker-Snoqualmie.

- What activities should be permitted within municipal watersheds?
- What measures should be taken that will maintain or enhance water quality?

8. Wildlife, Fish, and Plant Diversity

There is increasing recognition that diversity is important in the ecosystem and that management activities may or may not contribute to the enhancement or maintenance of this diversity.

- What management direction is needed and where should action be taken that will maintain and/or enhance plant, wildlife, and fish diversity to meet multiple use objectives?

9. Transportation System Development And Management

Transportation systems (roads, trails, helispots, etc.) are necessary for forest management, protection, and use. At present there are 2,789 miles of road and 1,428 miles of trail on the Forest. New roads and trails will be needed; however, there is increasing concern over the ultimate extent, standards, and management of roads and trails. Management of the transportation system is largely determined by land allocation and management of the various resources.

- What management direction is needed to minimize the effects of road and trail construction on other resources?

Evolution of Major ICO's During Preparation of the Draft EIS

The initial list of ICO's identified 9 issues and concerns to be addressed in the Forest Plan. But, by nature and design, public issues and concerns are not static. Between 1979 and the issuance of a draft EIS and proposed plan, there were changes in policy and procedure as well as shifts in the concerns of the public. The original list was revised and updated during the preparation of the draft documents.

Original Issues # 2 and 4 were revised following the 1984 Washington State Wilderness Act. A single issue was drafted to better reflect the release of the RARE II roadless areas, and the focus of public concern.

Two other ICO's were identified: American Indian Religious and Cultural Use and Wood Residue Management opportunity. These revisions and additions are described in more detail below.

Revisions and Additions, DEIS List of ICO's

"Released" Roadless Areas: At the beginning of the planning process, the RARE II roadless areas on the Forest had been designated by the RARE II process as "Further Planning" areas or "Non-Wilderness" areas. The allocation and management of these areas was to be addressed in the Forest Plan. In 1984, Congress addressed the RARE II roadless area issue in the State by passing the Washington State Wilderness Act of 1984. Roadless areas, or portions thereof, were either designated wilderness or "released" for other uses. This legislation addressed the two RARE II issues (#2 and 4) on the initial list of ICO's. For the draft EIS, the allocation and management of these "released" roadless areas remained a major issue. The following ICO was addressed in the DEIS

Unroaded Areas

- How should the released, unroaded areas be allocated and how will the resources be managed?
- At what rate should the Forest Service enter those unroaded areas that are allocated for development?

There are approximately 427,000 acres of undeveloped, unroaded lands that have been released from wilderness consideration by the 1984 Washington State Wilderness Bill These acres represent approximately 55 percent of the roadless areas inventoried during the RARE II process Until the Forest Plan is revised, either at the 10-year up-date or during any earlier revisions, these acres are now available for a full range of resource uses; wilderness designation will not be considered in this Forest Plan. Wilderness classification may be considered during future revisions.

Many of these acres possess scenic attractions; they also contain other high amenity and high commodity values. The commercial Forest land within the roadless areas has been calculated in the Forest annual allowable harvest totals; however, this timber has not been available for harvest since the beginning of the RARE I process in 1972. Consequently, timber harvesting in the roaded portions of the Forest has proceeded at a faster rate making it more difficult to meet environmental quality objectives

The allocation and management of these released, roadless areas - 25 percent of the net Forest acres - is a major issue.

Facets to Consider

-Identify opportunities to retain or enhance scenic values.
-Projected utility corridor needs
-Commodity values for timber and minerals.
-Land allocation impacts on community lifestyles.
-Dispersed roaded and unroaded recreation opportunities.
-Dispersed and developed recreation opportunities.
-Old growth: rate of harvest.
-Old growth: retention for selected wildlife species; for aesthetic values; for religious and cultural use for American Indians.
-Threatened and endangered wildlife, fish, and plant species.
-Wildlife, fish, and plant diversity.
-Establishment of additional research natural areas.
-Recreation and firewood opportunities close to urban centers to encourage fuel conservation.

American Indians: As discussed previously in this Appendix , the Forest recognized the need to address issues and concerns of the Indian Tribes that use the Forest. This issue was added to the list of ICO's addressed in the DEIS.

American Indian Religious and Cultural Use

- What policy and management direction is needed to comply with the American Indian Religious Freedom Act and various treaties?
- What are the effects of meeting this direction in terms of outputs and costs?

At least 23 American Indian tribal groups have occupied or used territory within the National Forest boundary. Currently, about 15 tribal groups use the Forest for religious, ceremonial, and/or cultural purposes.

In 1981, an inventory of religious use, practices, and localities on the Mt. Baker-Snoqualmie National Forest was completed. Over 300 cultural use areas and sites were identified, totaling nearly 450,000 acres or 26 percent of the net Forest acres. Some sites cover less than one acre; other larger areas average between 3,000 and 15,000 acres. Use-areas and sites are located throughout the Forest but are concentrated in the northern half.

The inventoried use areas can be placed in five broad categories: cedar sites, ceremonial flora, spirit sites, legendary sites, and cemeteries and archaeological sites. These categories are useful in identifying the attributes of isolation, privacy, and purity that are important in maintaining the usefulness and utility of the sites to American Indian users. There is a wide variation in compatibility between types of management activities and categories of religious, ceremonial, and cultural use.

Since the completion of the 1981 inventory, the Forest has initiated a consultation process with the Tribes. When proposed ground-disturbing projects fall within any of the inventoried use-areas, the proposed activity is reviewed in detail with representatives of the Tribe(s) which may be affected. To date, the consultation process has been generally successful. However, as more management activities are proposed, the potential for conflict will increase.

Facets to Consider

-Old growth retention.
-Access and development.
-Streamside management.
-Fisheries.
-Timber harvest levels.
-Privacy (solitude).
-Plant diversity and abundance
-Cedar retention and regeneration.
-Water quality.
-Impacts on Indian culture
-Impacts on other uses and outputs
-Wildlife.
-Cumulative effect.

Wood Residue Management: More recently the Forest recognized the opportunity *existed to increase the utilization of waste wood residues This opportunity* was been added to the DEIS list of major ICO's, as described below:

Wood Residue

- What are the impacts of wood residue removal on wildlife, soil productivity, erosion, nutrient cycling, and air quality?
- Will the Forest create political problems by promoting residue utilization on natioal forest land which may undercut the small woodland owner and compete with private enterprise?

The Forest has made steady progress in increasing the utilization of residues by promoting the availability of logging material to the public woodcutter. The MBS has responded to the challenge of increased public demand by selling or free-use removal of a large volume of wood to markets. In some areas, innovative timber sale purchasers are taking advantage of low cost, per acre material to process firewood or chips. In spite of these successes, the Forest is not close to meeting the potential residue market demand. A number of internal and external barriers have acted as disincentives for most operators. There is not enough value or profit margin in most cases to warrant removal.

At the same time, the timber industry in the Puget Sound area is evolving from a market with a predominance of plywood and lumber to a larger emphasis on wood fiber production. The Forest has large quantities of waste wood residues that are not being utilized. The opportunity exists for this supply of wood residue to be marketed both within the United States and abroad, primarily to Pacific Rim countries.

Facets to Consider

-Management of habitats for wildlife indicator species.
-Utilization of levels and standards for present and future timber harvest activities
-Compliance with Clear Air Act.
-Soil productivity and impacts that can be anticipated for various management activities.
-Costs and benefits of insect and disease control.
-Social, economic, and environmental relationships.
-Existing agreements.
-Open versus closed roads.
-Effects on fish habitat, recreation use, water quality, and other resource values.

Evolution of Major ICO's Between DEIS and FEIS

As discussed earlier in this appendix, the list of major issues, concerns, and opportunities has been revisited during the preparation of this FEIS. All revisions made are in response to public comments received on the draft EIS and proposed plan. Also, refer to Chapter I, FEIS for descriptions of the final ICO's, the planning questions, and indicators of response to ICO's.

Revisions to Unroaded Areas ICO: Based on public comment - which focused on development versus nondevelopment of unroaded lands on the MBS - this major issue is titled **Development versus Nondevelopment** Some public comments referred to the release of the roadless areas, but many others focused less on RARE II remnants and more on the general issue of whether the Mt Baker-Snoqualmie should be developed (more commodity emphasis) or managed to emphasize amenity resources. While this issue encompasses aspects of timber supply, old growth, and recreation opportunities, the RARE II parcels not designated wilderness in the 1984 Act are still to be allocated; it was felt this issue is still a major one, and needed to be identified separately. The

planning questions were not modified, but the indicators of response have been adjusted. The two, quantifiable indicators selected are those that best show how the alternatives respond to the issue. The indicators are: existing roadless areas allocated to nondevelopment, and roadless areas assigned to a roaded management prescription, but not developed in the next 15 years.

Revisions to the Timber Harvest Level ICO: This major issue has also been retitled, to better reflect the high concern from both timber industry and the general public. **Timber Supply** is the issue addressed in this FEIS, and it includes the issue of wood residue. The retention or harvest of old growth was frequently mentioned by the public in commenting on timber supply; however, the old growth issue is addressed as a separate ICO. The questions to be answered were not changed and only slight adjustments were made in the indicators of response. See Table I-1, Chapter I of the FEIS, page I-11.

Revisions to Old Growth and Diversity ICO: The title of this ICO has also been revised, again to better reflect what our public is telling the Forest: old growth is a major national issue and as a resource, it is important for biological diversity, wildlife and fisheries habitat, water quality, recreation, aesthetics, as well as industrial raw material. Wildlife habitat and fisheries also received considerable public comment, reinforcing that they are major public issues. The issue addressed in the FEIS is entitled **Old Growth Ecosystems and Fish, Wildlife, and Plant Diversity.** The planning questions were not changed; the indicators for responsiveness to old-growth wildlife indicator species and to big game indicator species were modified for clarity.

American Indian Religious and Cultural Use ICO: This issue remains a major ICO, addressed in the FEIS. The second planning question was rewritten to better reflect multiple use.

Revisions to Recreation ICO: This issue is now titled **Recreation Opportunities.** Public comment received on the draft only reinforces that recreation use - of all types - is a major public issue on the MBS. Trails will be considered as a recreation opportunity, rather than as a transportation facility, to reflect a new program, the National Recreation Strategy. Also in response to public comment, the list of planning questions to be answered has been expanded and the indicators of response updated to include miles of trails, and miles of roads open to public use.

New ICO: Wild and Scenic Rivers is identified separately as a major issue for the final planning effort. There was considerable public comment on the elgibility study done in the DEIS; wild and scenic river legislation is still under discussion and there is continued public concern (support and opposition). **Wild and Scenic Rivers** is addressed as a major ICO separate from the recreation issue (where it was handled in the draft EIS). Planning questions and indicators of response are displayed in Chapter I, FEIS.

Revisions to Water Quality and Municipal Watersheds ICO: While public and agency concern over water quality (including the cumulative effects of management activities on watersheds) continues, the Forest team felt this issue needed to be retitled to focus on the management issue of municipal watersheds, especially the Cedar River watershed. This reorganization of ICO's better reflects the kind of public comments received. The issue in the FEIS is **Management of Municipal Watersheds.** The planning questions were not changed; however, miles of roads constructed within watersheds was dropped as an indicator of response. It was felt this is a function of the timber harvest

level, which is also an indicator. Cumulative effects are also addressed in the Effects of Timber Management and Related Activities issue.

Dropped Transportation System as a Major ICO: There was considerable public comment on the issue of roads - building more or less, opening and closing to public use, etc. However, the transportation system is a facet of the development versus nondevelopment issue, the recreation opportunity issue, and the effects of timber management issue. In addition, the transportation system is a function of the land allocation, rather than an allocation itself. Therefore, this has been dropped as a separate ICO, and will be addressed as a facet of several others. The trail system is discussed under the recreation opportunities ICO.

Revisions to the Effects of Timber Management and Related Activities ICO: This topic remains a concern of major interest to elected officials, agencies, organizations, and individuals. In response to public comment, and to reflect the focus on hydrologic cumulative effects, water quality, and protection of fish/fish habitat, the description of this issue has been revised. The planning question did not change, but adjustments were made in the indicators of response: "acres meeting VQO of retention/partial retention" and "fishery production potential" were dropped and "sediment produced from all sources" was added as an indicator.

Adjacent and Intermingled Lands ICO: This issue remains a major ICO in the FEIS. The indicators of response were adjusted; where an indicator was included in another ICO, and did not serve as a specific measure for this issue, it was dropped. The remaining indicator of response is timber harvest level.

Dropped Wood Residue ICO: This management opportunity was dropped as a major ICO for the FEIS. There was very little public comment on this ICO. Agency comment focused on the growing concern from air pollution from burning residue and domestic wood burning for heat. Other comments were concerned about utilization of residue not leaving enough for soils and wildlife. Aspects of the wood residue are addressed in the Old Growth and Fish, Wildlife, and Plant Diversity and Timber Supply ICO's.

The table below shows the evolution of the ICO's during the planning process.

Table A-2
Evolution of Major ICO's During the Forest Planning Process

1979 Initial List	DEIS ICO's	FEIS ICO's	Rationale for Evolution - DEIS to FEIS
Allocation of Areas Designated for Further Planning in RARE II	Unroaded Areas	Development Versus Non-development of the Forest	Retitled to reflect public comment
Timber Harvest Level	Timber Harvest Level	Timber Supply	Retitled to reflect public and management concerns. Includes DEIS Wood Residue ICO as a facet.
Wildlife, Fish, and Plant Diversity	Old Growth and Diversity	Old Growth Ecosystems and Fish, Wildlife, and Plant Diverstiy	Retitled in response to public comment and growing concern over old growth ecosystems and diverstiy.
(new)	American Indian Religious and Cultural Use	American Indian Religious and Cultural Use	No change.
Recreation Impacts and Conflicts	Recreation	Recreation Opportunities	Slight adjustment in title to better reflect public comment. Includes trails as a facet (from the DEIS Transportation ICO).
-	-	Wild and Scenic Rivers	New major ICO, based on public comment on the DEIS
Water Quality	Water Quality and Municipal Watersheds	Management of Municipal Watersheds	Retitled to focus the issue. Water quality remains a facet of this ICO as well as the Effects of Timber Management ICO.
Transportation System Development and Management	Transportation System	(dropped)	Dropped as major ICO, facets included in Recreation and Effects of Timber Management ICO's. Little public comment.
Effects of Timber Management and Related Activities	Effects of Timber Management and Related Activities	Effects of Timber Management and Related Activities	Facets include more emphasis on the cumulative effects of activities on watersheds, fisheries.
Adjacent and Intermingled Lands	Adjacent and Intermingled Lands	Adjacent and Intermingled Lands	No change.
Management of Non-Wilderness Areas Allocated in RARE II	(replaced by Unroaded Areas ICO)	-	
(new)	Wood Residue	(dropped)	Dropped as major ICO, but still included as a facet of the Timber Supply ICO. Little public comment.

THE TIE TO THE ALTERNATIVES - TRADE-OFF EVALUATION

ICO's are used to build alternatives within the range defined by the benchmarks; this process is described in Chapter II and Appendix B.

Many ICO's are "competitive" and will require trade-off evaluation. In many instances, several interests compete for the same geographic area. The following examples illustrate some of the competing interests that have been addressed and evaluated. Again, these are only a few examples.

- Old growth located in suitable timber land has value as habitat for wildlife species dependent on old growth, value for diversity, for aesthetics, as well as having value as commercial timber. This is addressed in the issues of Old Growth Ecosystems and Fish, Wildlife, and Plant Diversity, Timber Supply, and Development versus Nondevelopment.

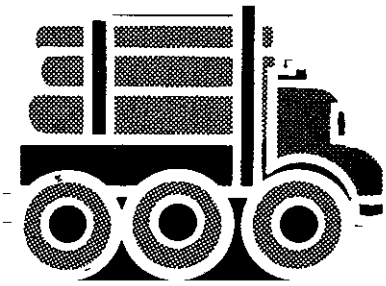
- Lower elevations typically have deeper soils, more vegetative cover (including commercial timber), contain many of the Forest's riparian zones, recreation values that can accommodate several types of opportunities, and habitat for a variety of wildlife species. The issues of Recreation Opportunities, Timber Supply, and Old Growth Ecosystems and Fish, Wildlife, and Plant Diversity address these competing resources.

- Higher elevations with scenic attractions are sought by a variety of recreationists. Many of these users seek to recreate on the same area, but their mode of travel varies, including foot, cross-country skis, horses, trail bikes, mountain bikes, 3 and 4-wheel drive vehicles, and snowmobiles. These competing users are addressed primarily in the Recreation Opportunities ICO.

The Mt. Baker-Snoqualmie's potential capability to respond effectively to each ICO is discussed in the FEIS: refer to the Responses to Major ICO's in Chapter II; also see Table II-10 (qualitative) and II-14 (quantitative) - response, by alternative, to the major issues and concerns.

Each ICO is treated differently in at least one of the alternatives. This facilitates the trade-off analysis, enabling the reviewer to evaluate the effects of different treatments

Appendix B



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DESCRIPTION OF THE ANALYSIS PROCESS

CHAPTER I - INTRODUCTION

CHANGES BETWEEN DRAFT AND FINAL - APPENDIX B, CHAPTER I

There are no significant changes in this chapter between the DEIS and FEIS.

* * * * * * * * * * * *

A. The General Planning Problem

1. Nature and Complexity of the Problem

Long range planning on the National Forests around the country was changed dramatically with the passage of the National Forest Management Act of 1976 and the subsequent approval of its implementing regulations in 1979 (P.L. 94-588, 10/22/76; 36 CFR Part 219, 9/19/79, as revised 9/30/82). For the first time in the history of the National Forest System, comprehensive, coordinated land and resource management plans were to be done for each Forest. Prior to that time, planning efforts had concentrated on either single resources (e.g., timber, wilderness, or a particular wildlife species), or on relatively small geographic subunits of the Forest (area planning, unit planning, etc.). The complexities of going from single resource or subunit area plans to Forest-wide integrated resource plans promised to increase geometrically as the size and scope of the planning process increased.

The Mt. Baker and Snoqualmie National Forests were administratively combined in 1974. During the late 1970's, the Mt. Baker-Snoqualmie National Forest was in a difficult management position because the Ranger District Multiple Use Plans approved in 1967-8 were outdated. In 1973, the Multiple Use Plans were amended to provide for the protection of the wilderness character of those lands inventoried in RARE I and to serve as interim guides during the preparation of comprehensive land-use plans.

Land-use planning projects were underway when the Forests were combined. The Alpine Lakes Management Act of 1976 designated the Alpine Lakes Wilderness and Management Unit and required preparation of an Alpine Lakes Management Plan, implemented in 1981. Continued objections to timber harvest and road building in roadless areas and jurisdictional reversals of the RARE I decision initiated a second roadless area review and evaluation process (RARE II) in June 1977. The legislative process subsequent to RARE II culminated with the Washington State Wilderness Act of 1984. In 1979, a DEIS was issued proposing a revision of the 1963 Timber Management Plan. This proposal was terminated to concentrate efforts on developing a Forest Plan.

The Mt. Baker-Snoqualmie National Forest is a land and resource complex which covers about 1.7 million acres of land along the west side of the Washington Cascades. The Forest extends from the Canadian border in the north to Mt. Rainier National Park in the south.

The Forest encompasses nearly 600,000 acres of timberland that meet legal and environmental tests of potential suitability for full-scale timber management.

It contains about 721,700 acres of designated wilderness in eight wildernesses as part of the National Wilderness Preservation System. Over 1,000 miles of rivers and streams and nearly 12,300 acres of lakes support populations of resident fish and runs of anadromous fish--salmon, steelhead, and sea-run cutthroat trout. About 24,000 acres of streamside lowlands provide wintering habitat essential to the maintenance of viable deer and elk populations. Large wintering populations of bald eagles roost and feed on dying salmon along the Skagit River.

The Forest is also important for the economic livelihood of a portion of the region's timber industry, and it is the source of recreation and relaxation for a large number of visitors every year. Potential and active conflicts over competing uses of the Forest's resources abound. For example, mountain goats, the northern spotted owl, pileated woodpeckers, and the marten all represent a wider range of species that are dependent on old-growth forest stands. While this shrinking component of the Forest is vital to the survival of these species, it is also economically important to those loggers and timber mills who historically have bought, cut and processed timber purchased from the National Forest lands.

The rivers which support anadromous fish runs are also economically important, as they provide the spawning grounds for the great runs of salmon and steelhead which are caught by commercial fishermen, Indians, and recreational anglers, both offshore and in the rivers. Maintenance of the anadromous fish populations is important economically and culturally (for American Indians) and requires protection of the fish spawning areas. Offshore and down river management outside the Forest boundary are also critical pieces of this management puzzle, but the Forest Service has little control or jurisdiction over these areas.

The Mt. Baker-Snoqualmie is in the backyard of over 2 million Washington State residents who live in the Puget Sound area, plus an additional 2.6 million in the Vancouver, BC area. Canadians make regular use of the Forest for recreational purposes. Demands are high for recreation experiences and opportunities on the Forest, ranging from the very primitive to the highly developed Recreationists currently spend over 5 million visitor days per year on the Forest; roughly half these visitor days are spent at developed sites and half spent engaging in dispersed recreation activities of various types.

The economic uses, recreational demands, and ecosystem maintenance requirements are often in conflict The challenge for Forest managers is to use the Forest planning process to find the mix of commercial, recreational and other competing uses which will have the highest overall value from a societal standpoint, while at the same time maintaining critical and diverse ecosystems, including vegetation communities and wildlife and fish species. Planning to achieve this social "optimum" on 1.7 million acres of land ranging all the way from low elevation dense forest to high elevation rocks and ice is a complex task. It is further complicated by the presence of more than 200,000 acres of privately owned lands within the Forest boundaries over which the Forest Service has little or no jurisdiction or influence.

2. Analytical Techniques

The mandate to the Forest Service by NFMA was to develop a Forest Plan that would result in the management of all the Forest's resources in an integrated fashion; resolve to the degree possible the primary issues, concerns, and management opportunities (ICO's) facing the Forest; and accomplish all this in a manner which would have the highest "net public value" for society. This was no small task, particularly when nothing of this scale or complexity had ever before been attempted, and the directions and policies for carrying out the planning process were generally untested.

It was a foregone conclusion that computers would be necessary to manage the massive amounts of data existing or soon to be generated. Computers were already being used to manage data bases of various kinds, and several different optimization programs had begun to be used on a limited scale for timber resource planning and for some area planning.

The size of the task had to be decreased without losing the most important information and relationships. Even with complete data and knowledge of all the resource interactions that take place on the Forest, the magnitude of using all that information would make it difficult to develop a meaningful plan that would relate to the important management issues, and could be utilized to make a decision about a preferred path of management. Since such complete information does not exist, problems of imperfect and missing data, and lack of quantifiable knowledge of resource interactions compounded the size of the problem.

The best way to cope with this type of situation is to use a "model" which, as an abstraction from reality, can focus on most of those areas which are important planning issues, can incorporate the resources for which data exist, and can help pinpoint areas where lack of data or knowledge of resource interactions is critical to the planning and decision process and must be developed. After considering a number of options, in 1979 the Forest Service Washington Office chose the FORPLAN (FORest PLANning) model for this role (1920 memo from Associate Chief Leisz to Regional Foresters, 12/3/79). FORPLAN can be used to simulate management practices, while at the same time optimizing for any given objective. As a manageable abstraction from reality, it can be used to manipulate information and look at alternative approaches to management, calculating tradeoffs and opportunity costs.

Although FORPLAN is a very flexible model, each Forest has different data and resource situations, and each has staff with varying analytical skills. Thus, it was necessary for each Forest to develop supplemental programs and processes for data manipulation and analysis prior to running FORPLAN, as well as for post-FORPLAN analysis. Also, the economic values for timber prices have to be developed outside FORPLAN from original sources and adjusted (e.g., by a statistical package such as SPSS) into reasonable proxies of prices to apply across a range of timber classes and sizes as specified for FORPLAN.

Forest Plans are created in an environment that includes qualitative, political, and social considerations as well as "hard" scientific and economic data and relationships. The analytical processes and tools provide the basis for shrinking the large amount of more quantitative data down to a manageable size and for providing a base of information that can be used in conjunction with those factors that are more qualitative in nature. The complex of data bases, computerized and noncomputerized models and processes (with FORPLAN as the centerpiece) became the analytical tools with which to carry out the heart of the planning process mandated by NFMA. They provided an enormous amount of useful information. But the final decisions were made in that broader context of qualitative, political and social considerations. The modeling tools and processes guided and aided, but did not control, the decision-making process.

B. NFMA Planning Steps

NFMA outlines 10 steps required in the Forest planning process. These steps are further refined in the implementing regulations (36 CFR 219.12). All ten of the steps are discussed below. Note that this Appendix deals primarily with the technical, analytical steps of the process (Steps 3, 4, 5 and 6). Steps 1, 2, 7 and 8 deal with more judgemental or subjective parts of the planning process and are primarily dealt with in Chapters I and II and Appendix A of the FEIS. The execution steps (9 and 10) are referenced in the Forest Plan.

1. Identification of Purpose and Need

Requires identification of public issues, management concerns, and resource use and development opportunities (ICO's) to be addressed in the planning process. Requires public input and involvement and coordination with other government agencies and Indian tribes in the identification of the ICO's. ICO's and their development are discussed in detail in Chapter I of the FEIS.

2. Development of Planning Criteria

Requires development of criteria to guide the planning process, including criteria for data inventory and collection, analysis of the management situation, and the design, formulation, and evaluation of the alternatives. Laws, policies, ICO's, technical and economic considerations, and resource integration and management requirements as delineated in 219.13-27 of the planning regulations shall be used in developing the criteria.

3. Inventory Data and Information Collection

The Interdisciplinary (ID) Team determined what data was necessary based on the ICO's The analysis of the management situation (AMS), formulation and evaluation of alternatives, and monitoring require data on resource capabilities, resource interactions, existing supply and demand, expected outputs, benefits, and costs. Existing data were used whenever possible but were supplemented with new data, if feasible, to help resolve sensitive issues or management concerns. For instance, data on the location of essential deer and elk winter range were not developed until well into the AMS step. And assessment of the acceptable disturbance levels by watershed (hydrologic cumulative effects analysis) was not completed until after the DEIS was released. Inventory data are on file in the Forest Supervisor's Office. Much of the data can also be reviewed in the AMS document (May 1985).

4. Analysis of the Management Situation

The analysis of the Forest's management situation examines past land and resource availability and use; current patterns; expected future demands made on the Forest for resources and land use, and the capability of the Forest to meet (or not meet) those demands. The AMS process is also used analytically to define theoretical production limits of goods and services from the Forest, hypothetically assuming for each "benchmark" run that provision of one resource would be maximized, disregarding all others.

These benchmark runs help to determine the "decision space" for the Forest Plan: what are the outer limits past which it is not physically, biologically, or economically possible to produce a feasible combination of Forest goods, services, and land use assignments. For example, assume that an unlimited timber production (benchmark) run is made that yields an annual allowable sale quantity (ASQ) of 340 MMBF. An actual EIS alternative, which will include a number of other resource objectives and constraints, cannot produce any more than 340 MMBF. Most likely, the actual ASQ will be significantly less for the alternative than for a benchmark.

The AMS process also involves a number of economic runs. Maximum present net value (PNV) runs are made first to set the outer limits for economic "value" (assuming no other constraints apply). Then major constraint sets are added individually, and the change in PNV analyzed to get an indication of the "opportunity cost" of the constraint set. Finally, policy changes, such as allowing flexible harvest scheduling (departure from non-declining yields), are examined to look at the relative costs of those policies. In general, economic runs are done with all economic values: market (e g., timber) and nonmarket or assigned (e.g., dispersed recreation). However, an additional set of runs is done with market prices only, and the PNV, activities, outputs, and land allocations compared with the full economic runs.

Two other runs are required by the regulations. One is an estimate of the "minimum management" necessary to meet basic land ownership and resource protection requirements for the Forest, without any active management or production programs. The second is a projection of the goods and services produced if current management direction is maintained.

The AMS step is the first step that requires major use of FORPLAN in the planning process. It sets the stage for the development of the alternatives and provides estimates of the costs and benefits of basic resource constraints *and tradeoffs, which are useful in further development of management strategies* and alternatives. The Regional planning direction requires 11 primary benchmark runs, some variations on those runs, constraint set opportunity cost analysis, and some runs to test the sensitivity of the benchmark results to different levels of timber management costs.

Region 6 has a formal review process for the AMS step involving the Regional Forester and his staff. The Mt. Baker-Snoqualmie finished the AMS review process in April, 1985. Results of the AMS and associated analysis are detailed in the Forest's AMS document (May, 1985). Additional discussion can be found in Section VI of this Appendix.

5. Formulation of Alternatives

This step is the key to a usable and defensible Environmental Impact Statement and Forest Plan The Forest ID Team is required to develop a broad range of management alternatives which are responsive to the ICO's, meet legal and policy constraints, emphasize different mixes of resource uses, are cost efficient, and are implementable.

Using the information developed in the first four planning steps, the ID Team and Forest Management Team developed a range of alternatives which they felt best met the required criteria. Management strategies, standards, and guidelines were developed to represent the most cost efficient mix of management practices that would achieve the management objectives for the various alternatives. The alternatives were mapped, input to R2MAP, converted to FORPLAN data sets, and run through FORPLAN to optimize PNV, given the desired land use assignments, minimum management requirements, and other constraints necessary to meet the objectives of each alternative.

For the DEIS, eight alternatives were formulated and run completely through the analysis process. Departure schedules were run on two of these. (Additional potential alternatives were considered, but not analyzed in detail; refer to Chapter II of the DEIS). Two of the eight alternatives are required by the regulations: continuation of current management direction, and attempting to meet RPA targets. A ninth alternative, NC or No Change, has been developed to represent the existing timber management plans.

For the FEIS, two alternatives developed in detail are added: Alternative I, in response to strong public support and comments; and Alternative J, the new Forest Service Preferred Alternative. In addition, significant modifications were made to Alternative G in response to public comment and to better meet its objectives.

On the other hand, three alternatives (D, E, & F) and departure schedules on E and H, all presented in detail in the DEIS, were dropped from further consideration in the FEIS. They received very little support in comments on the DEIS and were not needed to provide a full range for analysis with the additional alternatives that were added.

A full discussion of the alternative development process can be found in Section VII

6. Estimated Effects of Alternatives

This planning step is crucial for appropriate decision making. It requires the estimation of the physical, biological, economic and social effects of each alternative. As much information as possible is necessary from this step for the Forest managers to make appropriate assessments as to the ability of each alternative to respond to ICO's, the relative tradeoffs among alternative land and resource management paths, and the relative on-Forest and off-Forest costs and benefits of pursuing different management alternatives

The Forest ID Team first defined in general terms the interrelationships among resources (e.g. what will happen to sediment production or to certain wildlife groups when a new road is built; conversely, if wildlife habitat is protected at a certain level, what are the implications for timber growth and harvest, opportunity to build roads, etc). The numbers of interrelationships are vast, and good data defining those relationships are scarce. The resource managers and specialists used available research literature and field experience to define as many of these interrelationships as possible.

The second step was using the estimated activities, outputs, and economics (provided primarily through FORPLAN runs) to assess the magnitude of the effects, based on the interrelationships they had defined. The results of this analysis are documented in Chapter IV of the FEIS. Some additional details of that process can be found in Section VIII of this Appendix.

7. Evaluation of Alternatives

In this step, the information developed from the estimated effects of alternatives was used to evaluate the alternatives against established criteria, compare their overall effects and ability to respond to ICO's, and ultimately to choose a preferred management alternative for the Forest Plan. It is the bridge between the more quantitative analytical portion of the planning process, and the more qualitative and subjective decision portion. This step was carried out by the ID Team and Forest Management Team.

8. *Preferred Alternative Recommendation*

The Forest Supervisor reviewed the evaluation of the ID Team and Management Team and chose an alternative to recommend to the Regional Forester as the preferred alternative to become the Forest Plan.

9. Plan Approval

This step occurs when the Regional Forester signs the Record of Decision (ROD). The ROD is the decision document for the FEIS. The ROD clearly states the decision as well as rationale for the decision and the right to appeal.

10. Monitoring and Evaluation

A monitoring plan is included as part of the Forest Plan. Monitoring and evaluation of the implementation of the Forest Plan and subsequent effects will be critical to its success. Monitoring and evaluation should identify areas where change or modification is needed. This may occur because of sample data that were used which do not reflect an actual on-the-ground situation, inaccurate estimates of resource interactions and effects, or changing environmental (physical, biological, economic, or social) conditions. Modifications needed may be able to be postponed until the next round of planning (10-15 years), or they may be sufficiently large or critical to require immediate change in the Plan.

CHAPTER II - DATA INVENTORY AND INFORMATION COLLECTION

CHANGES BETWEEN DRAFT AND FINAL -- APPENDIX B, CHAPTER II

- o References to data updates that took place between the DEIS and FEIS are made.
- o Reference is made to the use of the Stand Projection System (SPS) yield simulator for development of the managed stand yield tables for true fir and western hemlock types in the FEIS.
- o Changes in the definition of the FORPLAN Level 1 identifier are described These changes relate to the recalculation of site productivity indices for the North and South portions of the Forest, and to the adoption of the SPS yield simulator for true fir and western hemlock stands.

* * * * * * * * * * * *

A. Data and Resource Inventories

The requirements of NFMA and its implementing regulations placed unprecedented demands for data of many kinds on the national forests Step 3 of the NFMA planning process (36 CFR 219.12(d)) specifically provides for data collection and resource inventories as part of the forest planning process. Part B of this chapter shows the broad range of data inventories and sources used during the development of the Forest's AMS, EIS, and Forest Plan. Data inventories for the 1963 Timber Management Plan, upon which Alternative NC (No Change) is based, were collected prior to 1963 and prior to subsequent plan amendments that changed the land base and potential yield.

Historically, the most comprehensive data collection had been done for timber; the most recent timber inventory was completed in 1976 However, there were still many problems, errors and omissions in the timber inventory. Data for other resources such as recreation, minerals, wildlife habitat, and fisheries were weak or non-existent when the planning process began.

The Mt. Baker-Snoqualmie National Forest has begun a new integrated resource inventory, which will replace the old timber-only inventory Potential old growth will be re-inventoried by Fall, 1990. Physical and biological attributes of stands -- not just size and age class -- will be measured. The rest of the integrated resource inventory will be completed by 1995

Ideally, complete data collection would have been done before the planning process proceeded. Constraints of time, budgets, and logistics resulted in completing the process with less-than-complete or perfect data.

Under the planning timeline established in the late 1970's, it was anticipated that all plans would be done within about four years. Data collection could only take a small portion of that total time. Wherever possible, existing data inventories were used. Where additional data were necessary, those inventories relating to the most critical resources and issues were done first. Lower priorities were accomplished if time and budget allowed.

In spite of difficulties, a number of positive factors from this process resulted. Among these: data were gathered for resources for which none had existed before; existing data were improved; serious data gaps were identified and the need to rectify them noted, either for immediate action, or for future attention if not absolutely critical to the planning process; finally, it became apparent that a comprehensive and coordinated computer-based data base system, using up-to-date technology, should be a high priority for the National Forest System. Institution of that system has begun; a system-wide Geographic Information System (GIS) is being established. The Mt. Baker-Snoqualmie began local installation of the GIS system in 1989.

This chapter provides a brief introduction to the major uses of data and resource inventories in the land management planning process It concludes with a list of the data sources and resource inventories used in developing the FEIS and Forest Plan.

A note about terminology: as discussed in Chapter III, B, 2, the primary computerized data base for the Forest planning process is a grid-based mapping system called R2MAP. When the term "resource layer" is used in this chapter, it refers to a set of resource information that has been mapped and entered into R2MAP as a specific data layer. An example would be "Existing Visual Condition." Several different data layers can be overlaid in the computer to produce a composite map, the same way one could physically overlay mylar data maps on a light table to see the overlaps and interactions produced from combining several maps.

1. Capability Areas

A capability area is a geographically specific area of land with a defined set of resource characteristics that will respond to a given set of management practices with a corresponding set of physical, biological, economic, and possibly social outcomes and effects. For instance, a specific area of land (say, 118 acres), locatable on the ground, that has the following characteristics is a capability area: is on the North end of the Forest (old Mt. Baker National Forest); is already roaded; is in the Principal working group (i.e., predominantly Douglas-fir and Western hemlock vegetation); has low to moderate slope; and vegetation is predominantly mature sawtimber.

The definition of capability areas on the Forest went through several refinements before the final specifications of resource characteristics and resulting delineations were decided. FORPLAN allowed only six categories of resource characteristics, so it was important to find and use those characteristics that potentially have the greatest effect on an area's responses to management activities, and to discard those that have little effect. For instance, in an earlier version of the capability delineations, deer winter range (as mapped at that time) was a resource characteristic used to delineate a capability area; it was later dropped and carried as a separate resource layer in R2MAP instead.

a. Levels and Level Identifiers. A large number of individual resource characteristics were used in the definition of the capability areas. There were five categories, or levels, of characteristics, and several variables, or identifiers, within each level. (As explained in Chapter III,C,2, there are six levels of characteristics allowed in FORPLAN; only five levels are used.)

Table B-1 lists the resource characteristic categories - levels - and the identifiers within each of those categories - level identifiers - that were used to delineate capability areas. A complete discussion of the level identifiers is found in Chapter III,C,2.

Table B-1
Resource Characteristics Used to Delineate Capability Areas

Level 1 - General Location, Water, Newly Acquired Lands, Developed Recreation

North	Mt. Baker NF
South	Snoqualmie NF
Water	Water (lakes, streams, ponds, etc).
New FS Lands	Newly acquired NFS lands with no resource data
Camp/Picnic	Existing developed site camp and picnic grounds
Camp/Ski	Existing campground within a developed ski area
Ski Areas	Existing developed ski areas
Rec. Residences	Private rec. residence areas and organization camps

Level 2 - Not Used

Level 3 - Roading and Accessibility Condition

Roaded	Currently roaded and economically accessible
Unroaded	Currently unroaded but economically accessible 2/ (i.e., can be roaded to access harvest areas)
Inaccessible	Currently unroaded and economically inaccessible (i.e., available for harvest only w/aerial systems)
Wilderness	Congressional-designated wilderness

Table B-1 Page 2 of 2

Level 4 - Working Group

Upper	True fir/Mtn. hemlock timber stand (higher elevations)
Principal	Western hemlock/Douglas-fir stands (mid-elevations)
Mixed Conifer	Douglas-fir/Western redcedar/hardwood stands (mostly lower elevations - approx. 70% conifer & 30% hardwood)
Inacc. Types	Aggregation of working groups in inaccessible lands (Level 3 identifier), grouped because of small acreages of individual working groups
Unsuitable	Forest lands unsuitable for timber production, as determined under the NFMA regulations
Nonforest	Lands with less than 10% tree crown cover; brush and grass lands; rocks; ice

Level 5 - Slope and Stability Classes

Slope Class A	Less than 35% slope; all stability classes
Slope Class B	35%-80% slopes; rock outcrops <35% of area; stream density <5 miles/section; all stability classes
Slope Class C	50%-90% slope; rock outcrops 35%-100% of area; rugged high dissected topography; stream density >5 miles/section; all stability classes

Level 6 - Condition (Age and Size) Class

Mature Large	Mature large sawtimber (generally 240+ years old)
Mature Small	Mature small sawtimber (generally 140+ years old)
Poles	Immature small sawtimber and poles (80+ years old)
Seeds and Saps	Seedlings and saplings (avg. 20 years old)
Reforestation	New regeneration growth (avg. 10 years old)
Mx. Conif. 1	Mixed conifer poles through large sawtimber
Mx. Conif. 2	Mixed conifer reforestation and seeds & saps
Inacc. 1	Mature large and small sawtimber on inaccessible lands
Inacc. 2	Immature small sawtimber and poles on inaccessible lands
Inacc. 3	Reforestation and seeds & saps on inaccessible lands ("Inaccessible" used as defined for Level 3)

2/ "Unroaded" designation is not identical with RARE II roadless area lands.

b. Data Sources for Level Identifiers. Following is a brief discussion of the data sources used as the basis for the level identifiers. A much more complete discussion of the reasons for and complexities of some of the identifiers can be found in Chapter III,C,2.

Level 1. Level 1 identifiers actually represent three different resource characteristics: general location on the Forest, lands without other data or resource characteristics, and developed recreation sites. One level can be used for three different resource characteristics because they are completely independent; there is no overlap between one characteristic and another, as tracked in the model. North and South are used in combination with one or more of the resource characteristics represented by Levels 3-6. Lands without any other resource characteristics (no characteristics represented in Levels 3-6) -- e.g , newly acquired lands without inventoried physical and biological information, and water -- are represented only by Level 1. And acres in developed recreation sites are carried separately from other acres, tracked Forest-wide rather than by North and South, and represented solely by a Level 1 identifier. (Putting the developed recreation identifiers in Level 1 was for convenience; they could have gone in any of the levels).

The North and South delineations are based on the boundaries of the Mt. Baker and Snoqualmie National Forests. Originally, up through the DEIS, productivity measures developed using 1976 timber inventory data were coincidental with the North and South delineations. After public comments on the DEIS, the Stand Projection System (SPS) timber yield simulator was added and productivity estimates were redone. There are now two productivity classes to use with the Douglas-fir Simulator (DFSIM) and two for use with SPS. These productivity classes are associated, respectively, with the Douglas-fir types north and south, and with the western hemlock and Pacific silver fir types north and south. These delineations do not match completely with any of the other level identifiers; therefore, the productivity classes were dropped as one of the level identifiers. Productivity is now incorporated through the application of DFSIM to Douglas-fir stands, north and south, and the application of SPS to western hemlock and Pacific silver fir stands, north and south. See Chapter III, Section F of this Appendix, and "Documentation of the Development of Managed and Empirical Yield Tables" (revised 9/89) in the Planning records for details of the development of the productivity classes and timber yield coefficients.

Newly acquired NFS lands without resource data inventories, bodies of water, and the developed recreation sites were inventoried, mapped, and input to R2MAP as separate data layers.

Level 2. This level was originally used to denote deer winter range. It was later dropped because of a lack of usefulness as a resource characteristic for the delineation of capability areas. Winter range was ultimately remapped and carried as a separate resource layer in R2MAP.

Level 3. These identifiers reflect the roaded status of Forest lands. Also included are the wildernesses. This level was based on: the RARE II roadless area maps, plus any additional unroaded acreages between 1000 and 5000 acres; by the map on which areas accessible by roads and those not suitable for roading because of topographic, soils, or economic factors had been specified; and by the wilderness base map. The wilderness identifier could have gone anywhere; Level 3 was chosen because of its indication of lands as developed or non-developed.

Level 4. The working groups in Level 4 were developed from the ecoclass typing done as part of the 1976 Forest timber inventory. Ecoclass typing was done based on an assessment from aerial photos and sample plots on the ground of the potential climax vegetation for every acre. Included in the ecoclass typing were unproductive forest lands (those with average growth of less than 20 cubic feet/acre/year) and non-forested lands (those lands with crown or canopy cover of less than 10%). The ecoclass layer exists in R2MAP.

Most timber stands on the Mt. Baker-Snoqualmie National Forest are mixtures of species; there are very few areas of pure, single-species stands. The first three working group identifiers are groupings of the potential climax species types representing the mixes generally found here. These groupings correspond fairly closely to elevational ranges as well, from Upper at the higher elevations, to Mixed Conifer at the Forest's lower reaches.

Level 5. Slope classes include all three stability classes, from low hazard to extreme soil stability problems. The slope classes (also referred to as topographic classes) were derived from the Soil Resource Inventory, which is mapped into R2MAP.

Level 6. The condition class level identifiers represent a combination of size and age of timber stands on the Forest. Identification and classification of stands according to their size and estimated age was done as a part of the 1976 timber inventory (Chapter II, part A), based on photo interpretation and plot sampling. The basic age class/size class data were input to R2MAP as a separate data layer. The two Mixed Conifer and the three inaccessible condition class identifiers were developed later from the original data, in order to aggregate small acreages and save on model size.

Every unique combination of these layers on the Forest is a capability area. Capability areas can vary widely in size, depending on over how many acres the unique combination of resource characteristics stays constant. Note that the same combination of characteristics occurring on two non-contiguous land areas make two different capability areas. Though never counted, there are probably between 10,000 and 50,000 individual capability areas on the Forest, as delineated by these particular resource characteristics.

2. Analysis Areas and Allocation Zones

a. Analysis Areas. The number of capability areas was far too large to work with in FORPLAN. For planning purposes, the capability areas were aggregated into "analysis areas" by dropping the locational specificity of each capability area Thus, all capability areas with the same level identifiers (e.g., North/Roaded/Principal/Slope A/Mature Sawtimber) were grouped as one analysis area without any locational identifier (other than the North or South identifier). These are know as "resource homogeneous - spatially noncontiguous" analysis areas.

The individual acres of an analysis area could be found scattered around in different size parcels over various parts of the Forest. Though lacking a specific location on the Forest, each analysis area's resource characteristics were the same for all acres within the AA. Thus, for planning purposes, all acres within an AA responded in the same manner to application of various management practices. (We could map the AA's outside FORPLAN and see where they were physically located, but FORPLAN did not know where they were).

In the final version of the analysis areas used for the model, collapsing the capability areas into analysis areas resulted in 121 land-based analysis areas. An additional analysis area was created for Water (Level 1 identifier only). The newly acquired NFS lands and developed recreation sites, as discussed above in the Level 1 identifier description, added another five analysis areas. (Four additional "dummy" one-acre analysis areas used for modeling purposes will be discussed in Chapter III,C.)

b. Allocation Zones. Allocation zones (AZ's) are geographically contiguous areas comprised of all or portions of analysis areas. AZ's provide for a degree of geographic definition and control within the model not allowed by the analysis areas alone.

Allocation zones were developed from two data bases, the hydrographic mapping of the 66 major watersheds on the Forest, and the roadless area/wilderness map layer. Zone boundaries were delineated primarily on the watershed boundaries, with the roadless areas providing secondary boundaries An exception to the watersheds as primary delineators was for the wildernesses, which were each specified as separate allocation zones. In those eight cases, the watershed separations within the wilderness were ignored. There were 86 allocation zones delineated for the model.

3. Production (Yield) Coefficients

The term "yield coefficient" refers to a figure representing the amount of a management activity input or a physical or biological output per some unit, usually of time, area, or other intermediate activity or output. For instance, a value of 4.5 acres of silvicultural exam for every acre of timber harvest is a yield coefficient. Similarly, a figure of 2.58 miles of new road construction per square mile is a yield coefficient. Timber volume of 8000 cubic feet per acre comes closest to the original derivation of the term "yield coefficient" used in earlier timber scheduling optimization models such as Timber RAM.

Yield coefficients, as a whole, represent one of the most critical links in the FORPLAN model. They are the quantification of the input and output sides of the production functions embodied in the model. It is through the yield coefficients that the activity and output figures are generated, along with their associated costs and benefits. These figures - either physical/ biological units, or dollars - are the basis for the solution of the linear program optimization algorithm. The basis of the yield coefficients is data.

Data (and data estimates in some places) were used to estimate yield coefficients of the types listed below:

- Sawtimber yields
- Firewood
- New road construction
- Developed recreation capacity
- Dispersed recreation capacity
- Wilderness recreation capacity
- Expected recreation use ("demand")
- Sediment outputs
- Old growth
- Timber management-related activities
- Anadromous fish production
- Wildlife populations

Chapter III,F describes in detail the development of these yield coefficients.

4 Determination of Suitability for Timber Production 1/

NFMA regulations (36 CFR 219.14) define the timber resource land suitability process and state that National Forest System lands shall be identified as not suited for timber production if:

a. The land is not forest land as defined in section 219.3;
b. Technology is not available to ensure timber production from the land without irreversible resource damage to soils productivity, or watershed conditions;
c There is not reasonable assurance that such lands can be adequately restocked as provided in section 219.27(c)(3);
d. The land has been withdrawn from timber production by an Act of Congress, the Secretary of Agriculture or the Chief of the Forest Service.

Not suited categories b. and c. will be referred to, respectively, by mapping symbols S-8 and J-8, which were used throughout the suitability process. In addition to S-8 and J-8 there were forest acres identified as not suited due to reforestation difficulty (category c. above) in the Mountain Hemlock Zone.

Determination of tentatively suitable forest land in the Mt. Baker-Snoqualmie National Forest took place over the period October 1980 through January 1986. "Change" best describes this period. Changes resulted from 36 CFR 219 revision, Forest Service planning procedure direction changes, Regional and Forest concern and review, the Washington State Wilderness Act of 1984, and Forest Planning data base changes resulting from boundary corrections, updating for land exchanges, and better defining developed recreation sites.

Following is a brief description of the process used to identify lands not suited for timber production. Table B-2 shows the results.

1/ More detailed documentation is in the Mt. Baker-Snoqualmie Forest Planning Records, 1920 file number 84.

a. Skills Utilized. Principal participants from the Supervisor's Office were the Forest Soils Scientist, Forest Silviculturist, Area Ecologist, and Forest Planning Team Resource Planning Specialist.

Others from the Supervisor's Office involved were. the Forest Supervisor, the Planning Staff Officer, Forest Fire, Biological Sciences, and Range Staff Officer and Timber Staff Officer; the Forest Planning Team Leader, Economist, and Recreation and Wilderness Specialist; Fisheries Biologist, Hydrologist, and the Logging System Specialist.

District level expertise included the District Ranger, Foresters, and Reforestation Specialists, Biologists, Hydrologists, and Soil Scientists attached to the district or technical zone.

Table B-2
Land Suitability for Timber Production 1/ - In Acres

	Totals	Not Suited for Timber Production	Tentatively Suitable for Timber Production
I. Mt. Baker-Snoqualmie N.F.	1,983,800		
A. Other Ownership		259,800	
II. Net National Forest	1,723,500 2/		
A. Water		17,400	
B. Non-forest		382,200	
C. Forest lands developed for other than timber production purposes (36 CFR 219.3)		22,800	
III. Forested Lands (II. - IIA, B, and C)	1,303,100		
A. Withdrawn from scheduled timber production (36 CFR 219.14)(a)(4))			
1. Wilderness		440,200	
2. Research Natural Areas 3/		1,000	
3. Jim Creek Naval Station		1,000	
B. Growing less than 20 cubic feet *per acre per year and not* included in III.A., C., or D.			
1. Classified as unsuitable		6,700 4/	
2. Classified as suitable			0
3. Classified as separate suitability component			0
C. Irreversible resource damage (36 CFR 219.14(a)(3))		95,500	
D. Regeneration difficulty (36 CFR 219.14(a)(3))		159,700	
E. Regeneration difficulty lands classified as a separate suitability component			0
IV. Forested lands not suitable for timber production (III A + B1, + C + D)		704,100	
V. Land tentatively suitable for timber production (III. - IV).			597,000

VI. Land status under current timber management plan	Non-commercial Forest Land	Commercial Forest Land
	1,142,500	579,800

1/ Reference 36 CFR 219.14 and Regional Planning Direction 1920, November 10, 1983
2/ R2MAP Land Management Planning Data Base acres used in II. through V.
3/ Long Creek Research Natural Area is included in Wilderness.
4/ Inadequate response information; there is not adequate information available, based on current research and experience, to project responses to growth or yield from timber management practices (FSH 2409.13-21).

b. Forest Land. The 1976 timber inventory included in-place ecoclass 2/ mapping of the entire Forest. This data was entered into the Total Resource Inventory (TRI) data base system. The in-place mapping resulted in land classification and acres of productive (capable of producing 20 or more cubic feet of wood per acre per year) and unproductive forest land (not capable of producing 20 cubic feet of wood per acre per year); nonforest vegetation (forbland, meadowland, and shrubland); non-vegetation (water); ecoclass formations, excluding forest and nonforest vegetation with less than 20% vegetative cover; and administrative or agricultural use areas, e.g. buildings, heliports, pastures, developed recreation sites, power lines, and rock pits.

This timber inventory data were transferred from TRI to the R2MAP Forest Planning data base and have been updated through fiscal year 1988 for timber sales and other necessary changes. The 22,800 acres meeting the definition of forest land developed for non-forest uses (36 CFR 219.3) includes existing roads (16,726 acres); ski areas (5,934 acres); and electronic sites (127 acres).

Forest inventory data for forest land capable of producing 20 or more cubic feet of wood per acre per year was completed, including: acres in-place, ecoclass, tree size class, tree class (mature, immature or reforestation), stocking, species, volume, average age, average site index, etc. Inventory data for forest land not capable of producing 20 cubic feet of wood per acre per year was incomplete; it included only ecoclass and acres in-place. More information was needed to complete the suitability process.

1. Forest Land Not Capable of Producing 20 Cubic Feet of Wood Per Acre Per Year. - These lands total 240,124 acres in the Forest and were considered to meet the definition of forest land except for 2,343 acres in ski areas. Location and disposition of the remaining 237,781 acres in the suitablity process is summarized in Table B-2a.

   Most of these forest lands not capable of producing 20 cubic feet of wood per acre per year occur in rugged terrain and under the severe climatic conditions of the sub-alpine environment; their potential for timber production was believed to be very low to not feasible. There is no historical data on timber management of these forest lands. It was felt that the minimum additional information needed was to verify and develop an estimate of their timber volume. For these forest lands not withdrawn from scheduled timber production (82,400 acres) shown above, the additional information needed was determined as follows:

2/ 7/16/75, 1630, 2410, Stand Mapping, letter to Directors and Forest Supervisors from Director of Timber Management, Region 6. Distributed "Stand Mapping and Classification," current instructions for mapping timber stands. This is tied into the Region 6 ecoclass designation system; "Pacific Northwest Ecoclass Identification", Regional Guide 1-2, Feb. '75.

Sampling 1976 timber inventory aerial photos, the number of trees per acre and the percentage of unproductive forest in each of the following land classes was estimated; sawtimber, pole timber, seedlings and saplings, and nonforest (less than 10% tree cover). Using 1976 timber inventory plot and other available data, an average tree volume coefficient was developed to estimate net timber volume per acre. The latter ranged from a low of 2,314 to a high of 5,121 board feet per acre. These volume estimates involved professional judgement, so could vary between estimators. These lands have insignificant timber volume using either the high or low estimate. These lands passing the suitability screen were classified unsuitable for timber production as described in footnote four, Table B-2.

c. Forested Land Withdrawn from Timber Production. These are shown in Table B-2. There are eight wildernesses and three research natural areas in the Forest. Long Creek Research Natural Area is withdrawn with wilderness. Jim Creek Naval Station includes forest land used by the United States Navy.

d. Identifying Forested Land not Suited for Timber Production. Completion of not suited categories a. and d., Section II. 4. of the suitability process have been completed and the results are shown in Table B-2 (III. and III.A.1.-3.). The identification of not suited forested land in categories b. and c. was carried out over a prolonged period (over five years). The not suited forested land acres shown in Table B-2 are summarized below by forest productivity class.

Table B-2a

Summary of Forested Land Acres Not Suited 1/

			Productivity Class	
			20 Cu.Ft./Ac/Yr. or More	Less Than 20 Cu.Ft./Ac/Yr.
III.	A.	Withdrawn		
		1. Wilderness	284,928	155,282
		2. Research Natural Areas	906	74
		3. Jim Creek Naval Station	1,014	0
	B.	*Less than 20 Cu.Ft./Ac./Yr.*		
		1. Insignificant Volume		6,715
	C.	Irreversible Resource Damage (S-8)	39,850	55,626
	D.	Regeneration Difficulty		
		1. J-8	63,752	15,987
		2. Mountain hemlock	75,899	4,097
		Total	466,349	237,781

1/ For documentation see 1920, March 24, 1986, Forest Planning Records.

The process of identifying not suited forested land in categories (2) and (3) is described in detail in the Forest Planning Records, file 84. The four phases of the process are listed below:

1. Identifying J-8 and S-8 on forested land producing 20 Cubic Feet or more Wood per Acre per Year. See above, or Glossary, definition of J-8 and S-8.

2. Revision of Phase One Results in S-8 Acres. The Forest Supervisor expressed concern that total S-8 acres were less than the districts had submitted and directed that the identification be reviewed. The review resulted in an increase in S-8 acres and a decrease in J-8 acres.

3. Identifying Forested Lands with Regeneration Difficulty in the Mountain Hemlock Zone. See the description of Management Area 19, Chapter II of this environmental impact statement, and standards and guidelines in the Proposed Forest Plan.

4. Identifying J-8 and S-8 in Forested Lands not Capable of Producing 20 Cubic Feet of Wood per Acre per Year.

Irreversible resource damage criteria for S-8 lands were developed at both the Regional Office and Forest levels. The general criterion used to identify these sites was that conditions be so sensitive to human disturbance that soil and water resources could not be adequately protected through the use of any acceptable silvicultural treatment. Forest personnel took this general criterion and developed indicators -- e.g., active slumps, topographic features, subsurface drainage capabilities, soil characteristics such as clay content and depth -- to identify these lands. Ranger District personnel then used their knowledge combined with these indicators to identify areas susceptible to irreversible resource damage (S-8 lands).

The identification of forested lands where regeneration difficulties would occur followed the same general path. Criteria used fall into two major categories: physical limitations of the soil for planting (size, volume, thickness and a real extent of coarse fragment content, and bedrock exposure), and environmental limitations to seedling survival (drought susceptibility, frost pockets, etc.). The Forest developed general criteria for lands where these factors could be a problem; e.g., south and west exposures with shallow soils. Ranger District personnel used these general guidelines in combination with their knowledge of past plantation failures and identified areas where regeneration problems could be expected to occur again (J-8 lands).

5. Allocation and Scheduling Alternatives

The Forest Plan EIS alternatives were developed by the ID Team and the Forest Management Team. An initial set of alternatives was developed and analyzed for inclusion in the DEIS after the AMS had been completed. The AMS process used data from numerous sources to analyze the Forest's past management activities and resource output levels; to assess current situation; and to estimate future conditions and demands. The analysis areas, allocation zones, and yield coefficients, along with economic data on costs and benefits were all used in FORPLAN to make "benchmark" runs, discussed in Chapter I. This information, along with other resource information carried outside the model, was all used to develop and analyze a broad range of alternative management regimes for the Forest.

After the DEIS was completed and public comment was taken, the ID Team and Forest Management Team developed two additional alternatives to include in the FEIS -- one in response to strong public comment, and the other as the new Forest Service Preferred Alternative. One other alternative was redone with significant modifications in response to public comment and to better meet its objectives. In addition, three alternatives and two departure schedules that had been included in the DEIS were dropped from further consideration in the FEIS. There was little public comment or support for them, and the remaining alternatives, along with the new additions, provided the necessary full range of alternatives for analysis.

6. Monitoring

A monitoring plan is included in Chapter VI of the Forest Plan. At intervals established in that document, management practices will be evaluated to determine how well objectives have been met, how accurate effects and cost projections are, and how closely management standards and guidelines have been applied. *The results of monitoring and evaluation will be used to analyze* implementation of the Forest Plan and determine if an amendment or revision is necessary

7. Subsequent Programs for Plan Implementation

The Forest Planning data base provides biological, physical, geographical and economic data that can be used to develop programs for plan implementation. As new or improved data becomes available, the data base can be updated. Much of this data is currently stored in the TRI System and in resource layers in R2MAP. Concurrently with plan implementation, a new Geographic Information System (GIS) will be implemented which will integrate the Forest's data bases and over time replace the TRI and R2MAP resource layers. During plan implementation, with the shift from a Forest level emphasis to the project level, use of GIS technology will allow automated access to many resource data layers that will be mapped at project level scales. GIS will be used to track, display, and analyze past, present, and future conditions.

B. Data Sources Used in the Analysis

A complete listing of references can be found in Chapter V of the Forest FEIS. The following data sources were key in the analysis process:

- Timber data regarding existing volumes, growth, size class and ecoclass were based on a Timber Resource Inventory of the Forest completed in 1976. Data for the 1963 Timber Management Plan (as amended) upon which Alternative NC (No Change) is based were collected in the timber inventory prior to 1963 and prior to subsequent amendments that changed the land base and potential yield.

- *Data on suitability for timber production were developed locally from a* combination of local experience of professionals, aerial photo interpretation, and field verification.

- Managed yield tables for timber production were developed using the DFSIM yield simulation model (along with its management strategy optimization companion model, DP-DFSIM) for the Douglas-fir types, and SPS for the western hemlock and Pacific silver fir types.

- Empirical yield tables were developed jointly by Forest and Regional Office personnel, utilizing the 1976 Timber Resource Inventory.

- Basic soil information was available from the Soils Resource Inventory (SRI) for the Mt. Baker and Snoqualmie National Forests.

- Slope and soil stability information was developed from the SRI's.

- Class I and II streams were inventoried and mapped, then updated through the Planning process.

- Class III and IV stream lengths were estimated on a density basis based on field information derived from a sampling.

- Basic recreation data were derived from information collected in the field and stored in the Recreation Information Management System (RIM).

- RIM data were converted to recreation potential utilizing the Recreation Opportunity Spectrum System (ROS).

- The visual resources of the Forest were inventoried prior to the start of the planning process These data were updated during planning.

- The relative ability of the landscape to absorb management activities was determined utilizing the Visual Absorption Capability (VAC) system.

- Major viewsheds on the Forest were mapped during the planning process and were used to give more specificity to changes in the visual resource.

- Information on potential wild and scenic rivers was based on the National Rivers Inventory (NRI) conducted by the National Park Service. These data were supplemented by field data and input from local citizens and groups.

- Information on deer, elk and goat range was collected and mapped during the planning process in cooperation with the Washington Department of Wildlife.

- Information on anadromous and resident fish habitat and production potentials was derived from field surveys and supplemented by data from the Washington Department of Wildlife, Washington Department of Fisheries and Indian Tribal Biologists.

- Information on cultural resources was obtained from the Forest Cultural Resource Overview, completed in 1987.

- Information on religious, cultural and ceremonial uses by Indian Tribes was available from an inventory completed by a contractor in 1981.

- Land status information was available from the Land Status Atlas which is maintained on the Forest and was updated during the planning process.

- Information on the possible occurrence on the Forest of threatened, endangered, or sensitive wildlife, fish and plant species was verified by the Fish and Wildlife Service.

- Information on existing and potential transportation systems was available from plans developed prior to the planning process and was updated during the planning process.

- Information on the social and economic environment of the Forest's zone of influence was available from a social and economic overview developed by contractor in 1981. These data were updated during the planning process.

- Information on the minerals potential of the Forest was developed from data from the U.S. Geological Survey and the Bureau of Mines.

- Economic benefits and trends were derived based on Region 6 Planning Direction. Economic costs were derived from historical cost collections on the Forest, updated to the base year.

CHAPTER III - THE FOREST PLANNING MODEL (FORPLAN)

CHANGES BETWEEN DRAFT AND FINAL - APPENDIX B, CHAPTER III

- o Minor changes in analysis area delineations and revisions in the FORPLAN Level 1 identifier are described.
- o Minor modifications to prescriptions, standards and guidelines made between the Draft and Final are described.
- o The use of the Stand Projection System (SPS) yield simulator for developing managed yield tables for true fir and western hemlock stands is introduced Changes made to incorporate SPS into the development of the yield tables and the selection of timber management intensities are described. The development of revised empirical and managed yield tables for use in FORPLAN is detailed
- o Revisions in the criteria for carrying out commercial thins are described, and revised calculations for estimated genetic gain from planting improved stock are displayed.
- o The hydrologic cumulative effects analysis and the resulting harvest acreage limits for the water quality management requirement are introduced.
- o An enhanced description of the Forest's approach to modeling anadromous fisheries is incorporated
- o Discussion of wildlife population response models used outside of FORPLAN is given in greater detail.
- o Timber Sale Program Quantities for alternatives are updated to reflect the final alternatives incorporated in the FEIS.

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A. Overview

Forest planning is a very complex process The resources which must be considered are numerous; there are a large number of planning issues (ICO's) involved; the data needs are enormous; and the analytical techniques need to bring together the resource data and the issues in such a way as to facilitate effective decision-making. To assist national forests in accomplishing this process, a number of interrelated computer programs and models have been developed Several of these have been used on the Mt. Baker-Snoqualmie in the development of the Forest Plan and Draft Environmental Impact Statement (DEIS), and the Final Environmental Impact Statement (FEIS).

The central analytical model used is FORPLAN (Forest Planning Model). There are three major parts to FORPLAN (Johnson, 1981). The heart of FORPLAN is a linear program (LP) algorithm (Unisys' FMPS). A linear program consists of a series of linear equations which define the problem to be solved. The system of equations consists of an "objective function" and a series of "constraints." The objective function specifies what values are to be either maximized or minimized during the solution of the LP. The constraint equations define the resources available and the physical or policy limitations within which the solution must be found. FORPLAN was used in analysis of all alternatives except Alternative NC (No Change).

The other two parts of the model are a matrix generator and a report writer. The matrix generator automatically sets up the matrix structure required for the LP algorithm to use in solving the problem. The matrix consists of rows and columns with coefficients, which represent the linear equations in the problem. The purpose of the matrix generator is to allow the user to input data in a structured format and have those data automatically and consistently written into the appropriate matrix format for the LP. This makes the matrix-building process much less tedious, and allows for more flexibility in making data changes or adjusting the model constraints.

The report writer converts the solution found by the LP algorithm into usable information for the user. It reports such things as acres assigned to management emphasis and intensities, outputs and activities by period, and costs and benefits associated with a particular run. There are optional reporting capabilities to design reports with specific combinations of information needed to answer specific questions.

The first version of FORPLAN (now known as Version 1) was the first linear programming model available for forest planning which incorporated both land allocation and harvest scheduling optimization capabilities. Prior to FORPLAN, Timber RAM (Resource Allocation Model) had been used quite widely in timber management planning as a harvest scheduling optimization model. In the late 1970's, another linear programming model called MUSYC (Multiple Use Sustained Yield Calculator) was developed to incorporate resource considerations other than timber in the optimization process. Out of these earlier efforts, FORPLAN was born.

FORPLAN, Version 1, allowed the user to "simultaneously" solve for the optimal patterns of both land allocations assigned to management strategies and timber harvest schedules over multiple periods. Resource output, or "yield," tables and economic cost and benefit tables were hooked together to form "management emphasis" or prescriptions, which described how the lands would be managed and what could be expected for outputs, effects, benefits, and costs. The greatest flexibility was allowed for the timber output. A range of stand ages could be specified during which commercial thinnings and/or final harvest could be accomplished. Existing and regenerated timber stand ages and inventory acres and volumes were tracked. The FORPLAN model "shell" had to be followed by the user, but within that structure, users on different Forests had great latitude to design the substance of the model to meet the particular planning issues and resource situations found on their Forest.

FORPLAN, Version 1, represented a major step forward in modeling capabilities for forest planning. However, it was evident that greater flexibility was needed in design of a particular Forest's model. There was need for greater capabilities to deal with data and issues that related to spatially contiguous, but nonhomogenous, areas in combination with data, such as for timber stands, that were generally modeled in homogeneous, but spatially noncontiguous, areas. There was need for the ability to model a much wider range of resource outputs and effects. And there was need for the ability to model forest management activities separately from the outputs.

The second version of FORPLAN, known initially as DE-FORPLAN (Direct Entry FORPLAN) was originally designed specifically for modeling problems encountered by planners in Region 3 (Southwest Region). They needed the capability to directly enter management prescriptions and associated yields, costs, and benefits for contiguous, nonhomogeneous areas as a single bundle. However, this new version of FORPLAN was quickly expanded into what is today known as FORPLAN, Version 2. This is the version of FORPLAN used by the Mt. Baker-Snoqualmie National Forest during the development of the Analysis of the Management Situation (AMS), the DEIS, the FEIS, and the Forest Plan. This Forest was one of three national forests across the country to serve as test forests for the development and debugging of Version 2. A number of the enhancements and capabilities that now exist in Version 2 are a direct result of needs and ideas developed during the testing process on this Forest.

FORPLAN, Version 2, has a number of important differences from Version 1. Among these are:

- capability to model up to 200 separate activities and outputs,
- use of "theming" by eight "level identifiers" to hook up the various parts of the model, rather than using table numbers;
- specification of both homogeneous, noncontiguous areas and nonhomogeneous, spatially contiguous areas for analysis, either separate or coincident;
- specification of coordinated land allocation and resource scheduling strategies, which allow specific combinations of management strategies to be assigned to all or portions of spatially contiguous areas;
- ability to set up linear functions to define outputs or activities as functions of other activities, outputs, or acres (significantly reducing the number of yields tables that would otherwise have been required to deal with up to 200 activities and outputs).

1. Basic FORPLAN Components

The major components with which FORPLAN, Version 2, on this Forest operates are analysis areas (AA's), prescriptions, yields, economics, allocation zones (AZ's), coordinated allocation choices (CAC's), constraints, and the LP objective function.

Analysis Areas. These are areas on the Forest which are homogeneous in resource characteristics, but spatially noncontiguous. Any one AA represents all acres of land on the Forest which, according to the best available inventory data, are of the same timber or vegetation type and age class, have the same topographic slope, are on the northern or southern part of the Forest, and are roaded, unroaded, or "inaccessible". See Section C for a more detailed description and delineation of these characteristics.

Because the AA's represent all acres on the Forest which are homogeneous in resource characteristics, they contain acres that are not necessarily contiguous with each other. Acres of an AA may be scattered in small groups all over parts of the Forest. Although at first this may seem inconvenient from an analytical standpoint, it does allow the model to treat all acres of any particular AA the same in solving the linear program problem. All acres of an AA respond in the same manner to resource management activities· a given activity will result in the same outputs and environmental effects, will cost the same, and will have the same economic benefits when applied to any or all acres in an analysis area.

Prescriptions. These are used in FORPLAN in a somewhat different sense than the term is defined by the NFMA regulations (see Section D). A FORPLAN prescription is made up of a particular management emphasis, management intensity, and the associated activities, outputs, costs, and benefits that result when that emphasis and intensity are applied to a particular analysis area. The management emphasis and intensities are tied directly to the management strategies, standards, and guidelines which are described in the *FEIS* and *Forest Plan*. *The FORPLAN* prescriptions are abstractions of the narrative management strategies, and reflect the intent of the strategies to the best degree possible within the model, tying the estimated outputs, activities, costs, and benefits of those strategies to a particular piece of land (analysis area).

Yields. Yields represent the level of activities required to carry out a management emphasis and intensity, and the level of outputs and environmental effects expected (at least for those which can be dealt with through the model). The term "yields" is a holdover from the days of Timber RAM, when the only outputs in the model were the timber yield tables. As the model was expanded through MUSYC and into FORPLAN, the term "yields" came to be applied to all outputs and activities. timber yields, new roads constructed, sediment outputs, pairs of spotted owls, etc.

Economics. The economics in the model represent the costs of carrying out the activities associated with a management emphasis or emphasis/intensity combination (for instance full timber management with precommercial thinning), and the economic benefits derived therefrom. Economic benefits may be either cash (timber stumpage) or noncash (dispersed recreation visitor day benefits).

Cash, or market, benefits exist where there is a market for the sale of the good or service being produced, such as timber or commercial harvest of *anadromous fish. Noncash, or nonmarket, benefits are used where people are* deriving value from the good or service being provided, but where there is no market in which to exchange that good or service for cash This latter situation occurs primarily for dispersed and wilderness recreation outputs in the Mt. Baker-Snoqualmie FORPLAN model.

Allocation Zones. One of the advantages of Version 2 over Version 1 is that both contiguous and noncontiguous land areas can be modeled at the same time. Analysis areas define the resource homogeneous, but spatially noncontiguous, land areas in the model. Allocation zones (AZ's) represent areas of the Forest which are spatially contiguous, but include nonhomogeneous resource areas. As will be discussed in more detail in Section C, AZ's were defined to coincide with areas of particular interest from a spatial standpoint, to provide a method to deal with issues relating to specific spatially contiguous areas, and to handle more effectively problems of modeling spatially-related outputs such as Recreation Opportunity Spectrum (ROS) areas and new road construction.

Coordinated Allocation Choices. These allow the user to specify analysis area/management emphasis combinations on allocation zones in order to model a specific pattern of management on a given geographical area. Because analysis areas are not spatially contiguous, prescriptions assigned just to analysis areas will not necessarily provide a spatially coherent management pattern. By use of coordinated allocation choices applied to AZ's, a pattern of management - which can include several different management emphases within one spatial area - can be specified which reflects one of several possible ways to manage an area. This capability, which does not exist in Version 1, allows the user to maintain the versatility of resource homogeneous analysis areas while at the same time being able to lay out one or several potential management strategy mixes on a geographically defined area. More about the advantages, and some of the tradeoffs, involved with the use of allocation zones and coordinated allocation choices will be discussed in Section C.

Constraints. These are the "guts" of FORPLAN, or any linear program. Constraints are necessary to define the resources available and the limitations within which the model can work during the optimization process. The data which are input to FORPLAN describing the analysis areas, resource yields, and economics provide the basic resource availability information. Constraints in FORPLAN are used primarily to set limits on the model that proxy legal, policy, and desired management requirements Some of the more standard constraints used are those which require non-declining yields from the timber solution over the life of the model, absolute constraints that require certain activities or outputs to be less than or greater than some limit, and constraints which control the rate at which lands can be accessed on a decade-by-decade basis for timber harvest. Because constraints are used to make FORPLAN represent necessary and/or desired management, their careful and thoughtful formulation and application is a must.

Objective Function. This is the "driver" of any linear program solution, within the limits set by the available resources and constraints that are applied. An objective function is an equation which defines some value that the analyst wants either maximized or minimized. Most of the FORPLAN benchmarks and alternatives are run with an objective function that defines and maximizes economic present net value (PNV) over the time period covered by the model. Economics then becomes the driving factor in the solution of the model, unless there is an absolute constraint that has to be met. Constraints override the objective function, they specify that certain conditions have to be met, no matter what.

As an example: the model is operating under an objective function to maximize present net value, but also has an absolute constraint requiring at least a certain amount of timber volume even if it results in a lower PNV than would otherwise occur without the constraint. In this case, the model may have to bring into solution some timber lands that would otherwise be left out because they have a negative PNV, or their use in another type of management would result in a higher PNV on a per acre basis. In order to get the volume required by the constraint, the model will take any additional volume it needs regardless of cost to PNV, up to the point that the constraint is met. (If the timber constraint asks for more volume than is available in total for a given time period, the run will be "infeasible"; that is, it is not possible to achieve the constraint with the resources available in the model).

It is also possible to maximize some other activity or output such as timber volume, recreation visitor days, etc. And it is possible to minimize, rather than maximize, an objective function. For example, budget costs or sediment production could be minimized. Again, whatever the value or resource specified by the objective function, and whether it is maximized or minimized, the objective function acts the same. It drives the solution of the LP, subject to the resources available and the constraints that have been established.

NFMA and its implementing regulations place major emphasis on the use of a cost-efficiency criterion in the forest planning process. FORPLAN accommodates this emphasis very well in the modeling process. The validity and reasonableness of the model solutions depend heavily on assumptions regarding the interconnections between analysis areas, prescriptions, yields, economics, and constraints. To the extent that the specifications made (whether based on "hard" data or more on best professional estimates and assumptions) are appropriate and reasonable, the use of the linear program and maximization of present net value will result in a cost-efficient solution for achieving the objectives of a given alternative.

Chapter III, F in this appendix discusses how the coefficients for each of these components were developed and incorporated into the FORPLAN model.

Recognition of Model Limitations. A number of objections are raised periodically to the use of linear programming in land and resource management planning. The issues most commonly raised are assumptions of linearity, non-negativity of decision variable values, and continuous (infinitely divisible) decision variables (Bell, 1977; Kent, 1980). The linearity assumption is most often criticized as being unrealistic to apply to the natural world, which is often nonlinear. But this is often not a major limitation, particularly if the range over which changes are considered are not very large, or if the nonlinear problem can be broken up into linear sections that approximate the nonlinearity over the range of consideration.

In any case, one must keep in mind that the linear program is a **tool** to aid decision-makers; it does not provide the answer by itself. Particularly in land and resource management planning processes, the application of judgment and consideration of factors not incorporated into the model are requisite for effective decision-making. As an abstraction from reality, the LP-based model allows the decision-maker to consider very complex problems, and alternative solutions to those problems, in a fraction of the time that would be required to find the best combination of decision variables by hand (Field, 1977; Iverson and Alston, 1986).

B. Analysis Process and Analytical Tools Used

1. Overview

Early Stages of the Planning Process. The analytical process required for the Forest Plan and its associated Environmental Impact Statement is outlined in sequential form by the National Forest Management Act of 1976 and its implementing regulations (36 CFR Part 219, 9/17/79; revised 9/30/82). Chapter I of this Appendix reviews that process

Although it is laid out in the law and regulations in a sequential or linear manner, the planning process began in several areas simultaneously. Of immediate concern was the "scoping" process to determine the nature of the issues, concerns, and management opportunities (ICO's) facing the Forest. Public involvement, along with Forest staff input, was utilized to define the major ICO's for the Forest. At the same time, an assessment was begun of the status of data on the Forest that would be relevant for the planning process. Initial efforts were made to define the specifics of the analytical process, so that data needs to carry out that process could be determined. It was not necessary to wait for the completion of the ICO delineation, as public input during the two Roadless Area Review and Evaluations (RARE I and II), the development of the draft revised Timber Management Plan, and the Alpine Lakes planning process had provided major indications of the issues and concerns surrounding national forest management in the Washington Cascades.

The choice of a major analytical model to use in forest planning was made by the Washington Office in 1979 (USDA Forest Service, 1979). All national forests were required to make use of FORPLAN as a multiple resource allocation and scheduling optimization model. Therefore, efforts were begun to collect and organize data in a manner that would respond to the ICO's, and that would work within the framework of FORPLAN.

Initial efforts were directed primarily toward defining the analysis areas to be used in the model, developing yield tables for existing and managed timber stands, collecting cost data for timber management and associated activities, and determining the appropriate timber stumpage prices to use in the model. Although by no means the only issues facing the Forest, timber management activities and associated road building were recognized as major issues with which the Forest would have to deal in the planning process. For this reason, and because a significant amount of work had been done just prior to the start of the Forest-wide planning process toward the development of the draft for a revised Timber Management plan, the early analytical efforts were directed in large part toward the timber resource. (Approval of the draft Timber Management Plan was held up at the last moment in favor of dealing with that resource within the comprehensive land and resource management plan).

In 1981, the Mt. Baker-Snoqualmie, along with the Shoshone and Allegheny National Forests, was chosen to test a developmental version of DE-FORPLAN. DE-FORPLAN, which later was called Version 2, became the major analytical model for the Forest, both for the Analysis of the Management Situation (AMS) benchmark runs, and for the DEIS and FEIS alternatives.

The adoption of Version 2 as the Forest's planning model added some additional analytical requirements. Spatially contiguous allocation zones had to be defined. With the significantly expanded capacity for modeling outputs and activities separately, thought had to be given to which activities and outputs needed to be modeled to best respond to the ICO's. Then decisions had to be made about which activities and outputs actually could be modeled, given the availability of data and the knowledge of resource interactions, or the ability to estimate resource interactions with some level of confidence. A determination had to be made about which activities and outputs could best be dealt with on a "per acre" (analysis area) basis, and which would best be suited for modeling on a "per area" (allocation zone) basis. Finally, coordinated allocation choices (CAC's) had to be developed and a strategy worked out for using them to model the benchmarks and alternatives in the most cost efficient manner.

The primary activities and outputs which are most responsive to the ICO's and which can be reasonably modeled within FORPLAN are timber management (harvest and silvicultural activities), road construction and maintenance (arterials, collectors, and locals), recreation capacity and use (wilderness, nonwilderness dispersed, and developed), sediment outputs from harvest and road construction activities, and anadromous fish outputs in response to varying investment levels in habitat management. Acres by various categories can also be tracked in FORPLAN; e.g., management areas, old growth, ROS, and visual quality.

Some resources are dealt with outside FORPLAN in separate models and assessments and incorporated into the final results. These include fire management, areas open or closed to mineral development, and quantity and quality of wildlife habitat and associated population changes by time period over the planning horizon.

Recreation capacity and demand (expected use) estimates were developed after most of the timber information was assembled. Road construction estimates were developed in several different ways and tested to find the method which most realistically represents the actual scheduling and construction of roads on the Forest. As will be discussed in more detail later (Section F), the roads problem represented one of the most intractable dealt with in the development of the model. Estimates of anadromous fish response to varying levels of investment in habitat maintenance and improvement were developed fairly early, but were not incorporated into the model until after the benchmarks were run.

Analysis of the Management Situation and the "Planning Pause". As part of the review and quality control process for forest planning, Region 6 did a formal review of the Forest's Analysis of the Management Situation (AMS) documents by the Regional Forester and his staff. The Mt. Baker-Snoqualmie went through this process twice: in March, 1983 and April, 1985.

The Regional Office review of the first AMS was in the final stages when a "pause" in forest planning, particularly for Region 6, was called by the Washington Office and the Assistant Secretary of Agriculture. There were several forest planning issues which the Assistant Secretary felt had not been adequately dealt with in the Forest Plans sent to the Washington Office for review. These issues included: the quality and quantity of tradeoff analysis being done and displayed; the lack of analysis of the opportunity costs of constraints used in the modeling process; the development and rationale for management requirements (known then as "minimum" management requirements, or MMR's) developed as required by NFMA and the regulations; and the lack of consistency among Forests in such things as economic values used, management requirements (MR's), and inconsistent management area determinations along contiguous boundaries of adjacent Forests.

The other major factor contributing to the pause in planning was the 9th Circuit Court's ruling in the case of California v. Block (Ninth Circuit Court Opinion) in which the State of California's contention that the EIS for RARE II was insufficient was upheld by the Court. The judge's ruling stipulated a number of conditions about information that would be required in an EIS dealing with the disposition of roadless areas before that document would meet the requirements of the National Environmental Policy Act of 1969 (NEPA). It was decided at the Washington level that direction would have to be reformulated so that Forest Plan EIS's would meet the requirements stipulated by the Court.

Region 6 received special scrutiny because of the size and controversial nature of its timber and road building programs, and the highly controversial issue of roadless area development in the Pacific Northwest. As a result, the planning process came to a virtual halt in the Region while task forces were formed to totally revamp the Region's planning direction for the Forests. The "planning pause" was a mixed blessing Although it sent a lot of Forests back several steps in the planning process, it also provided time to take a second look at work that was completed and a chance to make some changes.

On this Forest, a "second look" was given to some items that had not worked particularly well in FORPLAN during the benchmark runs for the first AMS. A number of changes were made in the structure of the model to eliminate factors that were not providing useful information, to slim down the model in order to bring down its size and run time/costs, and to bring in additional parts needed for improved modeling or to meet the new planning requirements.

A separate problem came to light during the "planning pause" which required a major change in the Forest's tentatively suitable timberland base. It was discovered that major regeneration difficulties were occurring in higher elevation timber stands (generally above 4200 feet) which were dominated by mountain hemlock. Although these stands supported large standing volumes, they were very old - some up to 800 years - reflecting a slow stand re-establishment and growth rate. After a good deal of study and debate, it was decided to remove slightly over 80,000 acres of these predominantly mountain hemlock stands from the tentatively suitable category because of a lack of assurance that they could be regenerated successfully within five years, as required by the regulations. The 80,000 acres were all located on the three northern districts. The decision included setting up a research and evaluation project for the first decade of the Plan, which will test a variety of harvest and regeneration methods to determine if there are feasible ways to solve the regeneration problems. If so, those acres will be added back into the tentatively suitable base for the next round of planning. If not, they will continue to remain out of the tentatively suitable base and available for nontimber allocations.

Another major factor affecting the planning process during and immediately after the "pause" was the formulation and passage of the 1984 Washington Wilderness Bill. The bill resolved the wilderness issue for a large number of roadless areas on the Forest, adding about 350,000 acres of designated wilderness to the National Wilderness Preservation System, and nearly doubling the acres of wilderness on the Forest. While the Act resolved a major portion of the roadless area question, it also entailed a change in the Forest land base in the model, and required additional analysis of the remaining parcels of roadless area lands not designated as wilderness.

All of the above changes combined to create major changes for the structure and content of the FORPLAN model. When running the benchmarks for the first AMS, Version 2 was still in an experimental stage. This Forest had one of the most complete and complex models in the nation, costs and run time were high (between $1200 to $2000 per run). By restructuring the model in light of the above changes, the IDT aimed to cut the size of the model while losing as little useful information as possible. Major results of restructuring were a decrease in AA's (from about 240 to 134) and a decrease in AZ's, from about 110 to 85.

A second AMS document was completed under the new Regional planning direction, including all the major land base changes discussed above. The revised AMS was reviewed and approved in April, 1985.

Prescriptions, Standards and Guidelines. Prior to initial development of the FORPLAN model, the ID Team did some development of management strategies, standards and guidelines. Although not fully developed and documented in narrative form at the time, the work provided a sufficient basis for creation of the FORPLAN prescriptions for the initial AMS benchmarks. The strategies needed were primarily timber management (with varying silvicultural intensities), recreation management, and wilderness.

Part of the revised planning direction (from "the pause") required a more rigorous development of the timber management prescriptions for FORPLAN. Those prescriptions were developed and approved by the Regional Office for use in FORPLAN. The benchmark runs for the second AMS again used a fairly limited set of prescriptions -- the revised timber management prescriptions with various silvicultural intensities, wilderness, wildlife management requirements, and minimum level management (min level). These were also based on the original management strategy work done prior to the initial AMS review.

After the second AMS review, the Planning Team, ID Team, and the Forest Management Team finalized the narrative versions of the desired management strategies, standards and guidelines, resulting in a total of 27 management strategies for the DEIS and Plan. Only minimal modifications, additions, and deletions had to be made to the FORPLAN prescriptions to bring them into line with the finalized management strategies. No changes were required in the benchmark runs; the basic prescription set used remained essentially the same. Most of the final management strategies were represented through the model; some, such as utility corridors, were not because of data and/or modeling limitations.

Some minor modifications were made in the prescriptions, standards and guidelines between the DEIS and the FEIS, partly in response to public comment and partly as a result of further fine tuning done by Forest staff. Some additional intensities were added in the timber management prescription, with corresponding changes made in FORPLAN to include those new intensities. Several management intensities with their own standards and guidelines were developed for specific Special Areas, while the deer and elk winter range management requirement intensity was dropped. The special area intensities were not tracked separately in FORPLAN, so there was no change required in that management prescription. An additional intensity was added in the Cedar River Watershed prescription, but that change did not require any changes in FORPLAN because of the way the Cedar River Watershed is modeled. Other than these changes, the final management strategies again were mostly represented through the model, in much the same form as they existed in the model for the DEIS.

Alternative Development, Analysis and Assessment. Development of the alternatives to be considered in the DEIS and FEIS was a combined ID Team and Forest Management Team effort, based on initial suggestions and guidelines from the Planning Team. Alternatives were mapped, input to R2MAP, and converted into FORPLAN data as sets of coordinated allocation choices and constraints representing the desired land-use assignments and objectives of the alternative.

The "No Change" alternative has been developed in response to decisions made regarding appeal number 1588, brought by the Northwest Forest Resource Council on May 19, 1986. The appeal centered on a decision by the Regional Forester to "require inclusion of minimum management requirements (MMR's) in the Current Direction Alternative for each Forest Plan." The substance of the appeal was that a "true no-action alternative representing current management plans' was not included in Forest Plan EIS's. In response to this, a No Change Alternative has been developed to represent the existing timber management plans, and consequently does not comply with all provisions of the National Forest Management Act (NFMA) and regulations promulgated by the Secretary of Agriculture to implement NFMA.

Alternatives were run under a "maximize present net value" (PNV) objective function, to assure the most cost efficient solution of the road building and harvest scheduling options, given the land-use assignments, constraints, and other resource considerations. To assure that noneconomic lands would not be assigned to timber harvest unless needed to meet a constraint - even if assigned to a timber management strategy - a combination timber harvest-min level intensity was used. That allowed any acre assigned to timber management to go to a nonharvest intensity if it detracted from the objective function (generally with a negative per acre PNV) by being subject to harvest.

The NFMA regulations require a great emphasis be placed on cost efficiency of individual and aggregate management strategies in the alternatives (36 CFR 219.12(f)(8)). The timber prescriptions are the most sensitive to cost efficiency and the most malleable in this regard. The combination of methods for developing the individual timber prescriptions (using DP-DFSIM, see Section D) and solving for the optimal mix of management intensities in FORPLAN with a maximum PNV objective function resulted in a high degree of correlation between the model results and the intent of the regulations.

Each alternative was run as a separate coordinated allocation choice. There was no attempt to mix the CAC's together and allow the model to choose pieces of each for an optimal solution. Although this had the effect of limiting the range of choice for the model's solution, it was necessary to maintain the intent of the Management Team for each alternative and the spatial integrity of the management areas. Allowing the model to choose among competing CAC's is possible, but raises problems of inconsistent and illogical management area assignments and boundaries which must then be fixed by constraint, and rerun

The assessment of alternative designs needed to achieve a wide range of alternatives with differing objectives was made by the ID Team and Forest Management Team prior to their mapping and subsequent entry into FORPLAN. They used the results of the benchmark runs and the tradeoff and constraints analysis done during the development of both the first and second AMS documents, along with professional judgment in this alternative development process. Allowing the model to choose the land allocations (although it did choose the timber management intensities) would have been a very inefficient way to design alternatives that approached in a number of different ways the Forest's ICO's. For each alternative run, the IDT provided an assessment of that alternative's physical, biological, economic, and social effects on the basis of criteria established beforehand. These criteria allowed assessment of both the kind of resource interactions and the magnitude of resource interactions for any given alternative.

2. Analytical Process and Tools - Details

The following subsections give more detail of the analytical process prior to FORPLAN, the use of FORPLAN, and any analysis done outside of FORPLAN.

Analysis Prior to FORPLAN. A good deal of analysis, using a variety of tools and techniques, took place prior to the development and running of FORPLAN. The earliest analytical efforts centered around delineation of AA's; development of timber yield tables, management costs, and stumpage benefits; and road construction needs and costs. Later efforts were made to estimate recreation capacity and future use, recreation costs and benefits, modeling requirements to proxy wildlife and riparian MR's, and anadromous fisheries response to varying habitat maintenance and enhancement investment levels. AZ's were delineated. Alternatives and associated coordinated allocation choices were developed, mapped, and input.

Analysis Areas and Basic Resource Data. The Mt. Baker-Snoqualmie used a grid mapping system, R2MAP, as its basic mapping, manipulation, and data query system for Forest-wide planning data. (The actual R2MAP version used is COLMAP, which includes capability for handling a larger number of code combinations and enhanced output manipulation and reporting capabilities). R2MAP resource layers provided the base information for most of the initial resource data information and manipulation done in the planning process for nonlinear (area) data. Like most grid mapping systems, R2MAP is very efficient in storing and manipulating area data represented by squares, or "cells," on a map; but it deals poorly with linear data, such as roads and streams, particularly if the scale of the cells is over 5 acres or so. The R2MAP cells each represent 21.1163 acres. Linear data, including narrow corridors such as streamside management units, were dealt with outside of R2MAP.

Although a cell represents 21.1163 acres, when calculating total acres in a given area, R2MAP truncates the figure back to the nearest integer. Thus, for every calculation made, there is the potential of one acre being lost, if *normal rounding would round the total up to the next highest integer instead of* down. In order to correct for that, a routine was included in all the FORTRAN programs which read R2MAP output, or "track", files to build FORPLAN data sets. This routine takes the truncated acres, converts them back to number of cells, which has to be an integer, remultiplies by 21.1163, adds a factor of 0.5, and then truncates again. But the adding of 0.5 allows the truncation to give the same results as rounding. So FORPLAN deals in "true" acres, while R2MAP deals with truncated acres.

Early in the planning process, it was decided that AA's would be resource homogeneous, but spatially noncontiguous. FORPLAN allows AA's to be identified by up to six characteristics. Given the nature of the issues facing the Forest, it was felt that characteristics representing the site productivity of the Forest, vegetative cover types, vegetation ages (particularly relating to ages of timber stands), and slope steepness and slope stability would be important factors in identifying land areas which would have similar outputs and responses to management activities that were applied to them. Another physical/biological characteristic, identified deer and elk essential winter range, was added. Finally, a set of characteristics identifying administrative and economic conditions was added. See Chapter III, C for details.

During the AA delineation process, it was apparent that certain areas on the Forest which were currently unroaded could never be roaded economically, even though they contained lands that otherwise would be suitable for timber management. The Forest's logging systems engineer and transportation planner identified those areas on the Forest that were too steep, too unstable, and/or had too little timber in the area to justify building roads into the area. This determination was made either on the grounds that the land across which roads would have to be built could not support those roads without unacceptable environmental damage, or that the amount of timber being accessed was insufficient economically to justify building the roads, given any forseeable timber stumpage prices. (Any lands within a mile of an existing road system were not included in this category, as long-span skyline systems could access those lands for harvest from the existing roads). These lands so identified are called "inaccessible" lands. They are "inaccessible" only in the sense that roads can not be built into them. For modeling and planning purposes, they are still available for timber harvest, but only by aerial systems.

Most of the information needed was stored in one form or another on R2MAP layers. Some of the inventory data were better than others; but, with no time to redo major inventories, such as timber size class, it was recognized that certain inconsistencies would remain in the data through this round of planning. Field checking during plan implementation will discover numerous areas where, on an acre by acre basis, the ground conditions are different than what is shown in the resource mapping. This is inevitable with any data base system unless perfect inventories with 100% sampling are available. Major errors were corrected. There are still some areas of inconsistencies between resource data and field-checked information; however, R2MAP system with grid cell size of 21 acres does not lend itself to accuracy to the nearest acre.

A number of Forests in Region 6 have used the Total Resource Inventory (TRI) data base, which is managed by a hierarchical data base management system (System 2000, or S2K) to supplement their grid mapping systems In this latter process the TRI polygon cell data and the R2Map grid cell data were "synchronized" at the time of R2Map data input, so that TRI extracts could provide meaningful information to supplement R2Map extracts for the same Forest area. This was not done on the Mt. Baker-Snoqualmie.

The Forest TRI data base was in reasonably good condition because it had been installed and corrected for use in the timber management planning effort. In the spring of 1980, Ranger Districts were involved in bringing the TRI Cell data file up to date and tracing each TRI Compartment and Cells. A freeze was put on changing TRI cell boundaries Activities that had not been entered as TRI cells were reported on a 1" per mile scale map. Computer extracts of TRI cell data were coded into R2MAP at 1 inch = 1 mile. R2MAP input consisted of the basic planning data base; unproductive forest (<20 CF/AC/YR), productive forest by ecoclass and condition classes (size, maturity, and age related coding), non forest vegetation and nonvegetation ecoclasses. Following this transfer of data to R2MAP, TRI was used on a limited basis for forest-wide planning, primarily to spot check R2MAP data or extract information not entered into R2MAP

The analysis areas were developed by "overlaying" the relevant resource data layers in R2MAP within the computer. Each of the characteristics mentioned above had several different possible values associated with it. When the data layers were overlaid, each cell was tagged with a combination of "identifiers". Each cell, or group of cells if they had identical identifiers, became a "capability area". A capability area is a specific area of land, or geographic location, that has the same resource characteristics (in terms of the physical, biological, economic, and administrative characteristics described above). Any capability area will respond in terms of physical, biological, and economic effects in an identical manner to any other capability area with the same characteristics, even if they are spatially separate.

A Forest the size of the Mt. Baker-Snoqualmie can have 10,000-50,000 capability areas, too many to deal with in a model. Capability areas that are identical (or very similar) in nature, other than their geographic location, can be combined into "analysis areas", because for most modeling purposes they will give the same response and therefore be treated the same within the model. When the initial AA's were combined from the capability areas, there were over 240 AA's that went into the model. FORTRAN programs written on the Forest were used to convert the R2MAP results into FORPLAN data files. These analysis areas were used for the first benchmark runs for the initial AMS development.

During the restructuring of the model after the AMS, the initial delineations made for AA's were reexamined. After assessing the usefulness of variables, the three steep slope stability breakdowns were collapsed into one, and the deer/elk winter range identifier was dropped. It was felt that the winter range base data could be tracked as easily through R2MAP, and management area assignments for deer/elk winter range would be tracked as management emphasis identifiers in FORPLAN. With these changes, the resource data layers were overlaid again in R2MAP, and 129 AA's (including water) were created. These were used in the FORPLAN runs for the DEIS.

After the DEIS was released, some additional model refinements were made, and the vegetation database was updated for timber sales between 1983 and 1988. During this process, 7 AA's with very small acreages (all Seeds/Saps and Reforestation) were aggregated with close neighbors and dropped from the model. Therefore, for the FEIS model runs, 122 AA's (including water) remained.

An additional 5 AA's were created to separate out developed recreation areas, and to track newly acquired lands for which there was no resource data. The developed recreation sites had initially been included in the nonproductive/nonforest lands category where they could not be dealt with adequately. The new Forest acres were picked up during refinement of the 1984 wilderness boundaries; they had to be assigned to some category for accounting purposes. These changes were made between the approved AMS and the DEIS alternative runs.

Finally, 4 more "dummy" one-acre AA's were created to carry Forest-wide costs such as for the genetics program, fixed costs, etc. The use of dummy AA's is a technique developed in the FORPLAN modeling process as a "trick" to get around FORPLAN limitations in dealing with certain costs, benefits, or outputs occurring Forest-wide, rather than on a per-acre or per-area basis. One acre is added for each dummy AA, but 4 or 5 "dummy" acres are an infinitesimally small percentage of 1.7 million acres.

Allocation Zones. Allocation zones are spatially contiguous areas defined along geographic bounds that represent important issue areas (e.g., watersheds), have special geographical significance (a designated wilderness, for example), or are areas that represent potential management problems or opportunities. The AZ's were first delineated on the Mt. Baker-Snoqualmie by using major watershed boundaries, roadless area and wilderness boundaries, and the boundaries of major scenic corridors and travel routes. These were outlined on maps, input to R2MAP, and overlaid to produce the AZ boundaries. The AZ's were then overlaid with the AA layer in R2MAP to create a combined layer in which each AZ was defined by its boundary and the acres of various AA's it contained. In the formulation used, the entire Forest was covered by AZ's, so all AA's (except the dummy AA's) were encompassed by one or more AZ's.

An important note: although FORPLAN uses both analysis areas and allocation zones as mapped areas, and ties yields, costs, and benefits (i.e., prescriptions) to them, only coincidentally will the final output ever show either of these areas. (For instance, wildernesses are each defined as an AZ, so the management area and the AZ are coincident). AA's and AZ's are artifacts created for the purpose of modeling, but they are transparent to the final product. The final product for the Forest Plan alternatives is the management area, which will generally cut across both analysis area and allocation zone boundaries But the existence of AA's and AZ's allows the modeling of activities, outputs, effects, and economics related to those management areas.

While restructuring the model after the first AMS, it was felt that delineation of AZ's by major scenic and travel corridors was not providing useful modeling flexibility and information. Also, the 1984 Wilderness Bill changed the wilderness and roadless area boundaries. Therefore, the AZ'a were redesigned, with the new wilderness and remaining roadless areas and the 66 major watersheds on the Forest serving as boundary delineators. The result was 86 AZ's covering the Forest. These zones were used in FORPLAN for AMS benchmark runs and the DEIS and FEIS alternatives. See Chapter III,C for more discussion of AZ's.

Timber Yield Tables. The latest timber inventory was completed for the Forest in 1976; it was used during the development of the 1979 draft Timber Management Plan, which was not released in final form. This work provided the base for developing the timber yield tables for FORPLAN. Statistical analyses were run using SPSS 1/ to group the species into a manageable number of "working groups".

Working groups and age classes were developed from the TRI data base that was entered into R2MAP. The initial resulting working groups and age classes for analysis purposes were:

Working Group

Upper - True fir and mountain hemlock stands
Principal - western hemlock and Douglas-fir
Mixed - Mixed conifer (Douglas-fir/western redcedar) and hardwoods.

1/ Nie, Norman H., C. Hadlai Hull, Jean G. Jenkins, Karin Steinbrenner, and Dale H. Brent, Statistical Package for the Social Sciences, Second Edition, McGraw-Hill Book Company, 1975

Age or Condition Class

Mature large sawtimber (230+ years old)
Mature small sawtimber (130+ years old)
Immature small sawtimber and poles (70+ years old)
Seedlings and saplings (15+ years old)
Reforestation (newly regenerated stands, 0-15 years old)

Eventually, one more timber-related working group and five more condition classes were created to take care of areas with acreages too small to break out into the initial separate classes. The working groups in the "inaccessible" areas were lumped into one, because of small acreages when the working groups were broken out separately, and the age classes therein were grouped into three· mature large and small sawtimber; immature small sawtimber and poles, seeds and saps and reforestation. The age classes in the mixed conifer working groups were grouped into two categories: large sawtimber down through poles; seeds and saps and reforestation.

Yield tables for existing pole and larger stands, including stand age, volume per acre, average stand diameter, and average stand basal area per acre, were developed from the 1976 stand inventory plot data using SPSS. Adjustments were made for mortality and other factors so that the final yields represented net green volume.

Yield tables for managed stands, including existing stands 20 years old and younger, were developed through the use of the DFSIM 2/ (Douglas-fir Simulator) yield generator, DP-DFSIM 3/, and the Stand Projection System (SPS) 4/. At the time the DEIS was published, DFSIM was the only yield simulator in existence and accepted by the Forest Service for managed westside Cascade stands. In response to input from the timber industry, SPS -- a yield simulator of more recent vintage -- was evaluated for use in the western hemlock and Pacific silver fir stands. It was agreed among Forest staff, Regional Office silviculturalists and external timber interests that SPS was more suitable for use in the western hemlock and Pacific silver fir stands than DFSIM, and new managed yield tables were generated. DFSIM would continue to be used to generate yield tables for Douglas-fir stands.

The DP-DFSIM program incorporates the biological relationships in DFSIM, and includes objective functions to maximize timber or present net worth which aid in selecting the best commercial thinning regimes. SPS is built on a data set derived from western hemlock stands, with equations that allow conversion of other stand types to the western hemlock data. Because none of the three working groups for the Forest -- Upper, Principal and Mixed Conifer -- are pure species groupings, it was necessary to apply the different yield models to portions of each working group. For instance, 82% of the Upper working group in the North is western hemlock and true fir, while 18% is Douglas-fir. The yield tables are applied accordingly.

2/ Curtis, Robert O., Gary W. Clendenen, and Donald J. DeMars, A New Stand Simulation for Coast Douglas-fir: DFSIM User's Guide, USDA Forest Service General Technical Report PNW-128, May 1981.

3/ Johnson, K. Norman, and Kathy E. Sleavin, DP-DFSIM-Overview and User's Guide, USDA Forest Service, January 10, 1984 Unpublished Draft.

4/ Arney, James D., Stand Projection System (SPS) (Version 86.1), Applied Biometrics, Spokane, WA, 1986.

For the mixed conifer working group, a hardwood yield table based primarily on red alder data was developed separately to model the yields from the hardwood portion of the stand (about 30%). Yields from DFSIM are applied to the conifer portion of the stand. If the mixed stand is converted to pure conifer, the DFSIM yields are applied to the entire regenerated stand.

Adjustments were made to the results from both DFSIM and SPS when developing the yield tables to bring down the estimated growth reported by the models after the first 100 years. It is known that they overstate growth projections after that point. Hand adjustments were made to the projected yields to bring them more into line with existing data.

A sample old growth (empirical) yield table is shown in Table B-3. The yield table extends from the existing stand age out another 20 decades (200 years). Shown for each age are the standing net green volume per acre, the average stand diameter per acre, and the average stand basal area per acre. Table B-4 shows the same information for a regenerated pure Douglas-fir stand. The full set of yield tables used in the model can be found in Forest process documents and in the model data set.

Timber Management Costs. Timber management costs were gathered from project records, contract records, budget estimates, and estimates by District and Supervisor's Office personnel. Costs were collected for direct silvicultural activities, plus timber harvest support costs, such as visual and cultural resources planning, soil and water planning and monitoring, and fuels inventory. It was decided to track logging system (stump-to-mill) costs as well as silvicultural costs. Logging system costs were collected primarily using the timber sale appraisal system handbook, 2400-17 records, and estimates by the logging system engineer. Timber management costs were identified as to whether they occurred on a per-acre or a per-thousand cubic feet (MCF) harvested basis, and whether they varied by land characteristic, such as topographic slope. Logging system costs for all ground systems (tractor, hi-lead, short- and long-span skyline) were combined into a weighted average. Logging costs for aerial systems were kept separate because of the large cost increase over ground systems. Costs were defined on a per acre or per MCF basis.

Table B-3
Sample Existing (Wild) Stand Yield Table
North Large Sawtimber

*I	NO	SF OLZT								
*A	Exist	24 North Large Saw								
	EA24	8.15	8 52	8 78	8.77	8.75	8 73	8.72	8 70	8.69	8 67
	EA34	8.66	8.64	8.63	8.61	8.60	8.59	8.57	8.57	8.56	8.54
	ED24	27.10	27 50	27.80	28.10	28.40	28.70	29.00	29.30	29.60	29.90
	ED34	30.20	30 40	30.70	31.00	31 30	31 60	31.90	32.20	32 50	32.80
	EB24	287	295.	295.	295.	295.	295.	295.	295	295.	295.
	EB34	295.	295.	295.	295	295.	295.	295.	295.	295.	295.
	EZ24	0.	0	0.	0.	0	0.	0.	0.	0.	0.
	EZ34	0.	0	0.	0.	0	0	0.	0	0.	0.

Table B-4
Sample Regenerated (Managed) Stand Yield Table
North
Plant - Precommercial Thin - Commercial Thin - Final Harvest
(DFSIM)

*I	NO	RDSH ZT B									
*A	Regen	5 0 North * PL - PCT - CT - FH									
	JA 1	.00	.00	00	.00	1.63	.00	.00	.00	.00	.00
	JA11	.00	.00	.00	00	.00	.00	.00	.00	.00	.00
	JD 1	.0	0	.0	.0	9.8	.0	0	.0	0	.0
	JD11	.0	0	0	.0	0	0	.0	.0	.0	.0
	JC 1	0.	0.	0.	0.	70.	0.	0.	0.	0.	0.
	JC33	0.	0	0.	0.	0.	0.	0	0.	0.	0
	RA 1	.00	00	.52	2.49	4 48	6 18	7.84	9 41	10.92	12.33
	RA11	13.34	14.02	14.49	14 87	15.15	15.34	15.45	15.60	15 54	15.55
	RD 1	.0	0	6.9	9.4	12 5	14.7	16.6	18.3	19.8	21.2
	RD11	22.6	24 1	25 6	27.2	28 8	30 4	32.0	33.7	35.4	37.1
	RB 1	0	0	80.	139.	119.	165.	204.	239.	273	305
	RB11	331.	350.	367.	382.	396	409	422.	436	449.	462.
	RZ 1	3	3	3.	2.	2.	2	2.	1.	1.	0.
	RZ11	0.	0	0.	0.	0.	0.	0.	0.	0	0.

Between the two AMS reviews, a paper released by Fight, LeDoux and Ortman (1984) described in detail logging cost equations for logging in second growth coastal Douglas-fir stands. These equations defined costs as varying both by tree diameter and by volume harvested per acre. The original logging costs on the Mt. Baker-Snoqualmie did not have both these variances. New cost figures were developed from the equations given in the paper; they were significantly lower than the historical costs used in the first AMS. That was not surprising, as the equations were based on managed coastal range second growth stands, while the historical costs were based on harvesting wild old-growth stands in the much steeper and more difficult ground of the Cascades. However, the relative spread of costs according to diameter and per acre volume appeared to be reasonable from the limited data available on the Forest. Therefore, for the revised model, the equation values were indexed upward to the Forest's historical cost level. This resulted in logging system costs reflecting the Forest's situation and experience, but providing cost differentiation by diameter and per acre volumes as well.

After much discussion, it was decided not to use higher logging and sale preparation costs for prescriptions with small harvest units (5-10 acres). No data existed for either of these situations because of a lack of history of dealing with small units. In terms of the total logging and sale prep costs, the increase would have been relatively small, in the judgment of the logging systems engineer Although this may slightly understate the total costs, there is no indication that the potential magnitude of difference would influence the model on whether and when to harvest timber.

Lowering logging costs for regenerated stands was also discussed, but not done, again primarily for lack of experience with harvesting managed stands. In any case, those costs would not come into play until at least 60-70 years out in the planning horizon, by which time, the discounting would lower the present value of the costs to between 6-10 cents on the dollar, making any adjustment insignificant.

Timber Values. Timber values shown in the model are mill pond values (value at the mill deck) for stumpage. The values were developed from the Timber Sale Statement of Accounts "Cut and Sold" reports for the period 1977-1983. The values used were the reported "cut" values; i.e., the value paid by the purchaser at the time the timber was actually cut, scaled, and billed. Using cut values tends to remove the "futures" and speculation problems that come with using "bid" values. Cut values also better reflect the existing market conditions in any given year. Even though the contracts have been bid in earlier years, purchasers will tend to cut those stands under contract with prices reflecting the current state of the market. For instance, if the market has taken a downturn and stumpage prices have fallen along with final product prices, purchasers will, if possible, leave stumpage standing which they have contracted at higher prices and cut lower priced timber bid on more recently.

Timber working groups are composed of mixes of species, so the timber values used are based on weighted averages of the individual species prices, according to the composition of the working group and the amount of timber of each species cut in each of the years for which data were gathered. Average manufacturing prices for the working groups were added to the stumpage values to get pond values. Prices by diameter were then developed utilizing standard Region 6 methodology as contained in the Regional planning direction.

The use of pond values allowed tracking logging system (stump-to-mill) costs, as noted above, as well as reflecting differences in net stumpage values depending on changes in logging system costs (primarily whether aerial or ground system). This reflects the actual situation, in which wholesale lumber and wood products values set the prices which mills are willing to pay to have material on their decks to process. In turn, these mill pond values are what the timber purchasers use to estimate how much they are willing to pay for stumpage after taking into account the specific costs of getting the wood to the mill from a specific sale area.

After a great deal of discussion Region-wide and nation-wide, timber values in the model were appreciated at a 1% per year rate for the first five decades. This value represents an anticipated real price increase in stumpage values over the general price level.

Road Construction. Modeling new road construction in a realistic manner is difficult in FORPLAN, particularly for Forests like the Mt. Baker-Snoqualmie that do not have the majority of their permanent road system built yet. It was almost impossible in Version 1; in Version 2, with the addition of spatial area (allocation zone) capability, greater flexibility was available for road modeling.

Dealing with the construction of roads independent of timber harvest scheduling, such as arterials and collectors, is not a particular problem with Version 2. In Version 2, the miles of road desired can be specified for each AZ, with the fine tuning problem one of making sure that the appropriate segments are scheduled to be built in an implementable order between AZ's.

The major problem is trying to model a road system that is correlated to the scheduling of timber harvest done by the model, but which will be built proportionately more rapidly than the area into which it is built will be harvested. In areas that are currently unroaded, a certain amount of roading in advance of the rate of timber harvest must take place in order to achieve dispersion of harvest units, to meet adjacency requirements and silvicultural guidelines. For an unroaded area, it is not correct to assume that, beginning with the first harvest in an area, for each acre (or thousand cubic feet) harvested, a certain fraction of a mile of road will be built. This is what results if road construction is modeled on strictly a per acre or per MCF harvested basis. On the other hand, if the roads are laid out on a per acre (AZ) basis, the model may choose to implement a coordinated allocation choice, thereby triggering the building of the roads, but then harvest none or only a portion of the timber actually available to be harvested in any given decade in the area. Thus, if the projection of roads to be built had been based on an expected harvest of 20% of an area in the first decade, but the model actually chose for some reason to schedule only 5% for harvest, the amount of road building modeled would be significantly overstated, and the PNV for the alternative would be lower than it actually should be.

After much trial and error, a modeling scheme was developed that reflected to some degree the desired forward roading needed in areas that are primarily unroaded, but was also responsive to the actual rate of harvest scheduled by FORPLAN. Early in the analysis process, the transportation planning engineer and Forest Soil Scientist did an analysis of nine sample areas and derived a road density in terms of miles per section (640 acres) needed to fully support timber management in an area. These densities by logging system were adjusted on a weighted average basis to reflect the logging system mix used by FORPLAN.

The scheme involved examining existing roads by AZ, the planned arterials and collectors for that AZ for the alternative being analyzed, and the acres specified by the CAC for that alternative that would be subject to any level of timber management (from full yield to partial yield, and extended rotations)

To calculate the remaining local roads to be built, the acres of roaded vs. unroaded lands in the AZ, and the acres of each type subject or not subject to harvest were assessed. The total miles of local roads needed to bring the area subject to timber harvest up to the full density for timber management were calculated, whether the area was currently partly roaded or unroaded. If the AZ was less than 25% roaded, 50% of the new local roads were built over four decades at a declining rate (25/15/5/5) on a per area basis, regardless of the harvest scheduling. If the AZ was more than 25% but less than 50% roaded, 35% of the roads were built over four decades (15/10/5/5) on a per area basis. The balance of the new local roads to be constructed were divided by the acres in the AZ subject to timber management. This coefficient was used (after some grouping to keep model size down) in conjunction with the actual acres scheduled by the model to be harvested in any given decade. Thus, the model reflects some advance roading in unroaded areas, but not in areas that are primarily roaded. The balance of the roads are constructed directly as a result of each acre of timber harvested. Refer to the planning records for more information.

The entire process is embodied in a series of computer programs which rely on the data for the existing road system by AZ, the planned arterials and collectors estimated by AZ for each alternative (mapped and measured), and the acres subject to timber management for each AZ, as specified by the coordinated allocation choice for the alternative. The output of the computer programs is a set of allocation zone yield tables for new arterial and collector and new local road construction, if any, (the latter representing the advanced per area roading), and a coefficient for each AZ giving the miles of road to be built per acre harvested.

Road construction and maintenance costs were developed by the transportation planning engineer from historical cost data, taking into account the trend toward building roads used predominantly for timber harvesting to lower standards and then closing them or maintaining them at lower maintenance levels. Road construction costs included preconstruction and construction engineering as well as the actual construction.

Recreation Capacity. Capacity of the Mt. Baker-Snoqualmie lands to support various types and qualities of recreational use varies by land type and by the management applied to that land. Since about 1980, the emphasis has shifted from managing for specific recreation activity types to managing for recreation experience levels. The Recreation Opportunity Spectrum (ROS) system was developed for use nationwide to guide land assessment and land management in this shift in emphasis toward experience levels.

Although recreation use, or "demand", is of major interest to the Forest, it is influenced primarily by factors outside the Forest, such as the Puget Sound and Vancouver, BC area populations, income, tastes and preferences, weather, etc.

The Forest has more ability to affect, through management, the "capacity" to support various types and experience levels of recreation. This can be done by changing management direction and/or expenditure levels for an area. The ID Team decided early in the analysis process that modeling recreation capacity should be the major focus in FORPLAN, with projected use figures employed to keep from overvaluing recreation use on the Forest in any given decade of the planning horizon.

The Forest Service definitions of the ROS classes were used to define ROS capacity for dispersed recreation outside wilderness. Capacities were defined primarily in terms of miles of road or trail, lakes, streams, and major landforms or attractions; the spatial relationship to roads and other developments; and the expected frequency of interaction with other recreationists (see Forest process documents). Results of this analysis were per acre coefficients showing the maximum annual Recreation Visitor Days (RVD's) by ROS class an acre of land can support.

Forest recreation specialists developed a "Wilderness ROS" designed specifically for the unique properties of wilderness. Less research and information were available to guide the determination of per acre capacity coefficients for the wilderness ROS classes. The resulting coefficients were primarily the best judgment of recreation specialists from several Region 6 Forests, the Regional Office, and the Recreation Research Office of the Pacific Northwest Forest and Range Experiment Station in Seattle.

The second stage in modeling recreation capacity was to take the land-use assignments for each alternative and map the resulting ROS classes, using the ROS criteria in conjunction with the management area standards and guidelines. The resulting ROS areas were input to R2MAP, adjusted to consistent boundaries (to correct minor mapping errors), and converted from the R2MAP track file output into per area (AZ) yield tables by computer program.

The ROS capacity yields were modeled as being achieved over a period of four decades for nonwilderness and two decades for wilderness. The existing ROS as mapped for the Forest was used as a starting point in Decade 1 of the planning horizon. A linear progression from the existing to the alternative capacity was assumed to occur over the two or four decade time span. Best estimates were that these time spans reflected the length of time it would take to reach the full effects of the alternative's management area assignments and management activities on the Forest's ROS. The ROS classes are most affected by levels of development, particularly road or trail construction. It was assumed that most of the trail construction in the wilderness would be completed within two decades, and that most of the road systems would be in place outside the wilderness within four decades.

Recreation "Demand". Estimated projections of recreation use on the Forest (often termed "demand") were necessary to keep from overvaluing recreation on the Forest for any given decade, as well as to see when and where demand was greater than capacity. When recreation capacity was being modeled, more RVD's could come out of the model than there would be demand for in that decade. Since the recreation values are applied to the capacity RVD's, this would overstate (perhaps in a very large way) the value of recreation for the alternative. So estimated demand was used to set up a "cutoff" point for recreation values.

Recreation use projections were made using multivariate ordinary least squares regression analysis. Historical RVD's by activity type were regressed on the Puget Sound population and on year as a trend variable for 1971-1982. From the regression equations derived, initial projections of use were made based on the Washington State Office of Financial Management population projections through the year 2030. The resulting activity type RVD's were converted to ROS classes through a crosswalk developed by the recreation staff. (Prior to 1984, the Recreation Information Management System did not track recreation use by ROS class. Thus, a shift had to be made from the historical data classifications to the desired use of ROS).

The recreation use projections were used in the Demand Curves section of FORPLAN to set up a two-step demand curve for each ROS class by period. This formulation allowed RVD's to be valued up to the point that they filled the first demand step; i.e., where supply and demand are equal. For any capacity produced past that point, the value given in the model to those RVD's was zero. If the capacity did not equal or exceed projected use, all the capacity was valued. (This is a slight simplification of a relatively complex technical part of the model. Please consult the Forest economist and the FORPLAN Users Guide for more information on formulation of demand curves used in the model).

Winter Dispersed Recreation. Because the nature of land use and accessibility changes during the winter when snow is on the ground and many roads are not plowed, the ROS classification actually changes from that experienced during the summer. It was not possible to model that change from summer to winter directly in FORPLAN, therefore, a Forest-wide estimate of capacity and existing use was made by District and SO recreation staff. These figures were carried on a one-acre analysis area for the Forest, along with associated cost and benefit estimates. This is an area where additional data is needed.

Recreation Costs and Benefits. Recreation benefits are for the most part considered "nonmarket" in that they are values which are not traded directly in the economic marketplace, yet they still exist for consumers. The recreation values used in FORPLAN were taken from the 1985 draft RPA program, as prescribed by Region 6 planning direction. These nonmarket, or "assigned," values were developed by the Washington Office staff, in conjunction with a research contract let to John Loomis and Cindy Sorg of Colorado State University. Some felt the original values derived were too high for marginal valuation; rather, the values were believed to be closer to average values for all recreation. A subsequent reduction was made to accommodate this prevailing belief. The adjusted values were the ones used by Region 6 Forests. Recreation benefits were tied directly to RVD's and were not trended.

Recreation costs on the Mt. Baker-Snoqualmie were felt by the recreation staff and the ID Team to be more directly connected to the land available for management by ROS class, rather than to the actual RVD load experienced. A great deal of recreation management is required from season to season (e.g. maintenance of facilities), which is more a function of size of the area and the facilities in existence, rather than of the number of people that might use them. (This is not a perfect correlation. For the next round of planning, when budgets and recreation use data by ROS class are available, regression analysis would provide a more suitable basis for modeling recreation costs).

A second decision made was to model recreation costs based on the dollars estimated to manage the recreation facilities to standard, rather than at current budget levels, in order to avoid building in consistent underfunding.

On the basis of these two assumptions/ decisions, recreation management costs were developed on a per acre basis for the acres in each ROS class. The same process was carried out for Wilderness ROS as well.

Wildlife Management Requirements. The development of the wildlife management requirements (MR's) began shortly after the first implementing regulations for NFMA were enacted in 1979, and has continued to the present time. ("Management requirements" were known as "minimum management requirements" in the DEIS. The terminology was changed in line with Washington Office direction.) A significant amount of analysis was done prior to running FORPLAN in terms of gathering data on available habitat, delineation of essential habitat, and specification of areas required to meet MR's (which changed several times during the planning process). The development and analysis of the management requirements are discussed in more detail in Chapter VI, B. A thorough discussion can be found in Appendix H to the FEIS.

Riparian Management Requirements. NFMA regulations require that "... special attention shall be given to land and vegetation for approximately 100 feet from the edges of all perennial streams, lakes, and other bodies of water. This area shall correspond to at least the recognizable area dominated by the riparian vegetation..." (36 CFR 219.27(e)). Riparian vegetation is recognized as critical vegetation for a large number of vertebrate and nonvertebrate wildlife species, critical for protection of stream and lake water quality, and thus critical for aquatic species as well.

Early in the planning process the ID Team recognized that the critical issue regarding riparian areas would be the degree to which timber harvest could take place in or adjacent to riparian areas, and how that harvest would be guided and controlled to prevent unacceptable damage to the riparian area. There was less concern over riparian areas in non-timber management areas, as only incidental disturbance of the riparian vegetation would take place.

After a period of conceptualizing and discussion, the ID Team arrived at a schematic representation of how timber harvest could be accomplished in riparian areas within an acceptable level of disturbance, while still protecting streambanks, maintaining stream shading, and providing a buffer against sediment moving into the stream. Basically, harvest would occur in small patches (schematically represented as diamonds and triangles) within the managed riparian area (streamside management unit) at different rotation lengths. Roughly 25% of the area would be left unharvested; 50% would be managed at about a 160-year rotation; and the other 25% would be subject to normal rotation management. The scattering of small units of varying rotation lengths, interspersed with unharvested areas, would allow some timber yield from these areas while still protecting stream banks, maintaining stream shading, provide a buffer against sediment movement to the stream, and maintain essential riparian habitat for dependent wildlife species.

To decide on an appropriate riparian zone width by stream class for modeling purposes, the Forest hydrologist and soil scientist did sampling studies in the field and map examination. This work indicated that riparian zones of 200 feet on either side of Class I and II streams, 100 feet on either side of deeply incised Class III streams, and 10 feet on either side of Class III lightly incised streams would be adequate for minimum riparian zone protection. These figures are for modeling only, to be considered a proxy for the actual project design , where riparian zones will vary from site to site according to slope, soil stability, channel incision, etc. The Regional Office approved this modeling scheme in 1984. Class IV, intermittent and ephemeral, streams are recognizing by the Forest-wide Standards and Guidelines as requiring consideration for protection during site-specific project planning. They were not allocated specific riparian zone widths for modeling.

Riparian zones were too narrow to map in the grid system of R2MAP. Class I and II streams were measured by electronic planimeter from Forest maps. Class III streams are not mapped consistently or completely, so their mileage was estimated using density factors by topographic class developed during the sampling process done by the hydrologist and soil scientist.

For most benchmark analysis, a constant acreage of streamside management unit (SMU) was developed from the miles of Class I, II, and III streams in areas subject to timber management, multiplied by the respective acres of SMU per mile of stream. (These acres were subtracted from wildlife MR acres so that the protected acres were not double counted).

For the alternative analyses, a slightly different approach was used to develop data sets for use in FORPLAN. The miles of Class I and II streams going through management areas subject to timber harvest at a higher intensity than that allowed by the SMU were measured by AZ from the alternative maps. A FORTRAN program then used the appropriate riparian zone widths to calculate total Class I and II acres needing protection. These acres were calculated as a percent of the total acres in those management areas, and a proportionate percent of acres in each AA within the management areas were assigned SMU designation. A separate program did roughly the same thing for Class III streams, except that the miles of stream were estimated by a density factor according to the acres by topographic class within those management areas subject to more intensive timber harvest. These acres, too, were designated for SMU status.

Finally, the program assigned 25% of the designated acres to a minlevel SMU prescription for no harvest, assigned 50% to an extended rotation SMU prescription that has a limited range of silvicultural intensities available, and left the other 25% in the original management strategies where they would be subject to normal timber management. These SMU prescription assignments were set up as part of the coordinated allocation choice for each AZ, for each alternative. (Acres in management areas subject to timber harvest at an intensity equivalent to or less than the SMU prescription were not designated as SMU. They were considered to be adequately protected within the original management area).

Water Quality Management Requirement. In providing feedback to the DEIS, a number of public agencies, tribes and private citizens described what they believed to be an insufficient treatment in the DEIS of the cumulative effects of timber harvest and other ground-disturbing activities on watersheds.

Between the DEIS and the FEIS, the Forest worked with the Regional Office to develop a methodology for identification of those areas on the Forest where the risk of adverse hydrologic cumulative effects was greatest, a procedure for determining the "threshold" limits for activities in those areas, and a means of incorporating those limits in the FORPLAN model as a management requirement.

An additional concern expressed by many respondents during the public review of the DEIS was the lack of a predictive model tying sediment production to fish production (see the discussions of anadromous fisheries later in this section). This led to the inclusion of fisheries as a major component of concern in the hydrologic cumulative effects analysis.

The process used by the Forest included a preliminary sensitivity analysis of all watersheds using factors that included management history, climatic conditions, presence of landslides, inherent soil stability, stream channel stability, and off-site impacts. This preliminary analysis resulted in all watersheds being assigned to one of three categories: those in acceptable condition that are generally stable, and where normal management activities can continue to take place (I); those with some recent management activity that, along with some natural events and features, has resulted in some adverse impacts to water quality and/or quantity (II); and those with a high frequency of management activities in recent decades that, combined with natural events and geomorphic features, produce highly unstable and dynamic watershed conditions that have resulted in significant adverse impacts to water quality and/or quantity (III).

Additional detailed analyses of Category II and III watersheds were conducted by ID Teams composed of experienced Supervisor's Office and District personnel. The process used was developed with assistance from the Regional Hydrologist. Major components included were: present and past in-channel stability, streambank stability, status of large woody debris, channel pattern, past harvest rates, road density and condition, presence of landslides, amount of unstable soils, and ability to revegetate and recover. At the end of the analysis process, a consensus was reached for the Category II and III watersheds on the maximum harvest rate per decade (based on tentatively suitable lands in the watershed) that would maintain acceptable watershed conditions, or which would allow improvement of those watersheds that are currently in an unacceptable condition.

Harvest limits to insure attainment of water quality and riparian management requirements were incorporated into FORPLAN as a result of the hydrologic cumulative effects analysis These harvest limits are established by use of a first decade accessibility constraint for each applicable watershed, as represented by one or more allocation zones in the model. The next four decades have a general flow constraint on final harvest acres applied Forest-wide, by North and South. This latter constraint maintains the water quality management requirement in a general way for the Forest, but does not artificially over-constrain the model's harvest and scheduling choices. The harvest constraint for the water quality MR is described in somewhat more detail in Chapter VI.B of this appendix. More comprehensive is the discussion in Appendix H of the FEIS. The most detailed explanation and the results of the analyses of individual watersheds are on file with the Biological and Earth Sciences staff, Supervisor's Office.

Sediment. Sediment yields for the model were based on calculations done by the Forest soil scientist of the amount of background sediment (natural sedimentation) coming from different areas, and the additional sediment in tons per acre that could be expected from road construction and timber harvest activities. The major resource variables for sediment outputs were slope steepness and soil stability class. For the first AMS benchmark runs, the stability classes for the less steep slopes (A and B) were grouped together for modeling purposes. It later became apparent that the three stability classes for the steep slope class (C) were not contributing much information, so they were grouped into just the slope class. Thus, for the second AMS and the DEIS/FEIS alternative runs, the three slope classes were the major variables affecting the amount of sediment coming from natural sources and/or from development activities. Sediment coefficients were developed for background sediment and on a per acre basis for harvest.

Anadromous Fisheries. Relationships between anadromous fish production and Forest management activities, particularly those resulting in additional sediment in the streams, were difficult to quantify. The difficulty for this Forest in defining these cause-effect relationships, or production functions, is to a large degree a result of the topography of the Forest as it affects streams. In the Puget Sound basin, anadromous fish spawning occurs more in steeper stream segments with swifter-moving water than it does on slower-moving stretches. Therefore, the damaging factor for spawning gravel tends to be streambed scouring with larger material rather than siltation with fine sediments. Differentiating between natural and management-related sources of large scouring materials has been more difficult than defining those sources for fine sediments, as has been done on other Forests.

The approach taken to provide for anadromous fish was to develop Standards and Guidelines (both Forest-wide and prescription specific), require implementation of Best Management Practices (BMP's), and incur investment costs that, at the minimum, will maintain existing levels of anadromous fish runs, which are considered minimal for population viability. In addition, two higher levels of investments were identified: 1) maintain existing populations, plus restore original spawning grounds to production; and 2) restore spawning grounds plus bring other potential spawning and rearing areas into production by techniques such as removing stream barriers.

Using a spreadsheet program, investment costs, fish output in numbers and pounds, and commercial and sport fishing benefits were estimated by fish species. They were then summarized for the investment level. A particular investment level was specified for each alternative, and the costs, outputs, and benefits reported. These investment levels correspond to management strategies 13A, 13B, and 13C respectively. Strategy 13D has the investment level of 13C for anadromous fisheries, but includes additional investment for resident fisheries habitat.

During the review of the Draft EIS, a number of comments were made questioning the way in which the Forest dealt with the anadromous fisheries. In particular, questions were raised concerning no apparent connection between levels of harvest activities and road building in an alternative, and levels of fisheries investment and production.

As discussed above, the lack of quantified relationships between timber management activities (including road building) and production of large streambed-scouring gravels and stones led to a separation in the modeling process of management practices from fish production. Instead, the assumptions of the application of Standards and Guidelines, BMP's, and investment levels in fish habitat restoration and enhancement were developed. This allowed the specification of levels of fish production to vary by alternative without regard to the overall level of timber management in that alternative. The concern over maintenance and protection of fish habitat in conjunction with timber management and road building activities resulted in the fisheries resource being a major component in the hydrologic cumulative effects analysis.

If S&G's and BMP's are applied in full, and if the water quality MR harvest acreage limits are applied by watershed, there should be no negative effects on the fisheries resources from management activities. This is an area that will receive close monitoring during Plan implementation, and in which more research will be conducted (given available funding) between the release of this Plan and the development of the next one.

Use of FORPLAN in the Analysis Process. FORPLAN played a central role in the analysis process during the AMS and the alternative formulation and effects analysis steps. During the AMS, FORPLAN was used to model required benchmark runs and assist in calculating maximum production capabilities and the opportunity costs of legal and policy constraints During the alternative analysis process, FORPLAN was used to model the alternatives for the DEIS and then for the FEIS FORPLAN was used in the alternatives analysis to 1) find the most cost efficient combination of prescription intensities within the desired land-use assignments for the alternative by maximizing PNV; 2) estimate activity levels, outputs, and environmental effects of implementing an alternative; and 3) ensure that the objectives of the alternative were achievable within the desired land-use assignment pattern and the various constraints required.

AMS Benchmark Analysis. The benchmark runs were formulated according to Region 6 revised planning direction. Eleven basic benchmark runs were done, varying such factors as non-declining yield vs. fluctuating harvest from decade to decade; timber yields taken at utilization standard (financial rotation) vs. 95% culmination of mean annual increment (CMAI); with and without MR's (known then as MMR's); and with all economic values (market plus assigned) vs. market values only.

Two resource specific benchmarks were done; one maximizing timber outputs, and the other maximizing primitive and semi-primitive nonmotorized recreation.

Finally, current management direction was modeled as a benchmark. This was done with three runs: 1) current management direction with no NFMA requirements incorporated (therefore legally not implementable), 2) current direction with NFMA requirements incorporated (primarily MR's); and 3) current direction with NFMA , but no first decade timber harvest requirement.

In addition to the benchmark runs, several sensitivity and constraints analysis runs were done. Three constraints analysis runs allowed examination of opportunity costs of incorporating wildlife and riparian MR's and the accessibility and dispersion constraints. Three sensitivity runs were done to test the effects of 0%, 2%, and 3% real price trends on the activities, outputs, and land assignments chosen by the model, in comparison to the standard 1% price trend incorporated by Regional direction. Two sensitivity runs were made to test the effects on the model outcomes of increasing or decreasing the timber-related costs by 20%.

An important difference between the benchmark formulations and the alternative runs was that in the benchmarks, the model was allowed to choose land-use assignments (management emphases) among a limited set of prescriptions, as well as choose intensities. In the alternatives, the land-use assignments were fairly well fixed using a much larger number of prescriptions; the model was still allowed to choose among intensities.

Differences between the benchmark formulation used for the first AMS versus that used for the second have been discussed in some detail above. Additional details regarding specific modeling formulation and coefficient derivation, and the benchmark analysis and results will be discussed in Chapter IV, C and D.

Alternative Analysis. FORPLAN was used in the alternatives analysis as an optimizing program, given the land-use assignment for an alternative decided on by the Forest Management Team; as a timber harvest scheduler, within the range of timber management assignments given and the range of intensities used in the model; and as a generator of activities, outputs, and effects from various production functions and yield tables built into the model, relating specifically to the optimal solution arrived at through the solution of the LP algorithm.

Once a FORPLAN data set was built reflecting the alternative land-use assignments and constraints, the model was run with a maximize PNV objective function. The activities, outputs, and effects reported from the model were used directly, if possible, in the assessment of the outcomes and effects of the alternatives. In some cases, more post-FORPLAN analysis was required.

Except for Alternative NC, all alternatives used in the DEIS and in the FEIS, as well as the departure options for Alternatives E and H, were run through FORPLAN. For E-departure option, timber output was maximized, rather than PNV When that solution was reached, it was "rolled over" to a maximize PNV objective function; i.e., the value of the timber objective function achieved in the first run was reset as a constraint to be achieved in the first five decades, and the model was rerun to maximize PNV. This assured the most economical solution for the run, while still attaining the initial timber outputs. (When FORPLAN is run under an objective function other than maximize PNV, it pays no attention for solution purposes to the costs and benefits in the model. Prescriptions that make equal contributions to the objective function will be chosen randomly, regardless of whether they are very cheap or expensive to implement. The "rollover" technique allows the user to have the model re-solve, given the initial objective function value, but choosing the most economical prescriptions to reach that result).

Alternative A (No Action) was also run with a maximize timber objective function, with the solution rolled over to a maximize PNV run. Alternative H-departure was run with a maximize PNV objective function, but the NDY constraint was relaxed. A maximum change in timber outputs of 20% (plus or minus) per decade was permitted. Additional detail on the use of FORPLAN in the alternatives analysis for the FEIS, the constraints set, and the results can be found in Chapter VII, B and Chapter VIII, C 2-5. Details on FORPLAN analysis of those alternatives considered in the DEIS but dropped from the FEIS can be found in the DEIS in the same sections just noted.

Analysis Done in Addition to and/or After FORPLAN. Because of the flexibility and capabilities of Version 2 of FORPLAN, it was possible to handle a number of resource activities that other Forests modeled outside of FORPLAN within the model on the Mt. Baker-Snoqualmie. However, there were still a number of areas that did not lend themselves to analysis through FORPLAN, either because of model or data limitations.

Nearly all monetary costs (including lump sum costs that would not affect model solution) were included in FORPLAN to assure that they were calculated into PNV. The cost efficiency of individual projects, i.e. a fish habitat improvement project, will be further assessed at the time of project selection.

Fire Management. The fire management program, including expected fire activity and fire management staffing levels, was handled outside FORPLAN. For each alternative, the fire management staff used the National Fire Management Analysis System (NFMAS) model 5/ to develop probable fire activity levels and optimal staffing requirements for the levels and types of activities represented in the alternative.

Anadromous Fish. A spreadsheet-based model was used to assess the economic benefits for each anadromous fish habitat investment level. After the pounds of fish by species were estimated by the fisheries biologist, those figures were put in the model, which used estimates of average pounds per fish, catch-to-escapement ratios, commercial fish values, sport fish values, and average angler days per fish caught to estimate the economic benefits associated with each level of investment by species. The model calculated commercial, Indian, ocean sport and river sport fishery values separately, then summarized them for the species. Total benefits for each investment level were derived by summing across all species. These values by investment level were carried in FORPLAN by a "dummy" one-acre analysis area (see earlier discussion in Section B.2 of this chapter), along with pounds of fish, angler days, and investment costs. Detailed calculations are in the Forest's planning records.

Wildlife Habitat Changes. Model size and lack of area-specific data in the model made it necessary for the age class (seral stage) changes in SOHA's, deer and elk winter range, and mountain goat winter range to be tracked after the model had run. Separate programs and spreadsheets were developed, using FORPLAN's Flatfile information for input. Harvest by AA by decade was prorated to the AA's within the habitat under study. Using R2MAP acres of initial inventory by age class within the habitat area, the programs showed how age class acres changed over time as harvest took place. Indices were developed by the wildlife biologists to indicate the number of animals that could be supported per acre for each seral stage group. The indices, multiplied by the seral stage acres, gave an estimate of the number of animals that the habitat could support. For a more detailed discussion on wildlife habitat changes see Appendix H).

5/ USDA, FSH 5109.19, Sept. 1985.

Minerals. Areas of mineral potential, defined in terms of low, medium, and high were provided by the Forest's minerals specialist and input to R2MAP. The management strategies were then grouped according to their relative restrictiveness for mineral exploration and development. These two layers were combined with each alternative layer to derive, by alternative, acres of levels of mineral potential subject to differing degrees of restriction for exploration and development.

Trails. Potential trails to be built, in and outside wilderness, for each alternative were determined through discussion among District, Supervisor Office, and Planning team recreation specialists. Construction schedules were estimated, construction costs were added to the total alternative costs, and the alternative PNV was adjusted accordingly.

Cultural Resources, American Indian Religious Use. Alternative effects on cultural resources, particularly inventoried American Indian religious and cultural sites, were estimated outside the model. The alternative layer and the cultural resources layer were used to identify which sites would be compatible with the overlying management areas, which would be disturbed, and what would be the estimated extent or severity of the disturbance.

C. Analysis Area Definition and Delineation

1. Analysis Areas

This section details the delineation of the analysis areas used in the model as run for the second AMS and the EIS alternatives. Major changes between the first and second AMS formulations are noted. There were no major changes between the DEIS and FEIS.

Within the constraints of data availability/reliability and model capabilities/size, the analysis areas were delineated to recognize significant physical, biological, economic, and social/political/ administrative differences among lands on the Forest. Although the resolution of the data in FORPLAN is ostensibly down to one acre, the R2MAP cell size of 21.1163 acres effectively limits the input data resolution to the nearest 21 acres. The model, however, treats each cell as 21 separate acres, even if they have all the same characteristics, thus giving the impression within the model that data resolution occurs down to an acre.

As described in Part B, 2 of this Chapter, AA's were created by overlaying R2MAP resource data layers. The first step was to create the geographically specific "capability areas". Because there are thousands of individual capability areas on the Forest, they were aggregated so as to retain common resource characteristics, but not their geographic definition. Thus, capability areas with the same resource characteristics scattered around the north half of the Forest in various locations were lumped together under one title or code as an "analysis area". In this manner, the capability areas on the Forest were initially aggregated into more than 240 AA's. After the winter range identifier was dropped and the steep slope stability classes aggregated for the second AMS (discussed above), there were 129 AA's remaining.

Five more AA's were defined after the second AMS review to identify separately acres in developed recreation sites and to carry for accounting purposes newly acquired lands which lacked resource data. And four "dummy" AA's were added to the model as carriers for various costs, benefits, activities and outputs which are most appropriately modeled on a Forest-wide basis. Although assigned one acre each, they do not really represent land area, but are simply a modeling technique to represent some Forest-wide information in one figure, rather than breaking it out across all AA's.

After the DEIS was released, some additional model refinements were made, and the vegetation database was updated for timber sales between 1983 and 1988. During this process, 7 AA's with very small acreages (all Seeds/Saps and Reforestation) were aggregated with close neighbors and dropped from the model. Therefore, for the FEIS model runs, 122 AA's (including water) remained, as defined by the level identifiers, along with the 5 AA's for new lands and developed recreation sites, and the 4 "dummy" AA's.

2. Analysis Area "Level Identifiers"

FORPLAN allows any area to be represented by up to eight identifiers, also known as the eight "level" identifiers. In the Mt. Baker-Snoqualmie FORPLAN model, Levels 7 and 8 were reserved for the management emphasis (prescription or management area strategy) and management intensity (level of investment or management activity), respectively. Levels 1 through 6 were used for the analysis area identifiers. After the first AMS benchmark formulation, the Level 2 identifier was dropped (even though it still shows in the model documentation maintained in the identifiers section at the front of the model data set). Following are listings and discussion of each of the five remaining level identifiers.

a. Level 1 - General Location/Developed Recreation/Miscellaneous

North	Mt. Baker NF
South	Snoqualmie NF
Water	Water (lakes, streams, ponds, etc).
New FS Lands	Newly acquired NFS lands with no resource data
Camp/Picnic	Existing developed site camp and picnic grounds
Camp Ski	Existing campground within a developed ski area
Ski Areas	Existing developed ski areas
Rec. Residence	Private rec. residence areas and organization camps
FW-1	Forest-wide AA carrying fixed costs and anad. fish
FR-1	Forest-wide AA carrying developed rec. information
WF-1	Forest-wide AA carrying winter dispersed rec. info.
GN-1	Forest-wide AA carrying genetic program costs

The North and South identifiers are based on the boundaries of the Mt. Baker and Snoqualmie National Forests, respectively. Originally, up through the DEIS, productivity measures developed using 1976 timber inventory data were coincidental with the North and South delineations. After public comments on the DEIS, the Stand Projection System (SPS) timber yield simulator was added and productivity estimates were redone. There are now two productivity classes to use with the Douglas-fir Simulator (DFSIM) and two for use with SPS. These productivity classes are associated, respectively, with the Douglas-fir types north and south, and with the western hemlock and Pacific silver fir types north and south. These delineations do not match completely with any of the other level identifiers; therefore, the productivity classes were dropped as one of the level identifiers. Productivity is now incorporated through the application of DFSIM to Douglas-fir stands, north and south, and the application of SPS to western hemlock and Pacific silver fir stands, north and south.

Additional categories were added to this level to represent water, the developed recreation analysis areas, newly acquired NFS lands, and the one-acre "dummy" AA's. These were simply put in Level 1 for convenience.

Location. The North/South breakdown reflects the old Mt. Baker and Snoqualmie working circles, which were the bases for development of potential harvest figures (roughly equivalent to allowable sale quantity - ASQ) in the 1979 draft Timber Management Plan. There was some question early in the process about whether ASQ on administratively combined Forests would have to be calculated separately, rather than for the combined Forests as a whole. The North/South definition would allow this type of calculation. North/South also allows some general location specification of the analysis areas. And timber stands and yield tables still utilize the North/South delineation, even though productivity is no longer directly correlated.

Developed Site Recreation. The developed site AA's were delineated during the time between the approved AMS and the DEIS alternative runs. Initially, developed sites were not identified separately in R2MAP, but were lumped in as part of the unsuitable/nonproductive lands. At this time, developed recreation appeared not to be a separate issues; also, small areas like campgrounds were difficult to represent in a grid mapping system where one cell covers 21 acres.

The issue decision was an error Existing developed recreation sites were areas that had to be dealt with specifically, in terms of level of management, closures, expansion, etc. Furthermore, it was not easy to answer the questions raised about how many sites were on the Forest and how much acreage they incorporated. After discussions with recreation staff, it was decided to represent each campground, picnic ground, group recreation area, organization camp site, and recreation residence (summer home group) area by at least one cell in R2MAP. Although the actual sites might not be 21 acres, the consensus was that the area actually managed for a site, including a buffer zone around the actual units, could easily average 21 acres per site across the Forest. An inventory of sites was done, and each site was mapped with at least one cell in R2MAP. Developed ski areas were an exception; they are much larger and were mapped to the extent of their current area under permit.

The new developed recreation analysis areas were created on a Forest-wide basis through R2MAP. Rather than tracking each individual camp and picnic site, they were aggregated Forest-wide for analysis purposes. AA acres from the first AMS formulation were reduced according to the acres of developed recreation site AA's taken out of them, and the total Forest acres re-balanced.

Newly Acquired National Forest System Lands. The "newly acquired FS lands" AA's were created following the approved AMS, while some wilderness and roadless area boundary adjustments were made. During the time since the AA base had been revised for the second AMS, some additional land acquisitions and trades had taken place, and for these acres no resource data were available. To keep the total Forest acres accounted for, the "new FS" AA was created as a place holder. Its only available prescription is "New FS - Minlevel."

Forest-wide ("Dummy") Analysis Areas. Four "dummy" AA's were specified to handle some Forest-wide outputs and fixed costs. Use of the "dummy" one-acre AA's is a technique to deal with modeling problems in FORPLAN that don't lend themselves to being tied to analysis areas, allocation zones, or other activities or outputs. The few additional acres do not count toward the Forest total nor do they affect the model solution, other than through the values they carry. When the one-acre AA is specified to be in solution, it is as if whatever is carried with that AA is being applied or implemented Forest-wide.

The one-acre AA's were designed to carry the following:

FW-1 - Forest-wide fixed costs and the three anadromous fish investment levels. The latter include the investment costs; fish output in pounds; angler days in RVD's; and benefits, both commercial and sport fishing.

FR-1 - Developed recreation capacity, use, costs, and benefits Forest-wide for existing developed recreation sites.

WF-1 - Winter dispersed recreation capacity use, costs, and benefits Forest-wide.

GN-1 - Forest-wide costs of the genetics program which are not assignable directly to the timber management program.

b. Level 2 - Not Used

Level 2 was originally used in the formulation for the first AMS to designate deer and elk winter range. In the process of trimming down the model for the second AMS, it was determined that deer and elk winter range as a land identifier was not providing any useful information or capability for modeling, and could as easily be dealt with as an external resource layer through R2MAP. Thus, it was dropped from the model.

c. Level 3 - Roading and Accessibility Condition

Roaded	Currently roaded and economically accessible.
Unroaded	Currently unroaded but economically accessible 6/ (i.e., can be roaded to access harvest areas)
Inaccessible	Currently unroaded and economically inaccessible (i.e., available for harvest only w/aerial systems)
Wilderness	Congressionally-designated wilderness

6/ "Unroaded" designation is not identical with RARE II roadless area lands.

Current status and future use of unroaded lands on the Forest are major issues. Whether an area is roaded or not also has important physical, biological, economic, and social implications. For the first AMS, the unroaded category was defined as "roadless," in line with the definition of roadless lands as used in the RARE II process. In fact, the RARE II roadless lands and the Level 3 "roadless" in FORPLAN were identical at that time.

The 1984 Wilderness Bill was passed between the first and second AMS reviews, converting upon passage about 350,000 acres of RARE II (and Level 3) "roadless" lands to designated wilderness A large number of small parcels of the original "roadless" lands were left outside the new wilderness boundaries; a number of these leftover parcels were under 100 acres in size.

After a great deal of consideration, it was decided during the model restructuring process to change the definition of lands that were not roaded to incorporate those lands (approximately 100,000 acres) that were not included in the RARE II inventory because they were less than 5000 acres. The rationale was that all the major areas of unroaded land were at issue, not just the RARE II roadless lands, particularly when portions of the RARE II roadless lands now existed as small, isolated parcels. Also, from an economic standpoint, any blocks of currently unroaded lands greater than 1000 acres in size would require additional roading for timber harvest, with the attendant implications for harvest economic feasibility, budgets, and alternative present net value. Thus, the revised "unroaded" base was delineated as the balance of the RARE II roadless lands <u>plus</u> the additional 100,000+ acres of unroaded lands mentioned above. (The RARE II parcels had to be kept in the unroaded base and tracked in order to comply with the 9th Circuit Court ruling on the RARE II FEIS and subsequent interpretations of that ruling).

Delineation of, and the rationale for, defining "inaccessible" lands were discussed earlier (part B of this chapter). These lands remained tentatively suitable for timber management, but no roads would be built. Timber harvest could only be accomplished by aerial systems.

"Wilderness" was kept separate as an administrative designation. Wilderness is legislatively withdrawn from timber harvest availability and other resource development activities, and has limited management options available. Separate wildernesses were tracked as individual allocation zones (see below).

d. <u>Level 4 - Working Group</u>

Upper	True fir/mtn hemlock timber stands (higher elevations)
Principal	Western hemlock/Douglas-fir stands (mid-elevations)
Mixed Conifer	Douglas-fir/western redcedar/hardwood stands (mostly lower elevations - approx. 70% conifer & 30% hardwood)
Inacc. Types	Aggregation of working groups in inaccessible lands (Level 3 identifier), grouped because of small acreages of individual working groups
Unsuitable	Forest lands unsuitable for timber production, as determined under the NFMA regulations
Nonforest	Lands with less that 10% tree crown cover; shrub, forb and grass lands; rocks; ice

The type of vegetative cover (or lack thereof) found across the Forest is one of the most important resource characteristics to consider. Vegetation information in terms of types, sizes, ages, and densities of trees is important to timber interests, and other major resources, including wildlife, recreation etc.

As mentioned in Part B above, the 1976 timber inventory and the subsequent analysis done for the 1979 draft TM Plan provided much of the basis on which the timber data for FORPLAN were developed. The stratification of the timber types into the three major working groups provide classes that respond in a similar manner to applied management practices, whether timber or non-timber. They represent general elevational zones, which is important for wildlife habitat considerations. They represent similar economic "zones" in terms of the benefits derived from stumpage. However, because of the diverse nature of the Mt. Baker-Snoqualmie's forest, it must be recognized that these working groups are statistical averages, abstracted from a statistical sample. They are useful for long-range planning on a Forest-wide basis, but would need to be supplemented for any short-range or site-specific planning. The number of working groups is small relative to the actual number of species represented on the Forest, primarily because of the inventory sample stratification and resultant difficulties in getting statistically reliable estimates for groups smaller than the three used.

Sample size played an important role in the aggregation of all types into one in the inaccessible areas. While still available for timber management, the sample sizes on this relatively small amount of land were too small to break out by the three major working groups.

Combining the four forested land working groups with the productivity indices embodied in Level 1 and the age and size classes represented in Level 6 gave a fairly complete picture of the forest status for any given acre in the model. Because timber management is a major activity and issue on the Forest, the delineation of the status of the forested lands was important. This formulation of the information on a per acre basis lent itself very well for use in a linear program for solving land use and scheduling problems.

The first four working groups listed above include all acres that are tentatively suitable for timber production on the Forest, and only those acres. Their basic makeup by major types is shown. There were originally about 80,000 acres more of the Upper working group, but when the decision was made to take a good portion of the mountain hemlock type out of the tentatively suitable base, much of the Upper working group, where the mountain hemlock was predominantly found, went into the Unsuitable group.

The "Unsuitable" working group contains the acres of land (but not water) outside of wilderness determined unsuitable for timber management because of legislative withdrawals, stand regeneration difficulties, for protection of fragile soils, and for other reasons required by law or policy.

The "Nonforest" working group tracks the balance of the land acres on the Forest that are not in the previous working groups: brush, grasslands, rocks, and ice. Since the range (livestock) program on the Forest is almost non-existent, grass and brushlands were not kept as a separate working group. This category also includes lands with scattered tree cover (less than 10% crown cover).

e. Level 5 - Slope and Stability Classes

Slope Class A	Less than 35% slope; all stability classes
Slope Class B	35%-80% slopes; rocky outcrops 35% of area; stream density 5 miles/section; all stability classes
Slope Class C	50%-90% slope; rock outcrops 35%-100% of area; rugged highly dissected topography; stream density 5 miles/section; all stability classes

Topographic classes are important primarily for determining sediment outputs, tendency for soil erosion and slope failure, and difficulty in road construction and timber harvesting activities. The slope classes above were defined to reflect those concerns. Originally, each slope class had two or three soil stability ratings associated with it. Because of the less steep slopes in Classes A and B, the soil stability factors were not carried for those classes in the original model formulation. However, Slope C carried three soil stability breakdowns. Soil stability problems show up most in relation to road construction. Steepness of slope affects other management activities to a greater degree than does soil stability. After the first AMS, it was discovered the three breakdowns in C did not provide much useful information, compared to the number of additional AA's created. The three breakdowns were collapsed into one and averaged (with weights) any associated coefficients, such as sediment production.

f. Level 6 - Condition (Age and Size) Class

Mature Large	Mature large sawtimber (generally 240+ yrs. old)
Mature Small	Mature small sawtimber (generally 140+ yrs. old)
Poles	Immature small sawtimber and poles (80+ yrs. old)
Seeds & Saps	Seedlings and saplings (avg. 20 years old)
Reforestation	New regeneration growth (avg. 10 years old)
Mx. Conif. 1	Mixed conifer poles through large sawtimber
Mx. Conif. 2	Mixed conifer reforestation and seeds and saps
Inacc. 1	Mature large and small sawtimber on inaccessible lands
Inacc. 2	Immature small sawtimber and poles on inaccessible lands
Inacc. 3	Reforestation and seeds and saps on inaccessible lands ("inaccessible" used as defined for Level 3)

Level 6 identifiers are an integral part of the vegetation definition, particularly for timber types. However, the age and size class approximations are also important for determining the status of old growth and wildlife habitat.

The condition class categories were taken from information gathered during the 1976 timber inventory These data were updated through fiscal year 1988 for additional harvest units, leading to an increase in reforestation acres. The aggregation of ages in the mixed conifer and inaccessible working groups represents problems of statistical sample size. Each of these condition classes, when combined with a working group and a productivity class (North or South), has a beginning average stand age, stand average diameter, basal area per acre, and standing net green volume per acre associated with it in the timber yield tables. Harvest costs and stumpage benefits are tied to these combinations.

It is important to note that the classes here represent existing vegetation states. The model tracks the changing age of a stand as it grows and then is cut some time in the future. But in this version of FORPLAN, the six level identifiers always stay the same, even if something were to actually change after an area was harvested. For example, if a stand of mixed conifer mature sawtimber were harvested in Decade 2, the AA identifiers in Decade 3 would still indicate mixed conifer mature sawtimber, even though the stand would then be reforestation, and even if it had been converted to pure conifer. As the planning horizon progresses through the model, one has to watch the internal reports tracking stand ages by decade and type of management actions taken, and not rely on the level identifiers to describe the current status of the stand.

Representation of the Timber Inventory in FORPLAN

The Mt. Baker-Snoqualmie National Forest Forest inventory was conducted in 1976 and is based on a plot expansion system with an inventory plot every 1.7 miles. Each plot represents 1,804 acres of forested lands. The emphasis of the inventory statistics was tree species, volume, and number of acres in each (Table B-4a). Shortly after this stratification was completed, an in-place mapping project to determine acres by vegetative condition was completed; i.e., acres of vegetative condition with tree species, size classes, and stocking levels. This information was combined with plot data to develop a forest timber model with volumes by different stratification (Table B-4a, section labeled "1976 (1977) Inventory Biological Forest Model"). The results were used in the development of the draft Timber Resource Plan in 1978.

In preparation for the Forest Planning effort, the timber model was updated to 1982, with subsequent changes in 1986 for the 1984 Washington Wilderness Act, and in 1989 for other activities through 1988. These changes are also displayed in Table B-4a, on the following page.

With the exception of the last two columns in Table B-4a, all acres and volumes are based on what used to be called "Commercial Forest Lands" and on the 1975 empirical volume information for those acres brought forward through time. The last two columns represent the change from Commercial Forest Lands and the 1975 empirical yield table to the tentatively suitable land base and the 1989 empirical yield tables.

These tentatively suitable acres and their corresponding growth and yield tables were then transferred to the FORPLAN computer model for use as the starting point for all alternatives. Further information on the transition from 1976 Forest Inventory acres to FORPLAN acres can be found in the Forest Planning records.

Table B-4a
Acreage and Volume of the Timber Inventory 1976-1988

1976 Inventory Plot Expansion (CFL) 1/			1976 (1977) Inventory Biological Forest Model (CFL)			1982 Update (CFL)			1986 Update (CFL)		1988 Update (CFL)		1988 Update (Tentatively Suitable)	
Component	Acres	Volume (MMCF)	Component 2/	Acres	Volume (MMCF)	Component 3/	Acres	Volume (MMCF)	Acres	Volume (MMCF)	Acres	Volume (MMCF)	Acres	Volume (MMCF)
Douglas-fir	129,914	1,075 1	North Conifer			North Conifer								
			M/LS	348,806	2,653 7	M/LS	335,740	2,536 1	277,253	2,098 0	265,448	2,007 6	174,264	1,424 3
Hemlock	270,654	1 857 7	M/MS	27,200	224 5	M/MS	23,923	183 7	22,798	183 0	22,850	186 2	17,162	138 5
			I/MS	29,950	179 6	I/MS & PL	59,219	336 3	56,823	343 0	54,935	343.8	46,568	297 1
True Fir	267,054	2,127 7	M/PL	7,628	63 0									
			I/PL	35,236	169 5									
Other Conifers	7,212	26 6	I/SS	63,140	N/A	SS	65,572	N/A	59,314	N/A	57,420	N/A	51,034	N/A
			REF	30,340	N/A	REF	39,934	N/A	44,182	N/A	62,905	N/A	53,867	N/A
Hardwood	10,826	45 7				North Mixed								
						LS-MS-PL	19,352	82 1	18,598	84 1	18,354	85.9	15,175	72 5
Subtotal	685,656	5,132 8				REF & SS	2,257	N/A	3,719	N/A	4,117	N/A	3,845	N/A
SS & REF	151,234	N/A	Subtotal N	541 800	3,290 3	Subtotal N	545,997	3,138 2	482,687	2,708 1	486,029	2,623 5	363,086	1,932 4
Total	836,890 4/	5,132 8	South Conifer			South Conifer								
			M/LS	176,820	1,367 9	M/LS	168,767	1,296 3	140,605	1 096 2	124,784	968 9	87,622	735 7
			M/MS	46,862	325 9	M/MS	44,869	324 1	33,149	249 1	30,093	230.0	24,626	195 4
			I/MS	3 915	23 5	I/MS & PL	37,705	117 8	35,470	121 0	33,820	120 6	28,371	79 1
			M/PL	185	1 3									
			I/PL	52,541	143 0									
			I/SS	36,026	N/A	SS	33,211	N/A	28,524	N/A	22,994	N/A	19,106	N/A
			REF	30,048	N/A	REF	33,048	N/A	31,895	N/A	54,895	N/A	50,848	N/A
						South Mixed								
						LS-MS-PL	26,347	117 7	23,874	113 8	23,428	116.2	21,793	104.1
						REF & SS	1,456	N/A	2,322	N/A	2,483	N/A	2,398	N/A
			Subtotal S	346 397	1,861.6	Subtotal S	345,403	1,855.9	295,839	1,580 1	292,497	1 435.7	235,946	1,114 3
			TOTAL	888,197 5/	5,151 9 6/	TOTAL	891,400 7/	4,994 1 6/	778,526 8/	4,288 2 6/	778,526 8/	4,059.2 6/	597,280 9/	3,046 7 10/

1/ CFL=Commercial Forest Lands
2/ Abbreviation M = Mature, I = Immature LS = Large Sawtimber, MS = Small Sawtimber, PL = Pole Timber, SS = Seedlings & Saplings, REF = Reforest
3/ Condition classes (Level 6) as defined in FORPLAN by North and South (Level 1) Acres carried in FORPLAN are further disaggregated into Working Groups Upper Principal and Mixed Conifer (Level 4)
4/ Does not Include Reserved or Deferred Lands
5/ Based on An In-place Mapping System acres in R2MAP
6/ Volumes based on 1975 empiricals are brought forward
7/ Acres based on 1982 update (1920 letter June 2, 1982) Does not include reserved or deferral lands
8/ Based on R2MAP data adjusted for roads land exchanges and legal
9/ Based on R2MAP data adjusted for roads, land exchanges and unsuitable lands
10/ Based on 1989 Empirical Yield Tables

Tentatively Suitable Lands. Lands determined to be tentatively suitable for timber management are defined through the following level identifiers:

Level 3
- Roaded
- Unroaded
- Inaccessible

Level 4
- Upper
- Principal
- Mixed
- Inaccessible Types

Level 5
- Slope A
- Slope B
- Slope C

Level 6
- All condition classes

Any acre with one of these identifiers will be tentatively suitable for purposes of the model. Any AA with one of these level identifiers cannot, by definition, have another level identifier that falls outside this list. Thus, all Roaded, Unroaded and Inaccessible lands are, by definition, tentatively suitable. The same is true with all lands given the Slope Class identifiers. To reduce confusion for lands not tentatively suitable, only one identifier - Level 4 "Unsuitable" or "Nonforest"' or, Level 3 "Wilderness", along with a Level 1 identifier of "North" or "South" - was used to identify those lands.

Table B-5 and B-6, respectively, summarize acres in each FORPLAN level identifier and list the level identifier and total acres for each analysis area carried in FORPLAN.

Table B-5
Summary of Acres in Each FORPLAN Level Identifier 1/

Level Identifier		Acres
Level 1	North	1,088,924.
	South	604,553.
	Water	17,349 2/
	New FS	4,260
	Camp/Picnic Developed Sites	1,787.
	Campground in Developed Ski Areas	63.
	Developed Ski Areas	6,333.
	Recreation Residences and Organization Camps	548.
Level 2	- Not Used	
Level 3	Roaded	391,235.
	Unroaded	155,665
	Inaccessible	64,057.
	Wilderness	714,025. 3/
Level 4	Upper	178,016.
	Principal	327,237.
	Mixed Conifer/Hardwood	41,647.
	Inaccessible (Aggregate of Types)	64,057.
	Unsuitable	263,979. 4/
	Non-forested	104,516.
Level 5	Topographic/Slope Class A	115,457.
	Topographic/Slope Class B	349,313
	Topographic/Slope Class C	82,130.
Level 6	Mature Large Sawtimber (Conifer)	226,247.
	Mature Small Sawtimber (Conifer	34,733.
	Poles (Conifer)	69,157.
	Seeds and Saps (Conifer)	72,142
	Reforestation/Plantations (Conifers)	102,974.
	Large Saw/Small Saw/Poles (Mixed Conifers)	35,398
	Seeds/Saps/Reforestation (Mixed Conifers)	6,249
	Large and Small Saw (Inaccessible)	50,759.
	Poles (Inaccessible)	9,191.
	Seeds/Saps/Reforestation (Inaccessible)	4,107.

1/ Total acres carried for the Forest in FORPLAN were 1,723,821. The acres above total more, as most acres have more than one of the attributes listed.

2/ All measurable bodies of water (lakes, reservoirs, ponds) on the Forest, in areas such as wilderness, unsuitable, and non-forest lands

3/ Acreage does not include water (an additional 7,581 acres).

4/ Does not include acres in water, wilderness, or developed recreation sites.

Table B-6 Page 1 of 3

Summary of Analysis Area Acres Carried in FORPLAN 1/

AA Code	Level 1	Level 3	Level 4	Level 5	Level 6	Acres
001	Water					17,349.
002	North	Roaded	Upper	Topog A	Large	2,803.
003	North	Roaded	Upper	Topog A	Small	672.
004	North	Roaded	Upper	Topog A	Poles	778.
005	North	Roaded	Upper	Topog A	Seeds/Saps	2,380.
006	North	Roaded	Upper	Topog A	Reforest	1,787.
007	North	Roaded	Upper	Topog B	Large	13,544.
008	North	Roaded	Upper	Topog B	Poles	1,852.
009	North	Roaded	Upper	Topog B	Seeds/Saps	7,675.
010	North	Roaded	Upper	Topog B	Reforest	10,887.
011	North	Roaded	Upper	Topog C	Large	3,643.
012	North	Roaded	Upper	Topog C	Seeds/Saps	1,873.
013	North	Roaded	Upper	Topog C	Reforest	3,221.
014	North	Roaded	Principal	Topog A	Large	12,109.
015	North	Roaded	Principal	Topog A	Small	2,148.
016	North	Roaded	Principal	Topog A	Poles	7,972.
017	North	Roaded	Principal	Topog A	Seeds/Saps	6,579.
018	North	Roaded	Principal	Topog A	Reforest	4,045.
019	North	Roaded	Principal	Topog B	Large	33,940.
020	North	Roaded	Principal	Topog B	Small	4,195.
021	North	Roaded	Principal	Topog B	Poles	15,213.
022	North	Roaded	Principal	Topog B	Seeds/Saps	25,381.
023	North	Roaded	Principal	Topog B	Reforest	26,804.
024	North	Roaded	Principal	Topog C	Large	9,470.
025	North	Roaded	Principal	Topog C	Small	504.
026	North	Roaded	Principal	Topog C	Poles	3,138.
027	North	Roaded	Principal	Topog C	Seeds/Saps	6,303.
028	North	Roaded	Principal	Topog C	Reforest	6,681.
029	North	Roaded	Mixed	Topog A	Mature-Mxd	5,080.
030	North	Roaded	Mixed	Topog A	Young-Mxd	862.
031	North	Roaded	Mixed	Topog B	Mature-Mxd	4,322.
032	North	Roaded	Mixed	Topog B	Young-Mxd	2,990
033	North	Roaded	Mixed	Topog C	Mature-Mxd	1,011.
034	North	Unroaded	Upper	Topog A	Large	1,874.
035	North	Unroaded	Upper	Topog B	Large	16,943.
036	North	Unroaded	Upper	Topog B	Small	947.
037	North	Unroaded	Upper	Topog B	Poles	1,094.
039	North	Unroaded	Upper	Topog B	Reforest	126.
040	North	Unroaded	Upper	Topog C	Large	9,362.
041	North	Unroaded	Upper	Topog C	Small	505.
042	North	Unroaded	Upper	Topog C	Poles	358.
045	North	Unroaded	Principal	Topog A	Large	4,364.
046	North	Unroaded	Principal	Topog A	Poles	588.
048	North	Unroaded	Principal	Topog B	Large	32,162.
049	North	Unroaded	Principal	Topog B	Small	3,606.

1/ Note: Some AA numbers are missing because of aggregations made after the initial delineation and numbering.

Table B-6

AA Code	Level 1	Level 3	Level 4	Level 5	Level 6	Acres
050	North	Unroaded	Principal	Topog B	Poles	7,125.
052	North	Unroaded	Principal	Topog B	Reforest	231.
053	North	Unroaded	Principal	Topog C	Large	14,258.
054	North	Unroaded	Principal	Topog C	Small	842.
055	North	Unroaded	Principal	Topog C	Poles	4,677.
056	North	Unroaded	Principal	Topog C	Seeds/Saps	21.
057	North	Unroaded	Principal	Topog C	Reforest	42.
058	North	Unroaded	Mixed	Topog A	Mature-Mxd	947.
059	North	Unroaded	Mixed	Topog B	Mature-Mxd	1,788.
060	North	Unroaded	Mixed	Topog C	Mature-Mxd	1,475.
061	North	Inaccess	Agg.Types		Saw	28,660.
062	North	Inaccess	Agg.Types		Poles	5,335.
063	North	Inaccess	Agg.Types		Young	2,147.
064	North		Unsuitable			167,149.
065	North		Non-forest			56,659.
066	North	Wilderness				494,777.
067	South	Roaded	Upper	Topog A	Large	7,062.
068	South	Roaded	Upper	Topog A	Small	967.
069	South	Roaded	Upper	Topog A	Poles	1,432.
070	South	Roaded	Upper	Topog A	Seeds/Saps	2,001.
071	South	Roaded	Upper	Topog A	Reforest	8,054.
072	South	Roaded	Upper	Topog B	Large	17,748.
073	South	Roaded	Upper	Topog B	Small	3,623
074	South	Roaded	Upper	Topog B	Poles	2,845.
075	South	Roaded	Upper	Topog B	Seeds/Saps	6,217.
076	South	Roaded	Upper	Topog B	Reforest	17,179.
077	South	Roaded	Upper	Topog C	Large	2,738.
078	South	Roaded	Upper	Topog C	Small	273.
079	South	Roaded	Upper	Topog C	Poles	402.
080	South	Roaded	Upper	Topog C	Seeds/Saps	42.
081	South	Roaded	Upper	Topog C	Reforest	1,430.
082	Sorth	Roaded	Principal	Topog A	Large	4,742
083	South	Roaded	Principal	Topog A	Small	1,389.
084	South	Roaded	Principal	Topog A	Poles	3,603.
085	South	Roaded	Principal	Topog A	Seeds/Saps	3,475.
086	South	Roaded	Principal	Topog A	Reforest	7,233.
087	South	Roaded	Principal	Topog B	Large	11,578.
088	South	Roaded	Principal	Topog B	Small	4,657.
089	South	Roaded	Principal	Topog B	Poles	6,831
090	South	Roaded	Principal	Topog B	Seeds/Saps	8,880
091	South	Roaded	Principal	Topog B	Reforest	14,202.
092	South	Roaded	Principal	Topog C	Large	1,052
093	South	Roaded	Principal	Topog C	Small	526.
094	South	Roaded	Principal	Topog C	Poles	631.
095	South	Roaded	Principal	Topog C	Seeds/Saps	294.
096	South	Roaded	Principal	Topog C	Reforest	1,052.
097	South	Roaded	Mixed	Topog A	Mature-Mxd	10,003.
098	South	Roaded	Mixed	Topog A	Young-Mxd	1,409.
099	South	Roaded	Mixed	Topog B	Mature-Mxd	5,144.
100	South	Roaded	Mixed	Topog B	Young-Mxd	988.
101	South	Roaded	Mixed	Topog C	Mature-Mxd	631.
102	South	Unroaded	Upper	Topog A	Large	2,568.
103	South	Unroaded	Upper	Topog A	Small	568.

Table B-6

AA Code	Level 1	Level 3	Level 4	Level 5	Level 6	Acres
104	South	Unroaded	Upper	Topog A	Pole	462.
105	South	Unroaded	Upper	Topog B	Large	10,252.
106	South	Unroaded	Upper	Topog B	Small	3,624.
107	South	Unroaded	Upper	Topog B	Poles	2,359.
108	South	Unroaded	Upper	Topog B	Seeds/Saps	21.
109	South	Unroaded	Upper	Topog C	Large	1,619.
110	South	Unroaded	Upper	Topog C	Small	883.
111	South	Unroaded	Upper	Topog C	Poles	1,283.
112	South	Unroaded	Principal	Topog A	Large	1,686.
113	South	Unroaded	Principal	Topog A	Small	716.
114	South	Unroaded	Principal	Topog A	Poles	1,201.
116	South	Unroaded	Principal	Topog B	Large	9,343.
117	South	Unroaded	Principal	Topog B	Small	3,625.
118	South	Unroaded	Principal	Topog B	Poles	5,273.
120	South	Unroaded	Principal	Topog C	Large	1,387.
121	South	Unroaded	Principal	Topog C	Small	463.
122	South	Unroaded	Mixed	Topog A	Mature-Mxd	1,898.
123	South	Unroaded	Mixed	Topog B	Mature-Mxd	3,099.
124	South	Inaccess	Agg.Types		Saw	22,099.
125	South	Inaccess	Agg.Types		Poles	3,856.
126	South	Inaccess	Agg.Types		Young	1,960.
127	South		Unsuitable			96,830.
128	South		Non-forest			47,857.
129	South	Wilderness				219,248.
130	New FS					4,260.
131	Camp/Picnic					1,787.
132	Camp in Ski					63.
133	Ski Areas					6,333.
134	Rec Resid.					548.
135	Forest-wide					1.
136	Dev. Rec.					1.
137	Wntr. Disp.					1.
138	Genetics					1.

3. Allocation Zones

Allocation zones have been discussed previously, but a short review here is relevant. AZ's allowed the Forest to deal with spatial problems that could not be dealt with using the noncontiguous analysis areas. In particular, they were used to deal with the road system construction problem on an area basis, and to predict ROS from an alternative with a known land-use assignment pattern.

AZ's can also be used for reporting, which is useful to get either direct or prorated information about a specific geographic area. The AZ's for the second AMS and the EIS alternative runs were delineated based on wilderness boundaries (each wilderness was a separate AZ); major unroaded areas; and the 66 major watersheds. Watersheds in particular provided useful spatial delineators, as management often changes on hydrographic boundaries (ridgetops). Watershed boundaries incorporated into the AZ's were used in the application of the water quality MR developed for the FEIS as a result of the hydrologic cumulative effects analysis.

(NOTE: Some AZ numbers, as shown below in Table B-7, are missing because of aggregations among zones made after the initial delineation and numbering process.)

Table B-7 Page 1 of 2

Allocation Zones and Acreages Carried in FORPLAN

AZ Code	AZ Name	Acres
Z02	Illabot	15,507.
Z03	Chilliwack, Mostly Unroaded	11,673.
Z04	Canyon Creek	17,447.
Z05	Lower Reach, North Fork, Nooksack	13,270.
Z06	Glacier-Middle Fork Nooksack, North	9,424.
Z08	Middle Fork Nooksack, Unroaded	6,772.
Z09	Upper Reach, North Fork, Nooksack	24,705
Z10	Middle Fork Nooksack, South	6,180.
Z11	South Fork Nooksack	19,036.
Z12	Mt. Baker National Recreation Area	8,741.
Z13	Mt. Baker Wilderness	122,675.
Z14	Swift-Park Creeks	6,425.
Z15	Baker River	23,124.
Z16	Baker Lake, Unroaded	15,725.
Z17	Lake Shannon	9,993.
Z18	Lake Shannon, Unroaded	11,880.
Z20	Jackson Creek, Mostly Unroaded	8,398.
Z21	Noisy-Diobsud Wilderness	15,014.
Z22	Middle Reach, Skagit River, Mostly Unroaded	12,472
Z23	Upper Reach, Skagit River	9,468.
Z24	Upper Reach, Skagit River, West, Unroaded	9,181.
Z25	Upper Reach, Skagit River, East, Unroaded	5,992.
Z26	Cascade River	24,269.
Z27	Lower Reach, Skagit River	3,245.
Z28	Lower Reach, Skagit River, Mostly Unroaded	10,951.
Z29	Deer Creek, Northwest	10,461.
Z30	Finney Creek	20,872.
Z31	Deer Creek, Southeast	6,258.
Z32	Deer Creek, Unroaded	7,174.
Z33	Lower Reach, North Fork Stillaguamish, Mostly Unroaded	5,777.
Z34	Middle Reach, North Fork Stillaguamish, North	3,874.
Z35	Middle Reach, North Fork Stillaguamish, South	6,976.
Z37	Upper Reach, North Fork Stillaguamish	30,794.
Z38	Sauk River, Northeast	6,200
Z39	Sauk River, Southeast	43,376.
Z40	Suiattle River	41,725.
Z41	Suiattle River, Mostly Unroaded	10,785.
Z42	White Chuck River	15,946.
Z43	Boulder River Wilderness	50,388
Z44	Canyon Creek	15,805.
Z45	Sauk River, Unroaded	16,442.
Z46	Lower Reach, South Fork, Stillaguamish	15,987.
Z47	Sultan River, Unroaded, North	2,596.
Z48	Upper Reach, South Fork, Stillaguamish	34,044.
Z49	Sauk River Forks	25,280.
Z50	Glacier Peak Wilderness	282,160.
Z51	Sultan River, Unroaded, Southeast	6,166.
Z52	Sultan River	7,912.
Z53	North Fork, Skykomish River, Unroaded, South	20,351.

Table B-7

AZ Code	AZ Name	Acres
Z54	North Fork, Skykomish River, Unroaded, North	13,993.
Z55	North Fork, Skykomish River	10,349.
Z56	North Fork, Skykomish River, Unroaded, West	11,189.
Z57	Skykomish River, Mostly Unroaded	9,225.
Z58	Henry M. Jackson Wilderness	75,834.
Z59	Tye River	4,092.
Z60	Beckler-Rapid Rivers	39,769.
Z61	South Fork, Skykomish River, Unroaded	5,146.
Z62	South Fork, Skykomish River	2,337.
Z63	Skykomish River/Tolt River	3,455.
Z65	South Fork, Skykomish River, ALMU	23,486
Z67	Tye/Beckler River, ALMU	20,153.
Z68	Foss River, ALMU	6,302.
Z69	Miller River, ALMU	5,375.
Z70	Tolt River, ALMU Mostly Unroaded	6,602.
Z71	North Fork, Snoqualmie River, ALMU	7,295.
Z72	Taylor River, ALMU	5,944.
Z73	Middle Fork, Snoqualmie River, ALMU	4,278.
Z74	Upper Reach, Middle Fork, Snoqualmie River, ALMU	11,515.
Z75	Pratt River, ALMU	9,156.
Z76	Alpine Lakes Wilderness	145,356.
Z77	South Fork, Snoqualmie River, ALMU	17,405.
Z79	Cedar River Forks	11,216.
Z80	Cedar River	4,761.
Z81	Upper Reach, Green River	17,045
Z82	Green River, North	7,335.
Z83	Green River, South	12,101.
Z84	Greenwater	18,504.
Z85	Lower Reach, White River	2,317.
Z86	Clearwater	3,313.
Z87	Norse Peak Wilderness	15,922.
Z88	Upper Reach, White River	11,804.
Z89	Upper Reach, White River, Mostly Unroaded	15,530.
Z90	Huckleberry Creek	9,995.
Z91	West Fork White River	16,857.
Z92	Clearwater Wilderness	14,254.
Z93	Carbon River/Puyallup Rivers	15,691.

D. Identification of Prescriptions

The NFMA implementing regulations define a "management prescription" as "Management practices and intensity selected and scheduled for application on a specific area to attain multiple-use and other goals and objectives" (36 CFR 219.3). To define the concept further, a management practice is "A specific activity, measure, course of action, or treatment" and a management intensity is a management practice, or group of practices, applied at a specific level of investment or cost in order to achieve a correlated level of output of goods and services (36 CFR 219.3).

A management prescription consists of a general goal statement for the prescription; a description of lands where the prescription is applicable; a statement of the desired future condition for the lands and associated resources to which the prescription is applied; and a list of detailed standards, guidelines, and constraints which control how the prescription is implemented. The Forest's management prescriptions were created within the following framework: (1) satisfy the "management requirements" in Part 219 27 of the regulations; (2) develop an adequate range of alternatives to ensure the available options are properly examined (Part 219.14(b)-(c)); and (3) formulate each prescription as the most cost efficient combination of management practices to meet the resource management objectives of that prescription (Part 219.12(f)(8)).

1. Overview of the Process

The prescriptions for this planning process were developed in two stages. Early on, the IDT made an initial outline of management prescriptions, considering factors such as the ICO's, and compatibility or noncompatibility among different management practices and desired end results. From this list, the initial FORPLAN prescriptions were developed. It was recognized that not all prescriptions necessary for on-the-ground management could be modeled through FORPLAN, for reasons discussed in earlier sections Therefore, the prescriptions developed for FORPLAN related initially to timber, recreation, and wildlife management. With some modifications and variations, these were the basic FORPLAN prescriptions used for both AMS benchmark runs.

Prescriptions Developed for the DEIS. After the approval of the second AMS, the IDT and Forest Management Team met for several weeks to finish developing all the management prescriptions needed for alternatives analysis and development of the Forest Plan The Forest-wide Standards and Guidelines were developed first, followed by the individual prescriptions Team members initially drafted portions of the Forest-wide Standards and Guidelines and the individual prescriptions most relevant to their resource specialty, or their District. Then small groups revised the product. Final decisions on each of the Forest-wide Standards and Guidelines and individual management prescriptions were made by the IDT and Management Team as a group.

The rules under which the group operated were·

1. Meet the requirements of the NFMA regulations and Region 6 planning direction,

2. Assure that the prescriptions, standards and guidelines represented a balance among resources, keeping in view the goal of the prescription, the management requirements of the regulations, cost efficiency, and implementability on the ground;

3. Incorporate direction for all resources and activities within a prescription (where not already covered by the Forest-wide Standards and Guidelines), so that management areas (prescriptions applied to a specific piece of ground) would be unique; i e , they would not need to overlap in order to adequately deal with all resources on that piece of ground.

4. Maintain future options and management flexibility to the maximum extent possible.

Using these criteria, through a highly interactive process, a range of prescriptions was developed which allowed the Forest to adequately examine resource management opportunities over a broad range of alternatives, while meeting the management requirements for vegetation manipulation, soil and water conservation, riparian areas, resource protection, silvicultural practices, diversity, and cost efficiency. In total, 26 prescriptions were developed that would be used to define management areas. A number of these prescriptions contained several possible management intensities.

It was known prior to running AMS benchmarks that the FORPLAN model solutions run with economic objective functions and the overall economic efficiency of the various alternatives would be most sensitive to the timber management prescriptions and intensities. Prior to reformulating the model for the second AMS, the timber management intensities (in terms of rotation lengths, types of silvicultural activities during the rotation, timing of intermediate thins, and so forth) were reformulated, using DP-DFSIM, discussed earlier.

The IDT/Management Team group had this information when completing the prescriptions for the DEIS; thus, cost efficiency of the timber management prescriptions was assured. Economic considerations were taken into account for other non-timber prescriptions through the use of experience and professional judgement of the resource specialists.

Once the prescriptions, standards and guidelines were final, desired management areas for the alternatives could be delineated by assigning prescriptions to different land areas.

After the prescription package was complete, the FORPLAN prescriptions required to model the DEIS alternatives were completed. Little change was required for the base set of FORPLAN prescriptions used for the benchmark runs (timber management, wilderness, wildlife MR's, and minimum level management). Additional prescriptions were added to represent the range of management activities actually present in the alternatives.

Changes in Prescriptions for the FEIS. Partly in response to public comment and partly as a result of further fine tuning, some minor modifications were made in the prescriptions, standards and guidelines between the DEIS and the FEIS. Some additional intensities were added in the timber management prescription, with corresponding changes made in FORPLAN to include those new intensities. Management intensities with their own standards and guidelines were developed for the following Special Areas: Heather Meadows, Sulphur Creek Botanic Area, and Mather Memorial Parkway. The special area intensities were not tracked separately in FORPLAN, so there was no FORPLAN change required for that management prescription. The deer and elk winter range management requirement intensity was dropped An additional intensity was added in the Cedar River Watershed prescription, but that change did not require any changes in FORPLAN because of the way the Cedar River Watershed is modeled. Other than these changes, the final management strategies for the FEIS were again mostly represented through the model, in much the same form as they existed in the model for the DEIS.

The titles of the management prescriptions and intensities finalized for the FEIS and Plan, along with the management area numbers used in the Plan, are shown in Table B-8. There are actually only 26 prescriptions; numbers 8 and 9 were aggregated into one. Rather than renumber all the others, 9 was not used. (Refer to Chapter II, Appendix D, and the Forest Plan document for detailed descriptions, standards and guidelines of management prescriptions

considered and adopted.) The prescriptions and intensities marked with an asterisk were modeled as FORPLAN prescriptions.

Table B-8 Page 1 of 3
Management Prescriptions and Intensities

	1	Dispersed Recreation
*		1A Primitive
*		1B Semi-Primitive Nonmotorized
*		1C Semi-Primitive Motorized
*		1D Roaded Natural
*		1E General Dispersed Recreation
*		1F Mt. Baker Recreation Areas (1926 Administrative Designation)
	2	Scenic Viewshed
*		2A Foreground
*		2B Middleground
	3	Developed Recreation
*		3A Public Sector Developed Sites
*		3B Potential Recreation Sites
*		3C Winter Sports Resorts
*		3D Private Sector Sites
*	4	Mt. Baker National Recreation Area (1984 Wilderness Bill)
	5	Potential Wild and Scenic River
*		5A Recreation
*		5B Scenic
*		5C Wild
*	6	Skagit Wild and Scenic River
	7	American Indian Religious and Cultural Use*
	8	Special Areas (Cultural-Historical, Geological, Biological, Botanic, and Scenic)
*		8A Heather Meadows Special Area
*		8B Sulphur Creek Botanic Area
*		8C Mather Memorial Special Area
*		8D Other Special Areas
	9	Not used
	10	Wilderness
*		10A Transition
*		10B Trailed
*		10C General Trailless
*		10D Dedicated Trailless
*		10E Special Areas
*	11	Old Growth Habitat (MR)
*	12	Mature and Old Growth Wildlife Habitat (MR)
	13	Watershed, Wildlife, and Fisheries Emphasis in Riparian Areas
*		13A Management Requirements
*		13B Restore (Level II) Anadromous Fish, Existing Resident Fish Habitat Capability
*		13C Enhance (Level III) Anadromous Fish and Existing Resident Fish Habitat Capability
*		13D Enhance (Level III) Anadromous Fish and Potential Resident Fish Habitat Capability
*	14	Deer and Elk Winter Range with Emphasis on Habitat Improvement
	15	Mountain Goat Habitat
*		15A Management Requirements
*		15B Current Management with Emphasis on Habitat Improvement

Table B-8 Page 2 of 3

	16	Threatened and Endangered Species
		16A Northern Bald Eagle
		16B Grizzly Bear
		16C Peregrine Falcon
		16D Gray Wolf
	17	Timber Production Emphasis - Investment Level
*		17A Minimum Investment: Natural regeneration
*		17B Low Investment: Natural regeneration and prelommercial thin
*		17C Low Investment: Plant
*		17D Low Investment: Plant genetically-improved stock
*		17E Low Investment: Plant genetically-improved stock and commercial thin
*		17F Moderate Investment: Plant genetic stock, PCT, possibly fertilize
*		17G High Investment with Regular Rotation: All silvicultural activities
*		17H High Investment with Extended Rotation: All silvicultural activities
*	18	Research Natural Areas (RNA's)
*	19	Mountain Hemlock Zone
	20	Municipal Watershed - Cedar River (City of Seattle)
*		20A Current Direction, 1962 Agreement
*		20B Exchange all N.F. Lands to City of Seattle with stipulation that old-growth stands will be maintained as habitat for old-growth dependent wildlife species.
*		20C Retain N.F. Lands but wildlife habitat for old-growth dependent and other species will be maintained in accordance with NFMA.
*		20D Negotiate new Cooperative Agreement with City of Seattle; in interim, retain lands and otherwise follow 1962 Agreement.
	21	Municipal Watershed - Green River (City of Tacoma)
*		21A Current Direction 1984 MOU
*		21B Public recreation prohibited except limited controlled hunts and recreation use of Pacific Crest National Scenic Trail
	22	Municipal Watershed - Sultan River (City of Everett)
*		22A Closed watershed. No activity except protection of watershed and production of hydropower
*		22B Current situation. Restricted watershed; recreation use only in developed sites. Provide for timber production, protect watershed values beyond legal requirements, maintain fish, wildlife habitat
*		22C Retain N.F. land. Open watershed, full multiple use.
	23	Watershed - Other Municipal
*		23A Timber harvest, moderate recreation opportunities
*		23B No timber harvest, limited recreation opportunities
*	24	Minimum Management
	25	Special Uses - Utilities
		25A Utility Corridors
*		25B Electronic Sites
*	26	Administrative Sites
*	27	Alpine Lakes Area

The Alpine Lakes Area prescription needs a special note of explanation. A decision was made early in the planning process to keep the Alpine Lakes Management Unit land allocations as they were originally approved in the Alpine Lakes Management Plan. That plan was recent, had incorporated public input and review, and had been approved by Congress. The only changes made were those required to incorporate MR's from NFMA. Thus, prescription 27 is just a cross-reference to the Alpine Lakes Management Plan, in which more specific land allocations and associated prescriptions are found. The FORPLAN model was constructed so that the actual Alpine Lakes allocations were modeled appropriately.

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2 Prescription Categories

The prescriptions and intensities, along with the Forest-wide Standards and Guidelines, can be grouped into broader categories, as outlined in Table B-9:

Table B-9

I. Forest-wide Standards and Guidelines
General Standards and Guidelines applicable to all lands and resources on the Forest, no matter where they occur

II. Management Requirements
- 11. Old Growth Habitat Emphasis
- 12. Mature and Old Growth Wildlife Habitat
- 13. Riparian and Fish Habitat Emphasis (Intensity A)
- 15. Mountain Goat Habitat (Intensity A)
- 16. Threatened and Endangered Species
- 24. Minimum Management

III. Recreation and Scenic Areas
- 1 Dispersed Recreation
- 2. Scenic Viewshed
- 3. Developed Recreation

IV. Fish and Wildlife Habitat Enhancement
- 13. Riparian and Fish Habitat Emphasis (Intensities B, C, D)
- 14. Deer and Elk Winter Range w/Emphasis on Habitat Improvement
- 15. Mountain Goat Habitat (Intensity B)

V. Water Production
- 20 Municipal Watershed - Cedar River (City of Seattle)
- 21. Municipal Watershed - Green River (City of Tacoma)
- 22 Municipal Watershed - Sultan River (City of Everett)
- 23. Watershed - Other Municipal

VI Timber Production
- 17. Timber Production Emphasis - Investment Level

VII. Designated and Special Resource Areas
- 4 Mt Baker National Recreation Area
- 5. Wild and Scenic River - Potential
- 6. Skagit Wild and Scenic River
- 7. American Indian Religious and Cultural Use
- 8 Special Areas
- 10. Wilderness
- 18 Research Natural Areas
- 19. Mountain Hemlock Zone
- 27. Alpine Lakes Area

VIII. Developed Special Use Sites
- 25. Special Uses - Utilities
- 26. Administrative Sites

The underlying purpose for each category of prescription, major assumptions made, and economic and other criteria considered are described below.

Category I - Forest-wide Standards and Guidelines. Their purpose is two-fold. First, there are certain requirements, such as soil and water conservation, endangered species preservation, and harvesting timber only from suitable lands (with special exceptions), that are required to be considered throughout the Forest, no matter what prescription was being applied. The Forest-wide Standards and Guidelines document that direction in one place. Also, the Forest-wide Standards and Guidelines establish broad guidelines relating to goals and objectives for various types of management activities carried out on the Forest, relating them to the structure of National Budget Activity Codes for programming and budgeting. This is important to avoid redundancy, as a number of management prescriptions allow several different types of resource uses within one management area. For instance, recreation use (dispersed and/or developed) may occur in almost all management areas, not just those having "recreation" in the title.

The criteria for developing the Forest-wide Standards and Guidelines included whether broad laws and policies existed that would affect all Forest lands, and whether redundancy in the individual prescriptions could be reduced by using Forest-wide Standards and Guidelines instead.

Economic efficiency considerations are not as significant at this level as they are for specific prescriptions, as the Forest-wide Standards and Guidelines wae either too general to incorporate cost efficiency considerations, or they relate to constraints on actions required by law or policy. Constraints on activities generally tend to reduce direct cost efficiency, in the financial sense; however, the constraints are necessary to improve long run societal economic well-being. Cost efficiency considerations in applying the required constraints come into play more in the specific management prescriptions.

Category II - Management Requirements. This category includes those management prescriptions and intensities that are required to achieve basic resource protection as required by NFMA and further defined by the NFMA regulations and the Region 6 planning direction. Included are prescriptions required to maintain viable fish and wildlife populations, protect riparian zones, and conserve soil and water resources. (Management practices to assure diversity maintenance are built directly into the vegetation management prescriptions and intensities, or are governed by the Forest-wide Standards and Guidelines).

These prescriptions were developed in response to the requirements of NFMA and the Region 6 planning direction. The areas to which they are applied were determined in conjunction with Region 6 planning direction, such as the requirements for size and distribution of spotted owl habitat areas (SOHA's), and requirements for other wildlife habitat areas. Ranger District involvement and input from the Washington State Departments of Wildlife and Fisheries were also part of the process of determining the areas to which these prescriptions would be applied. (See Chapter VI, B.)

It was assumed for the wildlife management requirement prescriptions that no timber harvest could be allowed if the minimum required habitat areas only were assigned to these prescriptions. The limiting factor at the minimum is old growth for thermal cover and/or breeding habitat. Since minimum areas dedicated to preservation of the existing stands are used, no harvest is allowed.

For the riparian prescription, it was determined that adequate protection of Class I, II, and deeply incised Class III streams could be maintained while allowing some timber harvest. On the average, riparian areas will be managed at about a 160-year rotation. In reality, some areas will remain uncut, a larger portion will be managed at the extended rotation, and a small portion (generally at the outer edges of the riparian zone) may be managed at normal rotation. The exact pattern will depend on site-specific characteristics.

Though these prescriptions were designed to meet minimum constraints, they were still developed considering economic efficiency. The wildlife management requirement approaches were all analyzed to determine if it would be more cost efficient to use a minimum area dedicated to no timber harvest, or to use a larger area and manage it with a combination of extended harvest and a smaller dedicated core. For the Mt. Baker-Snoqualmie, the answer was to dedicate the areas to non-harvest (see Forest planning process records on file in the Supervisor's Office). The riparian management requirement intensity was developed so that a certain amount of timber harvest can take place, thus enhancing the economic return from the management of the area, while still meeting the required minimum protection for the riparian zone.

Category III - Recreation and Scenic Areas. These prescriptions were designed to manage areas specifically for either dispersed or developed recreation, or to provide a visually pleasing view to travellers from major road and trail corridors, particularly in the foreground areas.

The dispersed recreation management intensities provide opportunities for a variety of different recreation experience levels. No timber harvest is allowed by the dispersed primitive, semi-primitive nonmotorized, and semi-primitive motorized management intensities. An minimum rotation of 125 years is allowed by the roaded natural intensity. The first three provide for essentially undeveloped recreation opportunities, and are applied to unroaded lands, or lands with closed roads. The roaded natural intensity was designed to manage primarily for dispersed recreation that relies on roaded access; but harvest is limited and other development activities are secondary uses.

Intensities E and F were designed specifically for the No Action alternative (Alternative A). Intensity E was developed to model the remaining general dispersed recreation areas in the Alpine Resource and Upper Forest Resource Zones designated in the Ranger District Multiple Use Plans. Dispersed recreation, both non-roaded and roaded, are dominant practices in these areas. The resulting ROS can only be determined by mapping from the current direction land allocations. Intensity F was developed to reflect the original administrative designation of the 1926 Mt Baker Recreation Area. This Recreation Area had different boundaries than the one created by the Wilderness Bill of 1984. Intensity F is used only in Alternative A.

The developed recreation management intensities provide for management of various types of developed recreation sites. Campgrounds and ski areas have different management needs, and thus, different intensities.

The scenic viewshed prescription was developed in conjunction with the visual resource management handbook. The intensities allow for management meeting high visual quality standards in designated foreground and middleground areas in accordance with the visual management system. (Meeting visual quality standards for background areas is provided for in the Forest-wide standards and guidelines, and in standards and guidelines for individual prescriptions.

Background visual areas can be managed at normal rotation, with attention paid to size and shaping of harvest units where necessary to meet visual considerations.) The assumption was that this prescription would only need to be applied along travel corridors that go through areas otherwise under active timber management. The foreground is to be managed at approximately a 200-year rotation, using small harvest units. The middleground is to be managed on a minimum rotation of 100 years, if that intensity is applied. Allocation of lands to this prescription varies by alternative, depending on the alternative's objectives.

Economic efficiency considerations played a role primarily through the determination that the highest values for dispersed recreation activities would be accrued only if no timber harvest was allowed in those areas. Areas managed for road-oriented recreation, and areas managed to meet visual quality objectives, could allow some timber management at lower intensities and longer rotations, thus increasing the overall cost efficiency of the areas.

Category IV - Fish and Wildlife. The management prescriptions represent active management to enhance and improve habitat capability to support production of harvestable wildlife and fish. Timber harvest in the deer, elk, and mountain goat winter ranges is used to allow creation and maintenance of a desired seral stage mix in the habitat area, as well as to produce small amounts of timber. Cutting in small units creates a habitat mix of age classes so that, at any one time, there will be areas for forage production, hiding cover, and thermal cover. Timber harvest allows the manager to control the timing and spatial arrangement of these age classes to achieve the appropriate mix of areas.

Wildlife enhancement intensities can be applied to habitat appropriate for that use, as delineated in the resource base. In general, these prescriptions are applied to areas that incorporate, but are larger than, the minimum habitat areas managed under Category II prescriptions (see discussion above). When this is the case, the enhancement prescription is applied to the entire area, and the minimum habitat area becomes a part of the entire enhancement area, subject to management under the enhancement intensity.

Management intensities for fish specify varying levels of investment necessary to restore or enhance anadromous and resident fisheries habitat. The criteria for developing these intensities were the estimated investments required to restore original habitat, make existing potential habitat usable, and open up new habitat areas.

Economic considerations for the wildlife enhancement intensities consisted primarily of using commercial timber harvest (with associated costs and benefits) to accomplish the desired habitat improvements. For the fisheries intensities, it was assumed that the escapement allowed by downstream and ocean management would be sufficient to utilize the habitat made available under the application of the intensity chosen. The benefits of additional fish production to the Indian and non-Indian commercial and sport fisheries were calculated, along with Forest-wide costs for implementing habitat improvements.

Category V - Water Production. This set of prescriptions applies to the 18 "municipal" watersheds on the Forest. Some of the watersheds do not supply cities or towns, but supply lodges, campgrounds, summer home groups, etc. These prescriptions were developed to assure that the activities allowed within watersheds are compatible with production of potable water for domestic users.

The Cedar River prescription intensities reflect the current agreement and understanding between the Forest Service and the City of Seattle; modifying that agreement to allow the retention of old growth areas within the watershed for spotted owl habitat; examining the option of retaining ownership of the NF lands within the watershed, rather than exchanging them to the City of Seattle after they are harvested; and negotiating a new coop agreement with the City, while retaining existing land ownership and continuing to follow the existing Agreement until a new agreement is concluded.

This range of intensities reflects the range of management options identified by the ICO's for the Cedar River watershed. Logging with primarily natural regeneration is the silvicultural prescription for the watershed under the first two intensities, as the lands would be traded to the City after harvesting, requiring no more silvicultural activities. Also, in the first two intensities, no recreation would be allowed. The third intensity would manage the watershed essentially as normal National Forest System lands, with both timber harvest and recreation activities allowed, but with guidelines to protect the portability of the water. The fourth intensity would provide for management to continue as in the first intensity (with the exception of carrying out any more land exchanges) while a new agreement was being negotiated. Upon concluding a new agreement, the Forest Plan would be amended to incorporate the terms and direction of that agreement.

The Green River prescription intensities were developed to reflect the current agreement the Forest has with the City of Tacoma, and to examine the option of restricting recreation use in the watershed solely to controlled big game hunts and the Pacific Crest Trail. The goal in both instances is to provide a satisfactory and safe water supply to the City. These intensities reflect concerns arising during the watershed agreement negotiations during 1984-85.

The Sultan River prescription intensities came from the ICO's relating to the management of the Sultan River watershed. The options are: (1) close the watershed to all activity except water and hydro power production, with the end goal of trading out of the NF lands in the basin; (2) maintain the watershed in NF ownership with limited management activities, including some recreation use and some timber harvest (essentially the current management); and (3) open the watershed to a full range of management and uses. Again, production of water and water quality protection would be paramount.

The prescription for all other municipal, or domestic, watersheds has two intensities One would be a full management option; the other would prohibit timber harvest and limit recreational use.

Consideration of factors other than cost efficiency were generally more important in the development of the watershed prescriptions. The Cedar and Green River intensities represent different philosophies of how best to meet the needs of the municipal user for quality water and still make maximum use of the land. The Forest Service generally supports more use, particularly recreational, of the watersheds than do the cities. Negotiations on these points go back for many years with both cities. The Forest Service takes the view that the more use an area can tolerate while still meeting its basic objective, the higher the total value to society. The cities generally feel that increased use means increased need for costly water treatment facilities downstream. They have been traditionally more worried about recreational use than timber harvesting; they feel the human effects in watersheds can be more tightly controlled in a logging operation than in developed site or dispersed recreation use.

In the intensities allowing more use, timber harvest was considered a contributor to overall cost efficiency of watershed management, with recreation adding some. But the real criterion considered here was a look at options in levels of use.

Category VI - Timber Production. This category contains the prescription for full timber management, and the associated intensities representing differing investment levels available to achieve full timber management. The criterion for developing this prescription was normal rotation timber management. The criterion for development of the intensities was to lay out different possible silvicultural paths to achieve full-yield timber management. These paths represent different combinations of silvicultural activities (reforestation, precommercial thinning, and commercial thinning in various combinations) and their associated investment and return levels.

Cost efficiency was a major consideration in the development of this prescription, particularly in developing the intensities. The development of the timber management prescription and intensities is described fully in the next section (III E).

Category VII - Designated and Special Resource Areas. The purpose of this category is to provide management direction for the special resources and specially designated management areas on the Forest, such as wilderness and the Skagit Wild and Scenic River. The criterion for the development of each prescription within this category was the presence of an existing or proposed special area designation. Each prescription was developed on the basis of the management requirements that need to be specified for an area to protect the resource of interest, provide for compatible uses, and specify the intensity of those uses.

The mountain hemlock prescription was developed to apply to those lands in the predominantly mountain hemlock type that were deemed unsuitable for timber management because of regeneration problems, but about which little data exists. On the recommendation of the Forest Supervisor, the Regional Forester agreed that these lands would be set aside in a separate management area, if not needed to fill some other non-timber resource need. Experimental harvests and regeneration attempts will be made over the next decade, on a research basis, to determine if there are silvicultural means of overcoming the regeneration problems. If so, the lands will be returned to the tentatively suitable base in the next round of planning. If not, they will remain classified unsuitable and be available for land-use assignment on that basis.

In general, cost efficiency was not a real issue in the development of these prescriptions. A number of areas were already designated: wildernesses, research natural areas, Skagit Wild and Scenic River, and Mt. Baker National Recreation Area. The major economic consideration was to what extent timber harvest could be allowed in an area without compromising the values being protected; and, if allowed, at what intensity in order to remain compatible with the overall management intent for the area. The specific intensities allowed are defined in the standards and guidelines for each prescription.

Category VIII - Developed Special Use Sites. There are a large number of existing and proposed developed administrative sites, ranging from ranger and guard stations to powerline corridors and sites for location of electronic equipment (radio, TV, radar, etc.). This category of prescriptions was developed to provide management direction specifically for these sites. In general, these sites will be managed specifically as management areas, rather than being included within the umbrella of another management area such as municipal watershed or dispersed recreation.

The major assumptions for these prescriptions were that management activities in and around these sites would be quite limited, and that recreational use would range from limited to prohibited, depending on the nature of the site. (Some administrative sites will serve as visitor information sites.) Cost efficiency was not particularly a consideration for these prescriptions.

Summary Comments about Cost Efficiency. The role that cost efficiency played in the development of the management prescriptions has been described. In addition, cost efficiency was a criterion in developing alternatives (resulting in management areas) where management prescriptions are applied to the ground. For instance, while cost efficiency did not play any particular role in the development of Category VIII prescriptions, it would play a very major role in the application of Prescription 26 to identify a new utility corridor in a particular alternative. So while the initial development of a prescription might not have had much to do with cost efficiency, its application to the ground was another story. That part of the process will be covered more thoroughly in Chapter VII.

Another area of cost efficiency not receiving a great deal of attention in the prescription development process was that of budget or management cost. Only in developing the timber management intensities (17A-17H) were the costs of associated management practices explicitly considered (see the following section). Part of the reason is that many management prescriptions do not have a range of management practices available. Thus, the only range in costs would come when the decision was made to use, or not use, a particular management prescription. This showed up in the overall PNV of the alternative runs, which included the costs of management, as well as the benefits, resulting from application of any given management prescription.

3. Prescription Standard and Guideline Table.

Table B-10 shows the prescriptions and how they vary by selected activities. The prescriptions available in each alternative vary by the multiple-use objectives of that alternative Where a full range of timber management intensities is appropriate to meet the multiple-use objectives, the FORPLAN model had the option of choosing the combination of intensities that would meet the objective. In some cases a full range of timber management intensities was not appropriate to meet the objectives of the alternative and prescriptions were constrained. Refer to Appendix D and the Forest Plan.

Table B-10 Prescription Comparison by Selected Activities Page 1 of 3

Prescription	VQO	Timber Harvest	Roads	Land Ownership
1A	Preservation	No scheduled harvest	No new, existing closed	Group II, acquire
1B	Retention	No scheduled harvest	No new; existing closed	Group II, acquire
1C	Partial Retention	No scheduled harvest	No new;	Group II, acquire
1D	Partial Retention to modification	Scheduled; extended rotation	Existing; new may be constructed	Group III - available for exchange
2A	Retention	Scheduled; extended rotation	Existing; may be constructed	Group III - available for exchange
2B	Partial Retention	Full range of intensities	Existing; may be constructed	Group III - available for exchange
3A	Retention partial retention	No scheduled harvest	Existing; may be constructed	Generally Group II, retain; some Group III
3B	Preservation to partial retention	No scheduled harvest	Existing; may be constructed	Group II - retain or acquire
3C	Variable; retention to modification	No scheduled harvest	Existing; may be constructed	Group III - available for exchange
3D	Variable; retention to modification	No scheduled harvest	Existing; may be constructed	Group III - retain or acquire
4	Retention, (foreground) partial retention	Scheduled, low investment intensity	Existing; no new permanent	Group II - retain or acquire
5A	Retention (foreground) to partial retention	Full range of intensities	Existing; may be constructed	Group III - available for exchange
5B	Retention to partial retention	Full range of intensities	Existing; may be constructed	Group III - available for exchange
5C	Retention	No scheduled harvest	No new construction	Group II - retain or acquire
6	Retention, partial retention	Full range of intensities	Existing; may be constructed	Group III - available for exchange
7	Variable; retention to modification	Full range of intensities; seasonal restrictions	May be constructed following consultation	Category II - retain or acquire

Table B-10

Prescription	VQO	Timber Harvest	Roads	Land Ownership
8	Preservation to retention	No scheduled harvest	May be constructed	Group II - retain or acquire
10A-E	Preservation	No scheduled harvest	No construction	Group I - retain or acquire.
11	Retention	No scheduled harvest	Permitted/restrictions	Group III - available for exchange
12	Retention	No scheduled harvest	Permitted/restrictions	Group III - available for exchange
13A-D	Variable; retention to modification	Full range of intensities	Permitted/restrictions	Group III - available for exchange
14A	Variable; retention to modification	No scheduled harvest	Permitted/seasonal restrictions	Group III - available for exchange
14B	Variable; retention to modification	Full range of intensities	Permitted/seasonal restrictions	Group III - available for exchange
15A	Variable, retention to modification	No scheduled harvest	Permitted/seasonal restrictions	Group III - available for exchange
15B	Variable, retention to modification	Permitted; extended rotation	Permitted/seasonal restrictions	Group III - available for exchange
16A	Variable; retention to modification	No scheduled harvest	Permitted/restrictions	Group III - available for exchange
16B	Variable; retention to modification	Permitted/restrictions	Permitted/restrictions	Group III - available for exchange
17A-F	Variable, generally modification	Includes full range of intensities	Existing; new may be constructed	Group III - available for exchange
18	Preservation	No scheduled harvest	No new construction	Group II - retain or acquire
19	Variable; retention to modification	Scheduled for study purposes only	Existing; new temporary may be constructed	Group III - retain or acquire
20A	Maximum modification	Scheduled; minimum intensity	Existing, new may be constructed	Group IV - disposal
20B	Variable; primarily modification	Scheduled; minimum intensity	Existing; new may be constructed	Group III - available for exchange

Prescription	VQO	Timber Harvest	Roads	Land Ownership
20C	Maximum modification	Scheduled; all intensities except extended rotation	Existing; new may be constructed	Group III - available for exchange.
21A	Variable; primarily max. modification	Scheduled; all intensities except extended rotation	Existing; new may be constructed	Groups III and IV - available for exchange and disposal
21B	Variable; primarily max. modification	Scheduled; all intensities except extended rotation	Existing, new may be constructed	Groups III and IV - available for exchange and disposal
22A	Variable; retention to modification	No scheduled harvest	No additional roads/ some exceptions	Group IV - disposal
22B	Variable; retention to modification	Scheduled; low investment intensity	Some new road construction	Group IV - disposal
22C	Variable, retention to modification	Scheduled; all intensities	New may be constructed	Group III - available for exchange
23A	Variable; retention to modification	Scheduled; low investment intensity	May be constructed/ restrictions	Group III - available for exchange
23B	Variable; retention to modification	No scheduled harvest	Construction limited	Group III - available for exchange
24	Variable; retention to modification	No scheduled harvest	New construction unlikely	Variable - little change likely
25A	Generally modification	No scheduled harvest	Permissible	Group III - available for exchange
25B	Variable	No scheduled harvest	Permissible	Group III - available for exchange
26	Variable; retention to modification	No scheduled harvest	Permissible	Group III
27	Varies according to Alpine Lakes Management Plan			

E. Development of Timber Options

1. Introduction

This section briefly reviews the criteria and process used to develop the analysis area yields for timber in tentatively suitable forest lands, and summarizes the development of FORPLAN timber prescriptions and their relationship to the management area prescriptions. Detailed documentation of development of both empirical and managed yield tables and intensities can be found in "Documentation of the Development of Managed and Empirical Yield Tables", September 1989 (revised), in the Forest Planning Records Yields for existing timber condition classes, as listed in part C above, that have poles and sawtimber are called "empirical yields" because they are based in part on continuous Forest inventory plots (inventoried two or more decades).

2. Overview of Process

Part D, above, described the 26 prescriptions and associated intensities which, in combination, identify management area prescriptions developed by the IDT to address the Forest's Planning ICO's. Sixteen of the 26 prescriptions (including 33 intensities) allow some degree of timber production. These were all carried in FORPLAN.

The silvicultural options that were developed for each of the management emphases are referred to as management intensities in FORPLAN. They reflect the different combinations of management practices and the different timing choices for implementing those practices. In essence, they represent alternative investments in levels of timber management to achieve the objectives of a management area.

Before continuing, a brief review of the criteria and process used in developing yields for timber in tentatively suitable lands will be presented.

How Timber Yield Tables Were Developed

1. Criteria

(a) Coordinated development and certification with the Olympic National Forest. Also coordinated with Region 6 Timber Management.

(b) Utilization Standards
  (1) 9" to 6" top existing stands.
  (2) 7" to 4" top - Existing Stands Precommercially or Commercially Thinned.
  (3) 7" to 4" top - regenerated stands.

(c) Made a deduction for "holes" (unstocked and nonstockable areas, defect and breakage).

(d) Develop Managed Yield Tables (MYT) for 3 basic evenaged management intensities plus modifications (23 intensity combinations were run in DFSIM 1/ by Mt. Baker-Snoqualmie, and the Olympic made many runs). Many trial runs were made and reviewed by IDT members before the 23 intensity combinations were selected. Two variables were PCT and CT ages.

(1) Cut-plant-cut
(2) Plus PCT
(3) Plus CT with entry cycles not less than 20 years and minimum CT entry 3,000 board feet per acre.
(4) Plus fertilization where determined feasible.
(5) Modify (2) and (3) by planting improved stock.
(6) Modify (3) to an extended rotation (200 years) for visual resource management.
(7) Use 3-year lag time between harvest and reforestation.

These criteria have not changed except a cut-natural-cut (natural-FH) and a cut-natural-PCT-cut (natural-PCT-FH) have been added; (1) was modified by planting genetically improved stock and (6) was developed with and without planting genetically improved stock.

After receiving comments on the DEIS and the production of managed yield tables, these same evenaged management intensities were used to develop yield tables using SPS.

(e) Modify yield table or scheduling to model other resource management objectives.

(f) Do not plan to CT stands unless they have been precommercially thinned (TSE may warrant CT in some stands).

(g) Do not CT stands if they are past culmination of mean annual increment (CMAI).

(h) Do not CT stands unless individual trees have crown ratios meeting or exceeding those prescribed in the Silvicultural Examination and Prescription Handbook. District Rangers have reported most stands that have not been precommercially thinned are overstocked, and crop trees do not meet the minimum 40% live crown ratio needed to respond to thinning in a reasonable period of time.

1/ Curtis, Robert O., Gary W. Clendenen, and Donald J. DeMars, A New Stand Simulation for Coast Douglas-fir: DFSIM User's Guide, USDA Forest Service General Technical Report PNW-128, May 1981.

(i) Stands receiving a CT should be expected to show a growth response to treatment. Condition class ages are one important aspect of the commercial thinning issue. Individual immature pole stands will be ages 72 and 79 in the South and North working groups, respectively, in 1995 (midpoint of the first Forest Plan decade). Immature small sawtimber stands will be age 101 in 1995. Combined pole/immature sawtimber empiricals in FORPLAN will be ages 78 and 91 in the South and North, respectively, in 1995. In addition to these ages, Chambers 8/ stated that the Washington State Department of Natural Resources, since about 1970, has recognized that commercial thinning in stands 40 years and older without prior silvicultural treatment will not produce a significant increase in usable wood.

(j) When conducting a CT in white woods, give priority to wetter plant associations. Research has shown that these plant associations are less susceptible to stem and root rots. 9/

(k) CT may be conducted in any stand that has a positive PNV over the rotation length. (Later DP-DFSIM runs indicated that commercial thinning is almost always uneconomical in and of itself on this Forest, resulting in a more negative PNV when added to the silvicultural regime for a rotation.)

The criteria enumerated in (g) through (k) above for commercial thinning were developed after the release of the DEIS and in response to public and internal comments. It is anticipated that the current stand structure on the Forest will allow for only a limited number of commercial thins in the first decade. Because of theis, the acres commercially thinned and the resulting contribution to ASQ are accounted for outside FORPLAN. There will be intensive monitoring of CT to ensure these guidelines are followed and adjustments made when conditions warrant.

(l) Use three working groups in planning unit.
(1) North Conifer
(2) South Conifer
(3) Mountain Hemlock Zone Conifer
(4) Hardwood-Conifer Mix

Number (3) above has been removed as a working group. In FORPLAN numbers (1) and (2) above are arranged in:
Level I - Timber Class/Developed Recreation/Miscellaneous
North - Mt Baker National Forest
South - Snoqualmie National Forest

Hardwood-Conifer Mix appears in FORPLAN in:
Level 4 - Working Group

8/ Chambers, Charles J., A Second Look at Thinning: The Effect of Thinning on Allowable Cut - The State Position, DNR Note No. 17, January 1977, Washington State Department of Natural Resources, Olympia, Washington.

9/ Symposium on Research and Management of Annosus Root Disease in Western North America, April, 1989.

The conifer-mix condition class occurs in both the North and South including about 10% of the total tentatively suitable acres. Volume make up in this existing condition class (Mix Conif.1; see Section III.C. above) includes approximately 70% conifer and 30% hardwood.

Upper and Principal used in Level 4 occur in both North and South and were used principally to value timber outputs from analysis areas.

(m) Develop the following empirical (existing timber) yield tables for exisitng working group timber condition classes:
  (1) Conifer Mature Large Sawtimber - north and south.
  (2) Conifer Mature Small Sawtimber - north and south.
  (3) Conifer Combined Pole and Immature Small Sawtimber - north and south.
  (4) Combined Pole and Sawtimber for north and south mixed conifer/hardwood.

In FORPLAN (1) and (2) above were combined in Inaccessible to represent mature large and small sawtimber yield. In (3) the separate pole and immature small sawtimber empiricals were combined to save model space.

(n) Use 1976 Timber Inventory Plot Data to develop empirical yield tables and to estimate mean productivity for working group managed yield tables.

(o) Empirical Yield Tables will be projected to begin in 1995 (midpoint plan decade 1).

(p) Yield of existing condition classes listed below and their future regenerated acres will be projected from the managed yield tables:
  (1) Conifer Seedlings and Saplings (Average 20 years old)
  (2) Conifer Reforestation (Average 10 years old)
  (3) Hardwood Reforestation, Seedlings, and Saplings

2 Managed Yield Tables Developed

(a) Hardwood - Used data from six inventory plots typed hardwood and developed a yield table (cut-plant-cut) using tables and equations reported by Charles J. Chambers of the Washington State Department of Natural Resources 10/.

10/ Chambers, Charles J. "Empirical Yield Tables for Predominantly Alder Stands in Western Washington," Washington Department of Natural Resources Report No. 31, September 1974.

(b) North and South Conifer - Methods and results of determining productivity are documented in Forest Planning Records. Briefly, the method involved using inventory plot site index 100 (total height at age 100) and published data to arrive at an average productivity (mean annual increment) for each the North and South working groups, and then arriving at a site index 50 (total height at age 50), which represents that average productivity within the yield simulator (DFSIM or SPS) model. The process included some adjustment for stocking. The deduction for "holes", defect, and breakages is 10%. Initially, many yield intensities were run using DFSIM as noted above.

Douglas-fir site index values were 95 and 79 North and South, respectively These were used in DFSIM For western hemlock and Pacific silver fir, Washington Department of Natural Resources Publication 22R was used to convert Barnes to Wiley, or Handley's equations to Wiley, for Pacific silver fir. This produced average site index values at age 50 for western hemlock and Pacific silver fir of 73 and 70 North and South, respectively. These values were used in SPS.

(c) Commercial Thinning Practice - The IDT developed detailed criteria for selection of timber stands that could be selected for CT. Briefly these criteria are:

(1) Plan CT only in stands accessible by road on suitable lands.
70% or greater Douglas-fir in stand is preferred
Candidate stand should not be past CMAI.
In true fir and hemlock stands, give priority to wetter plant associations.

(2) Stands meeting criteria (1) above can be commercially thinned:
In Slope Class A - about 98% is accessible by road;
In Slope Class B - about 94% is accessible by road;
In Slope Class C - about 70% is accessible by road.
Note: See description of Level 5, Slope and Stability Classes, in Section III.C. above.

(3) All stands meeting criteria (1) above can be CT'd if they are located not more than 300 feet above roads or 1200 feet below roads. The IDT analyzed the potential number of acres and stratification using only Douglas-fir stands meeting criteria for commerical thinning to determine the possible acreage. True fir and hemlock CT acres were considered to be small in number and were not evaluated in the FORPLAN model. These acres were handled outside the model and will be monitored for significance.

(4) Tentatively suitable analysis areas identified by Principal and Mixed Conifer in Level 4 - Working Group, described in Section III. C. above, were stratified where stands meeting the criteria for CT would be most likely to located.

(d) Fertilization Practice - Analysis determined that only about 2% of tentatively suitable acres may meet criteria and feasibility for this practice. Increase in LTSY would be insignificant, even if this practice were applied to all potential acres. These acres are scattered, which precludes contracts, or increases contracting costs, and they tend to be more in bottom lands, which could result in environmental conflict in or near streamside zones. The decision was made to permit fertilization practice, but not include yield intensities in FORPLAN.

(e) Genetically Improved Seedlings - Estimated genetic gain was stratified and calculated by Douglas-fir and western hemlock/Pacific silver fir on the North and South portions (Level 1 identifier) of the Forest, respectively. The average gains used are:

North Douglas-fir	+1%
North true fir/western hemlock	+1%
South Douglas-fir	+2%
South true fir/western hemlock	+2%

(f) DP-DFSIM 11/ - During the "Planning Pause" to review planning direction and standards, the Region 6 westside Forests were directed to use DP-DFSIM to develop managed yield intensities. DP-DFSIM is a computer program linking dynamic programming 12/, DFSIM, and FORPLAN. The dynamic programming makes a search among possible thinning patterns given an objective, a set of constraints, and an assumed investment level.

The biological relations expressed in the DFSIM computer model form the biological center of DP-DFSIM. The FORPLAN Version 2 approach to activities and outputs, costs, revenues, and some constraints is used.

Objective functions in the program are to maximize timber or present net worth in selecting the best thinning regime. The program calculates and reports detailed stand data, costs, present net worth, objective maximizing paths, and volume. An enhancement produces both cubic and Scribner board foot volume adjusted for "holes", defect, breakage, and genetic gain. All managed yield intensities were re-run in DP-DFSIM. Many intensity combinations were run (over 100 runs total) for those regimes which included intermediate thinning harvest(s) and the best intensity regime was selected. Commercial thinning is not cost efficient; no thinning occurred when the optional constraint "thinning must pay" was used in DP-DFSIM. However, in response to comments received after the DEIS, some commercial thinning will be scheduled in appropriate stands (see discussion in Part 1 of this section).

The SPS yield simulator was adopted for western hemlock and true fir stands after public comment on the DEIS was received and evaluated. There is no dynamic programming model similar to DP-DFSIM for SPS.

11/ Johnson, K. Norman, and Kathy E. Sleavin, DP-DFSIM--Overview and User's Guide, *USDA Forest Service, January 10, 1984 Unpublished Draft.*

12/ DOPT (Brodie et. al., 1979) The Model Brodie built for DFIT to express the dynamic programming algorithm was used and substantially modified.

However, as the growth patterns, costs and benefits are not grossly dissimilar, analysts relied on the results of the many original DP-DFSIM runs as guidance for efficient management intensity regimes to apply to the western hemlock/true fir stands with yield tables calculated from SPS.

(g) Criteria for Selecting FORPLAN Intensities in DP-DFSIM - The basic driving force in selection is due to the fact that Mt. Baker-Snoqualmie is a "deficit old growth" Forest. The basic objective is to obtain the most volume in the shortest rotation, so the long-term sustained yield can be reached sooner. Trade-offs are in terms of rotation ages and total volume - it is best to get a heavy early thinning volume and a short rotation. Criteria used are:

(1) Rotation Ages - Shortest rotation 95% CMAI and CMAI preferred.

(2) Volume - Most total volume in shortest rotation.
Select thinning with the greatest volume over 3,000 board feet per acre minimum, while meeting other criteria.

(3) Rotation MAI - Consider in conjunction with volume and PNW

(4) PNW - Consider cost per acre against volume difference between intensities. Maximum PNW may be the best due to the shorter rotation.

(5) DBH - Two intensities very similar, consider selecting one with the greatest rotation DBH Compared how intensities varied from a DBH of 17 inches.

(6) Percent Basal Area Removed in Thinning - Region 6 Standard is not more than 40%. The Forest guideline is not more than 35%, preferably about 30 to 33% removed.

(7) Feasibility - considered feasible to implement on-the-ground.

(8) Special - The extended rotation was designed for the visual management objectives of growing big trees
A maximizing regime with 3-thirty year interval thinnings was required.
A residual stand of about 50 TPA after the age 107 thinning harvest.
Largest stand DBH, considering other criteria.

(9) Judgement - There is no finite way to fully weight all criteria, so final selection is a judgement considering all criteria.

In the DP-DFSIM Natural-FH intensity simulation, volume in 1N and 1S intensities (see Table B-11) exceeded volume of empirical yield tables. It was assumed that a Natural-FH intensity would not exceed empirical volume projections for existing stands, so the volume was adjusted.

(h) Summary of Conifer Managed Yield Tables Selected for FORPLAN - Table B-11 lists results of pertinent DP DFSIM runs made. For intensities which include CT the results of DP DFSIM Maximizing Timber and PNW are shown and the regime selected based on the above criteria. Selected SPS runs are also shown.

Table B-11
Mt. Baker-Snoqualmie National Forest
Managed Yield Table Summary
Douglas-fir DP-DFSIM Site Index 95

REGIME INTENSITY	ROTATION LENGTH	TOTAL ROTATION VOLUME MCF	CMAI CF/AC/YR	PNW $/AC	DBH CT F.H. INCHES	FIRST COMM. THINNING AGE YR.	VOLUME MCF	MBF	SECOND COMM. THINNING AGE YR.	VOLUME MCF	MBF	THIRD COMM THINNING AGE YR.	VOLUME MCF	MBF	FINAL HARVEST AGE YR.	VOLUME MCF	MBF	REMARKS
North PL-FH +GEN (DF 7N)																		
CMAI	80	7.903	99	-239	11.9										78	7.903	32.748	Run 88
95% CMAI	66	6.173	94	-318	10.0										64	6.173	20.851	Path 7
North PL-CT(1)-FH +GEN (DF 8N)																		
CMAI	100	10.612	106	-288	15 3	67	2.01	6.33							98	8.599	38.506	Run 87
95% CMAI	80	8.092	101	-319	12.7	67	2.01	6.33							78	6.079	23.903	Path 4
North PL-PCT-FH +GEN (DF 9N)																		
CMAI	80	9.653	121	-141	16.1										78	9.653	45.495	Run 93
95% CMAI	66	7.571	115	-216	14.0										64	7.571	23.331	Path 1
North PL-PCT--CT(1)-FH +GEN (DF 10N)																		
CMAI	100	12.842	128	-351	21.2	47	1.70	3.068							98	11.143	57.735	Run 96
95% CMAI	80	9.795	122	-342	18.3	47	1.70	3.068							78	8.096	40.221	Path 10
North PL-PCT-CT(3)-FH +GEN (DF 11N)																		
CMAI	120	15.228	129	-328	30.0	47	1.451	4.07	77	2.695	11.37	107	2.12	11.414	118	8.958	49.762	Run 101
95% CMAI	100	12.931	123	-268	24.3	47	1.451	4.07	77	2.695	11.37				98	8.785	47.310	Path 4

Table B-11
Mt. Baker-Snoqualmie National Forest
Managed Yield Table Summary
Douglas-fir DP-DFSIM Site Index 79

REGIME INTENSITY	ROTATION LENGTH	TOTAL ROTATION VOLUME MCF	CMAI CF/AC/YR	PNW $/AC	DBH CT F.H. INCHES	FIRST COMM. THINNING AGE YR.	VOLUME MCF	MBF	SECOND COMM THINNING AGE YR.	VOLUME MCF	MBF	THIRD COMM. THINNING AGE YR.	VOLUME MCF	MBF	FINAL HARVEST AGE YR.	VOLUME MCF	MBF	REMARKS
South PL-FH +GEN (DF 7S)																		
CMAI	90	6 639	74	-284	11.1										88	6.639	24.671	Run 92
95% CMAI	75	5 238	70	-305	9.4										73	5.238	16.075	Path 16
South PL-CT(1)-FH +GEN (DF 8S)																		
CMAI	110	8.747	80	-308	13.2	67	1.037	2.818							108	7.710	30.277	Run 90
95% CMAI	86	6.569	76	-343	10.7	67	1.037	2.818							78	5.532		Path 4
South PL-PCT-FH +GEN (DF 9S)																		
CMAI	90	8.420	94	-288	15.7										88	8.420	34.615	Run 97
95% CMAI	70	6.256	89	-331	13.0										64	6.256	23.798	Path 1
South PL-PCT--CT(1)-FH +GEN (DF 10S)																		
CMAI	110	11.007	100	-289	21.2	57	1.807	4.982							108	9.200	42.881	Run 100
95% CMAI	85	8.094	95	-300	17.6	57	1.807	4.982							83	6.287	27.807	Path 4
South PL-PCT-CT(3)-FH +GEN (DF 11S)																		
CMAI	130	12.759	98	-313	31.3	57	1.270	3.49	87	3.030	11.92	117	1.757	8.931	118	6 702	34.287	Run 103
95% CMAI	100	10.008	100	-273	22.9	57	1.270	3.49	87	3.030	11.92				98	5 708	28.814	Path 4

Table B-11
Mt. Baker-Snoqualmie National Forest
Managed Yield Table Summary
SPS Site Index 73

REGIME INTENSITY	ROTATION LENGTH	TOTAL ROTATION VOLUME MCF	CMAI CF/AC/YR	PNW $/AC	DBH CT F.H. INCHES	FIRST COMM. THINNING AGE YR.	FIRST COMM. THINNING VOLUME MCF	FIRST COMM. THINNING VOLUME MBF	SECOND COMM. THINNING AGE YR	SECOND COMM. THINNING VOLUME MCF	SECOND COMM. THINNING VOLUME MBF	THIRD COMM. THINNING AGE YR.	THIRD COMM. THINNING VOLUME MCF	THIRD COMM. THINNING VOLUME MBF	FINAL HARVEST AGE YR.	FINAL HARVEST VOLUME MCF	FINAL HARVEST VOLUME MBF	REMARKS
North Natural-FH (MBS 10)																		
CMAI	94	7.032	75	N/A	10.1										90	7.032	31.011	
95% CMAI	84	5.954	71	N/A	9.5										80	5.954	22.982	
North Natural-PCT-FH (MBS 12)																		
CMAI	84	8.137	97	N/A	15.0										80	8.137	36.210	
95% CMAI	74	6.990	94	N/A	14.1										70	6.990	30.883	
North PL-FH (MBS 14)																		
CMAI	102	8.789	86	N/A	11.3										100	8.789	39.772	
95% CMAI	82	6.903	84	N/A	10.2										80	6.903	30.331	
North PL-PCT-FH (MBS 16)																		
CMAI	92	10.077	110	N/A	16.2										90	10.077	47.837	
95% CMAI	62	6.231	101	N/A	13.3										60	6.231	26.483	

Table B-11
Mt. Baker-Snoqualmie National Forest
Managed Yield Table Summary
SPS DP-DFSIM Site Index 70

REGIME INTENSITY	ROTATION LENGTH	TOTAL ROTATION VOLUME MCF	CMAI CF/AC/YR	PNW $/AC	DBH CT F.H. INCHES	FIRST COMM. THINNING AGE YR	VOLUME MCF	MBF	SECOND COMM. THINNING AGE YR.	VOLUME MCF	MBF	THIRD COMM. THINNING AGE YR.	VOLUME MCF	MBF	FINAL HARVEST AGE YR.	VOLUME MCF	MBF	REMARKS
South Natural-FH (MBS 9)																		
CMAI	94	6.683	71	N/A	10 0										90	6.683	29.405	
95% CMAI	84	5.555	66	N/A	9 4										80	5.555	21.951	
South Natural-PCT-FH (MBS 11)																		
CMAI	84	7.986	95	N/A	14.9										80	7.986	35.929	
95% CMAI	74	6.857	93	N/A	14.0										70	6.857	29.017	
South PL-FH (MBS 13)																		
CMAI	102	7.471	73	N/A	10.5										100	7.471	31.840	
95% CMAI	82	5.613	68	N/A	9.5										80	5 613	22.200	
South PL-PCT-FH (MBS 15)																		
CMAI	92	9.299	101	N/A	15.9										90	9.299	45.041	
95% CMAI	72	7.043	98	N/A	14.2										70	7.043	29.738	

The hardwood managed yield table applies to existing condition class Mx. Conf. 2 (mixed conifer reforestation and seeds and saps), and can be applied to any regenerated stand converted to hardwood. The conifer managed yield tables apply to existing condition classes - Seeds/Saps, Reforestation, and Inacc. 3 (Reforestation and Seeds/Saps on inaccessible lands) - and can be applied to any managed stands which result from the regeneration harvesting of existing conifer or mixed conifer-hardwood stands (Mx. Conif.1) The latter is termed conversion to pure conifer. Since Inacc 3 was predominantly in conifer types, the hardwood managed yield table could not be applied. (Refer to Chapter III, C for definition of Level 6 - Condition Class).

The hardwood management yield intensity was initially developed for the purpose of managing habitat for the ruffed grouse wildlife indicator species. This intensity was included in the model. Under Maximizing Timber or PNV objective functions, the FORPLAN program never selected this intensity in runs made. A constraint would be required for this intensity to be selected. Subsequently, ruffed grouse was dropped from the planning process as a wildlife indictator species; thus, *no hardwood management requirements were incorporated in the* alternatives or model.

The silvicultural prescriptions and their associated yield tables were developed based on the silvicultural characteristics of each working group.

3. *Empirical Yield Tables Developed*

For a discussion of the empirical yield tables developed, see "Unmanaged (Wild) Stands" in the next section (F), Part 3.

4. Scheduling Options Developed

Once the vegetative management objectives were identified for each management area (MA), the appropriate IDT members worked together to develop a range of harvest scheduling options. The overriding criterion in this process was that the silvicultural prescription and the associated yield table(s) achieve the vegetative management objectives for the MA. A range of scheduling timing choices, rotation ages, and investment levels were examined for each MA and, whenever possible, made available to the FORPLAN model.

It was necessary to reduce the number of prescriptions included in the FORPLAN model to keep it within feasible size limits. The process of running different yield intensities and selecting the most efficient ones has been briefly described above.

3. Range of Timber Management Options Considered

As discussed in part C of this chapter, analysis areas were delineated by six *level identifiers. Lands determined to be tentatively suitable for timber* management are defined through the following level identifiers·

Level 3 - Roading and Accessibility Condition
Roaded
Unroaded
Inaccessible

Level 4 - Working Group
- Upper
- Principal
- Mixed Conifer/hardwoods
- Inaccessible Types

Level 5 - Slope and Stability Classes
- Slope Class A
- Slope Class B
- Slope Class C

Level 6 - Condition (Age and Size) Class
- All Condition Classes

FORPLAN timber management prescriptions were developed for every combination of management emphasis and intensity which included scheduled timber harvest in tentatively suitable forested land. For any one prescription combination of management emphasis and management intensity, the model was also offered several timing choices on when to implement the prescription. Also for each management emphasis and AA combination which involved timber management options, the model allowed for an assignment to "Minimum Level-Suit. Lands" (Not Economic in Solution). This prescription was used as the final economic suitability test (36 CFR 219.14(c)(3) and 36 CFR 219.14 (d)). The latter is abbreviated "SM" in the Level 8, FORPLAN Management Intensities shown below:

Management Intensities	Intensity Abbreviation	Yield Simulator
Cedar River - Harvest/Minimal Plant - No Silv Followup	CD	SPS
Developed Rec Use	DV	N/A
Minimum Level - Suit. Lands (Not economic in solution)	SM	N/A
Minimum Level - Unsuit/Nonfor Lands In TM Emphases	UM	N/A
Minimum Level - Water In TM Emphases	WM	N/A
Natural Regen.-Final Harvest	NR	SPS
NR-PCT-Final Harvest	NI	SPS
Plant-CT-Final Harvest	CT	DFSIM
Plant-CT-Final Harvest (Conv. To Pure Conif.)	XC	DFSIM
Plant-Final Harvest	FH	SPS
Plant-Final Harvest (Conv. To Pure Conif.)	XF	SPS
Plant-Final Harvest (Conv. To Pure Hardwood)	YF	HW
Plant-Final Harvest (Conv.) DFSIM	2F	DFSIM
Plant-Final Harvest DFSIM	F2	DFSIM
Plant-PCT-CT-Final Harvest	PC	DFSIM
Plant-PCT-CT-Final Harvest (Conv. To Pure Conif.)	XB	DFSIM
Plant-PCT-CTX3-Final Harvest	EX	DFSIM
Plant-PCT-CTX3-Final Harvest (Conv. To Pure Conif)	XE	DFSIM
Plant-PCT-Final DFSIM	P2	DFSIM
Plant-PCT-Final Harvest	PT	SPS
Plant-PCT-Final Harvest (Conv) DFSIM	2P	DFSIM
Plant-PCT-Final Harvest (Conv. To Pure Conif.)	XP	SPS

FORPLAN could select from any of approximately 80,000 prescriptions/timing choices to meet the objective for a particular Plan alternative.

Cost Efficiency of Timber Management Intensities (Stage II Analysis)

Analysis of the individual management intensities has identified the intensity of harvest with the highest PNV for each major category of land as required by 36 CFR 219.14(b). The following table was taken from the Stage II FORPLAN Analysis, which was run between the DEIS and FEIS. This analysis includes the revised yield tables developed from both the SPS and DFSIM yield simulators. Overall moderate intensities produce the highest PNV. Principal working groups had the highest contribution while inaccessible lands always generated negative returns.

Yield Simulator	Productivity Class	Working Group	Intensity	PNV 1/ (M$/AC/150 years)
DFSIM	North	Inacc.	PL-PCT-FH	-.05
		Princ.	PL-PCT-FH	5.24
		Upper	PL-PCT-FH	4.72
	South	Inacc.	PL-PCT-FH	-.05
		Princ.	PL-PCT-FH	4.94
		Upper	PL-PCT-FH	4.26
SPS	North	Inacc.	PL-PCT-FH	-.05
		Princ.	NR-PCT-FH	5.34
		Upper	NR-PCT-FH	4.82
	South	Inacc.	PL-PCT-FH	-.05
		Princ.	NR-PCT-FH	5.12
		Upper	NR-PCT-FH	4.44

1/ Includes value of existing stand plus value of the regenerated managed stand.

F. Development of Yield Coefficients

The term "yield coefficient" refers to a figure representing the amount of a management activity input or a physical or biological output per some unit, usually time, area, or other intermediate activity or output. For instance, a value of 4.5 acres of silvicultural exam for every acre of timber harvest is a yield coefficient. Similarly, yield coefficients might be 2.58 miles of new road construction per section (square mile), or a value of 0.02 tons of sediment per mile of new road construction per year. Timber volume of 8000 CF/AC comes closest to the original derivation of the term "yield coefficient" used in earlier timber scheduling optimization models such as Timber RAM.

Yield coefficients, as a whole, represent one of the most critical links in the FORPLAN model. They are the quantification of the input and output sides of the production functions embodied in the model. It is through the yield coefficients that the activity and output figures are generated, along with their associated costs and benefits. (Costs and benefits will be examined in detail in Chapter IV.) These figures (either physical/biological units, or dollars) are the basis for the solution of the linear program optimization algorithm.

Quantification of the yield coefficients was one of the most difficult and potentially controversial aspects of building the FORPLAN model. In many cases, they represent a first attempt at quantifying production functions which had been dealt with only in qualitative terms. Understanding what the numbers are and their origin is important for understanding the results of the benchmark and alternative runs. An overview of some of this material was given earlier in Part B fo this chapter. Further detail is provided below.

The length of the planning horizon - 150 years - required estimation of quantified coefficients over that time period Estimates past 10 or 20 years, 50 years at the very most, have confidence bounds that become almost infinitely wide That limitation was recognized, and a basic assumption was made that yield coefficients past the first 10 or 20 years really represented indices and trends, rather than absolute values, as they may be significantly off target in absolute terms by the year 2030. Since all alternatives were run with the same values, the relative differences among alternatives could be assessed, which was important for the decision-making process.

Since Forest Plans will be redone every 10-15 years, the absolute magnitudes of the estimated outputs and activities are really most important for the time period covered by the adopted Plan; i.e., the next 10-15 years. Past that, relative values had to suffice if any yield quantification was to be used.

This subsection details the development of the yield coefficients used in FORPLAN. It also discusses how other yield coefficients were developed and used in offline analyses, such as for tracking the effects of an alternative on wildlife habitat and associated populations. The organization follows that of Part B of this chapter. Then, other yield coefficients used in the model are described, plus coefficients used outside the model. This subsection concludes with explanations and notes on various modeling conventions and techniques that were used to accomplish the intent of the production functions and the purposes of the alternatives The reader will be referred to Part B for details already covered, and to Forest planning process records for complete information.

1. Analysis Areas

Coefficients for analysis areas are simply acres. The total acres for each AA were derived as described in detail in Part C of this chapter. The model generally operates on a "per acre" basis, hooking activity and output coefficients to each acre of an AA. Because AA's might be split among different management emphases, not all acres of an AA would necessarily get the same activities and outputs associated with them. In total, the model would not count more acres of an AA than existed in the control total given (see Table B-6)

2. Allocation Zones

There are 86 allocation zones (AZ's) defined for the Forest. As discussed earlier, these are spatially contiguous, but resource heterogeneous areas. In gross form, outputs and activities applied to allocation zones are carried in number of units per area. For instance, AZ04 may have 1.6 miles of new arterial and collector roads slated for construction in Decade 1 for the entire area; and, there may be 5085 acres of semi-primitive nonmotorized ROS acres, yielding a potential of 2949 RVD's annually in Decade 1. (Although these coefficients are gross numbers per area, FORPLAN actually carries them as a per-acre equivalent: one acre is calculated as a percent of the entire zone, and that percentage of the zone yield is carried in the model).

3. Timber Yield Coefficients

More data were available from which to calculate timber yield coefficients than for any other output, though even that data base was not complete. A number of assumptions and adjustments had to be made to get a full set of yield estimates ranging over 200 years.

As described in Part B, timber yield coefficients were developed from two primary sources. The yields for existing, unmanaged (wild) stands were developed from the 1976 National Forest Inventory (NFI) data for the Forest. The yields for existing managed stands (identified in FORPLAN as Reforestation and Seeds and Saps under Level 6) and for regenerated managed stands (those stands reestablished after harvest of an existing stand) were developed from the Douglas-fir yield simulator (DFSIM) for Douglas-fir, and from the Stand Projection System (SPS) for western hemlock and Pacific silver fir. The final regenerated stand yields used in FORPLAN for Douglas-fir were derived from DFSIM after the cost-efficiency determinations using DP-DFSIM for each timber management intensity were made (see part E of this chapter). DP-DFSIM runs specified timing of thinnings, basal area removal, rotation length, etc. These factors were fed back into DFSIM to develop the final managed stand yield tables. SPS was used to develop final regenerated sand yields for western hemlock and Pacific silver fir, with the intensities and regimes chosen based on the initial analyses done with DP-DFSIM.

As mentioned earlier in this section, DFSIM was used for Douglas-fir portions of the working groups (which are only about 45% at a maximum of any of the working groups). SPS was used for the western hemlock and Pacific silver fir portions of the working groups. And hardwood yield tables were developed based on the empirical yield data for predominantly alder stands in Western Washington 13/.

13/ Chambers, Charles J. "Empirical Yield Tables for Predominantly Alder Stands in Western Washington," Washington Department of Natural Resources Report No. 31, September 1974.

Unmanaged (Wild) Stands. Empirically-based yield tables were developed from the 1976 NFI inventory data using stand average diameter, existing basal area, and growth (estimated mean annual increment) as factors to estimate future growth, diameters, and volumes per acre. Yields were originally developed for poles, immature small sawtimber, small sawtimber, large sawtimber, and mixed conifer/hardwood stands, according to statistical groupings done from the NFI data. These groupings were the basis for delineation of the Level 6 working group identifiers. Poles and immature small sawtimber were later combined into one class. Also, because of small sample size, poles, small sawtimber and large sawtimber were grouped together in the mixed conifer type; and small and large sawtimber were grouped in the inaccessible areas.

To develop the most accurate yield picture, NFI plots were used in developing yield tables only if they fell in lands determined to be tentatively suitable. Plots in wilderness (pre-1984 Washington Wilderness Act) and in the portion of the mountain hemlock zone classified as unsuitable were not used in development of empirical yield tables.

The FORPLAN yields are taken by the model at the midpoint of each decade (period) in the model. The first model period is calculated as 1990-1999, so the empirical timber yield coefficients for Decade 1 have to reflect expected diameters and volumes as of 1995. The initial empirical yield tables were developed for the next 200+ years, based on the 1976 NFI data as the starting point. From these tables, the existing stand yields for FORPLAN were calculated using the estimated diameters and volumes from the empiricals as of 1995, and every 10 years thereafter, for 210 years (the model allows a maximum of 20 periods of yield data). This adjustment allowed the model to reflect more accurately the expected diameters and volumes available for tracking harvest, inventory, and growth. One other adjustment had to be made when developing the empirical yields; the yield model tended to overstate the growth rate for large sawtimber, so the yield model was run with a cap on the basal area of these stands, allowing some increase in average stand diameter, but only minimal increases in stand volumes in that condition class.

Managed Stands. The process of developing managed stand prescriptions using DP-DFSIM model was described earlier. One major adjustment made to managed stand yields was to slow down growth rates after the first 100 years, as it is known that DFSIM has a tendency to overestimate growth and yields after 100 years. In consultation with the Regional Office, it was agreed that the forecast yields from DFSIM would be reduced by 1% per decade after age 100, e.g. 1% at age 110, 2% in year 120, etc. SPS-generated yield tables were also reduced by 1% per decade after year 100.

Another major adjustment made to the managed stand timber yield tables was deduction of volume from the DFSIM yields for "holes," defect, and breakage not accounted for in DFSIM. This deduction was 10% across the Forest in the Douglas-fir yield tables, based on work by Meyer 14/. The adjustment for SPS yield tables was only 2% for "holes," defect and breakage. (See "Documentation of the Development of Managed and Empirical Yield Tables," September 1989, in the Forest's Planning Records for additional detail.)

14/ Meyer, Walter H., "Relation Between Actual and Normal Yields of Immature Douglas-fir Forest."

A third major adjustment to the yield tables incorporated predicted planting of genetically improved stock in harvested units. Originally, the model was given the choice of planting genetic or natural stock. This choice doubled the number of management intensities, but left the model choosing almost all genetic stock. The slightly increased planting costs did not outweigh the additional value from estimated faster growth over the rotation, especially since the basic costs of the genetics program and seed orchards were carried separately as a lump sum cost per period. Therefore, the natural stock option was abandoned, and increased growth from genetic stock was incorporated into all the yield tables.

The Regional Office, Forest silviculturist, and geneticist agreed on a 20-year schedule for incorporating genetic stock into the planting program. The Forest silviculturist calculated a program-average factor for increased growth of 1% for all North species and 2% for all South species. These average genetic gain factors were acceptable to the Regional Office. Though this may seem low compared to some gains for genetic stock, it represents the fact that not all planted stock will be of genetically improved material until 20 years out, and that improved stock may not necessarily provide the high additional growth experienced on higher site lands or in the Southeast.

Table B-12 shows the volume adjustments for DFSIM and SPS model yields.

Table B-12
Summary of Adjustments for Holes, Cull, Breakage, Age Over 100 Years and Genetics for DF-North/South for Artificially Regenerated Stands

Age Class	Age Factor	Cull Breakage Holes	Genetic Gain	Weighted Adjustment
		North		
0-100	1.00	.90	1.01	.91
101-110	.99	.90	1.01	.90
111-120	.98	.90	1.01	.89
121-130	.97	.90	1.01	.88
131-140	.96	.90	1.01	.87
141-150	.95	.90	1.01	.86
151-160	.94	.90	1.01	.85
161-170	.93	.90	1.01	.84
171-180	.92	.90	1.01	.83
181-190	.91	.90	1.01	.82
191-200	.90	.90	1.01	.81
		South		
0-100	1.00	.90	1.02	.92
101-110	.99	.90	1.02	.91
111-120	.98	.90	1.02	.90
121-130	.97	.90	1.02	.89
131-140	.96	.90	1.02	.88
141-150	.95	.90	1.02	.87
151-160	.94	.90	1.02	.86
161-170	.93	.90	1.02	.85
171-180	.92	.90	1.02	.84
181-190	.91	.90	1.02	.83
191-200	.90	.90	1.02	.82

Table B-12 (cont'd)
Summary of Adjustments for Holes, Cull, Breakage, Age Over 100 Years and Genetics for Western Hemlock/True Fir Artificially Regenerated Stands

Age Class	Age Factor	Cull Breakage Holes	Genetic Gain	Weighted Adjustment
		North		
0-100	1.00	.98	1.01	.99
101-110	.99	.98	1.01	.98
111-120	.98	.98	1.01	.97
121-130	.97	.98	1.01	.96
131-140	.96	.98	1.01	.95
141-150	.95	.98	1.01	.94
151-160	.94	.98	1.01	.93
161-170	.93	.98	1.01	.92
171-180	.92	.98	1.01	.91
181-190	.91	.98	1.01	.90
191-200	.90	.98	1.01	.89
		South		
0-100	1.00	.98	1.02	1.00
101-110	.99	.98	1.02	.99
111-120	.98	.98	1.02	.98
121-130	.97	.98	1.02	.97
131-140	.96	.98	1.02	.96
141-150	.95	.98	1.02	.95
151-160	.94	.98	1.02	.94
161-170	.93	.98	1.02	.93
171-180	.92	.98	1.02	.92
181-190	.91	.98	1.02	.91
191-200	.90	.98	1.02	.90

Adjustments Made to Timber Yield Coefficients for Modeling Purposes. In addition to adjustments discussed above, two other adjustments were made to all the yield tables, both unmanaged and managed. The first dealt with acres of land put into roads as new permanent system roads are constructed; those acres will be unavailable for future timber growth and harvest once roads are built. The second adjustment was made to account for large trees maintained within area subject to harvest to provide habitat for cavity nesting wildlife.

a. Adjustments for Roads

There are an estimated 13,700 acres of tentatively suitable lands currently occupied by roads, and not available for other activities. Because of their linear nature, existing roads are not tracked in the R2MAP data layers Thus, when allocation choices were mapped into R2MAP, the number of acres actually available for timber management were overstated. This overstatement was dealt with by reallocating 3.5% of the acres in "Roaded" analysis areas (all of which are tentatively suitable) to a separate management emphasis, Suitable Nonproductive in Roads, which was a minimum level management emphasis. This process assigned approximately 13,700 acres to the management emphasis for existing roads in all alternatives.

The FORPLAN model employs a "Model 1" formulation. In Model 1, compared to a Model 2 formulation, it is not possible to reassign a management emphasis or intensity to a land area once an initial assignment has been made. For instance, it is not possible to tell the model to assign a timber management prescription to an area until after the first harvest, and then change the prescription to a wildlife habitat improvement area.

The Model 1 limitations created a problem regarding lands that would be taken out of the timber base as new roads were constructed. If some reductions were not made, hundreds of miles of new roads would be "built", taking up several thousand acres of suitable lands in the process, but FORPLAN would go along attributing timber growth and harvest to acres covered by gravel and asphalt.

The solution to this problem was to make adjustments in the timber yield tables to approximate the acres of land taken out of production by the construction of new roads. It was estimated that when full roading is achieved, approximately 4.5% of the Forest's tentatively suitable acres will be in roads. Since it was not possible to shift additional acres out of the base to the "Suitable - Nonproductive" category after the initial management emphasis assignments were made, the IDT chose to proxy the decrease in available lands for timber growth and harvest after roads were constructed by reducing the timber yields for regenerated stands. This required three different splits in the yield tables, according to the existing and future roading status.

As mentioned above, all "Roaded" analysis areas had 3.5% of their acres assigned to the "Suitable - Nonproductive" management emphasis during the development of the CAC data base. Therefore, in the yield tables for regenerated stands on these analysis areas, it was only necessary to reduce the yields by 1% to proxy the full reduction in yields required to reflect the fully roaded status.

"Unroaded" analysis areas had no reductions in acres. It was assumed that these lands would yield full timber volumes from the existing stands in the initial harvest, as logs cut from roadbeds being constructed would be sold along with the logs harvested from the rest of the area. However, once the roads were built, there would be no timber grown back on them Therefore, the fully roaded status was reflected in the timber yield tables for the "Unroaded" analysis areas by making a 4.5% reduction in the regenerated stand yields.

Finally, acres or timber yields for the "Inaccessible" analysis areas were not reduced; these areas are currently unroaded. By definition, no roads will be built in them, therefore, no volumes will be lost from future harvest. (Any apparent advantage this gives the "Inaccessible" AA's over other AA's in the model in terms of timber yields and benefits is offset by the significantly higher cost in harvesting those areas, as only aerial systems are allowed).

b. Adjustments for Cavity Excavators

Primary cavity excavators are a management indicator species (actually a group of species) fror this Forest. These animals require snags, both live and dead, as their habitat. NFMA and implementing regulations require maintenance of habitat to provide for viable populations of the management indicator species. A "viable" population of cavity excavators was determined by the wildlife biologists to be 20% of the maximum potential population for the Forest. To maintain sufficient numbers of live and dead snags to support this 20% population, it was estimated that 1.5% of the net green volume per acre from timber harvest operations would have to be left unharvested. Therefore, the minimum cavity excavator requirements were modeled by reducing all yield table volumes, for both wild and managed stands, by 1.5%.

Several alternatives examined providing cavity excavator habitat for populations above the 20% level. Alternatives A, H and J provide for 40% of potential maximum population levels; Alternative C examines a 60% level. For each of these alternatives, timber yields were reduced by 1.5% for each 20% increment in the cavity excavator population levels.

c. Summary of Yield Table Adjustments

Reduction for each 20% potential population of cavity excavators managed for in an alternative (Taken from all yield tables, wild and managed)	1.5%
Reduction for suitable lands actually in roads (Taken only from regenerated stand yield tables)	
"Roaded" Analysis Areas	1.0%
"Unroaded" Analysis Areas	4.5%
"Inaccessible" Analysis Areas	0.0%

d. Timber Yield Table Examples

Table B-13 shows the final empirical yield table for mature sawtimber on the North part of the Forest, after all the adjustments described above were made. This table is for an alternative that manages for 40% of maximum potential population for cavity excavators. The beginning stand age is 240 years. The first two lines of numbers in the table are the volumes per acre in thousand cubic feet. Each number, beginning in the second column, is the MCF that would be harvested from one acre of land at the midpoint of the decade. Thus, if the FORPLAN solution calls for 5000 acres of North Mature Sawtimber to be harvested in Decade 1, the model would report that 40,750 MCF of timber would be harvested in Decade 1 from those acres; this would be a total for the period. An average annual output can be derived by dividing the period total by 10. (E.g., 8.15 MCF/ac x 5000 ac = 40,750 MCF/dec.; 40,750/10 = 4,075 MCF/yr.)

The third and fourth lines of numbers show the average stand diameter (quadratic mean diameter) for each of 20 decades. Lines 5 and 6 show the basal area per acre for each decade. The basal area cap on mature sawtimber mentioned above can be seen here: 295 square feet per acre.

The last two lines of numbers (zeroes in this example) are counters used in the yield tables to indicate whether in any given decade a stand is: younger than minimal utilization standards would allow, meets minimum utilization standards but is below 95% culmination of mean annual increment (CMAI); at or above 95% CMAI, but below 100% CMAI, or is at or above 100% CMAI. These markers are numbered 3, 2, 1, and 0, respectively. The zeroes in Table B-13 indicate that the mature sawtimber stands are above 100% CMAI in all decades.

Table B-13
Sample Existing (Wild) Stand Yield Table
North - Large Sawtimber

*I	NO	SF	OLZT							
*A	EXIST	23 NORTH LARGE SAW								
	EA24	8.15	8 52	8.78	8.77	8.75	8 73	8.72	8.70	8.69	8.67
	EA34	8.66	8.64	8.63	8.61	8.60	8.59	8 57	8.57	8.56	8.54
	ED24	27.10	27.50	27.80	28.10	28.40	28.70	29.00	29.30	29.60	29.90
	ED34	30.20	30.40	30 70	31 00	31.30	31.60	31.90	32 20	32.50	32.80
	EB24	287.	295.	295.	295.	295.	295.	295.	295.	295.	295.
	EB34	295.	295.	295.	295.	295.	295.	295.	295.	295.	295.
	EZ24	0.	0.	0	0	0.	0.	0.	0.	0.	0.
	EZ34	0.	0	0.	0.	0.	0.	0.	0.	0.	0

Table B-14 shows an example of a managed yield table built from DFSIM for Douglas-fir on the North end of the Forest. The table is for an intensity that plants, precommercial thins, takes a commercial thin in Decade 5, and then can final harvest anytime from the eighth decade on, given the requirement of achieving at least 95% CMAI. If final harvest is permitted at utilization standards (e g., in a departure alternative), as indicated by the "2 " in row RZ1 of the table, then final harvest could occur anytime from Decade 3 on. The lines are read the same as for the unmanaged stand yield table. The extra rows beginning with "J" in the commercial thin tables are the volumes, diameters, and basal areas of the thinning volumes only; the final harvest values are in the "R" rows below them.

Table B-14
Sample Regenerated (Managed) Stand Yield Table
Plant-Precommercial Thin-Commercial Thin-Final Harvest
North - Douglas-fir (DFSIM)

*I	NO RDSH		ZT B							
*A	REGEN	5 0	NORTH * PL - PCT - CT - FH							
	JA 1	0.	0.	0.	0	1.63	0.	0.	0.	0.	0
	JA11	0.	0.	0.	0.	0.	0.	0.	0	0.	0.
	JD 1	0.	0.	0	0.	9.8	0.	0.	0.	0	0
	JD11	0.	0.	0.	0.	0.	0.	0	0.	0.	0.
	JC 1	0	0.	0.	0.	70.	0.	0.	0.	0.	0.
	JC11	0.	0.	0	0.	0.	0.	0.	0.	0.	0.
	RA 1	0.	0.	0.52	2.49	4.48	6.18	7.84	9.41	10.92	12.33
	RA11	13 34	14.02	14.49	14.87	15.15	15 34	15.45	15.60	15.54	15.55
	RD 1	0.	0.	6 9	9.4	12.5	14.7	16.6	18.3	19 8	21.2
	RD11	22.6	24.1	25.6	27.2	28.8	30.4	32 0	33.7	35.4	37.1
	RB 1	0.	0	80.	139.	119.	165.	204.	239.	273.	305.
	RB11	331.	350.	367.	382.	396.	409.	422.	436	449.	462.
	RZ 1	3.	3.	3.	2.	2.	2.	2.	1.	1.	0.
	RZ11	0	0.	0.	0.	0	0	0	0.	0	0.

The rest of the timber yield tables used can be found in the FORPLAN data set or the Forest Planning records. More specifics on reading the other codes in the tables can be found in the FORPLAN Version 2 User's Guide and by consulting with the Forest Planning staff.

4. Road Construction Coefficients

The process used to model roads and develop road construction coefficients has been described in section B of this chapter. Road construction coefficients are used two different places in FORPLAN. The miles of arterials, collectors, and locals to be constructed for an allocation zone are shown as miles per AZ by time period, and are found in the AZ (coordinated allocation choice) yield tables; they vary by alternative. Miles of local roads to be constructed per acre of timber harvested are shown as miles of road per acre in the activity/output relationships (composite yields) section of FORPLAN

All of the arterial and collector roads to be built were modeled on a zone basis. As soon as the model schedules the zone for implementation (which would be either in Decade 1 or 2 under the modeling strategy used), the model shows the miles of arterial and collector roads constructed by decade, as laid out in the yield tables. The model "builds" these roads, whether or not it schedules any other activity in the area. This follows the intent of the Forest Management Team to finish developing the arterial and collector road system in the next two to three decades. Those roads will be used not only for timber access, but also for recreation, administration, and other resource access use.

As described earlier, the local road modeling was split so that some local roads would be built on a zone basis, and some on a per acre basis. The purpose of this was to avoid the inaccuracies of either having all of the roads built strictly in response to each acre of timber harvested, or of having them all built strictly on a zone basis. The former strategy leads to an underestimate of the actual rate of road construction in the earlier decade of the planning horizon, particularly for currently unroaded areas, because it does not reflect the additional roading required to spread out harvest units to meet dispersion constraints and silvicultural guidelines. The latter strategy can overestimate the amount of road building in the earlier decades, because, when modeled on a zone basis, the roads are built when an AZ is implemented. They will be built even if the model chooses not to schedule timber harvest from those acres until later in the planning horizon. This can result in a situation of having local roads built for two or three decades before the timber is actually scheduled for harvest from those zones. This is not realistic for the local road system, which is built primarily to service timber harvest activities and future silvicultural practices.

The modeling strategy for local road construction attempts to reflect the need for local roads to be constructed proportionately faster than harvest would take place, while still maintaining a degree of responsiveness as to when harvest actually was scheduled. The "advance" roads show as "fixed locals" in the zone yield tables, while the road construction tied to harvest acres shows up in the composite yields section (dependency functions) as a time dependent per-acre activity.

If an AZ is less than 50% roaded currently, a portion of the total local roads to be built are scheduled to be built on a zone basis. These roads reflect the additional roads required to spread out harvest units. They would be built independently, and in addition to, roads built on a per acre of timber harvest basis. If an AZ is more than 50% roaded, all the roads would be built on a per acre of timber harvest basis. It was assumed that there are sufficient roads in the area (on the average) to allow dispersing the harvest units, so roads could be built at a rate tied solely to the acres of timber being harvested.

The local roads needed to reach the estimated density of 4.44 miles per section for full management were calculated on a zone by zone basis for each allocation choice, taking into account the existing road system, planned new arterial and collector roads, acres subject to timber harvest, and roaded versus unroaded acres. After making calculations to determine how many (if any) miles of local roads would be built on a zone basis, this figure was subtracted from the total miles of locals to be built for the zone, and the net local roads figure was converted to a per acre coefficient reflecting the acres in the zone subject to timber harvest. Therefore, every zone could have a different per acre coefficient for local road construction.

Because of the design of FORPLAN, the only way to carry each of the per acre coefficients through to the timber management emphases assigned to that zone would have been to have a differently coded timber management emphasis for each zone. The 85 additional management emphases would be far too many to deal with in terms of model size; therefore, four timber management-road class emphases (Level 7 identifiers) were created to reflect the one timber management prescription that uses ground-based harvest systems. (The aerial systems timber management emphasis was retained as originally developed).

As the road data were being developed for each alternative, the resulting per acre coefficients for each zone were grouped into four categories. This was done by hand, taking into account major breaking points in the spread, as well as harvest acres involved. These grouped coefficients were then run through a program to calculate weighted averages for each group, the weight being the number of acres in each zone subject to timber harvest. A weighted average for the entire set was also calculated. The timber harvest prescription for each zone for a given allocation choice was then assigned to one of the four timber management-road class emphases; G1 being the lowest coefficient per acre, and G4 being the highest. As the allocation choice track file data were processed further into the CAC files for FORPLAN, the timber management prescription assignments, which came out of R2MAP as one code, were translated into the appropriate timber management-road class emphasis by reference to the grouping discussed above. For instance, the zones with per acre road coefficients falling between 0.0 and 0.65 miles/section (0.0 and 0.00102 miles/acre) would be assigned timber management emphasis G1; those from 0.65 to 0.89 miles/section (0.00103 to 0.00139 miles/acre) would be assigned G2; etc. This scheme allowed the model to reflect at the zone level the appropriate level of local road construction tied directly to timber harvest activity.

In summary, the process for modeling local roads reflects the need to have some roads built proportionately faster than timber harvest was scheduled, in order to achieve harvest unit dispersion and meet silvicultural guidelines. At the same time, it allows a good portion of the local road construction to occur at the time when harvest is actually scheduled to take place. In addition, the local roads to be constructed in conjunction with timber harvest reflect fairly closely the calculated requirements for a specific zone, through the use of weighted average coefficients for a group of zones.

Management emphases other than full timber management which still involve timber harvest, such as Scenic Viewshed or Enhanced Deer and Elk Winter Range, were assigned the weighted average local road construction coefficient for all zones. It was felt the increase in numbers of management emphases required to carry each harvest-related prescription as four management emphases in the model did not increase precision enough to warrant the increase in model size.

5. Recreation Capacity

The recreation capacity coefficient required a great deal of attention and modeling effort. Recreation capacity is the estimated capability of a land area to support a given recreation experience level, generally expressed in terms of Recreation Visitor Days (RVD's) per acre per year. The criteria used to assist estimating recreation capacity were from the Recreation Opportunity Spectrum handbook (1986) as modified by Regional direction and adjustments by Forest recreation specialists to meet specific land and resource conditions on the Forest.

Dispersed Recreation. Recreation capacity was modeled in two steps. First, the acres of each ROS type, both wilderness and nonwilderness, were mapped. This was done by the Planning Team's recreation specialist, using the appropriate ROS criteria and management area prescriptions, standards and guidelines in conjunction with the alternative maps. The approach used was to map the ROS classifications as they would exist after major adjustments in land management had taken place, such as roading and harvesting currently unroaded areas. This was termed the "resulting ROS".

This information was input to R2MAP and overlaid with the AZ's, giving a track file of acres of ROS by AZ for the alternative. The track file of ROS acres was run through a program which read the information, read another file with the existing (current situation) ROS acres, and wrote out zone yield files showing the movement over time from the existing situation ROS to the resulting ROS, in terms of acres by ROS classification for each period.

The change in ROS from the existing situation to the resulting ROS was predicated on an estimate of how fast the land and resource changes governing the delineation of the ROS classes would take place. These changes are affected primarily by road construction and timber harvest. It was estimated that critical changes in terms of roads constructed and areas harvested would take place for nonwilderness AZ's over the first three decades following implementation of the allocation zone, so that by Decade 4, the ultimate ROS configuration would be reached. The zone yields for nonwilderness ROS acres were assumed to move from existing to resulting ROS by 40% in Decade 1, 30% in the second, and 30% in the third. These changes were adjusted to the midpoint of the decade, so the ultimate ROS was reached by the midpoint of Decade 4.

In wildernesses, trail location was the controlling factor for most of the WROS delineations. It was estimated that the majority of the trails affecting WROS determination would be built late in Decade 1. The full change appeared by the midpoint of the second decade.

The second step in modeling ROS capacity was connecting acres of ROS for wilderness and nonwilderness areas to RVD's. This was done by the capacity coefficients (RVD's/acre/year) discussed below. These coefficients were located in the composite yields section of the model. The model read the ROS acres from the zone yield files and applied the RVD coefficients to them to get total RVD's.

a. Wilderness Capacity

The original estimates for wilderness use and capacity were made based on a process developed by Forest recreation specialists. However, by the second AMS effort, a separate definition of wilderness ROS had been made, and the ROS capacity estimates were revised accordingly. Because WROS was new, estimates of capacity by ROS class were made primarily by the best judgments of wilderness and recreation specialists on the Forest and in the Region. Both social criteria (party size, encounters per day, etc.) and resource criteria (vegetation impact, soil erosion, etc.) were used in estimating capacity. These WROS capacity estimates were used in FORPLAN:

Wilderness ROS Class	RVD's/acre/year
Transition	15.0
Trailed	4.0
General Trailless	0.25
Dedicated Trailless	0.078
Special	1.0

All of the figures are relatively untried estimates, and will be subject to revision over time with refined data and experience. However, when multiplied by acres in each area, the coefficients approximate the estimated total wilderness capacity for the Forest. The General Trailless capacity figure is very small since it reflects a large area of land, much of which is actually unusable for recreation, other than as "seen area" from travel routes. The Dedicated Trailless capacity figure is smaller yet, reflecting a high degree of solitude (relatively few users) over a large area. The same capacity coefficients were used for all eight wildernesses, even though there are undoubtedly characteristics related to each area that would change the actual figures somewhat from those shown here. However, there is neither sufficient research nor data at this point to make those refinements.

b. Nonwilderness Capacity

The original capacity coefficient estimates for nonwilderness dispersed recreation were revised somewhat for the second AMS and the alternatives. Adjustments were made for some errors and for significant shifts in methodological approach. As mentioned in section B, the recreation capacities show the estimated RVD's per acre per year of a given recreation experience level that different Forest lands can be expected to support. The criteria for developing these estimates were taken and used as guidelines from the ROS Handbook. The following coefficients were used in FORPLAN.

Nonwilderness ROS Class	RVD's/acre/year
Rural Dispersed	7.23
Roaded Natural	3.60
Roaded Modified	3.08
Semi-primitive Motorized	3.45
Semi-primitive Nonmotorized	0 58
Primitive	0 08

These coefficients vary somewhat from those used in the AMS benchmark runs because of additional refinements made after the benchmark runs were complete.

c. Winter Dispersed Recreation

Winter dispersed recreation ROS was not mapped in detail for this analysis. At present, there is too little information to do detailed modeling. Total winter dispersed recreation capacity estimates were developed for the Forest by the District and Supervisor Office recreation specialists. These estimates were not expected to change significantly from alternative to alternative. Therefore, the total capacity by decade was put in an AA yield table, and was brought into the model on a one-acre AA, as described in section C of this chapter. Total estimated annual capacity Forest-wide for winter dispersed recreation was about 250,000 RVD's annually. This included both motorized and nonmotorized dispersed winter recreation activities (snowmobiling and cross country skiing).

Developed Recreation. Developed recreation capacity was dealt with directly through the AA yield tables in the same manner as winter dispersed recreation. A one-acre AA was used to carry the developed recreation, although the developed site recreation AA's that were developed later could have been used for the same purpose.

Developed recreation capacity figures were estimated by the Forest's recreation specialists based on practical, capacity for all existing sites, including those currently closed for budgetary purposes. Three categories were designated: campground and picnic sites, developed ski areas, and other developed recreation sites (organized group camps and recreation residences). Following the conventional approach to measuring developed site recreation capacity, the estimates were made in annual Persons-At-One-Time Days (PAOT-DAYS). This measure is the practical capacity of a site in PAOT's times the average length of the annual use season in days. The estimates were also made in RVD's to facilitate comparison of capacity with use, which is modeled in RVD's.

The capacity figures for developed recreation were built directly into AA yield tables and brought into the model on a one-acre analysis area. The estimated developed site recreation capacities for existing sites were:

Campgrounds and Picnic Areas	633,300 RVD's per year
Developed Ski Areas	3,436,300 RVD's per year
Org. Camps, Rec. Residences, Other	1,051,000 RVD's per year

6. Recreation Use ("Demand")

An overview of how recreation use or "demand" figures were derived and incorporated into the model was discussed above, in part B Additional details concerning the actual equations used and intermediate steps taken to arrive at the final numbers used in FORPLAN can be found in the AMS document (May, 1985) and in the Forest planning process records.

There are three major limitations in the reliability of the projected use data. First, regional per capita income was not included along with population as an explanatory variable in the regression equations. The specification of the regression equations would have been somewhat better if income had been included. However, this variable has been used with mixed results nationwide. In the RPA documents, per capita income was found to have a significant explanatory effect on the variations in recreation use over time. However, some central Sierra National Forests in California did not find that correlation. It is possible that per capita income would be a stronger explanatory variable in densely populated areas such as the Puget Sound region, than in more sparsely populated areas, but that hypothesis has not been tested.

Second, use data were projected for recreation activity types and then had to be converted to ROS. The Recreation Information Management System was not tracking recreation data by ROS until 1981, the year after the end of the historical data period used.

Third, the 1984 Wilderness Act required changes in acres of wilderness. The data projections were based on historical data that included only Glacier Peak and Alpine Lakes Wildernesses. Adjustments based on best estimates of the recreation staff were made to increase total projected wilderness use and to reduce the nonwilderness use projections accordingly. Additional assessment and adjustments between wilderness and nonwilderness use projections were made between publication of the DEIS and the FEIS. It appeared that the original projection of wilderness use related to the new wilderness areas was about 100,00 RVD's low.

The final limitation: any projections of human use of anything over a 50-year time span are unquestionably shaky. The figures should only be considered in relative terms, more as indices with which to help compare alternatives than as real numbers in and of themselves.

It should be noted that the manner in which the recreation use projections were dore imparted an implicit bias in favor of current land use patterns on the Forest, and in favor of current tastes and preferences of the Puget Sound population. This is not necessarily bad. It helps to keep the use (demand) projections from being pulled along by the supply side. As timber is harvested and lands are roaded, the recreation supply on the Forest outside wilderness is going to convert quite rapidly from unroaded to roaded recreation. The manner in which the projections were done continues to display a recreationist interest in unroaded recreation, even if the supply is dwindling. Some earlier modeling efforts on other Forests inadvertently applied the old economic principle called "Say's Law" that was once espoused by many. Say's Law simply says that supply creates its own demand. In those other modeling efforts, it was assumed that because roaded recreation capacity increased as timber harvest and road building progressed, so would demand for roaded recreation increase. Conversely, as the unroaded recreation capacity decreased, so would demand for unroaded recreation. On this Forest, that assumption was avoided with our recreation modeling approach

The projected use figures by ROS category are shown below for the first five decades. To minimize compounding errors, projected use was leveled out from the sixth decade through the rest of the planning horizon.

Thousand RVD's Annually

Recreation Class	Decade 1	Decade 2	Decade 3	Decade 4	Decade 5
Rural Developed	3149.0	4275.9	4939.5	6240.4	7464.1
Rural Dispersed	489.1	635 3	790.2	933.1	1077.6
Roaded Natural/Modified	1935 0	2517.1	3116.6	3693.3	4273.5
Semi-primitive Motorized	44.4	57.6	71.1	84.6	97.7
Semi-primitive Nonmotorized	342 5	445.5	551 1	653.0	755.7
Primitive	12.3	16 1	20.0	23.8	27.5
Wilderness (all classes)	407.5	539.5	671.4	802.8	933.9

Two-step demand curves were built to keep the model from valuing recreation capacity in a given ROS class that was in excess of the estimated use in that decade The figures above were input as the first step of the two-step demand curve, along with weighted average values of the recreation activity types (hunting, fishing, general dispersed, etc.) making up that class, based on historical use patterns. The second step of the demand curve for each class was set at a very large (maximum) width with a value of zero attached.

The theory behind use of the demand curves was that the model would fill the demand step with RVD's of capacity from that ROS class, valuing them up to the point that they completely filled the first step of the demand curve. The rest of the RVD's of capacity would be zero valued.

The FORPLAN demand curve "quality differentials" option was used. With quality differentials, the model carries a base benefit value input with the demand curves for all RVD's up to the point that the demand step is filled. (This value was the activity type weighted average benefit value referred to above). The model then calculates a "quality differential," which is the difference between the base value in the demand curve section and the economic value by ROS/activity type. The latter value is found in the common economics section

This quality differential is carried in the objective function coefficients for all capacity RVD's, regardless of the demand curves. The hope is that the quality differentials, which are both positive and negative around the base value, depending on activity type, will generally sum to zero so that the objective function will not be particularly affected, either positively or negatively. Indications were that this formulation was consistently affecting the objective function of the runs by 1% to 1-1/2%, well within the overall error bounds of the value estimates.

The demand section of FORPLAN had little close examination until early 1986 Earlier in the process, there was poor understanding of the way the model filled the demand steps with different types of recreation, and how that affected the overall objective function and model solution. However, because the model formulation carried acres of ROS as the yields and split activity-type RVD's off these acres through dependency functions in the activity-output relationships section of the model, the chances for aberrant results were minimized This was substantiated by the small differences between the objective function value from the LP solution and that reported by the Report Writer, as noted above.

7. Sediment

Coefficients for sediment production were derived for harvest-related activities, road construction, and natural background levels. The original data developed by the Forest soil scientist were much more detailed, and included breakdowns by North and South slope class and soil stability class, by logging system, and type of road construction.

For the first AMS, the original coefficients were broken out into figures for ground and aerial systems, for new arterial/collector and new local road construction, and for background, by Slope Classes A, B, C1, C2, and C3. For the second AMS and the alternatives, and after the IDT decided not to attempt to model road construction by slope class, the coefficients were reduced to natural background and activity-related sediment for new arterial/collector and new local road construction, for ground systems for timber harvest Forest-wide on Slope Classes A and B, for ground systems North and South on Slope Class C, and for aerial systems for timber harvest Forest-wide on all slope classes. The sediment coefficients used in the model were as follows:

	Tons of Sediment		
	Background	Activity	
		Dec 1	Dec.2
*Arterial/Collector Roads	7.39	17 38	0.0
*Local Roads	7.12	18.41	0.0
#Harvest - Ground - Topog A	0.0107	0 0324	0.0
#Harvest - Ground - Topog B	0 0360	0.1102	0.0
#Harvest - Ground - Topog C - North	1.22	0.7	0.1
#Harvest - Ground - Topog C - South	1 04	0.6	0.1
#Harvest - Aerial - All Topog	0.25	0.05	0 01

*Coefficients are tons/mile/year
#Coefficients are tons/acre/year

The sediment coefficients represent the estimated sediment that would actually make its way into a watercourse. Note that most activity sediment production tapers off to background after the first decade, with the exception of the harvest systems on Slope Class C, and with aerial systems.

8. Old Growth

In 1981, the IDT decided that mature large sawtimber as mapped in the 1976 NFI would be considered old growth in Forest planning In 1989, the acreage and average ages were updated through 1988. The average age of mature large sawtimber is 250 years. There were 643,500 acres of old growth in the Forest planning base when the alternatives were run - 276,600 acres in tentatively suitable lands, 232,500 acres in wilderness, and 134,400 acres in other unsuitable (see Planning Record file 74, 10/8/86 for details). From this base, the change over time in old growth acres was determined manually for each alternative. It was assumed there would be no change in old growth acres over time, except in suitable lands. FORPLAN report F10.8 "Acres by Age Class Before Harvest at the Midpoint of Each Decade" was used to determine the change in old growth acres in suitable lands (ages 240 and 260 in Decade 1) for each decade over the planning horizon.

9. Softwood and Hardwood Sawtimber

The timber yield tables only give the net green volumes of "sawtimber" They do not differentiate between softwoods and hardwoods. This becomes a problem only with the mixed conifer stands. In these stands, the NFI plot data indicate that, by volume, about 67% of the average mixed conifer stand is softwood; 33% is hardwood. The activity-output relationships section of the model splits the sawtimber yields from the yield tables out into the softwood and hardwood components so that they can be valued properly.

When a mixed conifer stand is regenerated after final harvest, if normal regeneration occurrs, it is assumed the stand will retain its mixed conifer character in the same proportions as the existing stand However, if the model selects a timber management intensity to convert the mixed conifer stand to a regenerated pure conifer stand (intensities XF, SP, XC, XB or XE), the regenerated stand would yield 100% softwood (conifer) sawtimber. (Refer back to section E for the discussion of the range of timber options considered.)

Conversely, if the model selects (or is constrained to select) management intensity YF to convert the mixed conifer stand to pure hardwood, the regenerated stand will get its volumes from the pure hardwood yield table, and the sawtimber outputs will be ascribed 100% to hardwood sawtimber. No constraints for conversion to hardwoods were applied in alternative runs and intensity YF was not selected by FORPLAN, because other intensities contributed more to the run objective function of Max PNV or Max Timber.

10. Other Wood Product Outputs

Three other wood product outputs were tracked through FORPLAN. These were firewood, nonchargeable live ("per acre") material 15/, and salvable dead material.

Firewood. Firewood was assumed to be available primarily as a result of timber harvest activities, specifically, from nonchargeable live material (nonmerchantable cull material with breakage, high defect, etc.) It was assumed that the firewood use of precommercial thinnings would be insignificant because of small size, often difficult access, and rapid decay. It was assumed that approximately 70% of the per acre material would be actually utilizable as firewood. At approximately 95 cubic feet of solid wood per cord, this would yield approximately 7.4 cords/MCF of nonchargeable live material.

Nonchargeable Live ("Per Acre") Material. This is the material nonmerchantable because of size or defect left after timber harvest. This currently accounts for about 20% of the volume on an average timber sale acre. However, with the major increase in emphasis on improved utilization of both merchantable volumes and residues, this figure is expected to drop to 8% of net green volume on a sale area by 1995, and down to 2% by the year 2035. Thus, the per acre material output was calculated as a percentage of sawtimber harvest by decade: Decade 1 = 8%; Decade 2 = 7%; Decade 3 = 6%; Decade 4 = 4%; and Decades 5 to 15 = 2%. It can be seen that the firewood output would drop accordingly over time, as it is calculated from the amount of per acre material available.

Salvable Dead. This is merchantable material that is dead but can still be harvested and sold by the timber purchaser. Past timber sale experience and timber inventory plot data indicate that there is an average of 301 cubic feet per acre of salvable dead material in stands of pole and larger timber.

11. Other Timber-Related Activities

A number of activities modeled in the activity-output relationships section are carried out in support of, or in conjunction with, timber harvest. Local road construction has already been discussed. Most of these activities occur on a 1:1 basis with timber harvest, either in terms of acres or MCF. Others occur at a greater or lesser ratio. All the data for these coefficients were derived from actual sale activity experience, samples of sale activity experience supplemented by professional judgment, or by best professional judgment.

15/ Although labeled live material a very small percentage may be from dead material present in the harvested unit.

Listed below are the coefficients which were modeled on a 1:1 basis with either final timber harvest acres or MCF:

Activity	Per
Visual and Cultural Resources Inv/Plng	Acre
Fish and Wildlife Planning	Acre
Soil and Water Planning/Monitoring	Acre
Sale Preparation	Acre
Sale Administration	Acre
Fuels Inventory	Acre
Fuels Treatment	Acre
Logging Costs (Set-up/down, road changes)	Acre
Logging Costs (Fell, buck, yard, load, haul)	MCF
Timber Purchaser Road Maintenance Cost	MCF

Other timber harvest-related coefficients were greater, lessor, or varied from time period to time period:

Activity	Coefficient	Per
Stand Exam		
At precommercial thin	1.25	Acre of PCT
At commercial thin	1.0	Acre of CT
At final harvest	4.6	Acre of Final Harv.
At reforestation	4.25	Acre of Planting
At reforestation	1.25	Acre of Nat. Regen
Planting		
For planting regimes	0.87	Acre of Final Harv.
For natural regeneration regimes	0.2175	Acre of Final Harv.

Activity	Coefficient	Per
Precommercial Thinning		
All stands except exist Seeds/Saps (Age 2, existing or regen stand)	0.80	Acre of Stand
Existing Seeds/Saps (Age 2)	0.20	Acre of Exist Stand
Road Reconstruction (miles)	0.0018207	MCF of Final Harv.
Boundary Location (miles)		
Decade 1 - 2	0.01	Acre of Final Harv.
Decade 3	0.05	of Existing Stand
Decade 4 - 15	0.0	Only

12. Anadromous Fish

Anadromous fish outputs, benefits, and costs were developed offline by the Forest fish biologist and economist. Estimates of fish output by investment level (see Part D) were made based on fry and smolt survival levels, average fish size in pounds, and catch-to-escapement ratios. These production estimates were incorporated into a spreadsheet program along with the estimated proportioning of the fishery catch among Indian and non-Indian fisheries (assumed to be 50-50 in line with the Boldt decisions); and within the non-Indian fishery, among the commercial, ocean sport, and river sport sectors. Also included in the spreadsheet program were the values associated with the commercial and recreational uses of the fish and the estimated angler days associated with the proportion of fish going to the recreational sport fishery.

For the DEIS, a total of 21 spreadsheet scenarios were run for combinations of the three investment levels and the associated estimated production for each of the five species of salmon (chinook, coho, pink, chum, and sockeye), for steelhead trout, and for other sea-run trout. Total costs, benefits, commercial pounds caught, and RVD's of angling (ocean and river) were summarized from the spreadsheet runs. Total costs and benefits were input directly for the investment level specified for a particular alternative. The related commercial pounds and angler days were also included for information. All the values were carried through with one of the one-acre "dummy" analysis areas

For the FEIS, the same process was followed, with the exception that sockeye salmon and sea-run trout were dropped from the analysis. The Forest did a major review and revision of the fish production and harvest estimates in response to public comment on the DEIS. In consultation with the State, it was determined that the sockeye salmon run originating on the Forest is too small to provide significant commercial or sport fishing opportunities; thus, there is little information on current production and harvest, and no estimates of potential production and harvest are made. Sea-run cutthroat trout provide a significant sport fishing opportunity, but there are simply no data for harvest or production on which to base future potential.

13. Summary

This part of Chapter III has recounted in detail the development and use of most of the physical/biological coefficients used in the FORPLAN model. The economic costs and benefits will be discussed in detail in Chapter IV. The reader is encouraged to read the Forest planning process records for additional details and discuss any questions with the Planning staff.

G. Timber Sale Program Quantity for Alternatives

The Forest Plan allowable sale quantity plus an estimate of annual sale volume to be added is displayed in Table B-14a. The total for RPA attainment is termed Timber Sale Program Quantity. The TSPQ is greater for all alternatives, except A, than the figures found in the FEIS tables (such as II-7a), because of the addition of volume from unsuitable lands in Management Area 19.

Table B-14a

Forest Plan Allowable Sale Quantity and Estimate of Annual Volume to be added to the Allowable Sale Quantity

Outputs	Alternatives							
	NC (No Change)	A (No Action)	I	B (RPA)	H	J (Pref)	G (Mod)	C
				Million Cubic Feet.				
I. Forest Plan Chargeable Volume Allowable Sale Quantity 1/	41.7 2/	31 0	26.6	26.3	24 1	22.4	18.3	13.8
II. Nonchargeagle Volume 3/								
A. Salvage								
1 Volume meeting utilization standards		1.2	1.0	1 0	0.9	0.9	0.7	0.6
2. Volume not meeting utilization standards	2 9	2.4	2.1	2.1	1.9	1 8	1.4	1.1
B. Volume from lands where timber is not programmed	0.4	0.4	0.4	0.4	0.4	0.4	0 4	0 3
C. Volume of other convertible products, eg., firewood, posts and poles 4/	0.0	0.0	0 0	0.0	0.0	0.0	0.0	0.0
Total for RPA Attainment (Timber Sale Program Quantity)	45 0	35.0	30.1	29.8	27.3	25 5	20.8	15.8

1/ Based on timber meeting Regional utilizatin standards, growing at the time of inventory and included in growth and yield projections used in Forplan.

2/ Potential yield differs from ASQ: it includes both net live (green) and dead (salvage) volume.

3/ Nonchargeable Volume All volume that is not included in the growth and yield projections for the selected management prescriptions used to arrive at the allowable sale quantity.

4/ Less than 0.1 MMCF Most potential firewood volume is in II.A 2. above.

CHAPTER IV - ECONOMIC EFFICIENCY ANALYSIS

CHANGES BETWEEN DRAFT AND FINAL - APPENDIX B, CHAPTER IV

There are no significant changes in Chapter IV between the DEIS and FEIS.

* * * * * * * * * * * *

Since Alternative NC (No Change) was not modeled in FORPLAN, economic measures comparable with benchmarks and other alternatives were not determined.

A. Present Net Value

Present net value (PNV) is the economic criterion maximized by the linear program algorithm of FORPLAN in most of the benchmark and alternative runs PNV is the difference between the sum of the total discounted benefits of a course of action over some time period, and the total discounted costs of carrying out that course of action over the same time period. Benefits and costs used to calculate PNV are those which have a market price or which can be assigned a market price equivalent.

PNV measures the net gain or loss to society of adopting a particular course of action. PNV will be positive if the total discounted benefits are greater than the total discounted costs. It will be negative if the converse is true. A positive PNV indicates that, from an economic efficiency standpoint, the course of action analyzed will result in a net gain to society and can legitimately be implemented. A negative PNV indicates that, from an economic efficiency standpoint, society would be worse off if the alternative were adopted. All other things being equal (i.e. all relevant costs and benefits are actually quantified in the analysis, there are no other competing societal goals, there are no policies requiring the alternative to be chosen, etc.), an alternative with a negative PNV should not be implemented.

The present net values of a series of alternatives can be compared to determine which one will result in the highest gain to society. Again, with all other things being equal, the alternative with the highest PNV should be the alternative chosen from an economic efficiency standpoint. (As will be discussed below, in Forest planning all other things are generally <u>not</u> equal, and other nonquantifiable factors and societal goals have to be taken into account before making a final decision).

In planning for this Forest, the PNV of an alternative reflects the total discounted value of priced outputs resulting from management of the Forest for a 150-year period, minus the total discounted Forest Service management and investment costs over the same period. Priced outputs are those that are, or potentially could be, exchanged in the market place. Management and investment costs are those dollar costs incurred by the Forest Service, directly or indirectly, in the management of the Forest. The PNV for an alternative did not include non-priced outputs, nor did it include non-Forest Service costs, values added to forest resources after their removal from the Forest, or income and employment effects of the alternative The definitions and derivations of priced and non-priced outputs and management and investment costs are discussed later in this section. Employment and income effects are discussed in Chapter V.

For modeling purposes, the value added and non-Forest Service costs were carried in FORPLAN for timber. Mill pond value was used for timber, and stump-to-mill logging costs were included. However, since mill pond value represents stumpage value plus stump-to-mill costs, this was equivalent to having the stump-to-mill costs added into both the benefit and the cost sides of the equation. Mathematically, the PNV would have come out the same if those extra costs and benefits had not been included They drop out when the costs are subtracted from the benefits.

1. Discounting

Discounting is the process used in financial and economic analyses to account for the effect of time on the real value of money. People generally prefer, if given a choice, to have money available to spend now rather than later, preferring immediate consumption to deferred consumption. However, if they receive a premium to defer consumption that is at least sufficient to offset the desire for use of their money right now, they may choose to put the money aside and wait. The premium they receive is known as "interest".

Interest is paid for some given time period. If a person puts $1000 into a savings account or some other instrument in return for a 6% interest rate paid annually, at the end of the first year the person would receive $60 interest. If that interest is left in the account along with the original principle of $1000, at the end of the second year, another 6% interest is due. But the second year the 6% will be due on $1060, a total interest of $63.60. Each year the $1000 principle plus interest is left in the account, the interest payment due at year's end will be larger. This process is called "compounding."

The important point is that at the end of two years, the original $1000 will be worth $1123.60. So $1000 today will be worth $1123.60 after two years at 6% interest. Conversely, $1060 a year from now is worth $1000 today, and $1123.60 two years from now is also worth $1000 today, if the interest rate is still 6%.

Because of the general propensity people have to consume today rather than wait, the passage of time has an effect on the value of money as seen from today. Thus, when costs and benefits are projected into future years while analyzing planning alternatives, it must be taken into account that those nominal values occurring in the future have a smaller real value in today's terms, just as the $1123.60 anticipated two years from now is actually worth today only the $1000 needed to put in the savings account. In fact, the $1000 today will have a different value every year in the future because of the compounding effect of the interest rate.

Discounting is the reverse of the compounding process. It allows taking values occurring at different times in the future and converting them to a common base, adjusting for the effects of time, so that the values can be compared on an equal basis. A "discount rate" is used to do this, which is the same rate as the interest rate used for compounding. For instance, today's value, or the "present value", of $1123.60 occurring two years from now is $1000, when discounted at 6%. The present value of $1060 occurring one year from now is also $1000 when discounted at 6%. By discounting both values by the same discount rate back to today from the years they occur, one can see that they are equivalent.

Just as $1000 today gets larger as it is compounded into the future, so does the present value of $1000 get smaller as that $1000 occurs farther into the future. The present value of $1000 occurring one year from now is $943.40; occurring five years from now, the present value of $1000 is $747.26; at 10 years, the present value is $558.39.

This relationship has major significance in economic efficiency analysis. It means that values occurring in the near term carry more weight than values occurring farther out in time, when all values are discounted back to the present and summed. Thus, any program that requires an investment in the near term in order to produce benefits farther out in the future will have its costs weighted more heavily than the benefits because of the effects of discounting.

When FORPLAN maximizes PNV (total discounted benefits minus total discounted costs), it will strive to put costs off as long as possible and to pull in benefits as soon as possible in the planning horizon. Thus, if given the latitude, it will put off road building for timber harvest as long as possible and pull roaded areas into solution for timber harvest first. (This is a simplified approach, as the discount rate, the existing and regenerated stand growth rates, the timber values, real price appreciation factors, non-declining yield constraints, and other factors all combine to complicate the actual solution. But the principle is the same)

2. Net Public Benefit

If all factors considered to be of value to society could be incorporated into an economic analysis as costs or benefits, the alternative with the highest PNV would be the best overall for society. But that kind of totally encompassing holistic analysis is not possible. There are values to society, such as preservation of endangered species or protection of American Indian religious and cultural areas, which the Forest does not have the capability to measure in quantitative terms so that they can be compared directly with other values

There are also societal goals other than economic efficiency that are difficult to measure in terms of costs or benefits. These relate primarily to economic equity (distribution of jobs, income and wealth) and to stability of the economic system: monetary and fiscal policy goals, such as budget reductions.

Although these other goals cannot be incorporated in the economic efficiency analysis done for the alternatives, they must still be incorporated into the decision process that selects the Preferred Alternative. To include these other societal goals in the decision-making process, the Forest Service uses the concept of the "net public benefit" (NPB). Net public benefit is defined in the NFMA regulations as "...the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index..." (36 CFR 219.3).

NPB is used to measure the overall value to society of the planning alternatives, including both priced and non-priced outputs and costs. The assessment of net public benefits is in the end a qualitative process, using the results of the economic analysis (PNV), analysis of the distributive effects of an alternative, evaluation criteria, and informed judgment. The alternative chosen as the preferred alternative for the Land and Resource

Management Plan is that alternative judged by the Regional Forester to have the highest net public benefit of all alternatives considered.

3. Benefits and Costs

Priced Outputs (Benefits). Priced outputs are those that can be exchanged in the market place. For this analysis, they included: timber, firewood, wilderness use, hunting, recreational fishing, other dispersed recreation, developed site recreation, and commercially harvested anadromous fish. In the planning effort on this Forest, the value of water from the Forest and the in-ground value of minerals were not included as priced benefits Water is considered to have a marginal value at or near zero in this region. Specific mineral deposits, their size and grade, are poorly known for the Forest; only broadly defined areas of mineral potential are known. The small probability of actual mineral extraction, plus poor data, resulted in omitting any mineral values as priced benefits. Consideration of potential mineral values was made in the context of the broader NPB criterion.

Values of priced outputs were determined from actual market transaction information or from estimation procedures that produced prices considered to be comparable with market transaction prices Timber and commercial fish prices were based on regional and local market transaction data. Recreation values were those specified in the 1985 Draft RPA Program for recreation areas managed at standard, as required by the Regional planning direction, November, 1983. RPA recreation values were based on a variety of studies, including market transaction data where available and applicable, and indirect value estimation studies, predominantly travel cost and contingent valuation

Values for recreation on national forests are not very comparable with existing market transaction data, because the type of recreation supplied by the national forests is generally much different in character and quality than that provided by the private sector. This is particularly true of dispersed and wilderness recreation. Developed recreation data may be somewhat more comparable, though private developed sites often vary significantly in character (location, visual quality, geographic and vegetation attributes) and in amenities provided (site spacing, accessibility, toilet/shower facilities, on-site services) from those on the national forests. This is particularly true on the Mt. Baker-Snoqualmie.

In spite of the difficulties of doing benefit valuation without market transaction data for some priced outputs, the values of priced outputs for both market- and nonmarket-based goods and services are as comparable as possible in terms of what is being measured and at what point in the production process the value measurement is being made.

Non-priced Outputs. Non-priced outputs are those for which there is no market in which they could be exchanged for money or something else of value. Further, because of the nature of the outputs, there are no potentially comparable markets and there is little likelihood of a market ever developing. Many of these outputs are provided for or required by law or policy, a not unusual outcome in situations where scarce values and valuable resources are not amenable to being handled by a market system in a way deemed appropriate and desirable by society.

Non-priced outputs include two mentioned earlier (endangered species and American Indian religious and cultural areas), plus viable populations of wildlife, vegetation diversity, quality water and air, wild and scenic rivers, and others. Non-priced outputs were usually provided for in the modeling process by setting constraints requiring production or maintenance of certain levels of output or certain areas of land. For instance, bald eagle nesting areas are off-limits to timber harvest and are assigned a specific management prescription, but no value is actually placed on the land around the nests, on the nests themselves, or on the eagles. Congress has simply said through the Endangered Species Act that the species is to be protected at all costs, and everything possible is to be done to bring it back to a viable population.

It is possible to estimate an "opportunity cost" of providing for a non-priced output, even if it is not valued directly. An opportunity cost is the value given up (or gained) by pursuing one course of action over another. For instance, if the bald eagle nest area could be used for timber management instead, the opportunity cost of making it a bald eagle nest area would be the present net value of the timber management program foregone on that area. But conducting such opportunity cost, or tradeoff, analyses requires care and skill. It is often the case on the Forest that provision for one non-priced output will also contribute toward another In economic jargon, they are "joint products." Therefore, calculating an opportunity cost and ascribing it solely to one or the other benefitting output would be a misstatement, as both are benefiting and should share the cost (generally to some unknown degree). For instance, if the eagle nest area is also part of a Research Natural Area that has been designated and would be protected anyway, it would be inappropriate to attribute all the opportunity cost of protecting the site to the eagle or to the RNA Because of these problems it is generally not desirable or appropriate to calculate the opportunity cost of a non-priced output and try to label that the "value" of that output.

Priced Activities (Costs). Priced activities are the direct management and investment costs incurred by the Forest Service in the process of protecting and maintaining the resource base and providing for the production of various outputs of goods and services from the Forest. Included in the planning process were costs of timber harvest activities, silvicultural practices, other resources management activities carried out in conjunction with the timber sale program (cultural, visual, wildlife and watershed planning, and inventory in the sale area), road construction, recreation management, recreation site construction, anadromous fish habitat improvement, and fixed management costs The dollar costs were derived from historical accounting data, budget data, contract records, work orders, and judgment by resource specialists.

Non-Priced Activities. Non-priced activities are really externalities of Forest management and use that are not amenable to valuation. They could probably be better considered as non-priced negative benefits, as they generally stem from negative effects or undesired outputs coming from various production processes. The two best examples are sediment loading of streams, and particulate input to the air. The former occurs naturally to some degree, but increases dramatically for a number of years as a result of road building and/or timber harvest It has not been possible to quantify what effects this has on fish populations (particularly anadromous fish) on the Forest and nearby areas. The subject is one of considerable controversy among fisheries scientists and among a number of other interested parties. To the extent sediment output has a negative but unquantifiable effect on fisheries, it can be considered a non-priced activity (or a negative non-priced output).

Smoke production from prescribed burning may in the future contribute to air pollution problems along the western side of the Cascades as urban growth moves east closer to the mountains. It is similar to sediment: the negative effects in terms of economic and health damage are as yet non-quantifiable. Until they are, particulate production from smoke can be considered a potential non-priced activity (or a negative non-priced output).

4. Distributive Effects and Impacts.

The distributive effects associated with the mix and level of outputs is also a national concern. These effects can be either positive or negative, and can be of local, regional, or national in scope. Some distributive effects, such as changes in consumer prices or taxpayer costs, have impacts at the national level. Others, such as changes in employment opportunity or payments to local governments, are more local or regional in nature. These concerns are more related to questions of equity rather than questions of efficiency, and are not assessed in the context of the efficiency criteria associated with PNV and net public benefits. However, these positive and negative distributive effects need to be assessed in conjunction with net public benefit measures, since equity objectives often influence efficiency objectives as well as vice versa. These effects will be discussed in more detail in Chapter V "Social and Economic Impact Analysis".

B. Parameters Used for Economic Efficiency Analysis

1. Discount Rate

The discount rate used for the economic analysis of the benchmarks and alternatives on the Mt. Baker-Snoqualmie is 4%, as prescribed by Forest Service Manual 1971.71. The 4% rate is a calculated real rate, net of inflation. It reflects the real marginal rate of return on investment in the private sector, which is appropriate to use as the cut-off rate for long-term government investment (any alternative yielding less than 4% net return would have a PNV less than zero). (See Clark, Kaiser and Sessions, 1981, paper for a full discussion of the adoption of the 4% interest rate).

An analysis of the sensitivity of the Preferred Alternative to the discount rate was performed by solving FORPLAN using both the 4% and the 7 1/8 % discount rates. For all other benchmarks and alternatives, the PNV, costs, and benefits were merely recalculated using the 7 1/8 % rate (FSM 1971.21). All costs and benefits were discounted from the midpoint of the decade in which they incurred.

Inflation is not incorporated in Forest Service land management planning economic analyses. Instead, costs and benefits are assumed to be net of inflation, as is the discount rate used. It can be shown mathematically that using inflated costs and benefits and a nominal discount rate that includes the same inflation assumptions will yield the same net results as using no inflation. The inflation in the values and that in the discount rate cancel.

2. Base Year Dollars

In order to compare costs and benefits on an equivalent basis, all values had to be taken to the same base year. For this Forest, the base year in which all dollars are expressed in the economic efficiency analyses is 1982. Historical data from different years used to derive costs and benefits were adjusted to 1982$, as were all analytical results. The Gross National Product Implicit Price Deflator series was used to make adjustments of values to the base year.

3. Real Price Appreciation (Trend) Factors

After considerable discussion and debate, the Regional Office directed that Region 6 Forests use a 1% real price trend on timber stumpage for the first 50 years of the planning horizon. A real price trend means that the value of the timber stumpage rises during the first five decades relative to all other costs and benefits in the model. Using a 1% annual trend results in timber price increases of 65.4% over the beginning prices by the end of five decades. The 1% trend reflects a belief that timber prices will continue to rise in real terms and relative to other prices in the economy, as they did for almost 100 years prior to 1980. The historical real price increase was actually closer to 2-3% annually, and some parties wanted to use at least a 2% real price trend. Others, though, argued that a fundamental restructuring of the wood products industry was taking place, and that imports, increased utilization, and changing technology would tend to hold down future real price increases. The 1% trend factor was essentially a compromise between these two positions.

Sensitivity runs were made during the benchmark analysis with real price trends on timber of 0%, 2%, and 3%, and were compared with the base 1% trend. For the Mt. Baker-Snoqualmie, there was only a change of a few percentage points in long-term sustained yield, first decade allowable sale quantity, and PNV when going to either 0% or 2% trends. The results of the analysis are displayed and documented in the Forest's AMS and in Chapter VI of this Appendix.

Real price appreciation factors are not applied to any other benefits in the planning process. No real price trends are applied to management or investment costs.

4. Demand Curves

As was discussed under recreation in Chapter III, demand curves for recreation were used only to force the model to stop valuing recreation capacity at the point where estimated demand was met. For planning purposes, it was assumed that the Forest faces a horizontal demand curve for its stumpage. This means that no matter how much timber the Forest puts up for sale (at least within the long run sustained yield capacity) it would not, on the average, significantly affect the price of stumpage in the market area into which it sells.

An estimation of the demand function was made during the development of the AMS. The point elasticity at the current price and production levels at that time was -13.52. This indicates that a 13.5% change in quantity offered on the market would be required to bring about a 1% change in stumpage price.

In light of this, no downward sloping demand curve for timber was assumed or used in FORPLAN. All quantities of timber harvested of a given type and diameter were valued at the same rate with no changes in price.

C. Costs

1. Costs in FORPLAN

FORPLAN Cost Listing. Following is a listing of all costs used in FORPLAN. Each cost, or category of costs, is discussed briefly, and the sources used to develop the cost(s) are highlighted. This section, and the one on benefits that follows, describe the economic ties between the prescriptions with their physical/biological yield coefficients described in Chapter III and the economic objective function which was used for most of the benchmark and alternative analyses.

Table B-15
FORPLAN Costs (1982$)

1. Timber Management-related Costs	
a. Timber Sale Support	
Visual and cultural res. planning/inv. (VIS1)	16.41 per acre
Fish and wildlife res. planning/inv. (C01)	37.84 per acre
Water and soil res. planning (F01)	38.70 per acre
Water and soil res. monitoring (F03)	8.73 per acre
Property boundary location (J06)	3,500.00 per mile
b Fuels Management	
Fuels inventory (P10)	
Commercial thin	6.25 per acre
Final harvest	11.80 per acre
Fuels treatment (USFS cost) (P11A)	
Commercial thin	75.00 per acre
Final harvest - existing	
Accessible w/roads	237.00 per acre
Inaccessible and/or aerial sys.	285.00 per acre
Final harvest - regen. stand	
Accessible w/ roads	158.00 per acre
Inaccessible and/or aerial sys.	190.00 per acre
Fuels treatment (Purchaser's cost) (P11B)	
Commercial thin	112.00 per acre
Final harvest - existing	
Accessible w/roads	411.00 per acre
Inaccessible and/or aerial sys.	493.00 per acre
Final harvest - regen. stand	
Accessible w/roads	161.00 per acre
Inaccessible and/or aerial sys.	193.00 per acre
c. Timber Harvest Activities	
Sale preparation (E06)	
Commercial thin	108.00 per acre
Final harvest	230.00 per acre
Sale administration (E07)	
Commercial thin	83.00 per acre
Final harvest	165.00 per acre
Stand exam (E03A)	7.10 per acre
Road reconstruction (L29R)	15,000.00 per mile
Road reconst. - engineering costs (L1QR)	10,000.00 per mile
Road maintenance (Purchaser's cost) (L19P)	54.00 per MCF 1/
Logging costs (per acre) (LOG1)	
Commercial thin	125.00 per acre
Final harvest	
Accessible w/roads	156.00 per acre
Inaccessible and/or aerial sys.	98.00 per acre

1/ This represents the average of a range $49.00/MCF for sales with large average stand diameters to $60.0/MCF for those with small average stand diameters.

Table B-15 Page 2 of 3

Logging costs (per MCF) (LOG2)		2/
Commercial thin and final harvest		
Accessible, Slope Class A		
7 - 9" dia., <2 MCF/ac	1,343.86	per MCF
11 - 13" dia., 4 - 6 MCF/ac	837.71	per MCF
17 - 19" dia., 6 - 7 MCF/ac	612.20	per MCF
21 - 23" dia., 7 - 9 MCF/ac	489.00	per MCF
25" + dia., 12 + MCF/ac	461.97	per MCF
Accessible, Slope Class B		
7 - 9" dia., <2 MCF/ac	1,524.28	per MCF
11 - 13" dia., 4 - 6 MCF/ac	942.15	per MCF
17 - 19" dia., 6 - 7 MCF/ac	682.79	per MCF
21 - 23" dia., 8 -10 MCF/ac	539.18	per MCF
25" + dia , 12 + MCF/ac	509 99	per MCF
Accessible, Slope Class C		
7 - 9" dia., <2 MCF/ac	1,717.71	per MCF
11 - 13" dia , 4 - 6 MCF/ac	1,054 12	per MCF
17 - 19" dia., 7 - 8 MCF/ac	755.28	per MCF
21 - 23" dia., 8 - 9 MCF/ac	595.72	per MCF
25" + dia., 12 + MCF/ac	561.49	per MCF
Inaccessible lands and/or aerial sys.		
(All diameters and volumes)	1,395.07	per MCF
d. Silvicultural Activities		
Planting (E04)		
Accessible w/roads	292 00	per acre
Inaccessible and/or aerial sys.	317 00	per acre
Stand exam after planting (E03B)	7.10	per acre
Precommercial thinning (E05A/E05B)		
Accessible w/roads	259.71	per acre
Inaccessible and/or aerial sys.	299.48	per acre
Stand exam after PCT (E03C)	7.10	per acre
e. Genetic tree improvement program (E09)		
1st decade	299,990.00	per year
Remaining decades	229,000 00	per year
2. New Road Construction Costs		
a. Arterials and Collectors		
Preconst. and const. engineering (ACN1)	30,000.00	per mile
New construction (A&CN)	250,000.00	per mile
b. Locals		
Preconst. and const. engineering (L10/L11)	20,000 00	per mile
New construction (LOCC/LOCN)	125,000 00	per mile

2/ This is a sampling of the full range of logging costs used in the FORPLAN data set. The first and last values in each set are the minimum and maximum costs used, respectively Commercial thin and final harvest costs are implicitly differentiated by the average stand diameters and volumes per acre harvested. Diameters and volumes will be smaller for commercially thinned material, resulting in higher logging costs, as shown by the table

Table B-15

3	Road Maintenance	
	a. Arterials and Collectors (L19A/L19B)	300.00 per mile/year
	b. Locals (L19L/L19M/L19N)	300.00 per mile/year
	c. Cost Share (USFS portion)	200.00 per mile/year 3/
4.	Recreation	
	a. Developed Site O&M	
	Campground and picnic areas (A07J)	0.58 per PAOT-day/yr
	Ski areas (A07K)	0.03 per PAOT-day/yr
	Other (rec. residences, org. sites, etc.)	0.11 per PAOT-day/yr
	b. Developed Site Construction (A07M)	
	Campground	11,020.00 per unit
	Picnic site	6,914.00 per unit
	c. Dispersed Nonwilderness O&M	
	Rural (A08A)	13.83 per acre/year
	Roaded Modified (A08F)	0 31 per acre/year
	Roaded Natural (A08B)	0.31 per acre/year
	Semi-primitive Motorized (A08C)	0.60 per acre/year
	Semi-primitive Nonmotorized (A08D)	0 13 per acre/year
	Primitive (A08E)	0.06 per acre/year
	d Wilderness O&M	
	Transition (B03A)	0 65 per acre/year
	Trailed (B03B)	0.35 per acre/year
	General Trailless (B03C)	0.14 per acre/year
	Dedicated Trailless (B03E)	0.14 per acre/year
	Special (B03D)	0.50 per acre/year
5.	Anadromous Fish Habitat 4/	
	a. Level I (FSH1)	
	1st decade	37,600.00 per year
	Remaining decades	40,000.00 per year
	b. Level II (FSH2)	
	1st decade	143,000.00 per year
	Remaining decades	80,000 00 per year
	c. Level III (FSH3)	
	1st decade	324,000.00 per year
	Remaining decades	200,000.00 per year
6.	Fixed Costs	6,200,000.00 per year

3/ The non-USFS portion of cost share road maintenance was not carried anywhere in the model. Unlike the timber purchaser's road maintenance costs (L19P), the non-USFS portion of cost share road maintenance is not related to any Forest Service activities.

4/ These are the total annual costs for each fishery investment level. In the FORPLAN data set, the figures for Levels II and III are the increments above Level I. In FORPLAN, Level I is added to the increment for Level II or Level III to get total costs for the level

Per acre costs shown in the table for timber-related activities are the actual costs developed. In the FORPLAN data set, one will also find the per acre costs shown reduced by 1% and 4% on Roaded and Unroaded lands, respectively, for the regenerated stand harvest. This is to proxy the additional reductions made for lands going into roads, as discussed in Chapter III.F.3.c Reductions in the per MCF costs were not needed, since the appropriate reduction had already been made in the volume yields.

FORPLAN Cost Development

a Timber Sale Support Costs

Resource protection, maintenance, and enhancement costs related to timber sale activity were developed by the various resource specialists (watershed, visual, cultural, fish and wildlife, and lands). These costs reflect the input required by the nontimber resource areas in the process of developing and implementing timber sales. Costs were generally developed on a per acre basis from project records, contract records, and budget estimates. Property boundary location costs were developed on a per mile basis. The model converted the acres of final harvest into miles of boundary line to be located at a rate of 0.01 miles per acre of final harvest in the first and second decades of the planning horizon; 0.005 miles/acre in the third decade; and 0.0 thereafter. The lands staff estimated that by the fourth decade, the boundary line location program will have been completed.

b. Fuels Management

Fuels management (residue management) costs, including inventory and treatment costs, were estimated by the fire and fuels specialists from project records and contract records. Fuels treatment costs are divided between the Forest Service and the timber purchaser. Based on data available, costs vary by commercial thin and final harvest, and by whether the lands are accessible by roads or are inaccessible and harvested by aerial system. The acre costs shown in the table are lower than the averages actually incurred by each party. Actually, the acres of a sale area treated by each party may be separate, with corresponding costs per acre higher than those shown in the table above, but applied to fewer acres than they were in the model. For modeling convenience, each party's cost was converted to an average cost across the entire sale area, and then applied to all acres harvested. The result was a lower average cost per acre, but the costs were applied to all acres harvested. With either approach, the total cost attributable to each party is the same.

c. Timber Harvest

Sale preparation and administration costs, stand exam costs, and road reconstruction and purchaser's road maintenance costs were all developed from project and contract records, supplemented by timber sale appraisal records (2400-17 and the timber sale appraisal handbook). Sale prep and administration costs vary by commercial thin or final harvest. The road maintenance costs included here are only those required of the purchaser as part of the timber sale contract. Road reconstruction is that done as part of a timber sale; other construction and maintenance costs are discussed below.

Logging costs (more correctly, stump-to-mill costs) are those incurred by the timber purchaser to get the timber cut, yarded, loaded, and trucked to the mill, along with associated environmental protection costs for which the purchaser is responsible. (The purchaser's road maintenance costs are tracked separately, as are the purchaser's fuel treatment costs). Even though logging costs are not Forest Service costs, they were used in the model because the values used were mill pond values i.e., the value of the log on the mill deck waiting to be processed. Carrying the logging costs allowed reduction of the number of benefit values required for timber.

Logging costs vary according to a number of factors: the size of the material handled, the volume per acre harvested and processed, the topography of the harvest area, distance from roads, logging system type, distance from the mill, special resource conditions such as unstable soils, etc. Because the regional wood products wholesale market generally sets prices of the material at the mill, values of logs of similar species, size and grade are similar at the mill, regardless of where they came from. Thus, the more it costs to get a log to the mill, the less the timber purchaser will be willing to pay for that tree while it is still standing in the forest. So as logging conditions get more difficult, the logging costs rise, and the stumpage values decline accordingly (assuming demand for stumpage and other factors remain constant).

These relationships allowed using a mill pond value for timber in the model, and application of logging costs that varied as shown in the table against the mill pond value, in order to arrive at a net stumpage figure. Although the net stumpage figure never showed up directly in the model, it was calculated internally, as the model calculated PNV by subtracting costs from benefits. Depending on what land type, average stand diameter, and volume per acre the model chose to harvest, the appropriate logging cost was subtracted from the mill pond value to get a stumpage value that reflected both timber size and quality and the ease or difficulty of getting the log to the mill.

Logging costs were originally developed using individual sale (2400-17) records, timber sale appraisal handbook guideline costs, and estimates by the Forest logging system engineer. Costs were defined for all ground systems (tractor, hi-lead, short-span and long-span skyline), by topograhic class, and on a per acre or per MCF basis. Because of the difficulty in forecasting what systems would be applied in future years, particularly on regenerated stands, and to keep down the size of the model, a weighted average value of all ground systems was calculated. The cost for logging using aerial systems was kept separate. These costs were used in the Forest's first AMS process.

As discussed in Chapter III, part C, a paper by Fight, LeDoux, and Ortman (1984) on logging cost in second growth coastal Douglas fir was used as the basis for redeveloping the logging system costs for the second AMS and the alternatives analysis. This paper detailed equations for each component of the stump-to-mill process; use of these equations resulted in costs that varied by average stand diameter and volume per acre. (The first set of costs developed on the Mt. Baker-Snoqualmie did not have these variables.) Costs for ground systems were developed from these equations for each of the Forest's three major topographic types (A, B, and C). Aerial system costs continued to be derived directly from Forest data and estimates.

The logging costs developed from the equations were significantly lower than the initial figures developed directly from the Forest data; not surprising, as the paper was written for much less difficult terrain than on the Mt. Baker-Snoqualmie. Also, harvesting in second growth forests should be relatively less expensive than harvesting in wild stands. Although the costs were lower, the relative spread of costs in terms of diameter and volume per acre seemed reasonable from the limited data available on the Forest. Therefore, the equation-based costs were indexed up to the Forest historical figures developed for the first AMS, maintaining the proportional spread across diameter and volume per acre. This allowed maintenance of a direct link with the Forest's actual experienced costs, but at the same time gave a reasonable estimate of how those costs varied over diameter of material handled and volume per acre harvested, information not available from past records.

The costs shown in Table B-15 above are on a per MCF basis for those that vary by volume harvested, and on a per acre basis for those that tend to vary more by the area harvested, such as rig-ups and rig-downs, road changes, etc. The costs shown in the table are just a sample of the range of the entire set of costs used in the model For more specific information on the development of the logging costs and the data and equations used, refer to the planning process records and the FORPLAN data set.

d. Silvicultural Activities

Planting costs, precommerical thinning costs, and stand exam costs were developed from project/contract records, budget estimates, and estimates by Forest silvicultural specialists. Planting and precommercial thinning costs vary by whether areas are accessible by road or are inaccessible.

e. Genetic Tree Improvement Program

The Forest geneticist calculated the expected costs of the genetic tree improvement program for future years. The estimate includes the costs of seed collection and management of the evaluation plantations and seed orchards. The costs were estimated to be about 30% higher in Decade 1 than in subsequent decades because of the higher costs of plantation and seed orchard establishment.

f. Road-related Costs

New road construction costs, including preconstruction and construction engineering, were estimated for arterial and collector roads and for local roads by the Forest's transportation planning engineer Cost estimates were based on historical data with some adjustments made for the recent trend toward building local roads to a lower standard, (a result of reduced budgets and recognition that, with proper design, locals can be built at lower cost while still protecting basic resource values and adequately serving the timber management areas).

Road maintenance costs were estimated by the Forest's engineering staff, based on past budgets and experience An average figure for all road types was used. In an average year, it was estimated that 90% of the Forest's permanent road system receives some kind of maintenance; this may range from a driving check, to culvert cleaning, to full-scale blading or resurfacing.

The Forest Service share of maintenance on "cost share" roads (roads in which the Forest Service has legal interest but are on lands not within the National Forest System) was estimated by the engineering staff to be about 2/3 of the annual total maintenance costs for the roads. The actual FS share will vary widely from road to road, but as more of the proportion of timber volume moving over those roads is from National Forest lands, the Forest Service is picking up a larger percentage of the maintenance cost, in accordance with the share cost agreements. The engineering staff estimate this share to be in the neighborhood of 2/3 throughout the planning horizon.

g. Developed Site Recreation

Developed site recreation management costs were developed from a combination of historical data, budget estimates, and information developed as part of the Recreation Information Management System. The RIM system information was developed to estimate the budget that would be required to manage recreation sites, both dispersed and developed, to standard. The IDT decided to use the costs required to manage to standard as the basis for recreation management costs, in order to avoid building underfunding into the future program.

Developed site O&M costs are tied to the capacity of the developed sites on the Forest in terms of "persons at one time" for one day (PAOT-days). The annual capacity can be measured by the total persons at one time the area can handle times the length of time during the year the site is open. The Forest's recreation staff felt that it was more accurate to tie the developed site management costs to capacity (PAOT-days), rather than visitation (RVD's). Many campground costs are incurred whether the campground visitation is at 40% or 80% capacity. Therefore, for modeling purposes, the total budget estimated as needed to manage to standard was divided by the total Forest developed site capacity in PAOT-days, getting a cost per PAOT-day for developed site management. These are the costs shown in Table B-15.

Construction costs for campground units and picnic units were developed from engineering estimates and converted into 1982$. The costs shown in the table are per unit, but can easily be converted to cost per PAOT if it is desired to model additional capacity construction on that basis.

h. Dispersed Recreation Management

Dispersed recreation O&M costs were also based on the RIM estimates of costs required to manage to standard. The Forest's recreation staff felt that the most meaningful cost connection for dispersed recreation was with acres of ROS experience level for which the Forest would manage, rather than RVD's of visitation. Management based on experience levels requires that areas of ROS be managed and maintained in such a manner as to provide the desired experience level for the recreationists that do come to the area. This is true whether visitation is heavy or light.

Because the RIM costs were developed prior to the time that RIM tracked ROS, the estimated total costs by activity type and area had to be converted to costs per acre of ROS. This was done by calculating estimated current RVD's by ROS class as a percentage of total RVD's of dispersed recreation. The total estimated budget to manage to standard was multiplied by these percentages to get the required budget for managing for each ROS class. These figures were then divided by the acres in the respective ROS classes to attain dollar figures for managing each acre of the ROS classes to standard. These are the figures shown in the cost table Again, it was recognized that tying the dispersed recreation management costs to acres of ROS, rather than RVD's, did not completely reflect the actual management situation, but was preferable to tying those costs just to RVD's.

i. Wilderness Management

Wilderness management costs were developed in the same manner as dispersed recreation costs. The costs for the first AMS were developed on the basis of the original ROS classifications After the change was made to the WROS system, the wilderness management costs were adjusted accordingly.

j. Anadromous Fish Habitat

Costs for fish habitat investment levels carried in FORPLAN were developed by the Forest fisheries biologist. For Level I, the costs are for maintaining the existing fisheries habitat (primarily spawning habitat) currently on the Forest. Costs would be for stream protection and for habitat structures and improvement, all done primarily for mitigation purposes.

For Level II, costs would be incurred to restore anadromous fish habitat lost or degraded by major modifications of watercourses by dam-building and resource extraction activities. Removal of barriers to upstream fish migration, creating improved pool:riffle ratios, placing log wiers, and similar activities would be included in the costs for Level II.

The intent of Level III is to improve fish habitat to its maximum potential, beyond that which historically existed under natural conditions. This investment level would involve removals of natural migration barriers, intensive management of streams by placement of structures (wiers, gabions, etc.) to maximize fish spawning and rearing habitat, and stocking of juvenile fish if necessary to meet production goals. For both Levels II and III, the initial costs for structural and nonstructural improvements occur in the first decade. Costs thereafter are primarily for maintenance and replacement. For Level I, costs rise somewhat after the first decade as increased mitigation measures are required to protect streams from increased pressures of road-building, timber harvest, and other development activities.

k. Fixed Costs

Other Forest management costs not discussed above were considered to be essentially fixed across all alternatives. Modeling fixed costs is difficult since they don't change on a continuum along with changes in program levels, outputs, or budgets. Fixed costs include the fire pre-suppression and suppression program, overhead, general administration, basic resource protection, minerals and special use permits processing and administration, and a variety of other activities not expected to change significantly until large

increases or decreases in current program levels are made. Total fixed costs were developed from budget figures for 1981-1983.

2. Costs Outside of FORPLAN

Monetary costs for alternative implementation outside of FORPLAN were not dealt with. Use of Version 2 of FORPLAN made it possible to carry nearly any activity and cost within the model, even if it was carried as a lump-sum cost that did not affect the model solution, such as the costs of the genetic tree improvement program. The approach was to keep as much of the economic information as possible within the model, even if simply running values through to get them calculated into PNV. This avoided doing extra spreadsheet calculations outside the model, and negated the concern that some economic values might actually have an effect on the model solution that would not be noticed if they were dealt with outside the model

3. Real Cost Trends

Real value appreciation (trend) factors were discussed above (part B). Use of real cost trends would have indicated that the expected value of one or more particular costs would rise at a rate faster than that of the general price level for all other goods and services in the economy. Under Washington Office and Regional Office planning direction, the Mt. Baker-Snoqualmie did not use any real cost trends in the analysis of the benchmarks or alternatives. All costs were assumed to stay even with the general price level, rising only along with all other goods and services at the general rate of inflation. This resulted in an effective real increase of zero for all costs.

4. Capital Investment vs. Operations and Maintenance Costs

According to FSM 1970.5, an investment (or capital) cost is "A cost of creating or enhancing capital assets, including costs of administrative or common-use transport facilities and resource management investments." Operations and maintenance costs are those costs incurred in the process of producing goods and services from the Forest for protection of the resource base, and for maintenance of capital assets

Investments in road construction, including all the preconstruction and construction planning and engineering costs, are capital investments. So are investments in facilities such as campgrounds, administrative buildings, water systems, trails, etc.

In a technical sense, any cost incurred in the production of timber stands or the creation of fish and/or wildlife habitat is a capital investment if it is expected to last more than a year and will produce future benefits, either regularly or as a one-time shot. Standing timber is a capital asset that will yield a return years or decades in the future, and which therefore has a current value which can be lost if not maintained and protected. Similarly, the mosaic of vegetation types and ages making up deer and elk winter range represents a capital asset that regularly yields a return in deer and elk produced, whether for consumptive use (hunting), nonconsumptive use (observation), or for ecological benefits (gene pool, diversity, etc.). This value produced at regular intervals is reflected in the capital asset value of the habitat, and can be lost if the habitat is not maintained and protected.

For display purposes in the DEIS and the FEIS, the more traditional definition of capital investment costs was used: those costs incurred to construct facilities such as roads, campgrounds, trails, and so forth. It seemed that this breakdown was more illuminating than one in which all timber management and habitat improvement costs were also included That decision may be debatable. If the reader so desires, all timber management costs incurred to produce the next crop of timber can be considered to be investment costs. This would include the costs of planting, stand exams, precommercial thinning, and even the net cost of commercial thinning, as this activity is generally done in order to increase the size and quality of the stand for final harvest. Costs of the genetic tree improvement program could also be considered part of the investment in the timber crop. Likewise, costs of wildlife and fish habitat improvements, including direct structural and nonstructural work as well as the net costs of timber harvest done to achieve age class distribution, can be considered to be investment costs.

5. Costs Relatively Constant Across Alternatives

The unit costs as shown in Table B-15 do not vary across alternatives; however, the total costs will change depending on the amount of each activity that occurs in a given alternative. In general, all the timber management-related costs can potentially vary widely across alternatives, depending on the timber sale program quantity for that alternative. Road construction costs vary by the amount of new construction in each alternative. Road maintenance costs are relatively constant, varying only at the margin by the differences in new roads built among alternatives.

Because of the way developed site capacity and expected use were modeled, those management costs stay almost constant across all alternatives In dispersed recreation, the management costs vary by the acres going into each ROS category by alternative. Costs for wilderness management stay relatively constant, with some variation among alternatives as acreages change among the five wilderness management intensities. Anadromous fish investment level costs are the same for any alternative with the same level assigned. They differ accordingly if different investment levels have been assigned The genetic tree improvement program costs were assumed to be the same across all alternatives, as were the cost categories included in the Fixed Costs, as discussed in part C, above.

D. Benefits

1. Priced and Non-priced Benefits

Priced Benefits. Outputs that are, or potentially could be, exchanged in a market place were given dollar prices in the planning process and in FORPLAN. Those benefit values that are actually based on market transaction data are called "market" values. Benefit values for goods and services that could potentially be traded in markets, but for which no markets or market transaction data actually exist, are called "nonmarket" or "assigned" values. These values were developed from estimation procedures that generated prices considered comparable to market transaction prices.

Market values used in FORPLAN were for timber (both softwood and hardwood) and commercially-caught anadromous fish. As was discussed earlier in the costs section, the timber values actually were the value of the log at the mill deck waiting to be processed. However, after incorporating logging costs, the effective value used was timber stumpage. Anadromous fish commercial values were integrated with the recreational values of the fishery to derive a total value expected from the anadromous fishery for each investment level used.

Assigned values used in FORPLAN were for developed recreation, dispersed recreation (including hunting, fishing, wildlife observation, and general dispersed activities), wilderness use, and firewood. Again, the recreational and commercial values for the anadromous fishery were combined into one for modeling purposes. (For more detail on the process used to calculate total anadromous fishery outputs and benefits, see the planning records.)

Two of the assigned values used actually have a "real" dollar price associated with them. Some developed campgrounds have overnight fees ranging up to $7 per night, depending on the amenities and services available at the campground. Also, firewood is now sold on the Forest at up to $10 per cord (for people collecting dead and down material for firewood, including yarded unusable material and residue from precommercial thins, as long as it is for personal use and not for resale) In both these instances, it is recognized that the administrative prices set by the Forest Service generally do not match the prices of similar goods and services sold in private markets. The on-site average value of firewood cut by commercial suppliers is about $15-$20 per cord, depending on the quality of the wood and its location relative to the nearest market. 1/

According to Washington Office and Regional Office direction, Forests are to use assigned prices in those instances where the market price is administratively set and does not fully reflect the market-clearing price that would be found in a "free" market. Therefore, we used assigned prices for both developed site recreation and for firewood.

Non-priced Benefits. Outputs that have no market for exchange because of their particular characteristics, but which still have value and benefit to society, are called "non-priced" outputs or benefits. The nature of these outputs is such that no economic markets are expected to materialize for their exchange, and there are no comparable economic markets from which to deduce prices. These benefits cannot be incorporated into the cost efficiency analysis of the planning process. Rather, they have to be considered qualitatively and incorporated into the estimate of overall net public benefits for each alternative (see the NPB discussion, part A).

1/ Based on perusal of classified ads and knowledge of what the Forest Service charges for firewood sales to commercial suppliers.

Non-priced benefits used in the planning process on the Mt. Baker-Snoqualmie included maintenance and enhancement of wildlife habitat; maintenance and protection of riparian vegetation; maintenance of old growth stands for wildlife, visual, esthetic, and genetic reasons; maintenance and protection of American Indian traditional religious and cultural areas; maintenance and protection of special ecological, cultural, historical and recreational areas; maintenance of air and water quality; effects of Forest management on area jobs and incomes, effects of Forest management on area lifestyles; maintenance of ecosystem diversity; visual quality; maintenance of opportunities for development and use of energy sources; and maintenance and restoration of threatened and endangered species populations.

It is evident that these benefits are extremely difficult to measure other than in some subjective, qualitative sense. The amount of at least some of them can be measured: acres of old growth remaining, acres of American Indian sites protected; changes in ecosystem diversity. But the overall benefits from even those amounts that are measured are qualitatively assessed, at best.

2. Point of Valuation

In cost-efficiency analysis, benefits should be calculated as close to the point of production as possible, to avoid double-counting benefits The economic analysis in the Forest planning process is trying to show the net benefits to society from the goods and services produced from the Forest by management activities. The value of timber from the Forest is not the wholesale price of lumber. The wholesale price of lumber includes not only the value of the tree in the forest, but also the cost to get it to the mill and the cost of processing it into wood products. These latter stages of production include labor, capital and entrepreneurial costs, which all contribute to the value added to the original raw material value.

In the planning process, timber was valued as stumpage in the forest (although as discussed previously, the actual values that show up in FORPLAN are the mill pond values and the logging costs; the two combined yield a stumpage value); firewood was valued at the point it was gathered from the Forest; commercially-caught anadromous fish were valued at the point of capture (ex-vessel price at the dock minus the average cost of harvest by the fishing boats), and recreation was valued at the point where the recreation was experienced - i.e., on the Forest.

In the last case, the value of recreation on the Forest represents what people would be willing to pay if they were required to do so to use the Forest's resources (scenery, streams, mountains, roads, etc.). The value represented by the recreation benefits is not the value of the recreationist's total recreation experience (which begins from the time the person leaves home until returning home), but that portion of the value of the recreation experience or activity contributed by the availability and use of the Forest's land and resources. Benefits valued as described here represent the net contribution made to society by the existence and management of the natural resources on the Forest.

3. Benefit Values in FORPLAN

FORPLAN Benefit Listing. Table B-16 lists the benefit values actually used in FORPLAN. Each benefit, or benefit category, is discussed briefly, and the sources used to develop the benefit(s) are highlighted. This section and the previous section on costs together describe the economic ties between the prescriptions with their physical/biological yield coefficients described in Chapter III and the economic objective function which was used for most of the benchmark and alternative analyses.

Table B-16 Page 1 of 3
FORPLAN Benefits (1982$)

1. Market Values	
a. Softwood Sawtimber (X06) [Mill Pond Value]	1/
North, Upper Working Group	
7" - 9" dia.	919.00 per MCF
13" - 15" dia.	1,176.00 per MCF
19" - 21" dia.	1,364.00 per MCF
23" + dia.	1,429.00 per MCF
North, Principal Working Group	
7" - 9" dia.	867.00 per MCF
13" - 15" dia	1,172.00 per MCF
19" - 21" dia	1,418.00 per MCF
23" + dia.	1,501.00 per MCF
North, Inaccessible Lands (Agg. Wrk. Grp)	
7" - 9" dia.	876.00 per MCF
13" - 15" dia.	1,167.00 per MCF
19" - 21" dia.	1,395.00 per MCF
23" + dia.	1,472.00 per MCF
South, Upper Working Group	
7" - 9" dia.	859.00 per MCF
13" - 15" dia.	1,110.00 per MCF
19" - 21" dia.	1,296.00 per MCF
23" +	1,358.00 per MCF

1/ This is a sampling of the full range of timber values used in the FORPLAN data set. The first and last values in each set are the minimum and maximum values used, respectively. Values are taken at the mill pond (deck) and vary by diameter of material harvested. See text for discussion of mill pond values, logging costs, and resulting stumpage values.

Table B-16 Page 2 of 3

South, Principal Working Group	
7" - 9" dia.	825.00 per MCF
13" - 15" dia.	1,124.00 per MCF
19" - 21" dia	1,367.00 per MCF
23" + dia.	1,449.00 per MCF
South, Inaccessible Lands (Agg. Wrk. Grp.)	
7" - 9" dia.	834.00 per MCF
13" - 15" dia	1,108.00 per MCF
19" - 21" dia	1,319.00 per MCF
23" + dia.	1,391 00 per MCF
North and South, Mixed Conifer Wrk. Grp.	
7" - 9" dia.	767.00 per MCF
13" - 15" dia.	1,115.00 per MCF
19" - 21" dia.	1,421 00 per MCF
23" + dia.	1,531.00 per MCF

b. Hardwood Sawtimber (X09) [Mill Pond Value]

North and South, Mixed Conifer Wrk. Grp.	
7" - 9" dia.	327.00 per MCF
13" - 15" dia.	476.00 per MCF
19" - 21" dia.	606.00 per MCF
23" + dia.	653.00 per MCF

c. Salvable Dead Material (X15) [Mill Pond Value]

North, Upper Working Group	
All diameters	1,218.00 per MCF
North, Principal Working Group	
All diameters	1,233.00 per MCF
North, Inaccessible Lands (Agg. Wrk. Grp.)	
All diameters	1,221 00 per MCF
South, Upper Working Group	
All diameters	1,151.00 per MCF
South, Principal Working Group	
All diameters	1,185.00 per MCF
South, Inaccessible Lands (Agg. Wrk. Grp.)	
All diameters	1,157.00 per MCF
North and South, Mixed Conifer Wrk. Grp.	
All diameters	1,001.00 per MCF

d. Anadromous Fish Commercial Harvest

Commercial ocean fishery	1.05 per pound
Indian fishery	1.05 per pound

2. Assigned (Nonmarket) Values

a. Firewood (X08) 20.00 per cord

b. Developed Site Recreation

Camping and picnicking	7 56 per RVD
Alpine (downhill) skiing	8.47 per RVD
Rec. residences, org. sites, etc.	7.56 per RVD

c. Dispersed Recreation

Wildlife observation/photography	
All ROS classes	25.00 per RVD

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Big and small game hunting	
All ROS classes	26 15 per RVD
Resident fish angling	
All ROS classes	15.00 per RVD
Primitive ROS other disp. rec.	11.25 per RVD
Semi-primitive nonmotor ROS other disp. rec	13.25 per RVD
Semi-primitive motor ROS disp. rec.	12 13 per RVD
Roaded Natural ROS other disp. rec.	9.38 per RVD
Roaded Modified ROS other disp. rec.	9.38 per RVD
Rural ROS other disp. rec.	8.92 per RVD
d. Wilderness Recreation	
All WROS classes	17.50 per RVD
e. Anadromous Recreational Fishing	
Ocean sport	33.00 per RVD
River sport	33.00 per RVD

Sources and Development of Benefit Values

a. Sawtimber Values

Sawtimber values were derived from the Timber Sale Statement of Accounts Cut and Sold Reports for April, 1977, through September, 1983, indexed to 1982$ The values used were the "cut" values - those prices actually paid by the purchaser at the time the harvested logs were scaled and billed to the purchaser by the Forest Service. Use of "cut" rather than "bid" values gives a much better representation of the market at the time the timber is actually harvested and eliminates much of the futures speculation found in bid prices.

Weighted average values by North and South by working group were calculated from the quarterly Cut and Sold Reports. Added to these base values were an average road construction cost per MCF and average stump-to-mill costs per MCF. The result was an average pond value by North and South by working group. This pond value, though, represented primarily logs 22" and greater in diameter. Based on a study done at the Pacific Northwest Experiment Station, the Regional Office provided a process to the Forests to develop a spread of timber values by diameter from the original timber value calculations The process used estimated the decrease in value experienced as log diameters decreased. The timber values shown in Table B-16 are the results of that benefit development process. They are average mill pond values. Site-specific stumpage prices were derived internally in the model by subtracting the site-specific logging costs (which vary by diameter and volume per acre) from the average mill pond value.

Hardwood sawtimber (X09) values required somewhat more general estimates, as much less data was available for that working group. Sawtimber values for salvable dead (X15) were not broken out by diameter for lack of data. The values shown are arithmetic averages of all the values by diameter for each group. Salvable dead material is all valued as softwood.

Some concern has been expressed by various interest groups during the Forest planning process that Forests developed their timber values right at the peak of the bidding frenzy in the late 1970's. The concern is that the resulting prices used in FORPLAN would be too high and distort the model solution in favor of increased timber allocations and outputs. The IDT felt that the timber values developed on the Mt. Baker-Snoqualmie do not have that bias. While the early part of the historical data period does cover the time of high bids, the values used are "cut" values, not "bid" values. So the data showing up from the late 1970's are based on contracts bid and sold earlier in that decade before bid prices skyrocketed. The values that show up in the early 1980's reflect only a portion of the results of the high bidding period, because many purchasers ended up not harvesting the sales bid and purchased during that time. They either did not harvest anything, or harvested as much low-cost timber as they could, mixing it in with the higher cost stumpage. Thus, use of the Cut and Sold Reports gave us a good basis to develop timber values representative of the longer-term market.

b. Anadromous Fish Commercial Harvest Values

The values per pound of anadromous fish commercially harvested were developed by the Washington Office for the draft 1985 RPA Program, and were specified for use in Region 6 Forest planning by RO planning direction. The value per pound represents the ex-
vessel price of the fish minus average costs of fishing off the NW coast.

c. Firewood

Firewood was carried in the model at its assigned price, even though it does have an administratively set market component. The Mt. Baker-Snoqualmie charges up to $10 per cord for personal use firewood collected on the Forest. As mentioned before, the real on-Forest value of firewood when sold through the market is closer to $15-$20 per cord. The administratively set price for personal use firewood is not capturing the total value of the resource as reflected in the marketplace.

d. Developed Site Recreation

Developed site recreation values were taken from the draft 1985 RPA Program, as required by the Regional planning direction. These values were developed to be as comparable as possible to similar private sector developed recreation prices. However, as noted earlier, there are few situations where that comparison can be made directly because of differences in location, environment, and amenities provided. The values used were those identified in the RPA document as values per RVD when areas and facilities are managed to standard.

The developed recreation values often have an administratively set market component in the form of user fees charged at various developed recreation sites As with firewood, the administrative price is not capturing the full market value that people would be willing to pay to use those, or similar, facilities. The assigned price reflects as much as possible that full market value, which should be the value of the contribution that National Forest lands and facilities are making to people's overall recreation experience.

e. Dispersed Recreation

Dispersed recreation values are also assigned values taken from the draft 1985 RPA Program, in accordance with Regional planning direction. The RPA values were developed from a number of sources, primarily travel cost and contingent valuation studies, and adjusted to proxy marginal values for incremental planning purposes, rather than the average values most studies produce. The values used were those identified in the RPA document as values per RVD enjoyed when areas are managed to standard.

The FORPLAN model carried, within each ROS class, wildlife observation, hunting, and fishing RVD's separately from other dispersed RVD's. The reason for this was to capture the significantly different values associated with those activities compared with the values for general dispersed activities. It was decided that the higher values for these types of activities would be the appropriate ones to use, no matter in what ROS class the activity took place. Therefore, the wildlife observation, hunting, and fishing RVD's carry the same value in all ROS classes, while the general dispersed recreation activities change according to ROS.

Dispersed recreation values were applied to RVD's of capacity, rather than to actual estimated use. As discussed in Chapter III.F.6, these values were used in combination with weighted average dispersed recreation values by ROS class in the demand curves section to provide a cut-off of valuation when the ROS capacity exceeded expected use in that class.

e. Wilderness Use

Values for all classes of wilderness use were taken from the draft 1985 RPA Program. The value was constant across all WROS classes and reflected value of wilderness managed to standard.

f. Anadromous Sport Fishing

The anadromous sport fishing value in the draft 1985 RPA Program included only the value for river sport fishing. All previous studies of recreational anadromous fishing values have indicated that ocean sport fishing has a higher average value than river sport fishing. Data from the 1980 RPA Program on values for ocean sport fishing were used in conjunction with the river sport fishing value from the draft 1985 document to develop a weighted average value that *includes both facets of the anadromous sport fishing experience.*

4. Benefits Considered Outside FORPLAN

No priced benefits were incorporated into the overall PNV of an alternative outside of those in FORPLAN. As mentioned in the costs section, the use of Version 2 allowed running through FORPLAN all the quantifiable benefits used, even if carried through on a simplistic basis just to get them added into the PNV, rather than having to do so outside the model afterwards. (Non-priced benefits were incorporated into the net public benefits assessment outside the model).

5. Non-cash Values and Cash Receipts

The Forest Service receives part of the economic value of the goods and services produced from the Forest in cash payment for the use and/or purchase of those goods and services. The rest of the economic value is enjoyed by users as "non-cash" benefits. The only payment required of users for those benefits is that required to "capture" the benefit: travel costs to get to the Forest to recreate, acquisition of a chainsaw to be able to cut firewood, etc.

The Forest Service receives cash for timber, for part of the value of firewood, and for part of the value of developed site recreation. (The Forest Service also receives some cash for various special use permits, but the amounts are insignificant and were not modeled).

Non-cash benefits to users are those accruing from the portion of firewood and developed site recreation not actually charged, and for nonwilderness dispersed and wilderness recreation. (Hunting and fishing license payments go to the appropriate State agency to pay for management of the fish or wildlife population. The State has authority over the populations; the Forest Service has authority over the habitat. No payment is currently made by the hunter or angler to access the habitat in order to hunt or fish).

Non-priced benefits are part of non-cash benefits, but are not shown anywhere in quantitative terms. They are discussed qualitatively.

Anadromous fish benefits are a special problem. Part of the anadromous fish population originating on the Forest is caught in the ocean and provides cash benefits to the fishers when they sell the fish to processors at the docks. None of this cash makes its way back to the Forest Service or the U.S. Treasury (except perhaps, in the latter case, as taxes). Ocean and river sport fishing for salmon and steelhead provide non-cash benefits to users; again, these benefits occur almost completely off National Forest System lands. All the anadromous fish values, both cash and non-cash, can be considered economic value to society and are included in PNV calculations. But they are more difficult to identify as cash and non-cash benefits, particularly in relation to the other resource goods and services produced from the Forest.

6. Real Price Trends

Real value appreciation (trend) factors were discussed in part B of this chapter. Real price trends on benefits were applied only to timber stumpage, in accordance with Washington Office and Regional planning direction. Stumpage was appreciated in real terms at 1% per year for 50 years. At the end of that time, real prices of stumpage are 64 5% above their beginning levels and above the base levels of all other prices in the model. After 5 decades, the price trend reverts to zero, and the timber prices stay at the appreciated level throughout the rest of the planning horizon. In FORPLAN, the 1% trend was applied both to the timber (mill pond) values and to the logging costs, in order to get a mathematically correct 1% real stumpage price increase

CHAPTER V - SOCIAL AND ECONOMIC IMPACT ANALYSIS

CHANGES BETWEEN DRAFT AND FINAL - APPENDIX B, CHAPTER V

- Socioeconomic data have been updated to late 1980's information
- Estimated changes in employment and income by alternative have been updated to reflect changes in alternative output levels and the final set of alternatives carried in the FEIS.

* * * * * * * * * * * *

A. Social and Economic Overview

The Forest Service has always tried to make its forest management decisions consistent with the needs and concerns of the populations affected by those decisions Socio-economic effects, or impacts, are simply those changes that happen to people because of the way a forest is managed.

1. Forest Area of Influence Zone As Established for Economic Analysis

Assessment of the relationship between the Mt. Baker-Snoqualmie National Forest and the social and economic environment surrounding it requires identification of a relatively homogeneous unit for the analysis. This was not a simple task, because the social and economic structure of the region is diverse, not lending itself to precise categorization, and the data available for the analysis are gathered according to administrative boundaries (e.g. counties) which do not correspond with meaningful analytical units such as economic status or geographic location.

For the purpose of forest planning, a five county zone of influence was defined This zone includes Whatcom, Skagit, Snohomish, King, and Pierce counties. In addition, information was gathered on Canadian use, since the Mt. Baker-Snoqualmie National Forest is an important recreation resource for the residents of Vancouver, B.C.

This region is one of the faster growing areas in the United States. The population, although far from uniform, tends to be young and well-educated, with incomes above the national average. The economy is highly diversified Manufacturing is led by the aerospace industry. While that industry does not dominate the region quite so much as it has in the past, a recent study showed that one out of six jobs in the State of Washington is still dependent, directly or indirectly, on spending by the aerospace industry (Pascall and others, 1989) Linkages with the Pacific Rim countries make the wholesale and retail trade industry an important employer. Other major sources of employment include the forest products industry, the tourist industry, and the broadly-based service industry sector.

The region is composed of residents with varied values and lifestyles who exercise different demands on both the region's economic and natural resources. Economic opportunities, amenity considerations, and the "Northwest lifestyle" all influence institutions and organizations throughout the region.

The Mt. Baker-Snoqualmie National Forest both influences and is influenced by social and economic activities in the area.

2. Population

Over one-half of Washington State's population resides in this five-county area, a total of over 2.6 million people. King, Pierce and Snohomish Counties are, respectively, the first, second and third most populated in the state. Population density is high in urban areas: 600 up to 1,500 persons per square mile. In the rural areas, especially in Skagit and Whatcom counties, the population density is well below the State average of 67 persons per square mile.

Population Composition. The three more heavily urbanized, industrial counties (King, Pierce, and Snohomish), have younger populations with fewer people in the over-65 age group than the State average. Skagit and Whatcom counties have a large number of residents over 65 years of age, reflecting the in-migration of retirees and a number of communities declining in population.

Minority Populations. The population of the Forest's Zone of Influence is predominately white; in 1980, 12 percent of the area's population was non-white. The majority of the State's Black and Asian populations live within the Seattle-Tacoma metropolitan area. Just under half of the State-wide Hispanic population lives in the metropolitan area. Slightly less than half of the State's Native American population live within the 5 counties.

Projected Population Growth. The Washington Office of Financial Management projects that the State population will increase from 4,132,400 in 1980 to almost 5,400,000 by the year 2000. The five-county area is expected to grow somewhat faster than the State over the same time period, reaching over 3,100,000 by 2000. At that rate, nearly 60 percent of the State's population would live in the five-county area by the year 2000.

3. Income

When adjusted for inflation, real per capita personal income increased 27.3 percent statewide, compared with about a 29 percent increase in the five-county area between 1970 and 1978 (Table B-17). From 1978-1987, the real increase for both the State and the five-county area dropped to about 10%, although King and Snohomish Counties were significantly above that (15.9% and 21.6%, respectively). Income in the area is expected to increase within this range of rates through the year 2000, averaging 1.7 percent increase per year, as compared to 2.7 percent from 1960 to 1980. (PSCOG, 1984)

Table B-17
Per Capita Personal Income
1970-1987

	1970 (1970 $)	1978 (1978 $)	1987 (1987 $)	Nominal % Change 1970-78	Real % Change 1970-78	Nominal % Change 1978-87	Real % Change 1978-87 1/
King	$4,601	$10,064	$19,511	118.7	31.0	93.9	15.9
Pierce	3,923	7,881	14,008	100.9	20.4	77.7	6.2
Skagit	3,653	8,269	14,301	126.4	35.6	72.9	3.4
Snohomish	3,649	7,625	15,511	109.0	25.2	103.4	21.6
Whatcom	3,599	7,773	13,595	115.4	29.4	74.9	4.5
Washington State	3,997	8,494	15,642	112.5	27.3	84.2	10.1

1/ Income deflated by implicit price deflator for personal consumption expenditures. Inflation by this measure was 66.9% from 1970-1978, and 67.3% from 1978-1987

4. Employment

The five-county study area accounts for over half of all economic activity in the State. As shown in Table B-18, manufacturing, especially aerospace, lumber and wood products, trade, government, and the service sector are the major components of the area's economy.

Table B-18
Wage and Salary Employment By Sector - Five-County Area 1/

	Persons Employed		
Sector	1979	1984	1988
Agriculture, Forestry, Fisheries 2/	9,475	12,488	16,142
Mining	694	634	804
Construction	56,686	47,682	63,001
Manufacturing	196,436	184,055	228,421
Food and Kindred Products	15,556	14,546	15,171
Lumber and Wood Products	18,850	15,644	16,116
Transportation Equipment	87,110	78,502	88,316
All Other Manufacturing	74,920	75,363	108,818
Transportation, Communication, Utilities	54,576	60,525	69,783
Trade (Wholesale and Retail)	228,298	249,780	298,660
Finance, Insurance, and Real Estate	61,380	67,942	79,799
Services	165,865	206,699	270,319
Government	148,981	156,401	177,464
TOTAL	922,391	986,206	1,204,393

1/ Employment covered by Washington Employment Security Act, which covers in excess of 85% of total employment in the State. Does not include self-employed.
2/ Fewer than 5% of jobs in this sector are in the Forestry Services SIC Group.

Manufacturing is a relatively recent major activity; the State and the Puget Sound area have a long historical dependence upon resource-based industries. Transportation equipment manufacturing - primarily the aerospace industry - employs about 7 percent of the total wage and salary workforce in the area. The forest products industry is the second largest manufacturing component in the regional economy. Lumber production has the greatest local significance in Skagit County, where it provided 4 percent of all wage and salary jobs in 1988.

The Seattle metropolitan area is the dominant commercial center in the State and the Pacific Northwest and functions as a hub for transportation, trade, finance, administration, and government. It is the location of Regional headquarters of many Federal agencies.

The two remaining industries which have major significance throughout the study area are tourism and travel, and agriculture and food processing. Jobs supported by tourism are somewhat hidden in the data for trade, services, and other sectors. It is likely the third largest industry in sales and employment generated within the study area. The type and amount of agriculture, forestry, fishing and food processing employment varies by county.

5 .Employment Growth

The Puget Sound area economy is quite diverse today, although it is still relatively dependent on aerospace employment and spending (Pascall and others, 1990). National economic trends have and will continue to affect the area. Housing starts are now up from the slump of the early 1980's, but are expected to stay fairly level over the next decade. The trade and services sectors are expected to continue growing. The forest products industry has already experienced major changes over the last decade. A shakeout of marginal mills and more extensive modernization, coupled with new products and expanding markets, have led to high levels of wood products outputs in the past three years, but with about 25 percent fewer employees than required for similar output levels in the late 1970's.

Future manufacturing growth will likely be in the high-technology industries. Aerospace employment has begun to stabilize and is expected to stay slightly below its historic high for the next several years. Basic industries - food products, lumber and wood products, etc. - and government are projected to grow relatively little through the year 2000. In fact, forest products employment is expected to continue to decline over time as modernization and productivity gains continue to be made (NWPPC, 1989). Non-manufacturing jobs should increase about 2.5 percent per year, compared to manufacturing, with projected annual employment growth of about 1.3 percent. However, the output of the manufacturing sector will continue to grow due to greater labor productivity and new technology (PSCOG 1984).

The areas location, lifestyle amenities, educated work force, and the many land and water resources should provide the base for continued economic growth in the future, though likely at a more modest rate than in the late 1980's, which has been a period of fairly rapid economic expansion.

6. Forest Payments to Counties

By law, 25% of the revenues collected by the Forest Service from timber sales, recreation, minerals, land uses and other charges is returned to the counties within which those National Forest acres lie. The funds are used for public schools and roads. Table B-19 shows returns to the five counties for 1980 through 1989.

Table B-19
Returns To Counties

County	FY80	FY81	FY82	FY83	FY84	FY85	FY86	FY87	FY88	FY89
King	$1,437,231	$1,419,189	$ 851,310	$ 988,049	$1,068,133	$ 826,239	$1,245,880	$1,643,427	$1,762,914	$2,394,581
Pierce	558,142	551,134	330,554	383,636	414,762	320,838	448,335	590,863	633,820	860,789
Skagit	1,140,871	1,053,328	974,277	691,636	1,033,620	821,666	768,290	1,042,655	1,352,249	1,271,552
Snohomish	1,746,191	1,659,040	1,300,661	1,118,111	1,463,418	1,151,755	1,307,590	1,749,770	2,085,419	2,328,524
Whatcom	1,842,167	1,700,812	1,573,286	1,116,871	1,668,556	1,326,402	1,240,238	1,681,677	2,181,015	2,050,861
Total	**6,724,602**	**6,383,502**	**5,030,087**	**4,298,303**	**5,648,489**	**4,446,901**	**5,010,334**	**6,708,393**	**8,015,417**	**8,906,307**

7. Future Trends - Lifestyle, Values

While most of the 5-county region's population is concentrated in the low-land areas along Interstate Highway 5, growth in the entire area reflects the national trends. Migration into the area is expected to continue. Most residents will live in urban-suburban areas, although growth in smaller towns and "bedroom" communities - reverse migration - is occurring, and people regularly commute to jobs in Everett-Seattle-Tacoma from Carnation, Duvall, North Bend, Enumclaw, and others. Rural population centers like Sedro Woolley are growing at a faster rate than the area as a whole.

The spread of knowledge, technology, and new values has shifted the metropolitan part of the Puget Sound area from an economy based on resource extraction to one based more on diversified manufacturing, trade, finance, tourism, and government. This same shift is now beginning to take place in the more rural portions of the area. The shift from resource extraction to services tends to place increasing emphasis on public goods such as developed and undeveloped recreation resources, clean air and water, and preservation of scenery. 2/

Darrington, Granite Falls, Concrete, Skykomish, Sedro Woolley and a few others are the remaining towns close to the Forest with residents who place more value on resources than amenities, though the environment and lifestyle of the area are important to them. But with mass communication, the up-river areas are exposed to modern technology, knowledge, and values. Many new residents of the smaller, less urban communities have had little direct experience with resource extractive uses of the Forest. A growing group of these "exurbanites" has already become a major source of opposition to active, visible environmental manipulation; herbicides in Index and Issaquah, and wilderness protection around Glacier are two examples of issues on which rural groups do not espouse wholly traditional values.

In the future, the decline of the traditional rural community is expected to continue, though overall population will increase. The changing local population composition, including greater numbers of people over age 65, a diverse regional economic base, and growth of regional industrial areas is likely to change the occupational patterns and value structures of many smaller towns.

As this occurs, traditional lifestyles in the smaller rural communities will be more and more challenged by new, more urban values and lifestyles. The Forest can expect to see increasing demands for recreation-oriented outputs and increasing challenge to ground and vegetation disturbing management activities as the traditional rural areas continue to evolve. The rate of change can be expected to be faster in towns closer to the metropolitan area, including Sedro Woolley, North Bend, and Enumclaw. Those towns further away, such as Darrington, will experience this change more slowly.

Refer, also, to Table B-67, in Chapter VIII.

2/ Bradshaw and Blakely, Rural Communities in Advanced Industrial Society, 1979.

B. Economic Impact Analysis

The result of the resource assignments and management prescriptions made in Forest Plan alternatives involve important links with the economies of an area. A computer based system, known as IMPLAN 3/, was developed by the Forest Service to assist planning efforts involving economic impact assessment. This system incorporates input-output analysis and enables Forest planners to develop non-survey based inter-industry models, and apply them to the evaluation of alternative management actions.

1. Input-Output Models

Input-output analysis is based upon the interdependence of the producing sectors of an economy. Industries must purchase inputs from other industries, as well as from primary sources, such as the employment of households for use in the production of products, which, in turn, are sold to other industries and final consumers.

Basically, an input-output model is an accounting device which depicts the structure of an economy. Flows of inputs can be traced through the model to show linkages between the industrial sectors of the economy. These linkages are represented by a system of simultaneous equations and the effect of a sale on total production in an economy is derived by solving this system of equations. In short, each purchase from a particular sector by a firm or by a final consumer initiates a series of reverberations throughout the economy. The input-output model traces through the maze of reverberations or interactions to show, when the rounds of spending have come to an end, what the total output of each sector will be given the initial increase or decrease in one of the final demand categories Employment, income, population, and other economic indicators which have a quantifiable relationship with the producing sectors can be estimated based on the level of production or resources made available in an economy.

IMPLAN. The IMPLAN data base consists of two major parts: 1) a national level technology matrix and 2) estimates of sectorial activity for final payments, gross outputs, and employment for each county in the nation. The software component consists of a set of linked programs that utilize the data base and user input to construct influence area input-output models. The approach used to build the regional set of accounts is the supply-demand pooling technique. This approach is based upon the assumption that if an industry is located in an area, and if there is demand for its output, this demand will first be met to the extent possible by the local industry. The IMPLAN system is well suited for economic impact analysis of national forest plans. Given the output levels of a particular forest allocation, input-output analysis indicates likely changes in area income and employment

3/ Gregory S. Alward and Charles S. Palmer, Implan: An Input-Output Analysis for Forest Service Planning

2. Analysis of Economic Impacts

Since changes are based on the economic ties between the Forest and the local economic system, the first step toward assessing any probable changes is to identify the output levels which result from a Forest Service activity and have significant impact or importance to an areas economy. Output levels for 13 different resources were examined and included in the input-output analysis. The resources were chosen based on: 1) their market effects, 2) data available to analyze trade flows within the area of influence, and 3) their ability to reflect the primary differences in the resource production levels between alternatives. Based on the above, the following resources were used as a basis for analyzing the potential economic impacts of each alternative:

Output	Unit of Measure
Developed Recreation:	RVD
General developed recreation	
Camping	
Downhill skiing	
Dispersed Motorized Recreation	RVD
Dispersed Nonmotorized Recreation	RVD
Wilderness Recreation	RVD
Wildlife Recreation:	WFUD
Fishing	
Hunting	
Non-consumption	
Commercial Fish Production	Lbs.
Timber	MBF
Lumber and Wood related	
Pulp and Paper	
Fuel wood	Cords

Forest Service land management activities impact the economy not only through the production of Forest outputs, but also through money paid to counties and annual Forest Service expenditures. Because the expenditures will vary depending on the intensities and outputs of each alternative, they were translated into changes in final demand and included into the analysis.

The procedure for converting changes in forest outputs into changes in final demand involves: 1) determining the per unit expenditure for each of the resources; 2) allocating the per unit expenditures to appropriate sectors; 3) adjusting values to constant dollars (1982); and 4) identifying the changes in output flows. In general, an average per unit market price or value is calculated for each resource, and sectors which have direct impacts are identified. The average value is then margined 4/ throughout these sectors to reflect per unit expenditures in 1982 dollars. In this way, when output flows from various alternatives are input into the IMPLAN system, both the sectors which are influenced and their proportional impacts (changes in final demand) can be determined.

4/ Determining Changes in Final Demand for Implan Economic Impact Analysis, Jay Sullivan.

The input-output model is now capable of tracking the effects of the various output and expenditure levels as they ripple through the area's economy. It allows prediction of the overall changes in income and employment that are likely to result from the land-use decisions made on the Forest.

The model was used to estimate how much of an impact, in terms of employment and income generated, each unit of output would have upon the economy. Table B-20 presents the income and employment response coefficients that would result from an output change of one unit for each resource. For example, for every 1 MRVD of developed recreation which is produced from the Forest, there would be 6.2 jobs and 0.1 $MM added to the area of influence's economy.

Table B-20
Employment and Income Response Coefficients, By Resource

Output	Units	Response Employment 1/ (# of Jobs)	Income ($MM)
Developed Recreation	MRVD	6.2	.1
Dispersed Motorized	MRVD	2.1	.04
Dispersed Nonmotorized	MRVD	1.4	.03
Wilderness Recreation	MRVD	1.4	03
Wildlife Recreation	MWFUD	2.7	.05
Commercial Fish	Mlbs	.1	.003
Timber	MMBF	13.9	.4
Fuelwood	MCORDS	1.2	.03

1/ Direct, indirect and induced employment

Given the output levels for the particular forest land-use assignments of each alternative, the model predicted the likely changes in employment and income. The potential economic impacts, in the form of employment and income, shown in Table B-21 reveal that alternatives which produce commodity based outputs will tend to have more positive impacts on an area's economy. These effects are typical of input-output models. Since the model is based on a linear system, it assumes perfect elasticity of supply, or no resource constraints, and thus ignores the normal forces of supply and demand.

For example, new industries may grow to meet the needs of new technologies and new resource use opportunities on the forest. The model measures benefits and costs as pure monetary transactions. Thus, an economic impact analysis can only reveal the best alternative if the goals are closely specified, such as maximizing employment. Moreover, the conclusions drawn from the economic impacts are bound by the assumptions of input-output analysis Although these assumptions in general do not reduce the usefulness of the analysis, they are reminders of the obvious point that the model and its outputs should not be applied mechanically.

Table B-21
Changes in Employment and Income by Alternative

	Alternatives							
Dec.	NC	A	I	B (RPA)	H	J (Pref)	C	G-Mod.
	Jobs Supported by Alternatives - Thousands of Jobs Per Year							
1st	30.1	29.3	29.1	29.1	28.9	28.8	28.0	28.4
2nd	39.6	39.3	38.9	38.9	38.7	38.6	37.6	38.0
5th	59.1	59.0	63.2	58.0	60.1	59.0	55.6	53.7
	Percent Change in Employment - 5 County Area of Influence							
1st	0	0	0	0	-0.1	-0.1	-0.2	-0.2
	Income Generated by Alternatives - Millions of Dollars Per Year							
1st	559	537	532	531	526	522	501	512
	Percent Change in Income - 5 County Area of Influence							
1st	0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-.02

Forest management decisions affect people in ways that do not pass through the economy or local governments. Recreationists' satisfaction can be directly influenced by changes in recreation opportunities and qualities on the forest. Management practices that change the perceived environmental quality of an area change the attractiveness of that area for its users. The amount and type of activity affects how people feel, particularly if they have always seen the forest as a place to get away from man's interventions and regulations.

Within the zone of influence, local economies have changed. The role of the traditional primary industries, such as timber production, have diminished in recent years. The area now has a broader economic base, which is more stable and adaptable to change and future growth. Social patterns have also changed as discussed above.

The diversity of lifestyles, values, and economic activity in the five county zone of influence makes the overall social-economic analysis a difficult task. In assessing the major tradeoffs between alternatives, one must reach a balance between values associated with preservation and those associated with meeting the need and demand for production.

CHAPTER VI - ANALYSIS PRIOR TO DEVELOPMENT OF ALTERNATIVES

A. Introduction

1. Requirements for and Purposes of Pre-alternative Analysis

The implementing regulations of the National Forest Management Act of 1976 require that an "analysis of the management situation" (AMS) be done prior to the development and analysis of Forest Plan alternatives (36 CFR 219.12 (e). The AMS process was described in Chapter I. Part of the required AMS process are the benchmark analyses. Benchmark runs are done primarily in FORPLAN, although a few (e.g., minimum level management) may be estimated outside the model. The purpose of the benchmarks is to:

help define the maximum economic and biological resource production opportunities on the Forest;

assist in evaluating the compatibilities and conflicts between market and nonmarket objectives;

define the range within which integrated alternatives will be developed;

estimate the schedule of management activities, resource outputs, discounted costs and benefits, present net value, and acres of prescription assignments appropriate for achieving the purposes of the benchmarks; and,

analyze the implications and opportunity costs of legal and policy constraints.

In other words, the benchmarks are used to define the "decision space" within which implementable alternatives must lie (the physical/biological production limits); to assess the opportunity costs of legal and policy constraints applied in the planning process; and to test the sensitivity of final results to major assumptions about activities, outputs, costs, and benefits.

A special note: the timber management plan upon which the No Change Alternative is based was developed in 1963. The plan was not an integrated resource plan, and consequently did not address all resource uses and outputs. As a result the timber output level lies beyond the timber outputs decision space defined by the benchmarks. The No Change alternative could not be implemented or used in future management of the Forest under the Forest Plan without Congressional and/or Secretary of Agriculture action to change the law or regulations.

CHANGES BETWEEN DRAFT AND FINAL - APPENDIX B, CHAPTER VI

This section describes the benchmark runs done for the Analysis of the Management Situation (AMS) completed in 1985 and carried forward to the Draft Environmental Impact Statement (DEIS) completed in 1987. As discussed above, the benchmark runs help define the Forest Plan decision space, as well as provide a structure within which to test the opportunity costs of applying management requirements (MR's) and to test the sensitivity of PNV and output results to changes in costs, prices, and price trends.

The benchmark analysis done for this Forest was thorough, as required by the Regional and Washington Offices, because of the status of the Mt. Baker-Snoqualmie as a "significant timber Forest." However, as described earlier in Chapter III, there were significant changes made in the FORPLAN model between the AMS and the DEIS, and some additional changes made between the DEIS and FEIS. Additionally, other factors such as the scope and definition of MR's changed significantly as the planning process moved ahead. As a result of these changes, all of the benchmarks originally done would have to be reformulated and rerun to make them match closely to the current model formulation, resource definitions, and constraint

The benchmarks have not been reformulated and rerun between the DEIS and FEIS because of the large amount of time and cost that would be involved. Though the model and other factors have changed, the indications of relative magnitude and direction of opportunity costs and sensitivities derived from the original benchmark analyses are still valid. These analyses helped define the development of alternatives for the DEIS. The FEIS builds on that initial process, as well as on what was learned from public input and additional analysis after the DEIS was published.

While the benchmarks were not rerun in their entirety, we did recalculate the decision space (reflected by Benchmark Run #7) in terms of ASQ and PNV, based on the most recent planning parameters as of the time this FEIS and Plan were developed. We also recalculated the opportunity costs of the major constraint sets based on these latest parameters, looking particularly at the effects of the revised spotted owl habitat areas (SOHA's) and the constraints applied as a result of the hydrologic cumulative effects (HCE) analysis. These results can be seen in FEIS Chapter II, Tables II-4 and II-5, Table B-23 of this chapter also displays the same material.

This chapter, then, contains an updated description of the development of the MR's and the constraints used to model these updated MR's. Benchmark results, opportunity cost analysis and sensitivity analysis results do not change from those displayed in the DEIS, except for the sensitivity of the alternative PNV's to varying discount rates. The latter have been updated to reflect the final set of alternatives carried in the FEIS.

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Decision Space Definition. Some benchmark runs are made to indicate the maximum amount of production that could be expected if all available lands and resources were concentrated on producing a single Forest output, such as timber, primitive recreation, or high visual quality. Benchmarks can also indicate the land-use assignments and resource scheduling patterns that would result if cost-efficiency (PNV) were maximized, or if budgets were minimized. Results of several benchmark runs can indicate the decision space within which any implementable alternative must lie. An actual alternative will have multiple objectives and constraints, with the result that all the Forest output and activity levels will lie within the maximums defined by the benchmarks.

Constraints Analysis. Benchmark runs are used for "with and without" comparisons of land-use assignment and scheduling patterns that are the same except for one particular constraint, such as nondeclining yields or wildlife management requirements (MR's). When just one factor is changed from one run

to the next, the changes in PNV and other outputs can be observed, and the opportunity cost of that constraint determined.

Although a simple concept, analysis of the opportunity costs of constraints becomes more complex when a series of interdependent constraints are analyzed. For instance, riparian areas by extended rotation management or no harvest also provide habitat to achieve wildlife MR's. Benchmark runs can be done that show the costs of applying each constraint set, individually, to an otherwise unconstrained land-use base. The results will be one set of opportunity costs for wildlife MR's and another set for riparian area protection. However, if the constraints are applied sequentially, the total effect of both constraint sets will be less than the sum of the two individual opportunity costs.

Sequential application of constraint sets can yield misleading results. It is not appropriate to apply the riparian constraint and calculate the opportunity cost of the riparian constraint, and then apply the wildlife MR constraint on top of the riparian constraint and calculate the incremental opportunity cost, calling the later the opportunity cost of the wildlife MR's. In this case, the riparian opportunity cost would be overstated and the wildlife constraint opportunity cost understated, because the riparian constraint would actually be serving to fulfill some of the wildlife needs as well. If the constraints were applied in the other order, the reverse would hold true.

In general, any time interdependent constraint sets are applied sequentially, the first set applied will show the largest opportunity cost and the last set will show the smallest Changing the order by which the constraint sets are applied can change the relative magnitudes of the respective opportunity costs.

In 1983, the Washington Office issued direction that required more rigorous analysis of the opportunity costs of constraints used in the Forest Planning process (Cargill's memo to Regional Foresters, dated 5/31/83). This memo was in response to dissatisfaction in the Secretary's Office over the quality of analysis in Forest plans seen up to that point. Part of the reason for the "planning pause" discussed in Chapter I was the content of this memo relating to additional requirements for constraints analysis.

Sensitivity Analysis. A number of major assumptions about production functions, costs, and benefits were made in the process of building FORPLAN and setting the base for the analysis of alternatives. A number of the assumptions selected came from a distribution of probable assumptions; there is uncertainty surrounding the actual value or form the assumption will take in the future.

On the Mt. Baker-Snoqualmie, the benchmarks were used to analyze three major economic assumptions in the planning process. One was the assumption that the real price trend for timber would be 1% instead of zero or 2%. Another concerned the level of timber management costs used in FORPLAN models. The third was the effects of using market prices only versus market plus assigned prices in the model The results of these sensitivity analyses are discussed later.

Benchmark runs with FORPLAN can be used to test the sensitivity of any desired factor, whether it be price trends, price levels (e.g., change recreation prices up or down by 50% and see what difference it makes in outcomes), production functions, yield coefficients, etc. Generally, sensitivity analysis runs are limited only by time, budget, and numbers of possible outcomes that can actually be comprehended in the decision-making process.

Benchmark Runs Completed. In order to accomplish the analysis required prior to development of the alternatives, 24 benchmark runs were made with FORPLAN; one benchmark (minimum level management) was done off-line. The results of these benchmarks will be discussed in the rest of this Chapter.

B. Management Requirements (MR's)

1. Development of MR's

The Planning Regulations (36 CFR 219.27) contain certain minimum requirements that must be met in accomplishing the goals and objectives of the National Forests. They cover requirements for resource protection, vegetative manipulation, silvicultural practices, even-aged management, riparian areas, soil and water, and diversity.

Region 6 developed direction to ensure that the minimum requirements were applied consistently across the Region. This direction is contained in letters dated February 9 and April 16, 1983, Land and Resource Management Planning (1920), both letters are available in the Planning Process records.

In response to direction by Deputy Assistant Secretary MacCleery in March, 1985, Region 6 reviewed all of its MR direction. As a result of this review, certain MR's were dropped, and others were modified. That information is reviewed in the June, 1986, Region 6 document "A Report on Minimum Management Requirements for Forest Planning on the National Forests of the Pacific Northwest Region." New direction was issued to Forests in Region 6 by the memo of July 25, 1986, entitled "A Revision to Appendix 2 of the February 9, 1983, MMR Direction."

Again, note that the TM Plan upon which the No Change Alternative is based was developed in 1963. The plan was not an integrated resource plan, and consequently did not address all resource uses and outputs. As a result, Alternative NC does not meet the MR direction.

The Regional direction recognized that some of the minimum requirements were procedural in nature, could not be incorporated in the analysis, or were not likely to have an impact on analysis These requirements have been incorporated into the standards and guidelines, either Forestwide or those unique to a specific management area prescription. Other minimum requirements in the Regulations that impose substantive standards, can be incorporated in the analysis and are significant to the analysis are discussed in detail below.

This section discusses in abridged fashion the development of the MR's. For a detailed discussion of their development and modeling, see Appendix H.

Wildlife

Spotted Owls. To the extent possible, the Forest chose to develop 3 pair SOHA's. SOHA's were initially located on a Forest map on a 12 mile grid, within areas below 4,200 feet in elevation. This initial screen was adjusted to place as many SOHA's as possible in areas not suited for timber production due to wilderness, RNA's, unstable soils, or regeneration difficulty. This second screen was compared against timber size class mapping (a proxy for old

growth) and adjusted to assure as many of the SOHA's were placed in suitable habitat as possible The existence of verified owl pairs from previous field checking was also utilized.

The office map of the SOHA's was reviewed by District personnel, using on-the-ground knowledge of timber productivity, harvest and blowdown since preparation of the data base, and status of preparation investments for sales on the 5 year timber sale program. This review resulted in some minor changes, where SOHA's conflicted with proposed sales. The maintenance of the SOHA took precedence and, if necessary, the sale was dropped or modified to assure that suitable habitat would remain at the time of plan implementation. Sub-Regional coordination was conducted to assure that dispersal was still possible to adjacent Forests. Existing information on status of owls was also reviewed for adjacent National Parks.

This formulation resulted in the establishment of 84 SOHA's necessary to meet the distribution and dispersal requirements contained in Regional Direction, and maintain a minimum viable population.

Efficiency analysis was conducted for a managed versus dedicated strategy for SOHA's. This analysis indicated that the dedicated formulation was more efficient than managed in terms of effect on timber outputs.

Pileated Woodpecker and Marten. Utilizing the mapping done for spotted owls, habitat areas were located between SOHA's to meet the dispersion requirements for these two species. The assumption was made that each pileated woodpecker habitat area would also provide habitat for marten. The same sub-regional coordination described for spotted owls was conducted for these two species The same procedure to assure that suitable habitat was being selected with the least impact on timber harvest programs was used. Again, where conflicts were identified, they were resolved in favor of the wildlife species

Efficiency analysis was conducted for a managed versus dedicated strategy for pileated woodpecker and marten habitat areas utilizing the methodology developed by the Siuslaw National Forest. This analysis indicated that a dedicated strategy was more efficient than a managed strategy in terms of timber outputs In addition, an economic evaluation was conducted for marten habitat areas, comparing managed and dedicated strategies; it confirmed that dedicated was more efficient in terms of PNV at a 4% discount rate.

Mountain Goat The Forest has limited information on the location of winter range utilized by goats. Generalized mapping of winter range was conducted by Ranger District personnel several years ago. It consisted of the general areas where goats were observed during the winter, and areas identified as suitable habitat but not verified to determine goat occupancy. This effort did not precisely identify all goat winter range boundaries. There likely were areas of occupied winter range that were not identified because of the remoteness of the area, and the difficulty in visiting these areas during the winter months.

Based on this information, an estimate of 124 family units was made for the Forest, including some within wilderness. Forty-five acres per family unit were dedicated to goat winter range, and this was modeled as the management requirement level for goats. Of the total 5,580 acres modeled, 1,900 acres are in tentatively suitable timber land base

Subsequent to this initial identification, additional information has been developed by Ranger District field personnel and WDW hunter kill location data. If it is assumed that location of hunter kills is closely correlated with family units, 108 family units are identified outside of wilderness. The identification of family unit locations from hunter kill location data can provide the basis for inferring generalized locations of winter range, but not exact boundaries.

A degree of uncertainty exists as to the exact location of goat winter range and the amount necessary to maintain viable populations. There is general agreement among knowledgeable professionals that goat winter range is unlikely to be reduced at a rate that would threaten viability of the population during the next 10 years, the life of this proposed Plan. This is based on knowledge of the physical characteristics of goat winter range, its proximity to existing road systems, timber volumes per acre, and the economics of timber harvest and roading necessary to support that harvest.

Forest-wide Standards and Guidelines were established as one means of dealing with the uncertainty involved. They provide that, during project design, surveys to determine the presence or absence of goat winter range shall be conducted. When winter range is identified during project design, the Standards and Guidelines included in the mountain goat winter range management strategy shall be followed.

Primary Cavity Excavators. "Wildlife Habitats in Managed Forests, the Blue Mountains of Oregon and Washington" was used to determine the numbers and sizes of snags necessary to maintain populations at 20% of their potential. This information was compared with timber yield tables and it was determined that a 1.5% decrease would be needed to provide the required number and size of hard snags. Timber yield tables have been reduced by 1.5%. It was assumed that sufficient numbers and sizes of snags would remain in areas not suited for timber production to meet the management requirements for these species.

Bald Eagle. Only one eagle nest site is known to exist on the Forest, although suitable habitat is known to exist over a larger area. The known nest site will be protected through Standards and Guidelines following the criteria developed by the Fish and Wildlife Service. Because of the very small acreage involved, nesting sites are not modeled.

A considerable amount of winter feeding occurs within the Forest, but most of it is outside the Forest boundary. It is assumed that winter forage requirements are adequately provided for by the riparian MR as far as modeling is concerned. Therefore, winter foraging is not directly modeled

Peregrine Falcon. Aerial surveys for peregrine falcon nest sites have been conducted by the Department of Game, but none have been located Habitat requirements for this species have not been modeled.

Grizzly Bear. Historical sighting data have been plotted on the Forest. Most of these sightings occur within dedicated wilderness; there is no known occupied habitat. Habitat requirements for this specie have not been modeled, but will be covered under Standards and Guidelines. These will reflect the Grizzly Bear Recovery Plan for the North Cascade Ecosystem.

Fish

The MR for anadromous fish is to maintain the existing smolt production level (Investment Level 1). The MR will be met through compliance with the Clean Water Act of 1977, associated Best Management Practices, and application of the harvest limits associated with the water quality MR (see below).

Water Quality.

The process used by the Forest to complete its hydrologic cumulative effects analysis consisted of two separate parts. These were 1) Watershed Sensitivity Analysis - a preliminary analysis of the sensitivity of all watersheds and the assignment of each watershed to one of three categories of sensitivity and 2) Watershed Condition and Management Requirement Analysis - a three step site-specific analysis of each watershed in the two most sensitivity categories from the Watershed Sensitivity Analysis. The first step of this second analysis further examined the stream channel conditions and upslope conditions for each watershed. The next step was to determine, based on the above conditions and other considerations, whether the watershed was in an acceptable or unacceptable condition. The final step in the second analysis was to establish a maximum level of harvest on National Forest lands that will maintain a watershed in an acceptable condition or will improve an unacceptable watershed to acceptable conditions.

Watershed Sensitivity Analysis.. A preliminary analysis was made of the sensitivity of all watersheds on the Forest using the following set of watershed condition factors: 1) management history, 2) climatic conditions, 3) presence of landslides, 4) inherent soil stability, 5) stream channel stability, and 6) off-site impacts. A team of the Forest's Soil Scientist, Hydrologist, Fishery Biologist, and Geotechnical Engineer made the first-cut analysis based on information at hand and their extensive field experience. This analysis was based on the planning guidance found on pages 8-9 of the "Process for Cumulative Effect Analysis" (RO letter 9/24/84) As a result of this analysis, watersheds were placed in one of three categories defined as follows:

> Category I: watersheds where there has been little or no effect on water quality or quantity values The existing natural and geomorphic features produce stable watershed conditions within the watershed and off-site. Of the total on the Forest, 8 watersheds were rated as Category I.
>
> Category II: watersheds with recent management activity (over the last 30 to 40 years) that, together with some natural events, have caused adverse impacts to water quality - quantity values within and/or outside the Forest's watershed boundaries. The existing natural and geomorphic features can and have produced unstable conditions in some areas of the watershed. There are 53 Category II watersheds on the Forest

Category III: watersheds with a very high frequency of management activities over the past 30 to 40 years. The magnitude of these activities has been significant within the watershed (large areas with activity occurring in a very short time period - 5 to 15 years). The existing natural and geomorphic features have produced and can continue to produce highly unstable and dynamic watershed conditions (within the watershed and off-site). Significant impacts have occurred within and outside the Forest's watershed boundaries. Of the total, 17 watersheds were rated as Category III. All of these lie north of Highway 2.

Watershed Condition and Management Requirement Determination. After the watershed sensitivity analysis, it was determined that an additional, more site-specific, analysis of the Category II and III watersheds would be necessary because of past level of management activities in most of these watersheds. The results of this additional analysis would identify limits of activity necessary to protect or allow recovery of these watersheds. The sensitivity of the Category I watersheds was determined to not be as critical, and normal silvicultural created opening constraints would mitigate any unacceptable adverse cumulative effects.

The Forest organized individual District Interdisciplinary (ID) teams to conduct the watershed condition and management requirement analysis for Category II and III watersheds.

The ID teams were composed of the most experienced personnel (with up to 25 years experience on the Forest) from the Supervisor's Office and each District, many of whom could offer insight from their personal experience over the years of working on the Mt. Baker-Snoqualmie. The team reviewed in-place empirical data and developed historical perspectives on watershed conditions from examination of aerial photos taken over the past 30 to 40 years This process was applied to every Category II and III watershed on the Forest (a total of 70 watersheds).

The Regional Hydrologist worked with the Forest in developing a format for a worksheet for documenting the process in each watershed. That format required the IDT to direct their analysis and answer questions about stream channel conditions. Analysis and discussion were kept separate for upper watersheds (1st and 2nd order streams) and lower watersheds (3rd and 4th order streams). For both the upper and lower watershed areas, the ID teams looked at present and past in-channel stability, streambank stability, status of large woody debris, and channel pattern (lower watershed only).

The teams also looked at upslope conditions by reviewing past harvest rates, road density and condition, presence of landslides, amount of unstable soils, and ability to revegetate and recover.

Some other considerations were incorporated, such as: 1) expectations of the effect of new or improved Best Management Practices (BMP's), 2) what the estimated effects of mitigation measures would be if prescribed, 3) the relationship of the mature sawtimber left in a watershed to streams and unstable soils, 4) the amount of roading necessary to harvest the remaining timber and potential location to streams and unstable soils, and 5) the practicability of helicopter logging.

All of the above analysis and documentation was summarized in order to provide an overall evaluation of the existing watershed conditions. It was also used to reach an agreement on a desired future condition measured at the Forest boundary. Thus, extensive state and private logging outside the National Forest was not considered. Depending upon the consensus of the ID team on the magnitude of the past cause and effect relationships projected to the future, each watershed was rated as being in an acceptable or unacceptable condition. Of the 70 Category II and III watersheds analyzed in detail, 51 were rated acceptable and 19 were rated unacceptable. The preponderance of the unacceptable watersheds -- 15 out of 19, or approximately 80% -- were found on the more geological sensitive north end of the Forest (see Chapter III of the EIS for a description of the geology of the Forest).

Based on the results of their analysis, the ID teams assigned a maximum harvest acreage per decade for each Category II and III watershed. The harvest rate assigned to a watershed is meant to maintain an acceptable condition, or improve an unacceptable condition within the National Forest The harvest rate was developed based on the tentatively suitable acres identified in the EIS and became a management requirement applied to all alternatives.

The consequence of a watershed being rated in an unacceptable condition is the application of a tighter harvest level in that watershed for some period -- usually at least the first two decades of the Plan. This allows for hydrologic recovery to take place before resuming what could be a higher harvest level and still avoid adverse hydrologic cumulative effects.

Only one unacceptable watershed (AZ #31, Deer Cr. SE) was assigned a no-harvest management requirement because of the seriousness of the watershed condition. No harvest will take place for the first two decades of the Plan; harvest will then resume at an acceptable level in the third and subsequent decades.

All of the other unacceptable watersheds showed some level of harvest. In most cases, the level was reduced for the first two decades, then increases in the third and fourth decades. The ID team's rationale was that some harvest could take place in a watershed while recovery was taking place if the harvest activity would be conducted using improved BMP's and located in the less sensitive portions of the watershed.

The documentation and results of the watershed condition and management requirement analyses were reviewed by a Forest Supervisor's Interdisciplinary (ID) team and a Regional ID team to assure consistency in application of the principles of this analysis strategy (See Appendix H and the Forest's planning records for further details of the hydrologic cumulative effects analysis process.)

Riparian Areas

Class I and II streams have been inventoried on the Forest, but Class III and IV have not. Because stream miles are linear, it is difficult to show them in R2MAP. To calculate acres within the streamside area, on-the-ground sampling was conducted to determine actual widths of management areas and treatment that occurred. This sampling was used to arrive at Forest-wide average widths. Sampling was also conducted to determine the densities of class III and IV streams, which was again utilized to calculate Forest-wide mileages.

The average width of SMU's was estimated by reviewing timber sale maps for a two year period on four Ranger Districts. The actual widths of leave strips and individual tree marking areas were measured from the maps. SMU strip widths averaged 225 feet on each side for Class I and II streams and 125 feet on each side for Class III and IV streams. Since these widths represented what was currently being implemented, it was assumed that they exceeded the MR necessary to protect riparian values. They were therefore reduced to 200 feet for Class I and II streams, and 100 feet for Class III and IV.

Based on professional judgment and experience, it was determined that all Class III streams did not require the same degree of protection as the 100 foot width might indicate. The lightly incised Class III stream width was reduced to 10 feet each side of the stream.

Based on the above estimates of stream width and length, acreages of SMU were calculated. For modeling purposes, the SMU acres were modeled as 25% with no timber yield, 50% as extended rotation yield (160 year minimum rotation and harvest entry rate not to exceed 6.25% per decade), and the remaining 25% the same as the adjacent land as if the SMU were not present. SMU acres were modeled only in management areas where the timber intensity prescribed rotations of less than 150 years. The assumption was that riparian areas would be adequately protected by standards and guidelines in areas with longer rotations or no scheduled timber harvest.

The SMU prescription does not apply to Class IV streams. These streams are provided protection through the Forest-wide Standards and Guidelines. The increased cost of implementing Best Management Practices on Class IV streams is reflected in the logging costs calculated by soil stability class.

Timber

The generalized approach for modeling harvest dispersion outlined in Regional Direction was utilized to develop a theoretical starting point. This approach resulted in a harvest dispersion factor of 16-23%, depending on the number of years required to close an opening. On this Forest, the time required for trees to reach 4 1/2 feet in height following regeneration harvest varies by elevation and reforestation method. When reforestation is accomplished by planting, the estimated time for trees to reach 4 1/2 feet in height is 11 years at lower elevations and 13 years at higher elevations. When reforestation is accomplished by natural seeding, the time estimate is 12 years at lower elevations and 16 years at higher elevations.

As a check, some of the theoretical sale layout work completed for unroaded and undeveloped drainages was reviewed and it was estimated that a 30% dispersion factor was appropriate. As a further check, the Gifford Pinchot National Forest was consulted. Their preliminary evaluation indicated that a 28-32% harvest dispersion factor was appropriate for their Forest. A Forest-wide harvest dispersion factor by AZ of 30% for Decades 1 and 2; 20% for Decades 3 and 4; and 20% by North and South for Decades 5 through 15 was used for all Benchmark Runs.

2. Modeling Constraints for MR's

The following constraints were used in FORPLAN to model the MR's:

Wildlife MR's (except Primary Cavity Excavators). All wildlife MR acres, both tentatively suitable and unsuitable, were assigned to a "no-harvest" MR prescription. As noted earlier, analysis showed it was more cost-efficient on this Forest to dedicate somewhat smaller land areas to non-harvest to achieve the MR's, rather than managing larger land areas under extended rotation. The wildlife MR prescription did not allow tentatively suitable acres assigned to it to be available for timber harvest; they could not become part of the suitable acres in solution for that alternative.

Primary Cavity Excavators. As discussed above, the per acre timber yield tables were reduced by 1.5% for each 20% of primary excavator populations maintained by an alternative. It was assumed that there would be sufficient numbers and sizes of snags to meet the management requirements for primary cavity excavators in areas not suited for, or not subject to, timber management.

Fish. No special modeling was developed to meet MR's; Best Management Practices are implicit in the modeling of silvicultural practices and sediment yields, and the harvest constraints for the water quality MR provide additional assurance that watersheds will not be degraded below levels necessary to maintain adequate water quality and viable fish populations.

Water Quality

The water quality management requirement developed by the watershed condition assessment ID teams is incorporated into the Forest's FORPLAN model as a set of constraints. Accessibility constraints applied by allocation zone set a maximum on the amount of an area that can be scheduled for harvest in a decade. The accessibility constraints for the water quality MR were developed by zone for the first decade by calculating the percent of the area that can be entered in the next ten years while maintaining cumulative effects in the watershed at or below the threshold of unacceptable damage. The maximum harvest acreage limits by watershed in the first decade developed by the ID teams form the basis for these accessibility constraints.

For the second and subsequent decades, the water quality MR was modeled by flow constraints on acres of final harvest Forest-wide (by North and South). Accessibility constraints were not used in these decades because of insufficient information available from the model to track the vegetation condition class by zone after management is implemented in the first decade. The flow constraints were developed in concert with the Forest's resource specialists to reflect the continuing need to manage in order to keep cumulative hydrologic effects below the unacceptable damage threshold. The flow constraints allow final harvest acres in the second decade to increase by 4% over the first decade final harvest acres; by 10% in decade 3 over decade 2; by 4% in decade 4 over decade 3; and 0% increase thereafter -- a total increase in final harvest acres of approximately 18% over the first decade levels. (See the Forest's planning records for the detailed calculations involved in developing the FORPLAN harvest constraints for the water quality MR.)

Riparian Areas. Analysis by Forest watershed specialists led to the conclusion that up to 200 feet each side of Class I and II streams, up to 100 feet each side of deeply-incised Class III streams, and up to 10 feet each side of lightly-incised Class III streams will need special management consideration if subject to vegetation manipulation, particularly timber harvest. This area was

designated as Streamside Management Unit (SMU), and a specific prescription (13A) was written to govern its management.

For modeling purposes, 25% of the SMU was allocated to a non-harvest minimum-level intensity; 50% could be harvested on minimum 160-year rotation; and the other 25% was left in the original allocation choice assignment. (In other words, this last 25% would generally be allocated to the same management activity as that adjoining the SMU.) The extended rotation of the SMU had all silvicultural options available to it. The SMU prescription did not apply to Class IV streams; they are protected under the Forest-wide Standards and Guidelines.

Harvest Unit Dispersion. Silvicultural guidelines and NFMA vegetation management and diversity specifications (36 CFR 219.27(d),(g)) required the use of a constraint on the maximum area the model could be allowed to schedule for harvest in any given decade. In order to meet these guidelines and specifications, at least one decade of regeneration growth (on the average) would be required on a harvest unit before the adjacent stand could be harvested. Analysis on the Forest and within the Region indicated that approximately 30% of an area could be cut in Decades 1 and 2 of the planning horizon without violating the adjacency requirements. Because of the cumulative effects of adding harvest units, that percentage was dropped to 20% in the third and fourth decades. Thus, after four decades an entire area could be cut over without violating the guidelines and requirements.

In FORPLAN, these requirements were proxied by applying accessibility constraints to the coordinated allocation choices for each AZ by decade for the first four decades. Acres assigned to full timber management were limited to a maximum of 30% harvest in the first decade, an additional 30% in the second, another 20% in the third, and final 20% in the fourth. Thereafter, a general relational constraint was applied to the north part of the Forest and to the south part of the Forest, respectively. This constraint allowed a maximum of 20% of the acres assigned to timber management on each of those parts of the Forest to be harvested in any given decade.

It is important to note that the percentages used are maximums. There were many instances when FORPLAN chose to harvest fewer acres than allowed by the constraint. The accessibility constraints, though, are cumulative constraints. That is, the model could theoretically not cut anything for two decades, then cut 80% of an area in the third decade. We did not observe this actually happening when analyzing the benchmark and alternative runs.

The modeling results of the accessibility constraints were tested by actually plotting units as scheduled for harvest in a benchmark run onto an AZ/AA map. The resulting pattern indicated that the adjacency requirements could be met in most instances, though not with a lot of leeway. The constraint level proxied the desired result quite well. (In actual implementation, more flexibility would be allowed between AZ's to move harvest units away from problem areas into areas that can absorb higher than the 30/30/20/20 entry rate modeled in FORPLAN).

3. Constraint Overlap

As discussed above, constraints are often interdependent. Standing alone, each constraint set developed will provide for the particular management requirements for which it is designed. However, when applied in the same benchmark or alternative run, one constraint set will often, additionally, provide for some of the management requirements covered by a separate constraint set. For instance, spotted owl habitat areas are often located along streams. If the spotted owl area is dedicated to non-harvest, it would be redundant to also designate and constrain for a SMU through the same area. By constraining for the spotted owl area, the riparian area protection requirements are already met.

Overlaps were calculated among the various constraint sets to avoid such double counting (which is a particular problem when constraints are applied to AA acres, rather than to AZ's or other specific geographic areas). Where constraint sets overlapped, only the most limiting was applied. Therefore, total acres affected by all constraints are fewer than the sum of the acres in each individual constraint set.

4. Additional MR Analysis

Additional discussion on the description, background, development and analysis of the MR's is included in Appendix H. The appendix describes MR's with potentially significant effects on resource outputs or environmental consequences, and presents the results of testing the sensitivity to varying the MR levels.

C. Benchmark Analysis

1. Constraint Analysis

Three major constraint sets were used in the benchmarks and alternatives (wildlife MR's, riparian area MR's and dispersion/accessibility constraints) for the AMS and DEIS. They were analyzed to determine their individual maximum opportunity costs, and the opportunity cost for all three applied concurrently. These analyses were based on Benchmark Run #3 (all the benchmark runs are discussed in detail later in this chapter), the basic "maximize PNV" run with no minimum management constraints, but with nondeclining yield and 95% CMAI applied. (The constraints were not analyzed separately against each of the other benchmark runs).

Between the DEIS and FEIS, the harvest constraints for water quality resulting from the hydrologic cumulative effects analysis were incorporated into the Forest planning process and into FORPLAN. This constraint set was also analyzed to determine its individual maximum opportunity cost, as well as the opportunity cost when applied along with the other three major constraint sets.

The individual constraint sets were added one-at-a-time to Run #3. In this way, they were considered individually without overlap of the other constraint sets in the model, and the maximum opportunity cost associated with each constraint set was calculated separately. The four constraint sets were applied concurrently in Run #7. The differences between Run #3 and Run #7 represent the opportunity costs of the four sets together.

Table B-23 shows the difference between Run #3 and each constraint set individually, and then in combination, as represented by Run #7. In all cases, an interdependence between the individual constraint sets is indicated. The difference between Run #3 and Run #7 is less than the sum of the four constraint sets individually. The full output/effects tables, Tables B-27, B-28, and B-29, for the initial three constraints analysis benchmark runs are found in part D of this chapter. (Because of the modeling changes between the AMS benchmark runs and the FEIS, as discussed at the beginning of this chapter, the harvest limts for water quality constraint set was not run in a full-blown benchmark run with all outputs and effects calculated.)

A significant reduction in harvest figures (both LTSY and ASQ) as well as harvest acres is observed when MR's are applied. Less intensive timber management prescriptions are also selected, which accounts for the much lower decrease in PNV (14%) compared to the decrease in first decade ASQ (approximately 41%) or the decrease in total harvest acres over the first five decades (approximately 37%).

Table B-23
Opportunity Costs of MR's (NDF)

	LTSYC	ASQ 1st Decade	Suitable Lands	Final Harvest (5 Decade Total)	Planting (5 Decade Total)	Pre-Commercial Thin (5 Decade total)	PNV
Unit of Measure	MMCF	MMCF	M Acres	M Acres	M Acres	M Acres	$MM
Run #3 1/	66 2	63 9	606 9	39 0	29 5	21 4	2631
Dispersion MR	59 6	59 1	606 9	36 6	22 8	16 8	2484
Actual Change	-6 6	-4 8	0	-2 4	-6 7	-4 6	-147
Percent Change	-10%	-8%	0	-6%	-23%	-21%	-6%
Wildlife MR	51 3	50 1	529 5	31 4	18 7	14 2	2410
Actual Change	-14 9	-13 8	-77 4	-7 6	-10 8	-7 2	-221
Percent Change	-22%	-22%	-13%	-20%	-37%	-34%	-8%
Streamside MR	62 3	59 6	583 4	36 4	26 9	19 3	2580
Actual Change	-3 9	-4 3	-23 5	-2 6	-2 6	-2 1	+11
Percent Change	-6%	-7%	-4%	-7%	-9%	-10%	+0 4%
Hydro C E MR	41 3	41 0	482 0	26 4	11 3	9 2	2297
Actual Change	-24 9	-22 9	-124 9	-12 7	-18 2	-12 2	-334
Percent Change	-38%	-36%	-21%	-32%	-62%	-57%	-13%
Run #7 1/	37 5	37 5	463 8	24 4	8 4	7 3	2254
Actual Change Run 3 to Run 7	-28 7	-26 4	-143 2	-14 6	-21 1	-14 1	-377
Percent Change Run 3 to Run 7	-43%	-41%	-24%	-37%	-72%	-66%	-14%

1/ Run #3 is Maximum PNV without MR's Run #7 is Maximum PNV with MR's

2. Required Benchmarks

There were seven benchmark runs required by NFMA regulations and the Region 6 planning direction (36 CFR 219.12 (e) (1) and memo of November 10, 1983, respectively). The required benchmark runs were:

Minimum Level Management - specifies the minimum level of management which would be needed to maintain the Forest as a part of the National Forest System, and to manage uncontrollable outputs and uses. (This benchmark was estimated outside of FORPLAN) See Table B-24 in this chapter.

Biological Timber Potential - specifies the management, outputs, costs, and effects that would occur to produce the biological timber potential with no constraints such as nondeclining yield (NDY), 95% CMAI, MR's, etc. (Run #1) See Table B-25 below

Maximum Present Net Value based on Assigned Prices (without MR's) - specifies the management which will maximize the present net value of those outputs that have assigned and market prices, NDY, 95% CMAI, with no MR's applied. (Run #3); see Table B-26.

Maximum Present Net Value based on Assigned Prices with MR's - specifies the management which will maximize PNV of those outputs that have assigned and market prices, NDY, 95% CMAI, with MR's applied. (Run #7) See Table B-37.

Maximum Timber Resource - specifies the management which will maximize timber outputs given NDY, 95% CMAI, and with MR's applied. See Table B-44.

Maximum Primitive and Semiprimitive Nonmotorized Recreation Opportunities - specifies the management which will maximize dispersed recreation in the Primitive and Semiprimitive Nonmotorized ROS classes. See Table B-45.

Current Direction - specifies the management most likely to be implemented in the future, and the resulting outputs, costs, and effects, if current plans and existing direction are followed. Three versions of this run were done. The first was current direction without the MR's required by NFMA, the truest representation of currently approved management direction for the Forest, and the reason why a new planning action is required. The second included MR's and the current first decade timber output requirement, to do this the NDY constraint had to be dropped. The third included MR's but no first decade timber harvest requirement, so NDY was maintained See Tables B-46, B-47 and B-48.

3. Other Benchmark Run

Variations of Runs #3 and #Z - Using Different Harvest Flow and Rotation Length Requirements.

a. Maximum PNV, assigned prices, no MR's, harvest allowed to fluctuate up or down by 20% compared to the harvest in the previous decade (known as 20% sequential upper and lower bounds), and final harvest allowed when trees reach utilization standards (7" DBH, 4" tops). This is the same as Run #3, Table B-26, except that nondeclining yield is replaced by harvest flows allowed to fluctuate by 20% from decade to decade, and harvest at 95% CMAI is replaced by harvest at utilization

standards -- a shortening of the minimum rotation by as much as 40 years. (Run #2) See Table B-30.

b. Maximum PNV, assigned prices, MR's included, 20% harvest fluctuations allowed, rotations based on utilization standards - same as Run #2 above, except that the MR constraint sets were added. (Run #4) See Table B-31.

c. Maximum PNV, assigned prices, MR's included, 20% harvest fluctuations allowed, 95% CMAI - same as Run #4, except using 95% CMAI instead of utilization standards. (Run #5) See Table B-33.

d. Maximum PNV, assigned prices, MR's included, nondeclining yields, rotations based on utilization standards; same as Run #4, except using nondeclining yields instead of fluctuating harvests. (Run #6) See Table B-35.

Variations Using Market Prices Only

a Maximum PNV, market prices, MR's, 20% harvest fluctuations allowed, rotations based on utilization standards - same as Run #4, except market prices only, rather than market plus assigned prices, used. (Run #8) See Table B-32.

b. Maximum PNV, market prices, MR's, 20% harvest fluctuations allowed, 95% CMAI - same as Run #5, except market prices only. (Run #9) See Table B-34

c. Maximum PNV, market prices, MR's, NDY, rotations based on utilization standards - same as Run #6, except market prices only. (Run #10) See Table B-36.

d. Maximum PNV, market prices, MR's, NDY, 95% CMAI - same as Run #7, except market prices only. (Run #11) See Table B-38.

Sensitivity Analysis Runs - See Tables B-39 through B-43 in part D for results of these five sensitivity analysis runs.

a. Same as Run #7, except that real timber price trends of 0% used.

b Same as Run #7, except that real timber price trends of 2% used.

c. Same as Run #7, except that real timber price trends of 3% used.

d. Same as Run #7, except that timber management-related costs (not including road construction and logging costs) were decreased 20%.

e. Same as Run #7, except that timber management-related costs (not including road construction and logging costs) were increased 20%.

Constraints Analysis Runs - The output results from the three initial constraint set runs (wildlife MR's, riparian area MR's and dispersion constraints) are shown in Tables B-27, B-28 and B-29 in part D of this chapter. Selected results of these three constraint analysis runs, along with those from the set of harvest limits for the water quality MR added between the

Draft and Final, are used in Table B-23 to show the opportunity costs of the constraint sets.

a Same as Run #3, except that full wildlife MR's constraint set added.

b. Same as Run #3, except that full riparian MR's constraint set added.

c. Same as Run #3, except that full dispersion/accessibility constraint set added.

D. Benchmark Detail

This section describes in detail the objectives, the assumptions incorporated, and the results of the required benchmark runs. Output tables are also given for benchmark runs that are primarily versions of the required benchmark runs, as shown above. A discussion is presented of the major differences between and among the various benchmark runs.

1. Minimum Level

Description and Purpose. The minimum level benchmark, Table B-24, specifies the level of management which would be needed to maintain the Forest as part of the National Forest System; provide for the protection of the life, health, and safety of the incidental Forest user, prevent environmental damage to lands or resources on adjacent or downstream lands of other ownerships; prevent significant impairment of the productivity of the land; and administer unavoidable non-Forest Service permits and leasable minerals. This benchmark was developed outside the FORPLAN model.

Assumptions and Constraints. 1) The transition costs of moving from the current situation to minimum level management were not included. 2) A minimum organization and a low level of management are needed to protect the life, health, and safety of incidental users; prevent environmental damage to adjacent non-Forest Service lands; and administer uncontrollable outputs and uses.

Results. Dispersed and developed recreation occur at levels far below current use, primarily because facilities such as roads and campgrounds are no longer maintained. In fact, recreation declines in future decades as non-maintained facilities become less and less useable. However, some use will still occur on the Forest, primarily along the periphery and by trail.

No timber sales are programmed in this alternative; therefore, ASQ and LTSYC are zero. No new roads are constructed; road reconstruction takes place only to the extent necessary to provide access for protection purposes. Sediment production overall decreases over time toward background levels as roads are closed. Some small localized areas of sediment increase may occur where areas in need of revegetation or stabilization do not receive that treatment.

Returns to the Treasury are minimal, coming primarily from salvage and sanitation sales made in response to resource protection needs. Some receipts may accrue where resource extraction activities such as gas, oil, and geothermal development take place under auspices of other laws.

As the environment returns to a more natural state, resources requiring low or no vegetation disturbance are favored. These would include archaeological,

Table B-24

Minimum Level Benchmark Run

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	312	304	298	293	288
Roaded Modified	MRVD	Included in Roaded Natural				
Roaded Natural	MRVD	829	808	791	778	765
Semi-Primitive Motorized	MRVD	0	0	0	0	0
Semi-Primitive Nonmotorized	MRVD	70	68	67	65	63
Primitive	MRVD	30	29	28	28	27
Winter Dispersed	MRVD	Not estimated				
Total	MRVD	1241	1209	1184	1164	1143
Wilderness						
Transition	MRVD					
Semi-Primitive Trailed	MRVD					
Primitive Trailed	MRVD					
Trailless	MRVD	Included in recreation				
Trailless Pristine	MRVD					
Total	MRVD					
Wilderness	M Acres	718 6	718.6	718.6	718.6	718.6
Fish and Wildlife						
Hunting	MWFUD	Included in recreation RVD's				
Nonconsumptive	MWFUD	Included in recreation RVD's				
Resident Fish	MWFUD	Included in recreation RVD's				
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	Not estimated				
Deer	Numbers	Not estimated				
Timber						
LTSYC	MMCF					
ASQ	MMCF					
ASQ	MMBF					
Final Harvest (Exist)	M Acres					
Reforestation (Plant)	M Acres	No timber management activities				
Reforestation (Natural)	M Acres					
PCT	M Acres					
Suitable Land	M Acres					
Suitable - Old Growth	M Acres					
Soil and Water						
Sediment	M Tons	Not estimated				
Facilities						
Arterial and Collector Roads	Miles	No new roads				
Local Roads	Miles					
Socio-Economic						
PNV	$MM	Not estimated				
Budget	$MM	3	3	3	3	3

2. Biological Timber Potential (Run #1)

Description and Purpose. This run establishes the highest possible level of timber outputs that can be sustained given a policy of non-declining flow, 95% CMAI, and in the absence of MR's. The run is initially made with a maximize timber in the Decade 1 objective function. Utilizing first decade timber harvest outputs as a constraint, a second run is made to maximize timber harvest for 15 decades. This second run is then rolled over using the first and 15th decade harvest levels as constraints to a maximize PNV objective function. The results of the third run are those shown in Table B-25.

Another purpose of this run is to calibrate the FORPLAN model in terms of timber information.

Assumptions and Constraints

- All lands identified as tentatively suitable are available for assignment to a timber prescription.
- The ending inventory constraint is applied.
- The non-declining flow constraint is applied.
- Rotation is based on 95% CMAI.
- Ending inventory constraint is applied.
- No budget constraint is applied
- Tentatively suitable lands within the Alpine Lakes and Skagit Wild and Scenic River are available for timber production, regardless of their current allocation in the approved plans.

Results. The average productivity from Run #1 was compared to the average productivity indicated in the current Timber Management Plan and also the average productivity in the 1979 Draft Timber Management Plan. The comparison was made using board foot values, since the current plan does not contain cubic foot information.

Source	Board Feet/Acre/Year
Run #1	551
Current Plan	373
1979 Draft Plan	660

The potential yield figure expressed in the current Timber Management Plan was developed utilizing the Hanzlik Formula and an area volume check. Any adjustments made to this are unknown. Because of the age (1963) and volume derivation methods used in this plan, it was decided to compare Run #1 outputs to the 1979 Draft Timber Management Plan.

	Draft TM Plan (1979)	Run #1
CFL/Tentatively Suitable (Acres)	770,781	604,800
Average Annual Production (MMBF)	508.6	333.3 1/
Board/Feet/Acre/Year	660	551
Average Site Index (100 Years)	133	113
Yield Generator	DFIT	DFSIM

Run #1 shows approximately a 17% decrease in board feet per acre productivity from the biological potential calculated in the 1979 Draft Timber Management Plan. A major portion of this difference is explained by the average site index used for the Forest between the two calculations. The difference between a site index of 133 and 113 would account for a difference in productivity of approximately 13%. In addition, the 1979 Draft Timber Management Plan assumed a genetics gain of 10% while a refined method of calculating the genetics increase for Run #1 shows only a 6.6% increase. The 1979 Draft Plan also assumed more acres would be available for precommercial and commercial thinning than are available in the existing current planning effort.

Based on the above evaluation, it was determined that the model was reasonable in terms of timber information provided.

1/ Reduced from benchmark output (334.5) proportional to approved tentatively suitable acres.

Table B-25
Biological Timber Potential Benchmark Run (Run #1)

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1134	1228	1425	1555	1831
Roaded Natural	MRVD	1032	970	840	756	574
Semi-Primitive Motorized	MRVD	16	16	16	16	16
Semi-Primitive Nonmotorized	MRVD	186	179	168	153	131
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7750	7775	7826	7862	7934
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0.6	0 6	0 6	0 6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352.6	352 6	352.6	352.6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	398	404	416	424	441
Nonconsumptive	MWFUD	25	26	26	26	27
Resident Fish	MWFUD	113	114	116	117	119
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1072	997	957	885
Deer	Numbers	19657	21350	20270	20191	18759
Timber						
LTSYC	MMCF	-	-	-	-	72 6
ASQ	MMCF	68 4	68.4	68 4	68.4	68 4
ASQ	MMBF	334.5	334 5	334 5	334 5	334 5
Final Harvest (Exist)	M Acres	9.033	8.999	8.485	7 417	8 444
Reforestation (Plant)	M Acres	7.859	7 829	7 382	6 453	7 346
Reforestation (Natural)	M Acres	0 0	0 0	0 0	0.0	0 0
PCT	M Acres	-	5 496	7 227	7 199	6 788
Suitable Land	M Acres	606 9	606 9	606 9	606 9	606 9
Suitable - Old Growth	M Acres	317	227	155	77	35
Soil and Water						
Sediment	M Tons	167.9	181.2	169.1	157.0	158 9
Facilities						
Arterial and Collector Roads	Miles	1 9	20 7	0 4	-	-
Local Roads	Miles	18 9	62 2	36 1	11 7	5 8
Socio-Economic						
PNV	$MM	2599.7	-	-	-	-
Budget	$MM	25.1	38 5	29.1	25.0	25 3

3 Maximum Present Net Value Based on Assigned Prices, No MR's (Run #3)

Description and Purpose. This is the first Benchmark Run that maximizes PNV utilizing both market and assigned values, rotations restricted to 95% CMAI, non-declining flow, and in the absence of MR's. This run will be utilized later to determine the opportunity costs associated with including the MR constraints.

Assumptions and Constraints. This Benchmark Run is formulated according to Regional Direction. The constraints that apply are:

- Objective function - maximize PNV for 15 decade
- Land base - tentatively suitable lands.
- Ending inventory constraint is applied.
- MR's are not included.
- NDF constraint is applied.
- Rotations are based on 95% CMAI.
- Budget is not constrained

Results. The results of this run (and its variations) by selected outputs and effects are shown in Tables B-26 through B-29. With the absence of MR's, this run has the highest level of suitable acres, with the exception of Run #1, Table B-25. It also has the second highest LTSYC and PNV.

A major portion of the required new road construction is being deferred until the second decade when timber values have increased slightly due to price trending, and when some discounting has occurred. This would tend to concentrate timber harvesting more in those areas that already have some roads in place, and have already been heavily harvested. The addition of MR's which includes a dispersal requirement tends to moderate this situation as can be seen by comparing road construction in this run to Run #7, Table B-37.

Recreation capacity for roaded modified increases with time and decreases in the SPNM and P Classes as timber harvest occurs.

Nearly all of the harvest in the first decade occurs in the old growth component of the suitable acres.

Table B-26

Maximum PNV, Assigned Prices, No MR's Benchmark Run (Run #3)

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1134	1214	1407	1487	1694
Roaded Natural	MRVD	1032	979	853	800	664
Semi-Primitive Motorized	MRVD	16	16	16	16	16
Semi-Primitive Nonmotorized	MRVD	186	180	165	158	142
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7750	7771	7823	7843	7898
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0.6	0 6	0.6	0.6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352 6	352 6	352 6	352 6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	398	403	415	420	432
Nonconsumptive	MWFUD	25	26	26	26	27
Resident Fish	MWFUD	113	114	115	116	118
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1072	1002	964	901
Deer	Numbers	19657	21472	20216	20009	18782
Timber						
LTSYC	MMCF	-	-	-	-	66 2
ASQ	MMCF	63 9	63 9	63.9	63 9	63 9
ASQ	MMBF	312 5	312 5	312.5	312 5	312 5
Final Harvest (Exist)	M Acres	8 408	8 412	8 049	6 350	7 747
Reforestation (Plant)	M Acres	6 687	6 062	5 632	5 054	6 099
Reforestation (Natural)	M Acres	0 722	1 444	1 575	0.541	0.737
PCT	M Acres	-	5 496	5 956	5 189	4.759
Suitable Land	M Acres	606 9	606 9	606 9	606.9	606 9
Suitable - Old Growth	M Acres	317	233	167	92	53
Soil and Water						
Sediment	M Tons	160 9	175 9	170 5	159 5	157 8
Facilities						
Arterial and Collector Roads	Miles	1 6	21 0	0 4	-	-
Local Roads	Miles	15 3	62 9	38 2	12.1	6 2
Socio-Economic						
PNV	$MM	2630.9	-	-	-	-
Budget	$MM	23.4	37.4	27.9	24 0	23.2

Table B-27
Benchmark Run #3 with Wildlife MR's Only

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1057	1125	1292	1360	1551
Roaded Natural	MRVD	1096	1052	942	897	772
Semi-Primitive Motorized	MRVD	19	19	19	19	19
Semi-Primitive Nonmotorized	MRVD	189	184	171	166	151
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7743	7762	7806	7824	7875
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0 6	0 6	0 6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352.6	352 6	352 6	352 6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	396	400	410	414	426
Nonconsumptive	MWFUD	25	26	26	26	27
Resident Fish	MWFUD	113	114	115	115	117
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1075	1012	976	922
Deer	Numbers	19657	21579	20137	19748	18638
Timber						
LTSYC	MMCF	-	-	-	-	57.8
ASQ	MMCF	55 8	55 8	55 8	55.8	55.8
ASQ	MMBF	272 9	272.9	272.9	272.9	272.9
Final Harvest (Exist)	M Acres	7 443	7.457	7.099	5.440	6.930
Reforestation (Plant)	M Acres	5 276	5.356	4.307	4 337	5.080
Reforestation (Natural)	M Acres	1 379	1.301	2.148	0 455	1.091
PCT	M Acres	-	5.474	4.484	4 579	3.388
Suitable Land	M Acres	549.2	549 2	549 2	549 2	549.2
Suitable - Old Growth	M Acres	265	190	132	66	40
Soil and Water						
Sediment	M Tons	130.0	147 6	139 4	131 0	133.8
Facilities						
Arterial and Collector Roads	Miles	1.6	21 0	0.5	0 0	-
Local Roads	Miles	13 3	55 5	34 7	10 9	5.7
Socio-Economic						
PNV	$MM	2497.9	-	-	-	-
Budget	$MM	26.0	27.0	23 7	21 0	19.4

Table B-28
Benchmark Run #3 with SMU Constraint Only

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1096	1170	1352	1426	1639
Roaded Natural	MRVD	1063	1015	896	847	708
Semi-Primitive Motorized	MRVD	17	17	17	17	17
Semi-Primitive Nonmotorized	MRVD	188	182	168	162	145
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7746	7766	7815	7834	7891
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0.6	0.6	0 6	0 6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352.6	352.6	352.6	352.6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	347	402	413	417	430
Nonconsumptive	MWFUD	25	26	26	26	27
Resident Fish	MWFUD	113	114	115	116	117
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1075	1006	971	912
Deer	Numbers	19657	21536	20170	19852	18712
Timber						
LTSYC	MMCF	-	-	-	-	62.3
ASQ	MMCF	59.6	59 6	59 6	59 6	59 6
ASQ	MMBF	291 4	291 4	291 4	291.4	291.4
Final Harvest (Exist)	M Acres	7.841	7 847	7 517	5.924	7.233
Reforestation (Plant)	M Acres	6.039	5 557	5 164	4.639	5.546
Reforestation (Natural)	M Acres	0.900	1 460	1 581	0.592	0.858
PCT	M Acres	-	4 973	5 313	4.721	4.327
Suitable Land	M Acres	583.4	583 4	583 4	583.4	583.4
Suitable - Old Growth	M Acres	304	225	165	94	57
Soil and Water						
Sediment	M Tons	171.1	185 7	180 7	176.5	171.3
Facilities						
Arterial and Collector Roads	Miles	1 2	21 3	0 5	0 0	-
Local Roads	Miles	14 4	54 9	34 3	10 8	5 6
Socio-Economic						
PNV	$MM	2579 7	-	-	-	-
Budget	$MM	22.2	35 3	26 4	22.8	22 1

Table B-29

Benchmark Run #3 with Dispersion and Accessibility Constraints Only

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1134	1237	1343	1442	1669
Roaded Natural	MRVD	1032	964	894	829	681
Semi-Primitive Motorized	MRVD	16	16	16	16	16
Semi-Primitive Nonmotorized	MRVD	186	178	170	162	144
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7750	7770	7805	7831	7892
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0.6	0.6	0.6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352.6	352 6	352.6	352.6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	398	404	412	417	431
Nonconsumptive	MWFUD	25	26	26	26	27
Resident Fish	MWFUD	113	114	115	116	117
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1082	996	973	909
Deer	Numbers	19657	21551	20157	19810	18592
Timber						
LTSYC	MMCF	-	-	-	-	59.6
ASQ	MMCF	59 1	59 1	59.1	59 1	59.1
ASQ	MMBF	289 0	289 0	289 0	289 0	289.0
Final Harvest (Exist)	M Acres	7 690	7 707	7.398	6.779	7.015
Reforestation (Plant)	M Acres	4 300	4 766	5 104	4 450	4 216
Reforestation (Natural)	M Acres	2.747	2 229	1.531	1 664	2.169
PCT	M Acres	-	5 496	3 222	3.788	4.285
Suitable Land	M Acres	606 9	606.9	606 9	606.9	606.9
Suitable - Old Growth	M Acres	317	244	184	130	63
Soil and Water						
Sediment	M Tons	188 0	185 4	175 4	174.3	170.5
Facilities						
Arterial and Collector Roads	Miles	15.0	7.8	0.2	-	-
Local Roads	Miles	60 1	46 6	18 1	8.7	1.2
Socio-Economic						
PNV	$MM	2483.8	-	-	-	-
Budget	$MM	32.2	30 1	23.3	22.5	20.8

Table B-30

Benchmark Run #2 with Max PNV, Assigned Prices, No MR's ±20% Seq. Bnds, Util Stds.

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1105	1254	1468	1596	1803
Roaded Natural	MRVD	1065	968	828	744	608
Semi-Primitive Motorized	MRVD	16	16	16	16	16
Semi-Primitive Nonmotorized	MRVD	186	174	158	148	131
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7754	7794	7852	7886	7940
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0.6	0 6	0 6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352.6	352 6	352 6	352 6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	394	408	421	429	441
Nonconsumptive	MWFUD	25	26	26	26	27
Resident Fish	MWFUD	113	115	116	117	119
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1092	1024	991	939
Deer	Numbers	19459	21514	19843	19215	18336
Timber						
LTSYC	MMCF	-	-	-	-	46 3
ASQ	MMCF	105 7	84.5	67 6	54 1	43.3
ASQ	MMBF	516.9	413 2	330 6	264.5	211.7
Final Harvest (Exist)	M Acres	13 881	11 002	7 956	6 531	5 401
Reforestation (Plant)	M Acres	4.253	2 393	2 211	1.420	1.175
Reforestation (Natural)	M Acres	8 992	8 251	5 415	4 899	4 050
PCT	M Acres	-	5 288	1 513	-	0 589
Suitable Land	M Acres	597 7	597 7	597 7	597 7	597 7
Suitable - Old Growth	M Acres	317	178	87	64	33
Soil and Water						
Sediment	M Tons	186 6	190 1	178 3	166 9	161 0
Facilities						
Arterial and Collector Roads	Miles	4 4	18 2	0 4	-	-
Local Roads	Miles	24 6	62 1	32 2	10 9	5 0
Socio-Economic						
PNV	$MM	2795 7	-	-	-	-
Budget	$MM	25.5	32 7	19 2	15.4	11 8

Table B-31

Benchmark Run #4, Max PNV, Assigned Prices, MR's, ± 20% Seq. Bnds., Util. Stds.

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	961	1065	1166	1253	1431
Roaded Natural	MRVD	1206	1138	1072	1015	898
Semi-Primitive Motorized	MRVD	20	20	20	20	20
Semi-Primitive Nonmotorized	MRVD	190	182	174	167	153
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7759	7787	7814	7837	7884
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0.6	0 6	0.6	0 6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352 6	352.6	352.6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	398	405	411	416	427
Nonconsumptive	MWFUD	26	26	26	27	27
Resident Fish	MWFUD	114	114	115	116	117
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1083	1014	977	923
Deer	Numbers	19459	21379	19986	19478	18428
Timber						
LTSYC	MMCF	-	-	-	-	36.3
ASQ	MMCF	56 0	54 1	56 9	45 5	36 4
ASQ	MMBF	273 8	264 5	278 2	222.5	178 0
Final Harvest (Exist)	M Acres	7 469	7 082	7 156	5 303	4.689
Reforestation (Plant)	M Acres	1 624	1 540	1 822	1 154	1 020
Reforestation (Natural)	M Acres	5 602	5.312	5 062	3 977	3 517
PCT	M Acres	-	4 279	-	-	0.326
Suitable Land	M Acres	515	515	515	515	515
Suitable - Old Growth	M Acres	256	192	135	92	42
Soil and Water						
Sediment	M Tons	152 3	146 7	143 6	135.1	132 1
Facilities						
Arterial and Collector Roads	Miles	18 9	3 9	0 3	0.0	-
Local Roads	Miles	56 8	42 9	12 9	7.1	0 4
Socio-Economic						
PNV	$MM	2409 2	-	-	-	-
Budget	$MM	25 9	20.7	14 6	12 5	9 7

Table B-32

Benchmark Run #8, Max PNV, Market Prices, MR's, ±20% Seq. Bnds., Util. Stds.

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1007	1104	1203	1298	1476
Roaded Natural	MRVD	1139	1075	1010	948	831
Semi-Primitive Motorized	MRVD	21	21	21	21	21
Semi-Primitive Nonmotorized	MRVD	192	184	176	169	155
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7741	7766	7792	7818	7865
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0.6	0 6	0 6	0 6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352.6	352.6	352 6	352 6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	395	406	407	412	423
Nonconsumptive	MWFUD	25	25	25	26	26
Resident Fish	MWFUD	113	114	114	115	117
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1085	1015	976	924
Deer	Numbers	19459	21404	19942	19409	18496
Timber						
LTSYC	MMCF	-	-	-	-	37 2
ASQ	MMCF	54 5	54 1	58 8	47.0	37.6
ASQ	MMBF	266 5	264 5	287 5	229 8	183 9
Final Harvest (Exist)	M Acres	7 238	7 082	7.387	5 419	4 862
Reforestation (Plant)	M Acres	1 574	1 540	1 607	1 179	1 058
Reforestation (Natural)	M Acres	5 429	5 312	5.540	4 064	3 646
PCT	M Acres	-	5 142	-	-	-
Suitable Land	M Acres	523 1	523 1	523 1	523 1	523 1
Suitable - Old Growth	M Acres	256	192	135	92	42
Soil and Water						
Sediment	M Tons	151 4	145 9	141 4	136 6	131 0
Facilities						
Arterial and Collector Roads	Miles	18 9	3 9	0 3	0.0	-
Local Roads	Miles	56 8	42 9	12 9	7 1	0 4
Socio-Economic						
PNV	$MM	1510 3	-	-	-	-
Budget	$MM	25 8	20 9	14 8	12.8	9.8

Table B-33
Benchmark Run #5, Max PNV, Assigned Prices, MR's, +20% Seq Bnds, 95% CMAI

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	958	1056	1159	1249	1427
Roaded Natural	MRVD	1210	1146	1078	1019	902
Semi-Primitive Motorized	MRVD	20	20	20	20	20
Semi-Primitive Nonmotorized	MRVD	190	182	174	167	153
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7760	7786	7813	7837	7884
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0.6	0.6	0.6	0.6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352.6	352 6	352.6	352 6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	399	405	411	416	427
Nonconsumptive	MWFUD	26	26	26	26	26
Resident Fish	MWFUD	114	114	115	116	117
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1086	1013	977	926
Deer	Numbers	19457	21629	20041	19674	18789
Timber						
LTSYC	MMCF	-	-	-	-	40 8
ASQ	MMCF	52.9	57.6	56.8	45.4	36.3
ASQ	MMBF	258.7	281.7	277.8	222.0	177.5
Final Harvest (Exist)	M Acres	6.987	7.551	7.147	5.312	4.680
Reforestation (Plant)	M Acres	1.744	2.514	2.711	1.187	1 018
Reforestation (Natural)	M Acres	4 982	4 661	4.031	3.948	3.510
PCT	M Acres	-	4 279	0.275	1.069	1.418
Suitable Land	M Acres	513 9	513.9	513 9	513.9	513 9
Suitable - Old Growth	M Acres	256	192	135	92	42
Soil and Water						
Sediment	M Tons	151 1	144 2	142.4	135.1	131.1
Facilities						
Arterial and Collector Roads	Miles	18 9	3 9	0.3	0 0	-
Local Roads	Miles	56 8	42 9	12.9	7 1	0.4
Socio-Economic						
PNV	$MM	2405 9	-	-	-	-
Budget	$MM	31 1	27 2	20.6	18.4	15.7

Table B-34
Benchmark Run #9, Max PNV, Market Prices, MR's ±20% Seq Bnds, 95% CMAI

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1007	1104	1203	1298	1476
Roaded Natural	MRVD	1119	1056	990	928	811
Semi-Primitive Motorized	MRVD	22	22	22	22	22
Semi-Primitive Nonmotorized	MRVD	194	187	179	172	158
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7724	7751	7776	7802	7849
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0.6	0 6	0.6	0 6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352.6	352 6	352 6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	391	397	403	409	420
Nonconsumptive	MWFUD	25	25	25	25	26
Resident Fish	MWFUD	112	113	114	115	116
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1086	1007	977	926
Deer	Numbers	19454	21432	19845	19472	18541
Timber						
LTSYC	MMCF	-	-	-	-	41.2
ASQ	MMCF	52 9	57.5	56 9	45 5	36 4
ASQ	MMBF	258 7	281.2	278.2	222.5	178.0
Final Harvest (Exist)	M Acres	6 987	7 534	7 163	5.316	4.691
Reforestation (Plant)	M Acres	1 744	2.421	2 577	1.253	1.020
Reforestation (Natural)	M Acres	4 982	5 096	8 233	3 876	3.519
PCT	M Acres	-	5 142	0 275	0.959	1.250
Suitable Land	M Acres	513 3	513.3	513.3	513.3	513.3
Suitable - Old Growth	M Acres	243	179	121	79	29
Soil and Water						
Sediment	M Tons	153 2	149.4	141 0	137 5	134 7
Facilities						
Arterial and Collector Roads	Miles	18 9	3.9	0.3	0.0	-
Local Roads	Miles	56 8	42 9	12.9	7 1	0 4
Socio-Economic						
PNV	$MM	1507 0	-	-	-	-
Budget	$MM	25 4	21 7	14 9	12.7	9.9

Table B-35
Benchmark Run #6, Max PNV, Assigned Prices, MR's, NDY, Util. Stds.

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	987	1074	1166	1249	1453
Roaded Natural	MRVD	1155	1098	1038	983	849
Semi-Primitive Motorized	MRVD	20	20	20	20	20
Semi-Primitive Nonmotorized	MRVD	190	183	176	169	153
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7734	7757	7782	7803	7857
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0.6	0 6	0 6	0 6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352.6	352.6	352 6	352 6	352 6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	394	399	405	410	422
Nonconsumptive	MWFUD	25	26	26	26	26
Resident Fish	MWFUD	113	113	115	115	116
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1076	1085	1019	986	933
Deer	Numbers	19222	21525	19840	19247	18232
Timber						
LTSYC	MMCF	-	-	-	-	48.3
ASQ	MMCF	48 9	48.9	48.9	48.9	48.9
ASQ	MMBF	239 1	239.1	239.1	239.1	239.1
Final Harvest (Exist)	M Acres	6.468	6.456	6 230	5 631	5 982
Reforestation (Plant)	M Acres	3.079	3 841	3.771	2 736	3 093
Reforestation (Natural)	M Acres	2 929	2 041	1 855	2 486	2 427
PCT	M Acres	-	5 094	2 051	2.987	2.963
Suitable Land	M Acres	522 4	522 4	522 4	522.4	522.4
Suitable - Old Growth	M Acres	256	107	146	102	47
Soil and Water						
Sediment	M Tons	146 3	143.0	137.4	133.3	130 6
Facilities						
Arterial and Collector Roads	Miles	12.0	10 7	0.3	0.0	-
Local Roads	Miles	53 0	41.2	16 8	7.8	1.3
Socio-Economic						
PNV	$MM	2384 1	-	-	-	-
Budget	$MM	22 8	22.5	15.2	14 4	13 0

Table B-36
Benchmark Run #10, Max PNV, Market Prices, NDY, Util. Stds.

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	991	1077	1167	1235	1457
Roaded Natural	MRVD	1150	1094	1035	991	845
Semi-Primitive Motorized	MRVD	20	20	20	20	20
Semi-Primitive Nonmotorized	MRVD	190	183	176	171	153
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7733	7756	7780	7799	7857
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0 6	0 6	0 6	0 6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352.6	352 6	352.6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	394	399	404	409	422
Nonconsumptive	MWFUD	25	25	25	25	26
Resident Fish	MWFUD	113	113	114	115	116
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1076	1085	1015	986	933
Deer	Numbers	19222	21253	19839	19245	18232
Timber						
LTSYC	MMCF	-	-	-	-	48.2
ASQ	MMCF	48 9	48 9	48.9	48 9	48 9
ASQ	MMBF	239 1	239 1	239 1	239.1	239.1
Final Harvest (Exist)	M Acres	6 461	6 452	6 225	5 626	5 978
Reforestation (Plant)	M Acres	2.952	3 810	3 762	2 735	3 004
Reforestation (Natural)	M Acres	3 068	2 073	1 901	2.482	2.525
PCT	M Acres	-	5 142	1 897	2.951	2.953
Suitable Land	M Acres	523 7	523 7	523 7	523 7	523.7
Suitable - Old Growth	M Acres	256	197	146	102	47
Soil and Water						
Sediment	M Tons	142.1	141 4	131 6	128.9	127.2
Facilities						
Arterial and Collector Roads	Miles	12 0	10 7	0 3	0.0	-
Local Roads	Miles	53 0	41 2	16.8	7.8	1.3
Socio-Economic						
PNV	$MM	1485.8	-	-	-	-
Budget	$MM	22 7	22 5	15 1	14.4	12.9

4. Maximum Present Net Value Based on Assigned Prices with MR's (Run #7)

Description and Purpose. This Benchmark Run forms the basis for the development of most of the alternatives to be developed in detail, in that it contains the minimum policy and legal constraints. It is also used as a basis for conducting sensitivity analysis for timber price trends and timber cost assumptions.

This run will also be used as a basis for analyzing the opportunity costs for including MR's.

Assumptions and Constraints. This run is formulated according to Regional Direction. The constraints that apply are:

- Objective function - Maximize PNV for 15 decades.
- Land Base - tentatively suitable lands
- Ending inventory constraint is applied.
- MR's are included.
- NDF constraint is applied.
- Rotations are based on 95% CMAI.
- Budget is not constrained.

Results. Results of this run (and its variations) by selected outputs and effects are shown in the run output Tables B-37 and B-39 through B-43.

This run differs from Run #3, Table B-26, in that MR's are included. Suitable acres drop to 528,800 acres or approximately 87% of the tentatively suitable acres.

Road construction increases in the first decade when compared to Run #3 which is primarily a function of the harvest dispersal factor included in this run.

A larger portion of the harvested acres are assigned to a natural regeneration prescription in this run than in Run #3. This appears to be a result of the MR's and in particular the dispersion constraint

This run does not harvest the suitable old growth quite as rapidly in the first decade as in Run #3, but by the fifth decade the remaining suitable old growth is approximately the same in both runs.

Table B-37

Maximum PNV, Assigned Prices, With MR's Benchmark (Run #7)

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1134	1237	1343	1442	1669
Roaded Natural	MRVD	1032	964	894	829	681
Semi-Primitive Motorized	MRVD	16	16	16	16	16
Semi-Primitive Nonmotorized	MRVD	186	178	170	162	144
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7750	7777	7805	7831	7892
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0 6	0.6	0.6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352.6	352.6	352.6	352.6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	397	402	408	413	426
Nonconsumptive	MWFUD	26	26	26	26	27
Resident Fish	MWFUD	113	114	115	115	117
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1090	1022	988	935
Deer	Numbers	19657	21689	20061	19464	18453
Timber						
LTSYC	MMCF	-	-	-	-	49.6
ASQ	MMCF	48 8	48 8	48.8	48 8	48.8
ASQ	MMBF	238 7	238 7	238 7	238 7	238.7
Final Harvest (Exist)	M Acres	6 449	6 440	6 214	5 616	5.970
Reforestation (Plant)	M Acres	2.568	3 913	4 185	3.083	3 364
Reforestation (Natural)	M Acres	3 497	1 942	1.404	2.072	2 103
PCT	M Acres	-	5 094	1 429	3.081	3 474
Suitable Land	M Acres	528 8	528 8	528 8	528.8	528 8
Suitable - Old Growth	M Acres	256	197	146	102	47
Soil and Water						
Sediment	M Tons	154.1	153 5	144 4	144 3	140 1
Facilities						
Arterial and Collector Roads	Miles	12 0	10 7	0 3	-	-
Local Roads	Miles	52 9	41.3	16 8	7.8	1 3
Socio-Economic						
PNV	$MM	2381 4	-	-	-	-
Budget	$MM	28 2	28.2	20 8	20.9	18.9

Table B-38
Benchmark Run #11, Max PNV, Market Prices, MR's NDY, 95% CMAI

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1007	1092	1183	1251	1476
Roaded Natural	MRVD	1141	1085	1026	981	834
Semi-Primitive Motorized	MRVD	20	20	20	20	20
Semi-Primitive Nonmotorized	MRVD	191	185	178	172	155
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7741	7764	7789	7806	7867
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0 6	0 6	0.6	0 6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352.6	352.6	352.6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	395	400	406	410	424
Nonconsumptive	MWFUD	25	25	25	26	26
Resident Fish	MWFUD	113	114	114	115	117
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1090	1027	988	935
Deer	Numbers	19459	21490	19862	19265	18255
Timber						
LTSYC	MMCF	-	-	-	-	49.6
ASQ	MMCF	48 8	48 8	48.8	48.8	48.8
ASQ	MMBF	238 6	238.6	238.6	238.6	238.6
Final Harvest (Exist)	M Acres	6 444	6 436	6.210	5.612	5.966
Reforestation (Plant)	M Acres	2 858	3 712	4 285	3.108	3.522
Reforestation (Natural)	M Acres	3.159	2 169	1.285	2 040	1.918
PCT	M Acres	-	5.142	1.786	2.835	3 598
Suitable Land	M Acres	524.3	524.3	524.3	524.3	524 3
Suitable - Old Growth	M Acres	256	197	146	102	48
Soil and Water						
Sediment	M Tons	148 0	148 1	141.3	139.8	135.8
Facilities						
Arterial and Collector Roads	Miles	12 0	10 7	0 3	-	-
Local Roads	Miles	52.7	41.5	16 8	7.8	1.3
Socio-Economic						
PNV	$MM	1482.9	-	-	-	-
Budget	$MM	22.6	22.5	15.3	14.5	13.3

Table B-39
0% Price Trend Benchmark Run Based on Run #7

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1007	1094	1185	1268	1476
Roaded Natural	MRVD	1152	1095	1035	981	845
Semi-Primitive Motorized	MRVD	20	20	20	20	20
Semi-Primitive Nonmotorized	MRVD	190	183	176	169	153
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7751	7774	7798	7820	7876
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0 6	0.6	0.6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352 6	352 6	352.6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	397	402	408	413	426
Nonconsumptive	MWFUD	25	26	26	26	27
Resident Fish	MWFUD	113	114	115	116	117
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1092	1022	988	935
Deer	Numbers	19459	21490	19864	19269	18250
Timber						
LTSYC	MMCF	-	-	-	-	48.9
ASQ	MMCF	48.9	48 9	48.9	48 9	48.9
ASQ	MMBF	239 0	239 0	239.0	239.0	239 0
Final Harvest (Exist)	M Acres	6 458	6 449	6.222	5.677	5.973
Reforestation (Plant)	M Acres	1.908	3.360	3 692	3 962	3.727
Reforestation (Natural)	M Acres	4.265	2 587	1.978	1.123	1.689
PCT	M Acres	-	5 142	0 616	2.400	2 867
Suitable Land	M Acres	527 9	527 9	527.9	527.9	527.9
Suitable - Old Growth	M Acres	256	197	146	102	47
Soil and Water						
Sediment	M Tons	137 5	139 2	130 3	128 7	127.6
Facilities						
Arterial and Collector Roads	Miles	12 0	10 7	0.3	0.0	-
Local Roads	Miles	53 0	41 2	16 8	7.8	1.3
Socio-Economic						
PNV	$MM	2217 4	-	-	-	-
Budget	$MM	22 3	22 1	14 3	13 9	12.3

Table B-40
2% Price Trend Benchmark Run Based on Run #7

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	993	1080	1168	1254	1463
Roaded Natural	MRVD	1168	1112	1054	997	861
Semi-Primitive Motorized	MRVD	20	20	20	20	20
Semi-Primitive Nonmotorized	MRVD	190	183	176	169	153
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7753	7777	7800	7822	7879
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0.6	0.6	0.6	0.6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352.6	352.6	352.6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	397	403	408	413	426
Nonconsumptive	MWFUD	26	26	26	26	27
Resident Fish	MWFUD	113	114	115	116	117
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1092	1024	991	939
Deer	Numbers	19459	21514	19843	19215	18235
Timber						
LTSYC	MMCF	-	-	-	-	51.2
ASQ	MMCF	47 2	47.2	47 2	47.2	47.2
ASQ	MMBF	230.8	230 8	230.8	230.8	230.8
Final Harvest (Exist)	M Acres	6 242	6 259	6.011	5.443	5.664
Reforestation (Plant)	M Acres	3.696	3 890	3.819	3.488	3.155
Reforestation (Natural)	M Acres	1.944	1.788	1.621	1.434	2 038
PCT	M Acres	-	5.094	2.867	3.100	3.079
Suitable Land	M Acres	525 4	525.4	525 4	525.4	525.4
Suitable - Old Growth	M Acres	256	198	149	104	51
Soil and Water						
Sediment	M Tons	156 3	151.8	146 1	143.3	140.9
Facilities						
Arterial and Collector Roads	Miles	12.0	10 7	0.3	0.0	-
Local Roads	Miles	52 6	41.5	16.8	7.8	1.3
Socio-Economic						
PNV	$MM	2603 9	-	-	-	-
Budget	$MM	22.7	22 6	15.7	15.4	13.8

Table B-41

3% Price Trend Benchmark Run Based on Run #7

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1007	1080	1167	1244	1476
Roaded Natural	MRVD	1152	1104	1047	997	845
Semi-Primitive Motorized	MRVD	20	20	20	20	20
Semi-Primitive Nonmotorized	MRVD	190	184	177	171	153
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7781	7770	7793	7813	7876
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0.6	0 6	0.6	0 6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352.6	352.6	352 6	352.6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	397	401	407	411	426
Nonconsumptive	MWFUD	25	26	26	26	27
Resident Fish	MWFUD	113	114	115	116	117
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1098	1027	995	948
Deer	Numbers	19657	21801	19899	19248	18529
Timber						
LTSYC	MMCF	-	-	-	-	60.7
ASQ	MMCF	40 8	46 2	46.5	46.5	46.5
ASQ	MMBF	199 6	225 9	227.5	227.5	227.5
Final Harvest (Exist)	M Acres	5 429	6 143	5 899	5.348	5.571
Reforestation (Plant)	M Acres	4 506	5 017	5 037	4 594	4 653
Reforestation (Natural)	M Acres	0 250	0.376	0 109	0 068	0 223
PCT	M Acres	-	5.142	4 077	4 512	4.602
Suitable Land	M Acres	529 7	529 7	529.7	529.7	529 7
Suitable - Old Growth	M Acres	256	202	156	108	56
Soil and Water						
Sediment	M Tons	162.9	164 7	156 5	153.0	149 2
Facilities						
Arterial and Collector Roads	Miles	10 3	12 3	0 4	-	-
Local Roads	Miles	47 4	43.4	19 2	8 2	1.9
Socio-Economic						
PNV	$MM	2919 5	-	-	-	-
Budget	$MM	26 5	29 5	22.9	23.0	22.1

Table B-42
20% Cost Decrease Benchmark Run Based on Run #7

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1011	1109	1209	1290	1544
Roaded Natural	MRVD	1149	1085	1020	967	800
Semi-Primitive Motorized	MRVD	20	20	20	20	20
Semi-Primitive Nonmotorized	MRVD	100	182	174	168	148
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7752	7778	7805	7827	7894
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0 6	0.6	0.6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352 6	352.6	352 6	352 6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	397	403	409	414	430
Nonconsumptive	MWFUD	25	26	26	26	27
Resident Fish	MWFUD	113	114	115	116	117
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1085	1016	981	922
Deer	Numbers	19657	21614	20122	19645	18521
Timber						
LTSYC	MMCF	-	-	-	-	57 3
ASQ	MMCF	54.0	54 0	54 0	54.0	54.0
ASQ	MMBF	264.1	264 1	264.1	264.1	264.1
Final Harvest (Exist)	M Acres	7.132	7.063	6 819	6 122	7.029
Reforestation (Plant)	M Acres	5 683	5 605	5 379	4.846	4.373
Reforestation (Natural)	M Acres	0 600	0 620	0.636	0.552	2 003
PCT	M Acres	-	5.146	5.066	4.988	4.776
Suitable Land	M Acres	529.7	529 7	529.7	529.7	529.7
Suitable - Old Growth	M Acres	256	191	133	91	41
Soil and Water						
Sediment	M Tons	155 7	153 5	144 3	143.2	141 9
Facilities						
Arterial and Collector Roads	Miles	18 9	3 9	0.3	0.0	-
Local Roads	Miles	56 8	42 9	12.9	7.1	0.4
Socio-Economic						
PNV	$MM	2667 7	-	-	-	-
Budget	$MM	30 9	26.0	20.4	20.0	18.9

Table B-43
20% Cost Increase Benchmark Run Based on Run #7

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	974	1042	1120	1199	1443
Roaded Natural	MRVD	1191	1147	1096	1044	884
Semi-Primitive Motorized	MRVD	20	20	20	20	20
Semi-Primitive Nonmotorized	MRVD	190	185	178	172	153
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7757	7776	7796	7817	7882
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0.6	0.6	0.6	0.6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352 6	352 6	352.6	352 6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	398	402	407	412	427
Nonconsumptive	MWFUD	26	26	26	26	26
Resident Fish	MWFUD	114	114	115	115	115
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1099	1035	1004	956
Deer	Numbers	19684	21831	19951	19106	18258
Timber						
LTSYC	MMCF	-	-	-	-	42.1
ASQ	MMCF	38 8	38 8	38 8	38 8	38 8
ASQ	MMBF	189 7	189 7	189 7	189.7	189.7
Final Harvest (Exist)	M Acres	5 145	5 178	5 037	5.078	4 353
Reforestation (Plant)	M Acres	1 119	1 196	2.481	1 404	1.507
Reforestation (Natural)	M Acres	3 859	3 803	2 185	3.464	2.621
PCT	M Acres	-	4 279	-	0.086	1 699
Suitable Land	M Acres	519	519	519	519	519
Suitable - Old Growth	M Acres	256	207	170	122	73
Soil and Water						
Sediment	M Tons	142 3	149.3	144 6	140 4	137 5
Facilities						
Arterial and Collector Roads	Miles	8 9	13 7	0.4	0 0	-
Local Roads	Miles	39 6	45 7	23 1	8.9	2 8
Socio-Economic						
PNV	$MM	2126 5	-	-	-	-
Budget	$MM	24 3	28 3	20.4	18.0	17 2

5. Maximum Timber Resource

Description and Purpose. This run is designed to determine the maximum timber outputs that can be produced on the Forest, given that legal and policy constraints are met. It is used as a basis for analyzing opportunity costs when other resource and economic objectives are met.

Assumptions and Constraints. This run is formulated according to Regional Direction. The one exception is that the run is first made to maximize timber for the first decade. The first decade harvest level is then used as a constraint in a run that maximizes timber outputs for 15 decades. The timber outputs from this second run are then used as constraints for a third run that maximizes PNV. This variation to Regional Direction was suggested by the Regional Timber Economist.

This run was formulated using the following constraints:

- Objective function - Maximum timber for 1 decade; maximum timber for 15 decades; maximize PNV.
- Land base - tentatively suitable lands.
- Ending inventory constraint is applied.
- MR constraints are applied.
- NDF constraint is applied.
- Rotations are based on 95% CMAI.
- Budget is not constrained.

Results. The results of this run are shown in the accompanying run output Table B-44.

This run has the highest LTSYC of any of the runs that meet legal and policy constraints. It is also has the lowest PNV of all the runs that use market and assigned values, except Maximum Primitive and Semi-Primitive Nonmotorized Recreation.

Timber outputs are above those of recent years, and approximately 37% above those in the current timber management plan after it was amended for the 1984 Wilderness Act. The main reason for this increase is the increase in the suitable land base.

The objective function drives timber management intensities to a higher level than occurs with a maximum PNV objective function, but it also accounts for the lower PNV value.

Suitable acres are also relatively high, exceeded only by Runs #1, Table B-25, and #3, Table B-26, which do not included MR's.

Arterial and Collector road requirements are very similar to those in Run #7, Table B-37, but are more evenly distributed between the first and second decade.

Nearly all of the timber harvest occurs in the old growth component in the first decade. Suitable old growth declines steadily through the fifth decade, when 14,000 acres remain.

Table B-44
Maximum Timber Resource Benchmark Run

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	1025	1137	1261	1370	1611
Roaded Natural	MRVD	1140	1067	986	914	756
Semi-Primitive Motorized	MRVD	20	20	20	20	20
Semi-Primitive Nonmotorized	MRVD	188	180	170	161	142
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7755	7786	7819	7847	7911
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0 6	0 6	0.6	0 6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352.6	352 6	352 6	352 6	352 6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	398	405	412	419	434
Nonconsumptive	MWFUD	26	26	26	26	27
Resident Fish	MWFUD	113	114	115	116	118
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1082	1012	974	910
Deer	Numbers	19657	21566	20156	19759	18537
Timber						
LTSYC	MMCF	-	-	-	-	63.0
ASQ	MMCF	57.2	57.2	57 2	57 2	57.2
ASQ	MMBF	279 7	279 7	279.7	279.7	279.7
Final Harvest (Exist)	M Acres	7 567	7 504	7 293	6 923	6 794
Reforestation (Plant)	M Acres	6 583	6.528	6.345	6.023	5 911
Reforestation (Natural)	M Acres	0 0	0 0	0 0	0.0	0.0
PCT	M Acres	-	5 198	6 054	6 003	5 835
Suitable Land	M Acres	529 7	529 7	529 7	529.7	529.7
Suitable - Old Growth	M Acres	256	187	125	74	14
Soil and Water						
Sediment	M Tons	161 8	158.6	149.3	147 8	146 1
Facilities						
Arterial and Collector Roads	Miles	18 9	3.8	0.3	0 0	-
Local Roads	Miles	56 9	42 8	12.9	7.1	0.4
Socio-Economic						
PNV	$MM	2302.3	-	-	-	-
Budget	$MM	33.4	28.7	23.6	22 8	21.7

6. Maximum Primitive and Semi-Primitive Nonmotorized Recreation Opportunities

Description and Purpose. This run was designed to maximize Primitive and Semi-Primitive Nonmotorized recreation opportunities on the Forest, and to determine the economically efficient level of outputs of other resources. It is used as a basis for responding to the major public issue of maintaining as much of the Forest in an unroaded and undeveloped condition as possible. It is also used as a basis for establishing the decision space for responding to Regional Planning Direction to develop an alternative where 12-16% of the total recreation demand is met in a Primitive or Semi-Primitive Nonmotorized setting.

Assumptions and Constraints. This benchmark was developed based on a number of assumptions. These include:

- 217 miles of existing collector roads and 34 miles of existing arterial roads would be closed. These closed roads are those that make long intrusions into areas that are currently mapped as Primitive or Semi-Primitive Nonmotorized. This includes areas that are designated wilderness as well as released roadless areas.

- 214 miles of planned collector roads would not be constructed These are roads that are similar in character to the existing roads described above.

- 111 miles of trail would be constructed within wilderness to increase carrying capacity. Affected acres would be managed at Semi-Primitive trailed level.

- Acres currently in Roaded Natural or Roaded Modified, and affected by road closures, would become Semi-Primitive within 5 decades.

- No scheduled timber harvest will occur on Primitive or Semi-Primitive Nonmotorized lands.

Constraints that apply to this Benchmark are as follows:

- Objective function - Maximize Primitive and Semi-Primitive Nonmotorized RVD's, rolled over to a maximize PNV

- Land base - All lands currently assigned, or with the potential to become, Primitive or Semi-Primitive Nonmotorized are considered suitable. Lands classified as tentatively suitable for timber production are reduced to reflect the P and SPNM acres.

- Ending inventory constraint is applied.
- MR's are applied.
- NDF is applied.
- Rotations are based on 95% CMAI.
- Budget is not a constraint.

Results. The results of this run are displayed in the accompanying run output Table B-45.

In keeping with the objectives of this benchmark, Semi-Primitive Nonmotorized and Primitive RVD capacity is approximately 37% higher by the 5th decade than in Run #7, Table B-37, then decreases only slightly thereafter, whereas the *other benchmarks show a rapid decline in Semi-Primitive Nonmotorized acres.* The five-decade display in the table does not include the transition of lands currently in a roaded state (approximately 62,500 acres of tentatively suitable lands) that will revert to a Semi-Primitive Nonmotorized ROS state after 5 decades.

Roaded recreation capacity grows only about 1.4% over the first five decades in this run, compared with an 8% increase in Run #7 This is a result of fewer acres being managed for timber and few miles of roads being constructed.

Hunting and fishing recreation capacity are at about the same level in the first decade as Run #7 and the Current Direction run, but increase only slightly thereafter. This reflects more lands staying in a Semi-Primitive Nonmotorized and Primitive status, with correspondingly lower capacity coefficients than roaded lands.

Suitable acres, timber harvest, and the LTSYC are respectively, 43% and 45% and 44% lower in this benchmark than in Run #7. Timber management intensity is slightly lower in this run than in Run #7, with a lower proportion of suitable acres precommercially thinned and reforested by planting.

As would be expected with a significantly lower timber harvest, PNV for this benchmark is about 14% lower than in Run #7, but the annual budget is also significantly lower.

Table B-45

Maximum Primitive and Semi-Primitive Nonmotorized Recreation Opportunities

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	842	877	911	923	927
Roaded Natural	MRVD	1245	1222	1199	1192	1189
Semi-Primitive Motorized	MRVD	36	36	36	36	36
Semi-Primitive Nonmotorized	MRVD	202	200	197	196	196
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7707	7717	7725	7729	7730
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0 6	0 6	0 6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352.6	352.6	352.6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	384	386	388	384	389
Nonconsumptive	MWFUD	25	25	25	25	25
Resident Fish	MWFUD	111	112	112	112	112
Anadromous Fish	*M pounds*	*Not estimated*				
Elk	Numbers	1082	1111	1051	1026	999
Deer	Numbers	19656	22010	19823	18679	17903
Timber						
LTSYC	MMCF	-	-	-	-	27.8
ASQ	MMCF	26 7	26 7	26.7	26.7	26.7
ASQ	MMBF	130 6	130 6	130.6	130.6	130 6
Final Harvest (Exist)	M Acres	3 526	3.549	3 304	2 841	3.222
Reforestation (Plant)	M Acres	1 033	1 744	1.965	1.050	1.493
Reforestation (Natural)	M Acres	2.339	1 544	1.045	1 634	1 506
PCT	M Acres	-	4.048	0 326	1 192	1.528
Suitable Land	M Acres	300 9	300 9	300 9	300.9	300.9
Suitable - Old Growth	M Acres	111	78	52	31	4
Soil and Water						
Sediment	M Tons	85.9	93 4	83 3	79 8	78 6
Facilities						
Arterial and Collector Roads	Miles	0 8	7 1	0.4	-	-
Local Roads	Miles	27 6	56.3	24 0	8 4	3 6
Socio-Economic						
PNV	$MM	2050.5	-	-	-	-
Budget	$MM	19 0	26 5	18.9	17.1	16.1

7. Current Direction

Description and Purpose. This Benchmark specifies the management, resource outputs, and economic and environmental effects most likely to occur in the future if current plans and direction are followed

Those current plans and direction that have the most effect on resource outputs and environmental and economic effects were modeled in FORPLAN. These include the Alpine Lakes Area Management Plan, the Skagit Wild and Scenic River Plan, the 1963 Timber Management Plan as amended, and the Ranger District Multiple Use Plans Direction that was modeled includes retention of old growth habitat for protection of 49 pairs of spotted owls (1,000 acres per pair), cavity excavators at 40% of their potential population on commercial forest lands, and rotations based on culmination of mean annual increment. No dispersion or accessibility restrictions are required.

The only plan that actually specifies resource outputs is the Timber Management Plan, which has a potential yield of 203.8 MMBF The plan does not contain cubic foot data, so the RPA conversion factor of 4.89 was used, which results in a potential yield of 41 7 MMCF

This Benchmark was extremely hard to model because of the lack of compatibility between the Timber Management Plan, the Alpine Lakes Area Management Plan, the Skagit Wild and Scenic River Plan, and the Ranger District Multiple Use Plans.

Amendments to the Timber Management Plan never reduced the potential yield to meet direction in the Alpine Lakes and Skagit River Plans to protect 49 pairs of owls, nor to maintain cavity nesters at 40% of their potential population.

The task was further complicated by the fact that the current Timber Management Plan was amended several times to reflect declining land bases. These reductions were most frequently made on lands containing old growth (higher standing volumes) and plan amendments were not based on a new timber inventory. The most recent amendment reflected the Washington Wilderness Act, where essentially all acre reductions were old growth. Because of RARE II restrictions on a major portion of these lands and the fact that in recent years harvests were concentrated on the roaded portions of the Forest, this resulted in a forest structure that contains a much higher proportion of young stands than the structure used in the original development of the Timber Management Plan.

This Benchmark was run under an objective function that maximized timber volume for 5 decades The results were rolled over twice: first to maximize timber volume for 15 decades; second to maximize PNV for 15 decades, to force the solution toward economic efficiency The non-declining yield constraint was applied, and an absolute constraint of 41 677 MMCF average annual harvest was set as floor for the first decade. Budget was constrained to $27.0 MM annually for the planning horizon (The budget constraint was based on the indexed average for Fiscal Years 1982, 1983, and 1984 This is a slight variance from the Regional Direction of using Fiscal Year 1980-1982 However, it was felt that the more recent budget levels are a much better reflection of the dollars that are available in the future for managing the Forest at current levels). No dispersion or accessibility constraints were applied.
The run as formulated above is feasible; it is able to meet about 108% of the first and subsequent decade harvest level specified in the current Timber

Management Plan, while satisfying the spotted owl, cavity excavator, 100% CMAI, and non-declining requirements. Of the estimated tentatively suitable land available under current direction, approximately 97% is considered suitable in this run.

Assumptions and Constraints. The major assumptions and constraints finally selected for this run are described above.

Results. The results of this run are displayed in the accompanying Table B-46.

Suitable acres are approximately 97% of tentatively suitable estimates. The difference is primarily spotted owl habitat. The low tentatively suitable acre figure is partially a reflection of the Ranger District Multiple Use Plans which place resource management restrictions on the upper forest zone for landscape management, soils, and other special areas.

This run results in higher levels of roaded natural recreation capacity because of the lower level of timber harvest when compared to Run #7, Table B-37. Roaded modified capacity starts out lower in this run, when compared to Run #7, but increases at a similar rate through decade 5. The decline in Semi-Primitive Nonmotorized is very similar to Run #7.

Total road construction (arterial and collectors) is approximately 13% lower in this run than in Run #7 because of the lower suitable land base.

Nearly all of the harvest in the first decade occurs in the old growth stands. This heavy harvesting of old growth continues through the fifth decade when the old growth is nearly depleted (in suitable lands).

Spotted owl populations are not as well distributed across their range as in the other Benchmarks. The loss of a single habitat area may cause the establishment of "islands" of these species.

Populations of pine marten and pileated woodpecker are not specifically supported over their existing range, and populations would decline over time.

Cavity excavators would be provided for at 40% of their potential population levels.

Table B-46
Current Direction Benchmark Run

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	911	1020	1063	1197	1429
Roaded Natural	MRVD	1255	1184	1155	1068	916
Semi-Primitive Motorized	MRVD	22	22	22	22	22
Semi-Primitive Nonmotorized	MRVD	191	183	179	169	150
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7761	7791	7801	7838	7899
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0 6	0 6	0.6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352 6	352.6	352.6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	398	405	408	416	430
Nonconsumptive	MWFUD	26	26	26	26	27
Resident Fish	MWFUD	114	115	115	116	118
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1082	1093	1026	992	948
Deer	Numbers	19657	21725	19976	19350	18522
Timber						
LTSYC	MMCF	-	-	-	-	56.9
ASQ	MMCF	44 8	44 8	44.8	44 8	44.8
ASQ	MMBF	219.1	219.1	219 1	219.1	219.1
Final Harvest (Exist)	M Acres	6.109	6.078	6 030	4.538	5.232
Reforestation (Plant)	M Acres	5 315	5 288	5 246	3 948	4 552
Reforestation (Natural)	M Acres	-	-	-	-	-
PCT	M Acres	-	3 516	4.887	4 862	4.824
Suitable Land	M Acres	473 7	473 7	473 7	473 7	473.7
Suitable - Old Growth	M Acres	234	173	126	66	27
Soil and Water						
Sediment	M Tons	140 6	144 6	142.7	130 7	126.2
Facilities						
Arterial and Collector Roads	Miles	16.3	3.6	-	-	-
Local Roads	Miles	26.8	50.1	31 3	10 9	3 7
Socio-Economic						
PNV	$MM	2319 8	-	-	-	-
Budget	$MM	26.0	27.0	23.7	21.0	19.4

8. Current Direction, Implementable with Specified Timber Targets

Description and Purpose. This Benchmark specifies the management, resource outputs, and economic and environmental effects most likely to occur in the future if current plans and direction are followed, including the requirements of the National Forest Management Act of 1976 and its implementing regulations. The timber harvest target (potential yield), as specified in the amended Timber Management Plan, is met in the first decade.

Those current plans, direction, and NFMA management requirements that have the most resource output, environmental, and economic effects were modeled in FORPLAN. These include the Alpine Lakes Area Management Plan, the Skagit Wild and Scenic River Plan, the 1963 Timber Management Plan as amended, the Ranger District Multiple Use Plans, NFMA regulations (FSM 1920), and the 11/83 Region 6 Planning Direction Specific modeling is discussed below. The same difficulties experienced in modeling the original Current Direction Benchmark were also experienced here, compounded by the additional constraints required to meet NFMA.

The only plan that actually specifies resource outputs is the Timber Management Plan, which has a potential yield of 203.8 MMBF The plan does not contain cubic foot data, so the RPA conversion factor of 4 89 was used, which results in a potential yield of 41 7 MMCF.

Assumptions and Constraints. This Benchmark was formulated and run along the same lines as the original Current Direction Benchmark, with some notable changes. Modifications were made to incorporate the management requirements to meet NFMA These are the same MR's used in all the other Benchmark Runs except Runs #1, 2, 3, and Current Direction The same accessibility/dispersion constraints were used as in the other Benchmark Runs to meet silvicultural guidelines, harvest unit size limitations, unit dispersion, and vegetation diversity. Habitat for 40% of the potential cavity nester population is maintained, as in the original Current Direction run (in contrast to the 20% level used as the MR level in the other Benchmarks). Rotations are based on culmination of mean annual increment

As in the original Current Direction Benchmark, the objective function was to maximize timber for 5 decades, rolled over to maximize timber for 15 decades, then rolled over once more to maximize PNV for 15 decades to force the solution toward economic efficiency.

The non-declining yield and ending inventory (perpetual harvest) constraints were applied. An absolute constraint of 41.677 MMCF average annual harvest was set as a floor for the first decade Budget was constrained to $27 0 MM annually for 150 year planning horizon.

Results. The initial run resulted in an infeasible solution. Timber harvest in the first decade could only reach about 40.7 MMCF instead of the required 41.7 MMCF. The budget constraint of $27.0 MM in the first decade could also not be met, probably because of increased intensities of timber management chosen to try to reach the required timber harvest level.

A second run relaxing the budget constraint by $5 MM annually cleared up the budget infeasibility in the first decade, but did not bring the first decade timber harvest up to 41.7 MMCF

A third run replacing non-declining yield with a 20% sequential upper and lower bounds (departure) formulation was made. First decade harvest was required to be equal to 41.7 MMCF, with departure allowed thereafter. This run was feasible.

The results of the third run are shown in the accompanying output Table B-47.

ASQ climbs to 54.6 MCF in the 3rd decade, drops to a low of 23 5 MCF in the 7th decade, and then again increases to 101.2 MCF by the 15th decade.

Road construction requirements increase in the 1st decade compared to the original Current Direction run, because timber harvest figures are slightly higher, but primarily because the harvest dispersion constraint is forcing harvest into the unroaded portion of the Forest.

Slightly higher levels of PCT are selected to meet the required ASQ in the 1st decade.

PNV is somewhat lower in this formulation as compared to the original Current Direction Benchmark because of the higher costs of increased timber management intensities and roading costs being incurred earlier in the planning horizon.

Suitable acres are approximately 89% of tentatively suitable as compared to 97% in the original formulation. This is due primarily to the effect of MR's.

Table B-47

Current Direction, Implementable With Specified Timber Targets Benchmark Run

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	845	944	1052	1130	1323
Roaded Natural	MRVD	1313	1248	1178	1126	1000
Semi-Primitive Motorized	MRVD	24	24	24	24	24
Semi-Primitive Nonmotorized	MRVD	194	186	177	171	156
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7758	7784	7813	7833	7885
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0.6	0.6	0 6	0.6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352 6	352 6	352.6	352 6	352.6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	398	405	408	416	430
Nonconsumptive	MWFUD	26	26	26	26	27
Resident Fish	MWFUD	114	115	115	116	118
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1068	1083	1010	971	932
Deer	Numbers	19437	21562	25292	25025	25025
Timber						
LTSYC	MMCF	-	-	-	-	51.9
ASQ	MMCF	41 7	50 0	54.6	43.7	34.9
ASQ	MMBF	203 9	244 5	267.0	213 7	170 7
Final Harvest (Exist)	M Acres	5 603	6 658	7.019	4.823	4.046
Reforestation (Plant)	M Acres	4 874	5 792	6 107	4.196	3 520
Reforestation (Natural)	M Acres	0 0	0 0	0 0	0 0	0 0
PCT	M Acres	-	4 237	4 482	5 326	5 615
Suitable Land	M Acres	434 3	434 3	434 3	434 3	434 3
Suitable - Old Growth	M Acres	206	154	98	55	12
Soil and Water						
Sediment	M Tons	146 3	140 7	134 1	130.9	129 3
Facilities						
Arterial and Collector Roads	Miles	19 6	0 3	0	0	0
Local Roads	Miles	59 3	41.5	12 2	6 9	5 8
Socio-Economic						
PNV	$MM	2192 7	-	-	-	-
Budget	$MM	31 0	26 0	22 5	20.7	17.2

9 Current Direction, Implementable With No Specified Timber Targets

Description and Purpose. This Benchmark specifies the management, resource ouputs, and economic and environmental effects most likely to occur in the future if current plans and direction are followed, including the requirements of the National Forest Management Act of 1976 and its implementing regulations.

Those current plans, direction, and NFMA management requirements that have the most effect on resource outputs and environmental and economic effects were modeled in FORPLAN. These include the Alpine Lakes Area Management Plan, the Skagit Wild and Scenic River Plan, the 1963 Timber Management Plan as amended, the Ranger District Multiple Use Plans, NFMA regulations (FSM 1920), and the 11/83 Region 6 Planning Direction Specific modeling is discussed below. The same difficulties experienced in modeling the original Current Direction Benchmark were also experienced here, compounded by the additional constraints required to meet NFMA.

The only plan that actually specifies resource outputs is the Timber Management Plan, which has a potential yield of 203.8 MMBF The plan does not contain cubic foot data, so the RPA conversion factor of 4 89 was used, which results in a potential yield of 41.7 MMCF.

Assumptions and Constraints. This Benchmark was formulated and run along the same lines as the original Current Direction Benchmark, with some notable changes. As the title indicates, modifications were made to incorporate the management requirements to meet NFMA. These are the same MR's used in all the other Benchmark Runs, except Runs #1, 2, 3, and Current Direction The same accessibility/dispersion constraints are used as in the other Benchmark Runs to meet silvicultural guidelines, harvest unit size limitations, unit dispersion, and vegetation diversity. Habitat for 40% of the potential cavity nester population is maintained, as in the original Current Direction run (in contrast to the 20% level used as the MR level in the other Benchmarks). Rotations are based on culmination of mean annual increment

As in the original Current Direction Benchmark, the objective function was to maximize timber for 5 decades, rolled over to maximize timber for 15 decades, then rolled over once more to maximize PNV for 15 decades to force the solution toward economic efficiency

The non-declining yield and ending inventory (perpetual harvest) constraints are applied. In contrast to the original Current Direction benchmark, no timber harvest target is set Budget is constrained to 27.0 $MM annually for the 150-year planning horizon.

Results With no first decade timber harvest target, this run was feasible. The results of the run are shown in the accompanying output Table B-48.

Most notable is the low first decade annual harvest of 20.9 MMCF, followed by a second and subsequent decade annual harvest of 43 1 MMCF. This is about 3.4% higher that the potential yield of 41 67 MMCF specified by the amended Timber Management Plan. In the 9th decade, the ASQ climbs to 46.9 MMCF and then rises to the LTSY level of 52.3 MMCF in the 10th decade through the end of the planning horizon

Road construction requirements increase in the 1st decade compared to the original Current Direction run, primarily because of the dispersion constraint is forcing harvest earlier onto the unroaded portion of the Forest.

Silvicultural intensity is slightly lower for this benchmark than for the original Current Direction benchmark, especially in the first three decades.

PNV is somewhat lower than for the Current Direction benchmark, reflecting primarily the low first decade harvest and roading costs incurred earlier in the planning horizon.

Suitable acres are approximately 89% of tentatively suitable, compared to 97% in the original Current Direction. This is primarily the result of applying the MR's.

Table B-48

Current Direction, Implementable With No Specified Timber Targets Benchmark Run

Output/Effect	Unit of Measure	Annual Figures Decade 1	2	3	4	5
Recreation						
Rural	MRVD	5132	5132	5132	5132	5132
Roaded Modified	MRVD	845	890	969	1045	1309
Roaded Natural	MRVD	1313	1284	1232	1182	1009
Semi-Primitive Motorized	MRVD	24	24	24	24	24
Semi-Primitive Nonmotorized	MRVD	194	190	184	178	157
Primitive	MRVD	1	1	1	1	1
Winter Dispersed	MRVD	249	249	249	249	249
Total	MRVD	7758	7770	7791	7811	7881
Wilderness						
Transition	MRVD	182	182	182	182	182
Semi-Primitive Trailed	MRVD	125	125	125	125	125
Primitive Trailed	MRVD	37	37	37	37	37
Trailless	MRVD	0 6	0 6	0 6	0 6	0.6
Trailless Pristine	MRVD	8	8	8	8	8
Total	MRVD	352.6	352 6	352.6	352.6	352 6
Wilderness	M Acres	718	718	718	718	718
Fish and Wildlife (WFUD's are included in Recreation RVD's)						
Hunting	MWFUD	397	400	404	409	425
Nonconsumptive	MWFUD	26	26	26	26	27
Resident Fish	MWFUD	114	114	114	115	117
Anadromous Fish	M pounds	Not estimated				
Elk	Numbers	1068	1102	1024	992	964
Deer	Numbers	19437	21867	19217	18513	18693
Timber						
LTSYC	MMCF	-	-	-	-	52.3
ASQ	MMCF	20.9	43 1	43.1	43.1	43 1
ASQ	MMBF	102 2	210 8	210.8	210.8	210.8
Final Harvest (Exist)	M Acres	2 835	5 871	5 641	4 726	5.083
Reforestation (Plant)	M Acres	2 467	5 108	4.908	4 112	4 422
Reforestation (Natural)	M Acres	0 0	0 0	0 0	0 0	0 0
PCT	M Acres	-	3 401	2 268	4.697	4 513
Suitable Land	M Acres	434 3	434 3	434 3	434 3	434 3
Suitable - Old Growth	M Acres	206	177	131	78	32
Soil and Water						
Sediment	M Tons	123 5	130 3	118 4	117 3	111 3
Facilities						
Arterial and Collector Roads	Miles	19 6	0 3	0 0	-	-
Local Roads	Miles	59 3	41 5	12 2	6.9	-
Socio-Economic						
PNV	$MM	2158 5	-	-	-	-
Budget	$MM	21 3	18 9	14 1	14.7	12.8

E. Opportunity Costs Analysis

The analysis of opportunity costs of legal and policy constraints incorporated in the Forest planning process and in FORPLAN was conducted in accordance with Washington Office and Regional planning direction. In this section, the opportunity costs of the MR's 95% CMAI, and non-declining yield are analyzed and discussed. For the 95% CMAI and NDY policies, the analyses are done singly and then in combination with each other.

1. MR's in Combination

The opportunity costs of individual MR's were examined earlier in this section. The analysis below examines the costs of MR's in combination.

Given maximum PNV, assigned values, sequential upper and lower bounds, and rotations set at utilization standards:

Table B-49 shows the results of comparing Run #4, Table B-31, with Run #2, Table B-30.

Table B-49
MR's in Combination
(Maximum PNV, Assigned Values, Seq. U+L, Utilization Standards)

Comparison Factor	Unit of Measurement	Run #2 w/o MR's	Run #4 with MR's	% Change
LTSYC	MMCF	46.3	36.3	-22
1st Decade Harvest	MMCF	105 7	56.0	-47
Total 15 Decade Harvest	MMCF	820 7	643.7	-22
Planted Acres 5 Decade Total	M Acres	11.5	7.2	-37
PCT (5 Decade Total)	M Acres	7.4	4.6	-38
Suitable Acres	M Acres	597.7	515.0	-14
PNV	MM$	2796	2409	-14

The addition of MR's causes a substantial reduction in values of all selected comparison factors. Suitable acres are reduced which drives LTSYC and harvest levels downward. The timber management intensity level is also reduced with less acres going to a planted prescription and considerably less acres assigned to a PCT prescription.

Although PNV drops significantly, the percent decrease is much less than the percentage decline in timber harvest levels. This is due to the less intensive management practices selected and the assignment of more acres to non-timber prescriptions which results in higher levels of other resource outputs, primarily recreation.

Given maximum PNV, NDF, and 95% CMAI:

Table B-50 shows the results of comparing Run #7, Table B-37, with Run #3 Table B-26.

Table B-50
MR's in Combination
(Maximum PNV, Assigned Values, NDF, 95% CMAI)

Comparison Factor	Unit of Measurement	Run #3 w/o MR's	Run #7 with MR's	% Change
LTSYC	MMCF	66.2	49.6	-25
1st Decade Harvest	MMCF	63.9	48.8	-24
Total 15 Decade Harvest	MMCF	960.8	688.3	-28
Planted Acres 5 Decade Total	M Acres	29 5	17.1	-42
PCT (5 decade total)	M Acres	21 4	13.1	-39
Suitable Acres	M Acres	606 9	528.8	-13
PNV	MM$	2569	2381	- 7

When NDF and 95% CMAI are introduced, the opportunity costs of MR's in combination are very similar to those above where a departure and utilization standard are used except first decade harvest decreases less The cost to PNV is not as great, percentage wise, as when departure was allowed

2. Rotations at 95% CMAI

Given maximum PNV, assigned values, MR's, sequential upper and lower bounds, and rotations set at utilization standards:

Table B-51 shows the results of comparing Run #5, Table B-33, to Run #4, Table B-31.

Table B-51
Rotations at 95% CMAI
(Maximum PNV, Assigned Values, MR's, Seq U+L)

Comparison Factor	Unit of Measurement	Run #4 Util Standard	Run #5 95% CMAI	% Change
LTSYC	MMCF	36 3	40.8	+12
1st Decade Harvest	MMCF	56 0	52 9	- 6
Total 15 Decade Harvest	MMCF	643 7	653.8	+ 2
Planted Acres 5 Decade Total	M Acres	7 2	9 2	+28
PCT (5 decade total)	M Acres	4 6	7 0	+52
Suitable Acres	M Acres	515 0	513 9	- 0.2
PNV	MM$	2409	2406	- 0.1

The 95% CMAI constraint causes a significant increase in LTSYC because harvest is deferred until the trees are larger The 95 CMAI rotation also causes a reduction in first decade harvest, but total harvest in 15 decades increases slightly Timber management intensities increase, but PNV shows a very slight decrease which is not considered significant

Given maximum PNV, assigned values, MR's and NDF:

Table B-52 displays the results of comparing Run #7, Table B-37, to Run #6, Table B-35.

Table B-52
Rotations at 95% CMAI
(Maximum PNV, Assigned Values, MR's, NDF)

Comparison Factor	Unit of Measurement	Run #6 Util. Standard	Run #7 95% CMAI	% Change
LTSYC	MMCF	48.3	49.6	+ 3
1st Decade Harvest	MMCF	48.9	48.8	- 0.2
Total 15 Decade Harvest	MMCF	733.5	688.3	- 6
Planted Acres 5 Decade Total	M Acres	16.5	17.1	+ 4
PCT (5 decade total)	M Acres	13.1	13.1	0
Suitable Acres	M Acres	522.4	528.8	+ 1
PNV	MM$	2384	2381	- 0.1

When NDF is introduced, first decade harvests and total 15 decade harvests are very close regardless of the rotation. LTSYC does increase slightly, but not as much as when departure was permitted. Acres assigned to a planted prescription are about the same, and no increase in PCT is observed. PNV remains unchanged.

Given maximum PNV, market values, MR's and sequential upper and lower:

Table B-53 displays the results of comparing Run #9, Table B-34, with Run #8, Table B-32.

Table B-53
Rotations at 95% CMAI
(Maximum PNV, Market Prices, MR's, Seq. U+L)

Comparison Factor	Unit of Measurement	Run #8 Util. Standard	Run #9 95% CMAI	% Change
LTSYC	MMCF	37.2	41.2	+11
1st Decade Harvest	MMCF	54.5	52.9	- 3
Total 15 Decade Harvest	MMCF	658.1	659.1	+ 0.15
Planted Acres 5 Decade Total	M Acres	7.0	9.0	+29
PCT (5 decade total)	M Acres	5 1	7.6	+49
Suitable Acres	M Acres	523.1	513.3	- 2
PNV	MM$	1510	1507	- 0 2

Because departure is again introduced in this comparison, LTSYC increases and first decade harvest decreases. Total harvest for 15 decades is almost the same regardless of the rotation age. Acres planted increases, and PCT acres increase. Suitable acres and PNV remain constant regardless of the rotation selected.

Given maximum PNV, market values, MR's, and NDF:

Table B-54 shows the results of comparing Run #11, Table B-38, with Run #10, Table B-36.

Table B-54
Rotations at 95% CMAI
(Maximum PNV, Market Prices, MR's, NDF)

Comparison Factor	Unit of Measurement	Run #10 Util. Standard	Run #11 95% CMAI	% Change
LTSYC	MMCF	48.2	49.6	+ 3
1st Decade Harvest	MMCF	48.9	48.8	- 0.2
Total 15 Decade Harvest	MMCF	733.5	732.8	- 0.1
Planted Acres 5 Decade Total	M Acres	16 3	17.5	+ 7
PCT (5 decade total)	M Acres	12.9	13.4	+ 4
Suitable Acres	M Acres	523 7	524.3	+ 0.1
PNV	MM$	1486	1483	- 0.2

The introduction of NDF causes a increase in LTSYC, but little change in harvest levels. Harvest levels are at LTSYC with utilization standards, but are about 2% below LTSYC with 95% CMAI. The utilization standards constraint allows harvest of stands at an earlier age and more of the existing younger age stands are available now.

Suitable acres and PNV remain unchanged regardless of the rotation selected.

Summary - Rotations at 95% CMAI. In summary, the rotation age selected has virtually no effect on PNV. Rotations at utilization standards does allow harvest levels to equal LTSYC when NDF is utilized

3. Non-declining Flow

Given maximize PNV, assigned values, MR's, and rotations based on utilization standards:

Table B-55 shows the results of comparing Run #6, Table B-35, with Run #4, Table B-31.

Table B-55
Non-declining Flow
(Maximum PNV, Assigned Values, Utilization Standards)

Comparison Factor	Unit of Measurement	Run #4 Seq. U+L	Run #6 NDF _	% Change
LTSYC	MMCF	36.3	48.3	+33
1st Decade Harvest	MMCF	56.0	48.9	-13
Total 15 Decade Harvest	MMCF	643 7	733.5	+14
Planted Acres 5 Decade Total	M Acres	7 2	16.5	+129
PCT (5 decade total)	M Acres	4.6	13.1	+185
Suitable Acres	M Acres	515 0	522.4	+ 1
PNV	MM$	2409	2384	- 1

The NDF constraint displays the typical characteristics of increased LTSYC, lower 1st decade harvest, increased 15 decade harvest, more intensive timber management prescriptions, and a slight decrease in PNV.

Given maximize PNV, assigned values, MR's and 95% CMAI:

Table B-56 shows the results of comparing Run #7, Table B-37, with Run #5, Table B-33.

Table B-56
Non-declining Flow
(Maximum PNV, Assigned Values, MR's, 95% CMAI)

Comparison Factor	Unit of Measurement	Run #5 Seq. U+L	Run #7 NDF _	% Change
LTSYC	MMCF	40.8	49.6	+22
1st Decade Harvest	MMCF	52.9	48 8	- 8
Total 15 Decade Harvest	MMCF	653 8	688.3	+ 5
Planted Acres 5 Decade Total	M Acres	9.2	17.1	+86
PCT (5 decade total)	M Acres	7.0	13.1	+87
Suitable Acres	M Acres	513 9	528.8	+ 3
PNV	MM$	2406	2381	- 1

With rotations at 95% CMAI, the imposition of the NDF constraint again exhibits the characteristic pattern of increased LTSYC and 15 decade total harvest with a significant decrease in first decade harvest. The model selects higher harvest levels in the early portion of the planning horizon to satisfy the objective function before discounting has the opportunity to reduce PNV. When NDF is added, the harvest is spread over the planning horizon. The loss in PNV is partially regained by increased investments in timber management intensities.

Given maximize PNV, market prices, MR's and rotations based on utilization standards:

Table B-57 displays the results of comparing Run #10, Table B-36, with Run #8, Table B-32.

Table B-57
Non-declining Flow
(Maximum PNV, Market Prices, MR's, Utilization Standards)

Comparison Factor	Unit of Measurement	Run #8 Seq U+L	Run #10 NDF	% Change
LTSYC	MMCF	37.2	48.2	+30
1st Decade Harvest	MMCF	54.5	48.9	-10
Total 15 Decade Harvest	MMCF	658.1	733.5	+11
Planted Acres 5 Decade Total	M Acres	7.0	16 3	+133
PCT (5 decade total)	M Acres	5.1	12.9	+153
Suitable Acres	M Acres	523.1	523.7	+ 0.1
PNV	MM$	1510	1486	- 2

With the introduction of market prices only the typical characteristics of NDF are still exhibited. There is a reduction in PNV because recreation is not contributing.

Given maximize PNV, market prices, MR's, 95% CMAI:

Table B-58 displays the results of comparing Run #11, Table B-38, to Run #9, Table B-34.

Table B-58
Non-declining Flow
(Maximum PNV, Market Prices, MR's, 95% CMAI)

Comparison Factor	Unit of Measurement	Run #9 Seq. U+L	Run #11 NDF	% Change
LTSYC	MMCF	41.2	49.6	+20
1st Decade Harvest	MMCF	52.9	48 8	- 8
Total 15 Decade Harvest	MMCF	659 1	732.8	+11
Planted Acres 5 Decade Total	M Acres	9.0	17.5	+94
PCT (5 decade total)	M Acres	7.6	13.4	+76
Suitable Acres	M Acres	513 3	524.3	+ 2
PNV	MM$	1507	1483	- 2

Again the non-declining flow pattern for this Forest is exhibited. The percentage changes are not as large for LTSYC and the same total for 15 decade harvest, but this is primarily the introduction of market prices only, which increases the suitable acres. The value of PNV is considerably below that when

assigned values were used, but the NDF constraint reduces it only 2% when compared to the departure option.

Summary - Non-declining Flow. In summary, NDF causes reductions in first decade harvest, but increases in LTSYC and total harvest. NDF results in limited reductions in PNV, because of the higher investments in intensive timber practices in the early decades When only market prices are used, there is little increase in suitable acres.

4. NDF and 95% CMAI in Combination

Given maximize PNV, assigned values, no MR's:

Table B-59 displays the results of comparing Run #3, Table B-26, to Run #2, Table B-30.

Table B-59
NDF and 95% CMAI in Combination
(Maximum PNV, Assigned Values, No MR's)

Comparison Factor	Unit of Measurement	Run #2 Seq. U+L Utl. Stan.	Run #3 NDF 95% CMAI	% Change
LTSYC	MMCF	46.3	66.2	+43
1st Decade Harvest	MMCF	105 7	63.9	-40
Total 15 Decade Harvest	MMCF	820.7	980 8	+20
Planted Acres 5 Decade Total	M Acres	11.5	29 5	+157
PCT (5 decade total)	M Acres	7.4	21 4	+189
Suitable Acres	M Acres	597.7	606.9	+ 2
PNV	MM$	2796	2569	- 8

This comparison reveals the characteristics pattern of the NDF constraint for this Forest, where LTSYC and total 15 decade harvest increase substantially, but 1st harvest decade declines dramatically. The NDF constraint requires harvest schedules to be evened out over the planning horizon rather than concentration of harvest in the early decades as is observed under a departure option. The reduction in early decade harvest is at the expense of the objective function because of the effect of discounting. Dramatic increases in investments in more intensive timber management on higher levels of suitable acres tend to increase the LTSYC.

Given maximum PNV, assigned values, and MR's:

Table B-60 displays the results of comparing Run #7, Table B-37, with Run #4, Table B-31.

Table B-60
NDF and 95% CMAI in Combination
(Maximum PNV, Assigned Values, MR's)

Comparison Factor	Unit of Measurement	Run #4 Seq. U+L Utl Stan	Run #7 NDF 95% CMAI	% Change
LTSYC	MMCF	36.3	49.6	+37
1st Decade Harvest	MMCF	56 0	48.8	-13
Total 15 Decade Harvest	MMCF	643 7	688.3	+ 7
Planted Acres 5 Decade Total	M Acres	7.2	17.1	+137
PCT (5 decade total)	M Acres	4.6	13.1	+185
Suitable Acres	M Acres	515.0	528.8	+ 3
PNV	MM$	2409	2381	- 1

The introduction of MR's in this comparison drives the timber values downward, but the characteristic pattern associated with NDF is again observed The opportunity cost in terms of PNV is minor, but significant decreases in first decade harvest occur along with substantial increases in LTSYC and total harvest for 15 decades. Again when NDF is used, investments in timber management intensity increase.

Given maximize PNV, market values, and MR's:

Table B-61 displays the results of comparing Run #11, Table B-38, with Run #8, Table B-32.

Table B-61
NDF and 95% CMAI in Combination
(Maximum PNV, Market Values, MR's)

Comparison Factor	Unit of Measurement	Run #8 Seq U+L Utl Stan	Run #11 NDF 95% CMAI	% Change
LTSYC	MMCF	37 2	49 6	+33
1st Decade Harvest	MMCF	54 5	48 8	-10
Total 15 Decade Harvest	MMCF	658 1	732.8	+11
Planted Acres 5 Decade Total	M Acres	7 0	17.5	+150
PCT (5 decade total)	M Acres	5 1	13.4	+163
Suitable Acres	M Acres	523 1	524 3	+ 0.2
PNV	MM$	1510	1483	- 2

This comparison is again typical of other runs where NDF is imposed. The introduction of market values drives PNV downward sharply, but the opportunity cost of imposing NDF and 95% CMAI results in only a 2% reduction. There is little change in the amount of suitable acres as the market price constraint had already driven them as high as possible

F. Sensitivity Analysis

This section details the sensitivity analyses done around the 1% real timber price trend, and around the level of timber management-related costs used in FORPLAN.

1. Timber Price Trends Analysis

The use of timber price trends and the correct ones to use is a major Regional issue. All Benchmark Runs utilized a timber price increase of 1% per year for 5 decades and then a 0% trend thereafter.

The sensitivity of the price trend was analyzed utilizing a 0%, 2%, and 3% trend. Benchmark Run #7, Table B-37, was selected as a base for this analysis as it includes MR's. The results of the sensitivity runs are displayed in the table, B-62, below.

Table B-62
Timber Price Trend Sensitivity
(NDF MR s 95% CMAI)

Comparison Factor	Measure Unit	0% Trend	% Change From Base	Base (Run #7)	2% Trend	%Change From Base	3% Trend	% Change From Base
LTSYC	MMCF	46 3	- 1	49 6	51 2	+3	60 7	+22
1st Decade Harvest	MMCF	48 9	+ 0 2	48 8	47 2	-3	40 8	-16
Total 15 Decade Harvest	MMCF	820 7	+ 7	688 3	718 0	+4	784 0	+14
Planted Acres								
5 Decade Total	M Acres	16 6	- 3	17 1	18 0	+5	23 8	+39
PCT 5 Decade Total	M Acres	11 0	-16	13 1	14 1	+8	18 3	+40
Suitable Acres	M Acres	529 7	+ 0 2	528 8	525 4	-1	529 7	+ 0 2
PNV	MMS	2217	₣ 7	2281	2604	+9	2919	+23

In general, the results of this sensitivity analysis are what one would expect. When a 0% trend is compared to the base (1% trend), less intensive timber prescriptions are selected and PNV declines by 7%. With a 0% price trend, 1st decade harvest is equal to LTSYC, while with a 1% trend, annual harvest does not reach LTSYC until sometime after the 15th decade.
With a 2% trend, LTSYC increases by about 3% from the base, but 1st decade harvest is slightly lower than with a 0% or 1% trend. Acres selected for planting increase 5% over the base with a 2% trend, but acres assigned to a PCT prescription increase 8%. With the 2% price trend, PNV increases 9%.

When a 3% trend is utilized, LTSYC increases 22% over the base, but first decade harvest decreases 16%. A significant increase in the number of acres assigned to a more intensive timber management intensity is observed when prices are trended at a 3% rate, with the increased intensities and higher timber values, a 23% increase in PNV is observed.

The highest number of suitable acres actually occurs within 0% and 3% and decreases slightly with the base and 2% trends. All of these changes are 1% or less and not considered significant

The most significant conclusions that can be drawn from this analysis is that the first decade ASQ decreases with an increase in timber price trend and PNV shows significant change with a change in timber price trend.

2. Timber Costs Assumptions and Analysis

Timber Industry has expressed concerns about the sensitivity of timber costs utilized in the FORPLAN model.

The Forest made two cost sensitivity runs by increasing and decreasing timber-related costs by 20%. Benchmark Run #7, Table B-37, was used as a base for this analysis, since this run includes MR's which respond to several issues on the Forest. The results of this analysis are displayed in Table B-63.

Table B-63
Timber Cost Sensitivity

Comparison Factor	Measurement Unit	20% Cost Decrease	% Change From Base	Base (Run #7)	20% Cost Increase	% Change From Base
LTSYC	MMCF	57 3	+16	49 6	42 1	-15
1st Decade Harvest	MMCF	54 0	+11	48 8	38 8	-20
Total 15 Dec Harvest Planted Acres	MMCF	820 7	+19	688 3	582 0	-15
5 Decade Total	M Acres	25 9	+51	17 1	7 7	-55
PCT 5 Decade Total	*M Acres*	*20 0*	+53	13 1	*6 1*	-53
Suitable Acres	M Acres	529 7	+ 0 2	528 8	519 0	- 2
PNV	MMS	2668	+12	2381	2127	-11

The above data indicates that as timber-related costs decrease by 20%, the LTSYC and timber harvest increase and the suitable timber land base remains relatively unchanged The higher timber management intensities scheduled in this run along with the lower costs result in a higher (12%) PNV

As timber-related costs are increased 20%, reductions in the comparison factor values for 1st decade harvest and total 15 decade harvest and planted acres decrease more significantly than they increase with the 20% decrease All other comparison factor values decrease with the 20% cost increase approximately the same amount as they increase with the 20% cost decrease Because of the increased costs, less acres are intensively managed for timber, resulting in less timber outputs and a corresponding decrease in PNV of 11%.

This analysis indicates that the model and the forest structure are more sensitive to cost increases, in timber-related costs, than to cost decreases, *although both bring about significant changes in all factors except suitable* lands.

G. Analysis of Assigned Price Runs vs. Market Price Runs

On some Forests, assigning prices to recreation use can have significant effects on the amount of lands allocated to timber management. If higher prices are assigned to Primitive and Semi-primitive Nonmotorized recreation than to road-related recreation, the value of keeping the lands unroaded and available for more primitive types of recreation experience can outweigh the value of roading and harvesting the lands, particularly if the timber values are fairly low, and the recreation opportunity is high quality.

That situation was apparently not the case on the Mt. Baker-Snoqualmie. There was very little difference in outputs and land allocations in the benchmark runs that were identical except for assigned prices being used in one and market prices only being used in the other. For comparison see runs #4 vs. #8 (Table B-31 vs. B-32); #5 vs. #9 (Table B-33 vs. B-34); #6 vs. #10 Table B-35 vs B-36; and #7 vs. #11 (Table B-37 vs. B-38). The PNV in these paired runs averages 38% lower in the "market price only" runs (#'s 8, 9, 10, & 11).

Part of this result is undoubtedly a reflection of large timber values on this Forest When the model can harvest 40,000 BF/Ac at an average stumpage price of about $125/MBF in Decade 1, it gets a benefit of $5000 per acre. If that same acre yields about 0.6 SPNM RVD's per year at a value of $13 25 per RVD, in Decade 1, that acre would yield a gross value of $79.50. It would take almost 70 years for that acre to provide as much benefit as the timber does in the first decade. Even if the net benefit from timber after all management costs were accounted for was only half the gross timber value per acre, it would still take more than 30 years for the recreation to catch up

The discounting process has an effect here as well. If the timber is harvested in the first or second decade, it is not affected significantly by the discount rate. But as the recreation is trying to catch up over a space of 30-60 years, it is more affected by the discount rate. Even if the recreation value does catch up over the time it takes to grow another timber stand, the present value of those recreation benefits will be substantially below that of the early period timber harvest If the model is maximizing PNV, it will tend to choose timber over recreation more often than not. If that is the case, it becomes relatively immaterial whether or not assigned values are used for recreation.

The other major factor involved is that there is very little potential to make major increases in Semi-primitive Nonmotorized and Primitive recreation capacity on this Forest. Much of the land providing these experiences is not suitable for timber anyway The benchmark maximizing this type of recreation only managed to get a capacity of about 200,000 RVD's annually by the end of the fifth decade. The maximum timber potential run, on the other hand, is still experienced by the end of five decades. So at the extremes, there was only about a 50% gain in capacity. In absolute terms, which is what the model will pay attention to when it maximizes on PNV, there is very little that can be gained, even by putting a high price on the unroaded recreation, because there is so little room within at least a five-decade span for expansion in capacity. Increases in roaded recreation, which go along with timber harvest, can easily outweigh losses in unroaded recreation, even if priced significantly lower, because of the much larger absolute amount of capacity and demand. These two factors combine to make little difference in outputs and land allocations between the assigned price runs and the "market price only" runs. There is apparently not enough absolute value that can be associated with increasing unroaded, primitive recreation to pull any significant amount of land away from assignment to timber management.

H. Sensitivity of Alternatives to the Discount Rate

To help determine the sensitivity of the benchmarks and alternatives to varying discount rates, present net value, costs, and benefits were calculated using both the 4% and 7 1/8% discount rate (FSM 1971.71) In addition, an analysis of the sensitivity of the preferred alternative to the discount rate was performed by solving the FORPLAN model using both of the discount rates. Table B-63a displays the results of the calculating present net value, discounted benefits, and costs using the 4% discount rate vs. the 7 1/8% discount rate.

Table B-63a
Comparison of Present Net Value, Discounted Costs, and Discounted Benefits by Alternative for Discount Rates of 4% vs. 7 1/8% - in Million 1982 $

Rate = 4%

Alternative	PNV	Discounted Benefits	Discounted Costs
Max PNV Benchmark	2590.7	4287 6	1696.9
B (RPA)	2343 2	3434 7	1091.5
I	2342 9	3438.3	1095 4
A	2283.5	3557 2	1273.7
H	2260.0	3291.3	1031.3
J (Pref)	2258.8	3243 2	984 4
G-Mod	1997.0	2825.1	828.1
C	1970.9	2695.2	724.3
NC 1/	NA	NA	NA

Rate = 7.125%

Alternative	PNV	Discounted Benefits	Discounted Costs
Max PNV Benchmark	1305.9	2161 2	855.3
B (RPA)	1215.4	1790 9	575.5
I	1221.8	1796.9	575 1
A	1187 1	1858 1	671.0
H	1174.3	1717 1	542.9
J (Pref)	1170.2	1689.2	519.0
G-Mod	1055.3	1493.6	438 3
C	1029.6	1417 9	388.3
NC 1/	NA	NA	NA

1/ The TM Plan upon which the Alternative NC is based was developed in 1963 It was not an integrated resource plan, and consequently did not address all resource uses and outputs. Since Alternative NC was not modeled in FORPLAN, economic measures comparable with the Max PNV Benchmark and other alternatives were not determined.

Across all the alternatives, lower PNVs, discounted costs and benefits resulted from using the higher discount rate; however, the magnitude of the change was not constant for all alternatives In one case, the rankings between alternatives (B and I) was changed. Under a 4% rate, B has a slightly higher PNV than I When recalculated at 7 1/8%, the rankings switch, with the PNV for I almost $6 million higher than B. The reason for the differences, caused from using the 7 1/8% discount rate, is a function of the point in the planning horizon at which the benefits and costs of the alternative occur as well as the magnitude of the costs and benefits themselves

To test the sensitivity of the preferred alternative to the discount rate, the FORPLAN solution was resolved using the 7 1/8% discount rate. The analysis revealed that when the objective function values are discounted using this discount rate, the optimal solution will include more intensive silvicultural management prescriptions As a result, both ASQ and LTSY increased. The model is optimizing on these prescriptions to generate shorter rotation ages, and therefore perform a final harvest twice within the planning horizon (natural regeneration usually uses a rotation of 120 years compared to a 70 year rotation for more intensive practices) By doing so, the model is taking advantage of the higher discount rate and the effect of discounting any costs associated with later harvest activities, since in general, the changes in discounted benefits are more than compensating for increases in discounted costs. Although these benefits minus the costs did produce a positive PNV, the total discounted PNV for this run was still only about 50% of the prior 4% PNV.

I. Summary of Benchmark Results

The outputs and associated PNV for each benchmark run are shown in the output and effects tables in Part D. Runs without MR's had the highest PNV's because of additional lands available for timber management. Runs allowing fluctuating harvest and harvest utilizations standards instead of 95% CMAI tended to have higher PNV's than comparable runs with non-declining yield and 95% CMAI The market price only runs had uniformly lower PNV's than those for the assigned price runs. Valuing recreation added around $800 million to the 15-decade PNV.

All of the benchmarks with MR's had the same acres going to the MR management emphasis After accounting for overlaps, about 99,600 acres were assigned for wildlife MR's, of which about 70,400 acres were tentatively suitable Another approximately 19,500 acres were assigned to SMU, with 25% non-harvest, 50% harvest at 160-year rotation, and the remaining 25% available for full management. Slightly over 700,000 acres were assigned in all cases to wilderness. The balance of the tentatively suitable acres were available for assignment to timber management. The "suitable acres" line in the results tables indicates how many acres in each run actually went to timber management. With a little over 600,000 acres of tentatively suitable lands in the data base for the benchmarks, for most runs almost all of the available lands not assigned to MR's went to timber, usually within 10,000 acres. Acres not chosen for timber management (generally inaccessible lands with high harvest costs), acres assigned to MR's and all unsuitable acres went into essentially a minimum level state However, they still produced recreation opportunities and had recreation management costs charged against them.

CHAPTER VII - FORMULATION OF ALTERNATIVES

CHANGES BETWEEN DRAFT AND FINAL - APPENDIX B, CHAPTER VII

- o The "Process Used to Formulate Alternatives" section has been updated to describe the process up through the development of the preferred alternative for the FEIS.

- o Reference to the water quality MR and associated harvest acreage limitations by watershed has been added.

- o Discussion of the availability and application of commercial thinning has been updated to reflect review and revision of commercial thinning criteria between the Draft and Final.

- o Alternative descriptions have been updated to encompass the final set of alternatives carried in the FEIS.

- o Discussion of constraints to meet NFMA management requirements has been updated to include the water quality MR constraints resulting from the hydrologic cumulative effects analysis.

- o Two additional alternatives are developed for consideration in detail in the FEIS. Alternative I was developed in response to strong public support and comment. Alternative J was developed by the Forest Management Team as the new Forest Service Preferred Alternative.

- o One alternative considered in detail in the DEIS, Alternative G, was significantly modified in response to public comment and to better meet its stated management objectives.

- o Alternatives D, E, E-Departure, F, and H-Departure, which were considered in detail in the DEIS, were dropped from further consideration in the FEIS. They received very little support or comment during the DEIS review. They are not needed to provide a full range of alternatives for analysis.

- o Alternative H is carried forward to the FEIS as an alternative considered in detail, but is no longer the Forest Service Preferred Alternative.

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A. Introduction

A Forest Plan alternative is a mix of management prescriptions applied in specific amounts and locations of the Forest to achieve a desired management goal and objectives. As a result, each alternative would generate a different mix of goods, services, and environmental effects. The planning regulations (36 CFR 219,12(f)) require that an alternative must:

- o Be within the maximum and minimum resource potential of the Forest to provide a full range of major commodity and environmental resource uses and values.

- Reflect a range of resource outputs and expenditure levels.
- Be formulated to facilitate analysis of opportunity costs, resource use, and environmental tradeoffs among alternatives.
- Be formulated to facilitate evaluation of present net value, benefits, and costs of achieving various outputs and nonpriced benefits.
- Address and respond differently to major public issues, management concerns, and resource opportunities.
- Be formulated to require changes in existing laws and policies, to implement if reasonable and necessary, to address major public issues, managementconcerns, or resource opportunities.
- Respond to and incorporate the RPA Program tentative resource objectives for the Forest in at least one alternative.
- Reflect the level of goods and services provided by the unit, and the highest level of goods and services that would be provided in the future if current management direction continues in at least one alternative (the "no action" alternative pursuant to NEPA).
- Represent, to the extent practicable, the most cost-efficient combination of management prescriptions to meet the objectives of the alternative.
- State the condition and uses that will result from long-term implementation.
- State what goods and services will be produced, including timing and flow of outputs, and the costs and benefits generated.
- State the resource management standards and guidelines.
- State the purposes of the proposed management direction.

The formulation of alternatives for the DEIS (planning step five) was based on information gathered during the first four steps of the planning process: identification of issues, concerns, and opportunities; development of planning criteria; inventory and data collection; and Analysis of the Management Situation.

The benchmarks from the Analysis of the Management Situation defined the range within which alternatives could be developed. In addition, the planning team developed several alternatives that are required by regulation, Regional and *National direction*.

The choice of alternatives to develop and present in detail in the FEIS built on the information developed up through publication of the DEIS, public response, and additional analysis conducted prior to the preparation of the FEIS. For the FEIS, two additional alternatives are presented: one in response to strong public support and comment, and the other the new Preferred Alternative. Significant modifications were made to another alternative presented in the DEIS, and three alternatives and two departure schedules were dropped from further consideration in the FEIS.

Several alternatives are required by regulation, Regional, and National direction; these required alternatives are listed and briefly described below.

No Change.

This alternative, developed in response to a 1986 appeal, is designed to represent the existing direction in approved plans. The No Change Alternative represents the 1963 Timber Management Plans (as amended); coordination with other resources is guided by the Ranger District Multiple Use Plans and the Forest Service Directives System. It does not comply with the provisions of the National Forest Management Act. **In this FEIS, Alternative NC is the No Change Alternative.**

Current Direction (No Action)

This is the alternative of "No-Action" required by the Council on Environmental Quality (CEQ) regulations (40 CFR 1502.14) and the NFMA regulations (36 CFR 219.12(f)(7)). This alternative will continue the management of the Mt. Baker-Snoqualmie as defined by existing direction in approved management plans; continuation of existing policies, standards, and guidelines; management requirements; current budget updated for changing costs over time; and, to the extent possible, production of current levels and mixes of resource outputs. **In this FEIS, Alternative A is the "No-Action" Alternative.**

Emphasis on the RPA Program

This alternative will determine how the 1980 RPA Program distributed to the Forests through the Regional Guide can best be implemented. **In this FEIS, Alternative B is the 1980 RPA Program alternative.**

Emphasis on Nonmarket Opportunities

This alternative puts an emphasis on water, fish and wildlife, recreation, and other amenity values. Management for other resources will be consistent with the emphasis on amenity values. **Alternative C is the alternative which emphasizes nonmarket opportunities in this FEIS.**

Emphasis on Market Opportunities

This alternative has an emphasis on outputs that have an established market price (timber, livestock range forage, commercial fish, developed recreation opportunities, and minerals). Management for other resources will be consistent with the emphasis on market-oriented outputs. **In this FEIS, Alternative I is the alternative which emphasizes market opportunities.**

B. Process Used to Formulate Alternatives

The process used to derive alternatives, first for the DEIS and then for the FEIS, is outlined below as a series of steps. Some of these steps took place concurrently; some were repeated in whole or in part.

1. Identify Major Issues, Concerns, and Opportunities (ICO's)

Major public issues, management concerns, and opportunities were identified through public and internal meetings and Forest Plan Reports. See Appendix A for additional detail.

2. Develop a Forest Planning Base

A comprehensive multi-resource data base was formed based on the identified issues and concerns; it was stored in a computer mapping system R2MAP.

3. Identify and Map Analysis Areas

Analysis areas which represent lands having similar physical and biological attributes were identified and mapped. The capability, suitability, and management opportunities of specific areas of the Forest were considered in this step.

4. Prepare a Set of Possible Management Prescriptions to Respond to ICO's

A set of management prescriptions was prepared to represent a variety of possible ways and intensities to manage the Forest in response to the issues, concerns, and opportunities. These prescriptions include the most cost efficient set of activities which meet the goals and objectives of each prescription.

5. Determine Management Prescriptions Applicable to Each Analysis Area

6. Estimate Cost, Yield, and Value Coefficients from Applying Management Prescriptions

The costs of applying management prescriptions to analysis areas, and the outputs and resource values which would result, were estimated.

7. Estimate Demand for Various Forest Outputs

8. Develop a FORPLAN Model for the Forest

A FORPLAN model was developed for the Forest incorporating the information developed in the preceding steps. A detailed description of the FORPLAN model is found in Chapter III of this Appendix.

9. Analysis of the Management Situation

During the AMS, supply potentials were determined using the FORPLAN computer model and other techniques. Various assumptions, constraints, and objectives were used to establish benchmarks for supply potentials of each resource. A benchmark was established for maximum present net value. Existing resource supply and projected demand were compared. Opportunities to resolve issues and management concerns were explored by comparing existing and projected demand to potential production levels. These potentials, when compared to the Current Direction, indicate opportunities and/or need for change.

10. Establish a Broad Range of Alternative Goals and Objectives to Respond to ICO's

Alternative goals and objectives were established to provide a broad range of options for future management of the Forest and to provide a broad range of responses to the Forest's planning problems.

11. Map Feasible Land-Use Assignments For Alternative Goals and Objectives Established in Step 10.

Feasible alternative land-use assignments were mapped by the Forest Management Team, using the goals and objectives identified for these DEIS alternatives: RPA Alt. B, nonmarket emphasis Alt. C, and market emphasis Alt. I. The No Action, Alternative A, land allocations were identified from existing plans and adjusted where necessary to reflect current direction, such as NFMA regulations.

12. Map, Utilizing Forest Planning Data Bases, Land-Use Assignments Made by the Conservation Liaison Group

The land-use assignments for the Conservation Liaison Group were developed by that group, utilizing the multi-resource data base, AA's, and management prescriptions developed by the Forest. They were analyzed as Alternative G.

13. Check to Ensure Estimated Outputs of Mapped Alternatives Had a Good Distribution Over the Decision Space Determined in Step 9

Based on the information developed in the AMS and the results of the various benchmark runs, estimates of resource outputs and effects were made for the alternative land-use assignments to determine if a good distribution of outputs within the decision space would result.

14. Formulate Another Alternative

Based on this evaluation, an additional alternative land use assignment was made to fill some gaps identified in the decision space. This alternative was designated Alternative F.

15. Model Alternative Land-Use Assignments in FORPLAN

These land-use assignments were modeled in FORPLAN. Additional objectives were modeled as constraints. FORPLAN computer runs were made utilizing the alternative land-use assignments, the appropriate constraints and, an objective function of maximization of present net value. For the No Action Alternative A, a maximize timber objective function was utilized to be consistent with the goals of these alternatives. These runs were then "rolled over" with a maximize PNV objective function to, ensure that the objectives could be realized in the most cost efficient manner.

16. Cost Efficiency in FORPLAN Runs

Economics played an important role in selecting the mix of timber management intensities which were available in each alternative. Prior to making FORPLAN runs, an intensive examination of alternative silvicultural practices was made, considering the many possible combinations of reforestation method, precommercial thinning, commercial thinning, and rotation lengths. Cost efficiency as well as volume production were also examined prior to selection of the prescriptions to be carried forward into FORPLAN.
Utilization of DP-DFSIM permitted the examination of approximately 100 different timber management intensities. Of those examined, 23 were eventually carried forward to the FORPLAN model. The full range of management intensities was not appropriate, given the desired future condition of the Forest. In those cases, only the intensities that met the multiple use objectives of the alternative were available. The possibility of not managing for timber

production was available in all alternatives. FORPLAN solutions provided the most cost efficient method of meeting the objectives of the alternative.

17. Analysis of the RPA Alternative

An examination of the results of the RPA Alternative revealed that the RPA targets could not be met simultaneously given the current management situation. Several additional FORPLAN runs were made by relaxing discretionary constraints and examining departure options. It was finally concluded that meeting the RPA targets simultaneously was infeasible.

18. Analyze FORPLAN Run Solutions to Determine if the Range of Alternatives were Responsive to ICO's

The results of FORPLAN solutions to these alternatives were analyzed to determine if a broad range of alternatives that were responsive to the issues had been achieved. This analysis identified the need to develop an additional alternative that was more responsive to some of the ICO's.

19. Formulate a Preferred Alternative for the DEIS

An additional alternative (J) was developed, modeled in FORPLAN, and analyzed. This alternative was selected by the Regional Forester as the Preferred Alternative.

20. Publish the DEIS

21. Receive and Analyze Public Comment

22. Revise Mix of Alternatives for FEIS in Response to DEIS Review and Comment

A new market-oriented alternative supported strongly by the Public Land Users Society (PLUS) was developed, mapped, modeled and analyzed. This was designated Alternative I, and replace Alternative D as the required alternative emphasizing market opportunities.

The Conservation Liaison Group Alternative (G) was modified in response to public comment, and to more closely reflect the objectives of the alternative. Some areas originally assigned to timber production were re-designated and mapped as Semi-primitive Nonmotorized areas. Trails proposed under "Trails 2000" were added. This alternative is shown as G-Modified in the FEIS.

In addition to Alternative D, Alternatives E, E-Departure, and H-Departure were dropped from further consideration because of a lack of interest and public comment. The new and revised alternatives, along with the other alternatives carried forward from the DEIS, provided the full range required for analysis in detail in the FEIS.

23. Develop a New Preferred Alternative for the FEIS

After consideration of the revised mix of alternatives, public input, and other factors such as changes in the wildlife management requirements and application of a timber harvest constraints for a water quality management requirement, the Forest Management Team and ID Team developed a new Preferred Alternative, designated Alternative J. This is the culmination of the alternative formulation, assessment, and review process, and reflects the Forest Service estimation of the best mix of activity and output levels, costs and benefits,

and environmental effects that will maximize net public benefits. Alternative J is the basis for the Forest Plan.

C. Constraints Common to All Alternatives

A number of constraints were used in the FORPLAN model for all alternatives to reflect conditions that had to be met by any implementable alternative. These conditions are legal and policy requirements set at the Regional and National level (non-declining yield, MR's, etc.), as well as requirements established in the Forest's Prescriptions, Standards and Guidelines for the Forest Plan (rotation lengths, commercial thinning criteria, etc.). Each common constraint, its purpose and rationale are listed below. Most of the tradeoffs are discussed in general terms, as the constraints used were not analyzed individually on an alternative-by-alternative basis. The major constraints (wildlife MR's, riparian MR's, water quality MR's, and dispersion/diversity) were analyzed using benchmark runs during the AMS process (see Chapter VI of this Appendix).

1. Ending Inventory Constraint

Purpose and Description. The ending inventory constraint was applied without exception in all alternative runs. The purpose of the ending inventory (or perpetual harvest) constraint was to assure that the model had enough timber inventory at the end of the planning horizon to enable it to maintain growth and harvest at long term sustained yield levels indefinitely into the future. This constraint is built into FORPLAN and can be specified or not.

Rationale. NFMA regulations require that "Each sale schedule shall provide for a forest structure that will enable perpetual timber harvest which meets the principle of sustained-yield and multiple-use objectives of the alternative" (36 CFR 219.16(a)(2)(iv)). Without the ending inventory constraint, the model would have no incentive to hold stands to meet long term sustained yield past the end of the 150-year planning horizon. It would tend to cut increasing amounts of timber in the latter decades of the planning horizon until the standing inventory was at or near zero by the end of the 15 decades.

Tradeoffs. Use of the ending inventory constraint was necessary to proxy reality in forest management. It is unforeseeable that future managers would allow the standing volume in suitable timber stands to be reduced to near zero, resulting in a gap of 60-70 years before harvest could once again take place. The tradeoff in applying the constraint was a reduction in the total timber outputs available over the 15 decade horizon.

2. Long-term Sustained Yield (LTSY) Link

Purpose and Description. The LTSY link was used in all the alternatives. The constraint was set so that the harvest in the last period of the planning horizon could not be greater than the Long-term Sustained Yield Capacity (LTSYC) calculated by the model. NFMA regulations require that allowable sale quantity (ASQ) not be above LTSYC except when considering departure options from the base sale schedule (36 CFR 219.16(a)(1)). The LTSY link is a constraint built into FORPLAN which may be specified or not at the user's choice.

Rationale. Without the LTSY link constraint, set at "Maximum", the model could have cut at rates higher than the LTSYC in the final decade of the planning

horizon, as long as there was still sufficient standing inventory to meet the ending inventory constraint, and the non-declining yield constraint was met.

Tradeoffs. The LTSY link constraint potentially reduced the timber outputs available from the latter decades by keeping ASQ in the last decade at or below LTSYC. When non-declining yield is also applied, ASQ prior to the final decade would have to be at or below LTSYC, since non-declining yield keeps ASQ from declining from one period to the next. Thus, ASQ could not rise above LTSYC at any point in the planning horizon as long as non-declining yield applied.

3. Tentatively Suitable Lands

Purpose and Description. Although in some ways a data base determination, the specification of tentatively suitable lands also acted as a constraint on the model. Tentatively suitable lands were defined to meet the requirements of 36 CFR 219.14 (timber resource land suitability), and indirectly to meet 36 CFR 210.27(a) (management requirements for resource protection) and 36 CFR 219.27(c) (*management requirements for vegetative manipulation*). *Refer to* Chapter II, A for details. Tentatively suitable lands were identified through the AA delineations in the data base.

Rationale. Without the restriction that only tentatively suitable lands were available for harvest, the NFMA regulations would have been violated and, if implemented, irreversible resource damage would occur.

Tradeoffs. The restriction of timber harvest to tentatively suitable lands resulted in a lower timber output than would have otherwise occurred. The reduction in harvest came from timber lands taken out of the suitable base because of extremely unstable soils or regeneration problems.

4. Management Requirements

Purpose and Description. MR's were discussed in detail in Chapter VI, B. The MR's were designed to meet NFMA requirements for maintaining viable wildlife and fish populations (36 CFR 219.27(a)(6)); for providing "special attention" to management of riparian areas (36 CFR 219.27(e)); for meeting harvest opening size limitations in even-aged management regimes (36 CFR 219.27(d)); for meeting vegetation diversity requirements (36 CFR 219.27(g)); and for soil and water conservation (36 CFR 219.27(a)(1)). MR's were incorporated in the model as follows:

a. As discussed in Chapter VI, C., all acres determined as required to maintain viable populations for spotted owls, pileated woodpeckers, pine martens, mountain goats, and bald eagle were assigned to non-harvest MR prescriptions, effectively dedicating those acres to the wildlife MR's. In some alternatives, a prescription for enhanced mountain goat habitat was applied. When that prescription was applied to areas including, but larger than, the management requirement acres, the entire area was given the enhancement prescription and was subject to vegetation manipulation in accordance with the standards and guidelines for that prescription. It was assumed that the larger area being managed for the wildlife species in conjunction with the practices specified by the prescriptions would be sufficient to, at the minimum, maintain the viable population, if not substantially increase it.

b. Viable populations of primary cavity nesters were provided for by providing sufficient numbers and sizes of hard snags per acre to meet the nesting

requirements of the species. This was done in the model by reducing the timber yield tables by 1.5% for each 20% of the potential primary excavator populations maintained. (See Chapters III.F and VI.B.2.) A viable level of primary cavity excavator species was determined to be 20% of their maximum potential population.

c. Viable populations of resident and anadromous fish will be maintained by retaining at least the level of fish production currently experienced. This was modeled by applying Level I fisheries investments at the minimum, to all alternatives, following Forest-wide Standards and Guidelines, and applying the water quality management requirement in terms of harvest acreage limitations by watershed across all alternatives.

d. Maintenance of acceptable water quality and watershed condition was modeled by the application across all alternatives of the harvest acreage limitations by watershed developed through the hydrologic cumulative effects analysis process. Accessibility constraints on acres available for harvest are applied by allocation zone for the first decade to limit the harvested acres to the maximum determined by the ID teams for each watershed. In the second and subsequent decades, Forest-wide flow constraints were applied (by North and South) to limit the amount of increase in harvest acres allowed from decade to decade. The total increase allowed over the first decade levels is approximately 18%; no additional increase is allowed after the fifth decade. (See Chapter VI.B or Appendix H for additional details.)

e. Riparian area management was modeled by providing a mix of harvest and non-harvest activity in Streamside Management Units. In the model, 25% of the acres assigned to SMU were given a non-harvest intensity; 50% of the acres were allowed an extended rotation with a minimum rotation age of 160 years and a corresponding harvest entry rate not to exceed 6.25% of the suitable acres per decade; and 25% of the acres stayed in the adjoining prescription, including those providing for full-scale timber management.

f. Harvest opening size limitations and vegetation diversity requirements were modeled in two ways. For the first four decades, accessibility constraints were applied to the acres subject to any timber harvest. The maximum constraint (i.e., that allowing the greatest entry per decade) was applied to those acres going to full-scale timber management (Management Area 17).

This constraint was set to allow up to 30% of the acres assigned to MA 17 within an AZ to be harvested in Decade 1, up to 60% in Decade 2, up to 80% in Decade 3, and up to 100% in the fourth decade. The accessibility constraints are maximum and cumulative; that is, the percentage specified is the maximum that can be harvested in a decade, but the decadal constraints are cumulative. So if the entire 30% is not harvested in the first decade, the balance of the 30% plus the 30% allowed in the second decade can all be harvested in the second decade; and so on up through the fourth decade.

For other MA's with longer rotation lengths specified to meet the objectives of the area (Scenic Viewshed, Deer and Elk Winter Range, etc.), accessibility constraints were also used, with the accessibility proportions set to achieve the desired rotation length. For instance, the Scenic Viewshed prescription specifies a minimum rotation of 200 years to meet the foreground retention objective. Thus, the accessibility constraint is set at 5% for each decade. These accessibility constraints

are designed to meet the objectives of the prescription, not for achieving MR's for diversity and harvest size limitation, but in effect, they more than provide for the MR's in those areas.

After the fourth decade, the harvest size limitation and diversity requirements are modeled using a general relational constraint. This constraint is applied separately to the North and South halves of the Forest. The constraint is specified so that only 20% of all acres assigned to a prescription allowing full-scale timber management can be harvested in any given decade for decades 5-15. See Chapter IV, B for additional discussion.

Where the water quality MR harvest acreage limitations were limiting in a watershed (as represented by one or a combination of allocation zones), the accessibility constraints for harvest opening size and vegetation diversity requirements were adjusted downward to reflect those harvest acreage limits.

Rationale. The MR constraints were required to meet NFMA regulations and Regional planning direction. Had these constraints not been used, the alternatives analyzed would not have been implementable. They would have represented courses of action in violation of law and policy.

Tradeoffs. The MR constraints were analyzed in the AMS through the benchmark process. Additional analysis of the tradeoffs from applying the MR constraints was done after the hydrologic cumulative effects analysis process was completed and a water quality MR was developed. This tradeoff analysis is discussed in detail in Chapter VI, C. The combined effect of applying the MR constraints (except for the primary cavity excavators) was a reduction of about 42% in LTSYC and ASQ, a 24% reduction in tentatively suitable acres going into solution (because of the dedication of acres to non-harvest to meet the MR's), and a 14% reduction in PNV (Chapter VI, Table B-23).

These tradeoffs can be considered maxima, as they were analyzed against a relatively unconstrained benchmark. For any given alternative, otherwise implementable, the constraint sets would show lower overall effect on timber outputs and PNV because of other objectives being met by the alternative (e.g., visual corridors or wild and scenic rivers) which allow less than full-scale timber harvest. On the other hand, institution of the MR constraints maintained some additional area that supported unroaded recreation; although, because of the relatively small size of the individual MR areas, the increment of unroaded recreation was not very large.

The timber yield reduction for primary cavity excavators was 1.5% for the MR level. This was a direct reduction in timber output and associated benefits.

5. Rotation Length

Purpose and Description. Constraints on rotation length were necessary to achieve the objectives of the various management prescriptions, as specified by the prescription standards and guidelines. Rotation length constraints were designed to require rotations to meet a minimum age. For example, enhanced deer and elk winter range required that regenerated stands not be cut until they were at least 160 years old; regenerated stands in the Skagit Wild and Scenic River management area had to be at least 200 years old to harvest.

Appendix B
Chapter VII

The rotation length constraints were specified in two ways. First was a harvest entry per decade control, along with a combination of accessibility and general relational constraints. The minimum rotation length was converted to an equivalent percentage of area that could be harvested in one decade. If a minimum rotation of 200 years was required, only 5% of an area could be harvested in any one decade (5% for 20 decades = 100% of the stand harvested). The percent entry was specified for the applicable prescription as an accessibility constraint by AZ for the first four decades and as a general relational constraint Forest-wide with the appropriate entry percentage for decades 5-15.

The second constraint specified the rotation length as the minimum age at which the model could access the stand for harvest. This was done through the "common prescription harvest/implementation periods" ("harvest source") section of FORPLAN. In this section, the user specifies at what ages the model can enter the existing and regenerated stands for harvest. The rotation length was set as the minimum age for entry for both existing and regenerated stands.

The two types of constraints to achieve a minimum rotation length might seem redundant, but both were necessary to achieve the desired result. If only the percent entry per decade constraint were used, the model could make the appropriate cuts for 6-7 decades, then start over harvesting the regenerated stands which are growing faster and potentially giving more volume and value than the stands left uncut. This would result in an area in which only one-third to one-half of the original stands were cut and then harvested again as regenerated stands at age 60-70, while the balance of the stands in the area would remain unharvested. This would not meet the desired objective of achieving a desired rotation length before harvest. Conversely, if only a minimum rotation age were specified in the "harvest source" section of the model, the model could cut an entire area at once and then let it all sit until it once again met the minimum rotation age. So both types of constraints were necessary.

The following minimum rotation lengths and maximum harvest entry percentages were used in FORPLAN:

Prescription	Minimum Rotation Length	Maximum % Entry per Decade
Scenic Foreground (2A)	200 years	5.00%
Mt. Baker NRA (4)	200 years	5.00%
Potential Scenic River (5B)	200 years	5.00%
Skagit Wild & Scenic River (6)	200 years	5.00%
Enhanced Goat Winter Range (15B)	200 years	5.00%
Riparian & Fish Hab. Emph. (13)	160 years	6.25%
Enhanced Deer/elk Wntr Range (14B)	160 years	6.25%
Potential Recreation River (5A)	155 years	6.50%
Scenic Forest (Alpine Lakes) (27)	150 years	6.68%
Roaded Natural Recreation (1D)	125 years	8.00%
Scenic Middleground (2B)	100 years	10.00%

Rationale. These constraints were necessary to meet the intent of the management prescriptions, as stated in the standards and guidelines. (Rotation lengths were stated either directly, or inferred from the visual quality objectives specified for the prescription. In the latter case, the rotation lengths were calculated using the Timber Management volume of the Visual Resource Management Handbook (USDA-Forest Service, Agric. Handbook No. 559).

Tradeoffs. Any minimum rotation length set that is greater than the normal rotation length will cause a reduction in overall timber yields and LTSYC. The amount of the reduction depends on the ages set, the working groups to which applied, and the other constraints affecting the model.

6. Commercial Thinning Availability and Application

Purpose and Description. For the alternatives considered and modeled in detail for the Draft EIS, a constraint was set to limit the lands on which commercial thinning could be carried out. Analysis by the Forest Silviculturist and Timber Planner, plus District input, showed that commercial thinning was physically and biologically viable only in the Principal and Mixed Conifer working groups. Thinning in the Upper working group (primarily true firs) results in too much damage to the residual stand with resulting unacceptable loss from physical damage and disease, particularly root rot. Thinning in the inaccessible working group is not feasible since commercial thinning relies on roads, and no roads are built in the inaccessible lands.

Analysis also showed that commercial thinning yields worthwhile results in terms of increased yields only where a predominant portion of a stand is Douglas fir and western hemlock. This occurs only in the principal and mixed conifer working groups. After adjusting for the amount of those lands actually suitable for Douglas fir management in the future, the analysis showed an estimated 42.25% of the principal and mixed conifer working groups in the north and 48.75% of those working groups in the South to be suitable and available for commercial thinning. Refer to planning records for details.

The commercial thinning constraint was set in two ways. First, in the "common prescriptions specifications" section of the model ("prescription source file"), all upper and inaccessible working group lands were excluded completely from availability for commercial thinning by not connecting the commercial thinning intensity to these lands. Second, a set of general relational constraints was used that applied to the principal and mixed conifer working groups by slope class (A, B, and C) on the North and the South. These constraints specified that no more than 42.25% of the A, B, and C topographic lands in the North, and no more than 48.75% of the A, B, and C topographic lands in the South, could receive a commercial thinning intensity. (The rest of the lands would be treated with a timber management intensity that did not include commercial thinning.) The only purpose of applying the constraints across the topographic classes was to spread out the application of commercial thinning. Otherwise, the model would tend to group up the commercial thinning intensities all on one type of land, probably A or B. Applying the constraints in this way kept the commercial thinning spread out in a more realistic manner.

A thorough review of the commercial thinning situation for the Forest was made between the review of the DEIS and the release of the FEIS. Of particular concern was the possibility that FORPLAN was not recognizing commercial thinning opportunities in existing stands within the first decade or two of the planning horizon.

A review of stands on the Forest by the District silviculturists indicated approximately 200 acres that could be commercially thinned each year over the next decade after meeting criteria for commercial thinning such as percent Douglas fir, age, distance from existing roads, etc. (see Chapter III.E.2 of this appendix). As a result of this review, the Standards and Guidelines for Management Area 17 (timber production emphasis) were rewritten to allow more flexibility for initiating commercial thinning based on site-specific

assessments by the silviculturists, within specified criteria such as those noted above. Because the acreages were so small, and because data in FORPLAN lack the level of resolution to model these commercial thinning opportunities effectively, the estimated acres and values of commercial thinning opportunities were calculated outside the model and incorporated later. The model itself continues to allow only those commercial thinning opportunities meeting the model specifications discussed above, usually occurring later in the planning horizon.

Rationale. The constraint was required for all alternatives to restrict commercial thinning to those lands on which it actually could or would be applied. Lack of the constraint would have allowed commercial thinning to be scheduled and applied where it would not be physically or biologically appropriate to do so.

Tradeoffs. The tradeoffs are likely only on paper. If the constraint had not been used, additional timber volume might have been made available from commercial thins. However, commercial thinning is not particularly viable from an economic standpoint, as discovered during the development of the timber management intensities (Chapter III, E.). Any run made without the commercial thinning constraint under an economic objective function would probably have not added much by way of thinning.

7. Non-declining Yield

Purpose and Description. The non-declining yield constraint was applied to meet the requirements of the NFMA regulations that any sale schedule for a decade be equal to, or greater than, the sale schedule for the previous decade (36 CFR 219.16(a)(1). The exception to this is when departures from the base schedule are analyzed. Regional planning direction required a non-declining yield constraint for all alternatives, including those analyzed additionally with a departure from the base sale schedule. Every alternative was run with the non-declining yield constraint. An attempt was made to analyze Alternative B under a departure regime in order to meet the RPA Program targets, but even with a change from 95% CMAI to utilization standards in the timber yield tables, the model could only achieve about 70% of the required targets. There was no feasible solution to achieving the RPA Program timber targets while meeting the other Program requirements, such as high investments in wildlife habitat enhancement.

The non-declining yield constraint is built into the FORPLAN model. It can be specified or not, at the user's choice. If NDY is not specified, the user will usually specify "sequential upper and/or lower constraints" or "absolute" constraints on timber harvest instead.

Rationale. The non-declining yield constraint was invoked to meet NFMA and Regional planning direction.

Tradeoffs. The non-declining yield constraint generally has fairly major effects on the scheduling of timber harvest over time and the amount of timber actually made available for harvest in each decade. The magnitude and direction of the effects of the NDY constraint depend on whether a Forest is deficit or surplus in old growth timber (has more old growth or less old growth than that necessary for the mix of stand ages allowing harvest at LTSYC).

The Mt. Baker-Snoqualmie appears to be an old growth surplus Forest, so the ASQ for the Forest could actually be above LTSYC for a few decades, then below

LTSYC while the regenerated stands were getting older, and finally just at LTSYC in a fully managed state. The result would be a higher timber output than under NDY, particularly in the early decades of the planning horizon.

Because it schedules timber harvest on a Forest-wide basis, FORPLAN has built into it what is known as the "allowable cut effect", or ACE. The allowable cut effect raises early decade harvests over what they would be on a solely per acre basis by taking credit on a forest-wide basis for the higher per acre future volumes from regenerated stands in the calculation of the Forest's LTSYC. This LTSYC based on regenerated stand volumes is then used to calculate the harvest volumes by decade. The ACE allows the model to schedule harvest on more acres of existing stands than would otherwise be the case, based on the anticipation of higher volumes of regeneration growth forest-wide.

The non-declining yield flow constraint tends to intensify the allowable cut effect because, as a harvest constraint, it overrides the economics of the problem in order to satisfy the constraint. It tends to pull more acres into solution than would otherwise be the case, but manages them less intensively to keep costs down (and PNV up). Having more acres in solution provides a larger acreage base and inventory pool to keep future period harvests equal to or greater than the previous decades' harvest, and still allow the higher early decade harvests that the model chooses because of the effects of discounting.

8. Demand Curves

Purpose and Description. The demand curves were used in the model to limit the amount of recreation capacity actually valued to the amount of estimated use in that decade. See Chapter III, B regarding use of demand curves in the model.

Rationale. Without the demand curves, recreation would have been valued to capacity whether or not actual use of that magnitude was expected. If expected use were actually less than capacity, this would have overstated the recreation value of the alternative and possibly affected land-use assignment and scheduling solutions in the model.

Tradeoffs. Without the demand curves constraining valuation of recreation capacity to expected use, recreation benefits and PNV would have been overstated.

9. Budget Constraint

Purpose and Description. A budget constraint row was built into all alternative runs to facilitate calculation of the Forest Service budget for an alternative. It was set very high, $100,000,000 per year budget, so that it would be non-constraining but still accumulate budget costs and show them in the LP solution rows.

Rationale. The budget constraint was included in all alternatives for ease of tracking total budget costs.

Tradeoffs. There were no tradeoffs for any alternative. Alternative A did not require a budget restraint. Incorporation of MR's and the concomitant reduction in harvest levels, associated timber management and road building resulted in a budget level about $5 million below FY year 1982-1984 average.

10. 95% CMAI Timber Tables

Purpose and Description. NFMA regulations require that "...all even-aged stands scheduled to be harvested during the planning period will generally have reached the culmination of mean annual increment of growth..." (Part 219.16(a)(2)(iii)). Washington Office and Regional direction have interpreted "generally" to mean that harvest should be allowed when stands have reached at least 95% of CMAI. The use of timber yield tables based on 95% CMAI was in response to this direction.

Rationale. NFMA and implementing regulations were definitely written to exclude using timber yield tables and rotations based on financial rotations or rotations based on stand age and size just meeting utilization standards. The word "generally" was interpreted, though, to leave a little room for shortening rotations below full 100% CMAI, which had been the harvest standard up to that time for the Forest Service. The interpretation agreed on was 95% CMAI.

Tradeoffs. Tradeoffs of the 95% CMAI were either positive or negative. From the financial rotation viewpoint, the tradeoff was a loss in timber volume, though with some gain in average diameter and unit value, because the rotations were extended anywhere from 10 to 40 years. However, compared to 100% CMAI, the 95% CMAI tables allowed the rotations to be shortened by 10 to 20 years, thus making more volume available, although slightly smaller in size. From a non-timber perspective, shortening rotations can have a deleterious effect on habitat for wildlife, as there is less time to gain hiding and thermal cover characteristics before the stand is entered once again for harvest. See Chapter VI, E for more detail on effects of 95% CMAI and Utilization Standards.

D. Development of the Alternatives

Benchmarks defined the minimum and maximum output levels of the Forest under a given set of constraints. The maximum PNV benchmark with MR's (Run 7) identified the most efficient land-use assignment and schedule of activities and outputs, given the information modeled in FORPLAN. This provided a starting point for formulation of alternatives developed in detail. However, benchmarks do not consider the spatial feasibility of implementation. In order to incorporate the feasibility of implementation into the FORPLAN model the management team mapped alternative land allocations (coordinated allocation choices) consistent with the goals and objectives of the alternatives.

The following is a description of each alternative, including the design elements common to all alternatives Detailed descriptions of the alternatives are included in Chapter II of this DEIS.

Elements Common to All Alternatives

A number of resource management programs are treated the same in all the alternatives considered in detail. These are described below and are **not** included in the alternative descriptions which follow.

- The Alpine Lakes Area Management Plan,implemented in 1981, is incorporated into all alternatives except Alternative NC.

- The Skagit Wild and Scenic River Plan, implemented in 1984, is incorporated into all alternatives except Alternative NC.

- The Mt. Baker National Recreation Area, established in 1984, is the same in all alternatives.

- The three existing Research Natural Areas - North Fork Nooksack River, Lake Twenty-two and Long Creek - are retained in all alternatives.

- The foreground of the Mather Memorial Parkway, designated in 1931, is managed to retain its scenic quality in all alternatives.

- The management requirements necessary to integrate the requirements of law and regulation are incorporated in all alternatives except Alternative NC.

- The rights established by the various Indian Treaties are retained in all alternatives. Consultation with Indian Tribal leaders will continue on any proposed projects within sites inventoried in response to the American Indian Religious Freedom Act.

- The acres of designated wilderness are the same in all alternatives. Acres assigned to classes of the Wilderness Recreation Opportunity Spectrum (WROS) do vary by alternative; however, there are no WROS classes in Alternative NC.

- Even-aged management and regeneration harvest through clearcutting are assumed in estimating timber outputs in all alternatives; the use of other systems, however, is not precluded. Refer to Appendix F for a discussion of those situations where other harvest methods are acceptable.

- All alternatives would make full use of vegetation management techniques including herbicides and fire. In 1988, the Pacific Northwest Region, USDA Forest Service completed a final EIS on managing competing and unwanted vegetation (USDA 1988b). That final EIS, the Mediated Agreement, and accompanying implementation direction is incorporated by reference into this FEIS. It will guide vegetation management activities as the Forest Plan is implemented.

- All existing utility corridors, electronic sites, and administrative sites are retained in all alternatives.

Alternative NC (No Change)

The No Change Alternative has been developed in response to decisions made regarding appeal number 1588, brought by the Northwest Forest Resource Council on May 19, 1986. The appeal centered on a decision by the Regional Forester to "require inclusion of minimum management requirements (MR's) in the Current Direction Alternative for each Forest Plan." The substance of the appeal was that a "true no-action alternative representing current management plans" was not included in Forest Plan EIS's.

The No Change Alternative is designed to continue the level of goods and services as set out in plans formulated and approved prior to the passage of the National Forest Management Act, specifically the 1963 Timber Management Plans. This alternative does not comply with all provisions of NFMA and the regulations promulgated by the Secretary of Agriculture to implement NFMA; the alternative could not be implemented or used in future management of the Forest under the Forest Plan without Congressional and/or Secretary of Agriculture action to change the law or regulations.

Alternative NC: does not use the most up-to-date inventories for assessing effects and estimating outputs; does not use current yield projection methods; its harvest schedule was not developed according to the concepts and philosophy of non-declining flow; and it does not incorporate management requirements, including those designed to maintain viable plant and animal populations.

Design Criteria for Alternative NC (No Change)

Timber: the 1963 Timber Management Plans are the basis for the alternative

Roads: the Naches Pass road would not be constructed.

Roadless Areas: an estimated 60% of the roadless areas would remain undeveloped; this estimate is based on the acres of commercial forest land assumed to be in the roadless areas.

Visual Resource: same as "Elements Common to All Alternatives."

Wild and Scenic Rivers: no provision for study or protection of potential rivers is included in the TM Plans.

Research Natural Areas: no potential areas recommended.

Spotted Owls: no provisions made to protect old-growth habitat for wildlife.

Big Game Habitat: no provisions made for protection of big game habitat.

Cavity Excavators: no provisions made for protection of habitat.

Anadromous/Resident Fish: no provisions made for protection of fish habitat.

Municipal Watersheds: all are managed under current agreements, memoranda of understanding.

Alternative A (No Action)

Alternative A was developed to continue management direction as set out in plans formulated and approved prior to the passage of the National Forest Management Act. The alternative incorporates the requirements of the National Forest Management Act of 1976 (36 CFR 219.12 through 219.27). The goal of Alternative A is to provide maximum timber outputs while maintaining or exceeding existing recreation, wildlife, fisheries, and visual resource outputs.

The plans approved prior to NFMA, plus current laws, regulations, and directions - including MR's - were used to assign management direction to different parts of the Forest. The most recent inventories were used to identify land base features, such as riparian zones and different timber condition classes. The NFMA process of land stratification for timber production was applied to commercial forest lands identified in the 1963 TM Plans. The latest technical processes were utilized to develop growth and yield projections for existing and regenerated timber stands. See the discussion below for more about the relationship of Alternative A (No Action) and the No Change Alternative.

This is the No Action Alternative required by the Council on Environmental Quality Regulations for implementing the National Environmental Policy Act (NEPA).

Design Criteria for Alternative A (No Action)

Timber: an exception to "Elements Common to All Alternatives", in FORPLAN, Alternative A was run with an objective of maximize timber volume for the first five decades, then was rerun to maximize PNV for 15 decades with the same timber outputs as in Decades 1-5. This resulted in some timber prescriptions having less than maximum economic efficiency. Approximately 70 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed for timber production. In the first two decades, approximately 26 miles of arterial and collector roads would be built. During that same period, about 330 miles of local roads would be constructed. The Naches Pass road would not be constructed.

Roadless Areas: would be managed under the direction contained in the Ranger District Multiple Use Plans; approximately 82 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: same as "Elements Common to All Alternatives."

Wild and Scenic Rivers: the 15 rivers included in the National Park Service Nation-wide Inventory are recommended for designation as part of the National Wild and Scenic River System. These fifteen rivers include a total of 375 miles, of which 142 miles are within the national forest boundary.

Research Natural Areas: no potential areas recommended.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 36,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: habitat is provided for viable populations at the MR levels; additional habitat for some species in wilderness, RNA, and areas not suited for timber production.

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at 40% of their potential population levels.

Anadromous/Resident Fish: current populations are maintained through habitat maintenance or improvement at the MR level (low investment, MA 13A; see below.)

Municipal Watersheds: are managed under current agreements, memoranda of understanding.

Alternative B (RPA)

The goal of Alternative B is to simultaneously produce high levels of timber, anadromous fish, commonly hunted species of big game, and dispersed unroaded recreation, as specified in the 1980 RPA Program.

The RPA targets specified are:

Timber: annual programmed timber sales (TSPQ)
Decade 1 - 66 MMCF; Decades 2,3 - 69 MMCF; Decades 4, 5 - 70 MMCF
Developed Recreation: in thousand RVD's
Decade 1 - 2,381; Decade 5 - 2,660
Dispersed Recreation (includes hunting, fishing): in thousand RVD's
Decade 1 - 2,910; Decade 5 - 3,930
Wildlife Habitat Improvements: in acre equivalents
Decade 1 - 7,278; Decade 5 - 3,068

Design Criteria for Alternative B (RPA)

Timber: is produced at the highest level possible, while meeting the other goals of the alternative. Approximately 64 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed for timber production. In the first two decades, approximately 28 miles of arterial and collector roads would be built. During that same period, about 280 miles of local roads would be constructed. The option to construct Naches Pass road is retained.

Roadless Areas: all roadless area acres that are tentatively suitable for timber production are available for assignment to a timber harvest prescription, unless needed to meet MR's. Approximately 87 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: same as "Elements Common to All Alternatives."

Wild and Scenic Rivers: high timber goal precludes recommending any eligible rivers for Wild and Scenic designation.

Research Natural Areas: no potential areas recommended.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 79,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: alternative designed to increase population levels over time. Acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotation, sale design, smaller clearcuts, etc., provide an optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on land suitable for timber production, habitat is provided to maintain cavity excavators at the MR level - 20% of their potential population levels.

Anadromous/Resident Fish: anadromous fish production is increased through habitat improvements at a high investment level (MA 13C; see below).

Municipal Watersheds: Cedar River - contains 2 SOHA's, retain NF lands, timber production on suitable lands, maintain old-growth habitat; Green River - high level of timber production, essentially closed to public recreation; Sultan River - retain NF lands, full multiple use; Others - managed for a full range of outputs, timber production on suitable lands.

Alternative C

The goal of Alternative C is to emphasize primitive and semi-primitive nonmotorized recreation (accomplished through retention of existing roadless areas and, over time, reversion of some roaded areas to unroaded condition); protect scenery, fish, and wildlife habitat; and protect sites and areas important to American Indians for religious and cultural use.

Design Criteria for Alternative C

Timber: no production goals set; suitable acres and harvest level will be the lowest of all alternatives considered in detail. Approximately 43 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: roads to be closed include approximately 300 miles of existing arterial and collector roads. In the first two decades, about 15 miles of arterial and collector roads would be built, and about 180 miles of local roads would be constructed. Construction of the the Naches Pass road is precluded by management of surrounding lands for unroaded dispersed recreation.

Roadless Areas: nearly all (97%) of the roadless area acres are retained in an unroaded condition at the end of the fifth decade.

Visual Resource: high to moderately-high protection of the foreground and middleground of all inventoried primary and secondary viewsheds.

Wild and Scenic Rivers: all 47 rivers determined to be eligible for Wild and Scenic River designation are recommended for designation as part of the National Wild and Scenic River System. The total mileage of rivers included is 786, of which 441 miles are within the national forest boundary.

Research Natural Areas: five potential RNA's are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 36,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: some acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotations, sale design, smaller clearcuts etc. provide optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat provided to maintain cavity excavators at 60% of their potential population levels.

Anadromous/Resident Fish: anadromous and resident fish production is increased through habitat improvements at a high investment level (MA 13D; see below).

Municipal Watersheds: Cedar River - contains 2 SOHA's, with stipulation that habitat be maintained as old growth when lands exchanged to City of Seattle; Green River - current direction (timber production, dispersed recreation permitted); Sultan River - closed watershed, exchange NF lands; Others - no timber harvest, limited recreation use.

Alternative G-Modified

The goal of Alternative G-Modified is to emphasize maintenance of natural ecosystems and diversity of native plants and animals, emphasize providing uses not found on private lands, and produce timber in a way that is consistent with the other goals and is non-damaging to soils.

Design Criteria for Alternative G-Modified

Timber: timber production will occur on currently accessed sites first. Maintenance or development of old growth, especially at lower elevations, is emphasized. Approximately 41 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: roads to be closed include approximately 65 miles of existing arterial and collector roads. In the first two decades, approximately 13 miles of arterial and collector roads would be built, and about 145 miles of local roads would be constructed. Construction of the Naches Pass road is precluded by management of surrounding lands for undeveloped recreation.

Roadless Areas: approximately 96% of the roadless area acres are retained in an unroaded condition at the end of the fifth decade.

Visual Resource: the foreground of selected corridors is protected, including the upper end of Mt. Baker Highway, portions of the Cascade River and North Fork of the Cascade, portions of the Mt. Loop Highway, the upper Sauk, lower Sultan, and Mather Memorial Parkway. Integral vistas within and from Class I airsheds and other wildernesses (not yet designated Class I) are protected.

Wild and Scenic Rivers: all 47 rivers determined to be eligible for Wild and Scenic River designation are recommended for designation as part of the National Wild and Scenic River System. The total mileage of rivers include is 786, of which 441 miles are within the national forest boundary.

Research Natural Areas: five potential RNA's are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Special Areas: special interest areas are recommended for designation at Twin Sisters, Monte Cristo, Baker Lake, Naches Pass, and along the Mather Memorial Parkway.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide with additional habitat areas being protected to meet the objectives of the alternative. Approximately 113,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: habitat provided for viable populations at the MR levels; some additional habitat for some species in wilderness, RNA.

Cavity Excavators: on lands suitable for timber production, habitat is provided for cavity excavators at the MR level - 20% of potential population levels.

Anadromous/Resident Fish: anadromous and resident fish production is increased through habitat improvements at a high investment level (MA 13D; see below).

Municipal Watersheds: Cedar River - managed to retain old-growth habitat with stipulation that it be maintained when lands exchanged to City of Seattle; Green River - current direction (timber production, dispersed recreation permitted); Sultan River - current situation (exchange NF lands, moderate timber harvest, restricted recreation use); Others - managed for a full range of outputs, timber production on suitable lands.

Alternative H

The goal of Alternative H is to provide an increased emphasis on unroaded recreation; protection of scenic values in the foreground and middleground of heavily traveled highway corridors; increasing big game populations; plus emphasis on timber production on tentatively suitable acres not assigned to other objectives.

Design Criteria for Alternative H

Timber: about 60 per cent of the tentatively suitable acres are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed. About 20 miles of existing roads, located in areas assigned to unroaded dispersed recreation, will be closed. In the first two decades, approximately 11 miles of arterial and collector roads would be built. During that same period, about 250 miles of local roads would be constructed. The option to construct the Naches Pass road is retained.

Roadless Areas: areas with a high percentage of tentatively suitable lands are available for timber production emphasis, except where they also have a combination of high values for unroaded dispersed recreation, big game winter range enhancement opportunities, and are inventoried American Indian religious sites. Approximately 88 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: the foreground and middleground seen areas of heavily traveled highway corridors are managed for scenic quality (meet inventoried visual quality levels): I-90, U.S. 2, Mather Memorial Parkway, and Mountain Loop, Mt. Baker, and Baker Lake Highways.

Wild and Scenic Rivers: the five rivers determined in the DEIS to be eligible for Wild and Scenic River designation are recommended for designation - North

Fork Nooksack, North Fork Skykomish, South Fork Skykomish, Tye, and Middle Fork Snoqualmie Rivers, a total of 154 miles, of which 71 miles are within the national forest boundary.

Research Natural Areas: five potential are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 61,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: some acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotations, sale design, smaller clearcuts etc. provide optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at 40% of potential population levels.

Anadromous/Resident Fish: anadromous fish production is increased through habitat improvements at a high investment level (MA 13C; see below).

Municipal Watersheds: Cedar River - current direction (exchange NF lands to City of Seattle, no old-growth habitat maintained); Green River - current direction (timber production, dispersed recreation permitted); Sultan River - current situation (exchange NF lands, moderate timber harvest, restricted recreation use); Others - manage for a full range of outputs, timber production on suitable lands.

Alternative I

The goal of Alternative I is to emphasize those resources with an established price in the market place: timber production, anadromous fish, developed recreation, and minerals. Emphasis is also placed on enhancement of big game wildlife and fish habitat, and developing/maintaining an extensive trail system to accommodate a wide variety of users on a year-round basis. Other resources are managed at levels that do not reduce the outputs from the market resources.

Design Criteria for Alternative I

Timber: timber production is emphasized. Approximately 65 percent of the acres tentatively suited for timber production are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed, to meet timber production goals. In the first two decades, approximately 34 miles of arterial and collector roads would be built. During that same period, about 290 miles of local roads would be constructed. The option to construct the Naches Pass road is retained.

Roadless Areas: all roadless area acres that are tentatively suitable for timber production are available for assignment to a timber harvest prescription, unless needed to meet MR's. Approximately 86 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual: the foreground of heavily-traveled highways are managed for scenic quality (I-90, U.S. 2, Mather Memorial Parkway, and Mountain Loop, Mt. Baker, and Baker Lake Highways).

Wild and Scenic Rivers: high timber goal precludes recommending any eligible rivers for Wild and Scenic River designation.

Research Natural Areas: no potential areas are recommended for designation.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. About 93,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.
Big Game Habitat: alternative designed to increase population levels over time. Acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotation, sale design, smaller clearcuts, etc., provide an optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at the MR level - 20% of potential population levels.

Anadromous/Resident Fish: anadromous fish populations are increased through habitat improvements at a high investment level (MA 13C; see below).

Municipal Watersheds: Cedar River - contains 2 SOHA's, retain NF lands, timber production on suitable lands, maintain old-growth habitat; Green River - high level of timber production, essentially closed to public recreation; Sultan River - retain NF lands, full multiple use; Others - managed for a full range of outputs, timber production on suitable lands.

Alternative J (Preferred)

This is the Preferred Alternative. It is a new alternative and was not displayed in the DEIS. Beginning with the draft EIS Preferred Alternative (H), Alternative J was developed to respond to public comment and new information. Differences between the draft and this Preferred Alternative include: a considerable increase in trail mileage; an increase in the number of rivers recommended for addition to the National Wild and Scenic Rivers System; allocation of three Special Areas (Botanic, Scenic, and Recreation/Education); an increased emphasis on unroaded recreation; and greater protection of scenic values within travel corridors. Timber production is emphasized on suitable acres assigned to a timber harvest prescription. Other resources will be managed at levels commensurate with the objectives of the alternative.

Design Criteria for Alternative J (Preferred)

Timber: about 58 per cent of the tentatively suitable acres are available for assignment to a prescription that includes timber harvest.

Roads: are constructed as needed. Roads to be closed include about 25 miles of existing roads, located in areas assigned to unroaded dispersed recreation. In the first two decades, approximately 15 miles of arterial and collector roads would be built, and about 240 miles of local roads would be constructed. The option to construct the Naches Pass road is retained.

Roadless Areas: areas with a high percentage of tentatively suitable lands are available for timber production emphasis, except where they also have a combination of high values for unroaded dispersed recreation, big game winter range enhancement opportunities, and are inventoried American Indian religious sites. Approximately 91 percent of the roadless area acres remain in an undeveloped condition at the end of the fifth decade.

Visual Resource: the foreground and middleground seen areas of heavily traveled highway corridors are managed for scenic quality (meet inventoried visual quality levels): I-90, U.S. 2, Mather Memorial Parkway, and Mountain Loop, Mt. Baker, and Baker Lake Highways.

Wild and Scenic Rivers: 30 of the 47 rivers determined to be eligible for Wild and Scenic River designation are recommended for inclusion in the National Wild and Scenic Rivers System. A total of 452 miles are recommended, with 276 of those miles located within the national forest boundary. This recommendation is a preliminary administrative recommendation that will receive further review and possible modification by the Chief of the Forest Service, Secretary of Agriculture, and the President of the United States. The Congress has reserved the authority to make final decisions on designation of rivers as part of the National Wild and Scenic Rivers System.

Research Natural Areas: five potential RNA's are recommended for designation - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Special Areas: special interest areas are recommended for designation at Mather Memorial Parkway, Heather Meadows, and Sulfur Creek.

Spotted Owls: spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Approximately 54,000 acres of owl habitat in lands otherwise suitable for timber production are in designated Spotted Owl Habitat Areas.

Big Game Habitat: some acres of suitable habitat are assigned to habitat improvement (timber management prescriptions that, through longer rotations, sale design, smaller clearcuts etc. provide optimal mix of thermal, forage, and hiding cover).

Cavity Excavators: on lands suitable for timber production, habitat is provided to maintain cavity excavators at 40% of potential population levels.

Anadromous/Resident Fish: anadromous fish production is increased through habitat improvements at a high investment level (MA 13D; see below).

Municipal Watersheds: Cedar River - initiate negotiations on a new Cooperative Agreement to reestablish goals and management for the watershed; until then, do not enter into land exchanges affecting National Forest lands; Green River - current direction (timber production, dispersed recreation permitted); Sultan River - current situation (exchange NF lands, moderate timber harvest, restricted recreation use); Others - manage for a full range of outputs, timber production on suitable lands.

E. Alternative Constraints

This section discusses the constraints applied to each alternative to meet the goals and objectives of the particular alternative. The constraints applicable to all alternatives (with exceptions noted) have been discussed above in Part B of this Section. Some general comments applicable to all alternatives will be made first, and then constraints specific to each alternative discussed.

Constraints to Meet NFMA Management Requirements (36 CFR 219.27). Part 219.27 of the NFMA regulations sets forth "minimum specific management requirements" to be met in accomplishing goals and objectives for the National Forest System. The following listing shows the constraints applied to all alternatives used to meet the management requirements of Part 219.27. The purpose, rationale, and tradeoffs associated with each constraint applied was discussed in part C of this Chapter, as well as in Chapter VI, parts B and C.

NFMA Regulation	Constraint (Discussed in Part)
219.27(a) - Resource protection	Tentatively suitable lands (C.3) Wildlife MR's (C.4.a-b) Fish MR's (C.4.c) Riparian MR's (C.4.d) Water quality MR's (C.4.e)
219.27(b) - Vegetative manipulation	Tentatively suitable lands (B.3) Riparian MR's (C.4.c) Harvest unit size limit (C.4.f) Dispersion constraint (C.4.f)
219.27(c) - Silvicultural practices	Ending inventory constraint (C.1) LTSY-Link (C.2) Tentatively suitable lands (C.3) Riparian MR's (C.4.d) Harvest unit size limit (C.4.f) Dispersion constraint (C.4.f) Commercial thinning (C.6) Non-declining yield (C.7) 95% CMAI (C.10)
219.27(d) - Even-aged management	Harvest unit size limit (C.4.f) Dispersion constraint (C.4.f) Rotation length (C.5)
219.27(3) - Riparian areas	Riparian MR's (C.4.d) Rotation length (C.5)
219.27(f) - Soil and water	Tentatively suitable lands (C.3) Riparian MR's (C.4.d) Water quality MR's (C.4.e)
219.27(g) - Diversity	Wildlife MR's (C.4.a-b) Fish MR's (C.4.c) Riparian MR's (C.4.d) Harvest unit size limit (C.4.f) Dispersion constraint (C.4.f)

Cost efficiency was considered in the development of the constraint sets to meet the wildlife, riparian, and dispersion/diversity constraints. This process was discussed in Chapter VI of this Appendix, as well as in the AMS document. For the constraint developed after the hydrologic cumulative effects assessment process to meet soil/water and resource protection management requirements, cost-efficiency was considered to the degree possible. While there were no viable options other than limiting harvest in the affected watersheds, harvest acre limitations were set as low as possible while still meeting the necessary threshold for watershed disturbance. Also, the constraint is structured so that it can be filled first with first with large and small sawtimber before accessing pole stands. If the small sawtimber returns a higher benefit than the poles (true in almost all situations), then, within the total acre constraints, the small sawtimber will be brought into solution for harvest before poles are scheduled.

The constraints required by Washington Office and Regional planning direction were applied without further analysis of cost efficiency, although the opportunity costs of applying non-declining yield and 95% CMAI were calculated (see Chapter VI, E). The cost efficiency of the commercial thinning constraint was analyzed through the use of DP-DFSIM and off-line calculations done by the Forest Silviculturist and Timber Planner. Rotation length constraints were determined by the Forest Management Team to be the best way to meet the overall desired objectives of the alternatives, after considering a number of factors, including implementability and relative cost-efficiency.

These constraints were not analyzed on an alternative-by-alternative basis, either individually or together, in terms of their effects on PNV and total discounted benefits and costs. The opportunity costs of the major constraint sets for the management requirements can be seen in Chapter VI. The total effects of all the constraints, including management area acre assignments, can be seen in Chapter VIII.

Constraints Unique to Each Alternative

Coordinated Allocation Choices. The constraints common to all alternatives described above were invoked primarily to meet legal or policy directives, or to force the model to act similar to the way things would happen in the "real world". The major changes among alternatives came from the different acre assignments made to various management prescriptions by the Forest Management Team in the course of developing the alternatives. These acre assignments, as represented in the coordinated allocation choices (one for each alternative), reflected the Management Team's best judgment about how the objectives of each alternative could best be met. In that way, the acre assignments (coordinated allocation choices) acted as major constraint sets applied to each alternative to achieve the goals and objectives of that alternative.

Because of the use of coordinated allocations choices and varying acre assignments to prescriptions to achieve the goals of each alternative, the coordinated allocation choices were just about the only difference among alternatives. Table B-64 shows the acres assigned to each management area by alternative.

Yield Reductions for Primary Cavity Excavators. Aside from the coordinated allocation choices, only one other factor varied as a constraint with some alternatives. Primary cavity excavators were carried at a level of 20% of potential population in all alternatives, with a corresponding 1.5% reduction in timber yields. However, in some alternatives, a higher than minimum level was stated as an objective. The following alternatives had goals of maintaining primary cavity excavators at greater than minimum levels:

Alternative	% Population	% Timber Yield Reduction
A	40%	3.0%
C	60%	4.5%
H	40%	3.0%
J	40%	3.0%

As mentioned in part B, the timber yields and associated benefits were reduced 1.5% for every additional 20% cavity excavator population maintained.

Departure Alternatives (DEIS Only)

Two alternatives were included in the DEIS that examined a departure in timber harvest scheduling from the base sale schedule, as provided for in the NFMA regulations (36 CFR 219.16(a)(3)). These departure options were based on DEIS Alternatives E and H. In the departure alternatives, the basic land-use pattern stayed the same. The departure, however, was run with the harvest flow constraints set to allow a fluctuation in harvest up or down by a maximum of 20% from one decade to the next. Thus, the harvest patterns toward the end of the planning horizon rose near the 20% rate per period for both departure runs, resulting in last decade harvests above LTSYC. (However, if the planning horizon were extended, the harvest levels would cycle down again in the future, as they can't stay above LTSYC indefinitely.)

As discussed in Chapter II of this Appendix, the departure schedules were dropped from further consideration in the FEIS because of lack of public comment and support. The remaining alternatives, along with new ones developed, were sufficient for the necessary full range of alternatives for analysis.

F. Summary of Alternative Development Process

DEIS

The alternative development process involved the Forest ID Team, the Forest Management Team, and the Regional Forester and his staff. It began during the Analysis of the Management Situation, when the Planning Staff and Management Team roughed out the broad outlines of the alternatives originally thought needed to provide a broad range of forest management options and to respond to the Forest ICO's.

The completion of the Prescriptions, Standards, and Guidelines by the Forest ID Team and Management Team set the stage for the development of the full alternatives. With the prescriptions, their standards and their intent freshly in mind, the Forest Management Team and ID Team spent several days initially mapping out the management areas necessary to meet the objectives of the alternatives which had been established. They took into account the requirements for assigning various portions of the roadless area base to development and nondevelopment in different alternatives. Also considered were

Table B-64

Acreages in Management Areas by Alternative

Management Area	A (No Action)	I	B (RPA)	H	J (Preferred)	C	G (Modified)
Lands Suitable for Timber Production	412,508	386,512	380,448	358,754	346,411	256 206	247 091
1 Dispersed Recreation							
1A Primitive	0	0	0	4,561	45,278	16,914	6,793
1B Semi-Prim Nonmotorized	0	0	134,585	248,479	225,104	387,168	369,889
1C Semi-Prim Motorized	0	143,102	5,123	2,501	2,981	0	3,608
1D Roaded Natural Rec.	0	5,307	20,159	12,852	14,926	15,699	0
1E General Dispersed Rec	344,304 2/	0	0	0	0	0	0
1F 1926 Mt Baker Rec	7,991 3/	0	0	0	0	0	0
Subtotal	352,294	148,409	159,867	268,393	288,289	419,781	380,290
2 Scenic Viewshed							
2A Foreground	3,321	29,223	4,015	24,581	23,406	65,721	9,486
2B Middleground	0	0	0	81,573	95,795	57,500	0
Subtotal	3,321	29,223	4,015	106,154	119,201	123,221	9,486
3 Developed Recreation							
3A Public Sector Sites	1,813	1,809	1,764	1,810	1,819	1,761	2,273
3B Potential Rec Sites	0	0	0	0	0	0	0
3C Winter Sports Resorts	4,618	5,904	5,214	5,692	6,041	5,290	4,865
3D Private Sector Sites	556	555	541	555	558	540	557
Subtotal	6,986	8,268	7,519	8,057	8,418	7,591	7,695
4 Mt Baker Natl Rec Area	8,740	8,740	8,740	8,740	8,740	8,740	8,740
5 Potential Wild & Scenic R	24,506	0	0	8,794	20,865	29,617	20,234
6 Skagit Wild & Scenic River	17,037	17,037	17,037	17,037	17,037	17,037	17,037
7 *Amer Indian Relg/Cult Use* 4/	*0*	*0*	*0*	*0*	*0*	*0*	0
8 Special Areas 5/	0	0	663	0	6,321	809	22,006
10 Wilderness							
10A Transition	12,067	21,878	14,402	7,982	15,078	7 032	7,644
10B Trailed	44,356	49,628	39,786	46,734	49,015	45,700	52,669
10C General Trailless	585,326	643,495	543,881	437,931	457,000	272,679	444,688
10D Dedicated Trailless	80,000	0	121,409	219,292	191,606	386,992	207,930
10E Special Area	0	6,715	2,238	9,777	9,017	9 313	8,785
Subtotal	721,716	721,716	721,716	721,716	721,716	721,716	721,716
11 Old Growth Habitat	36,247	93,037	79,328	60,977	54,191	36,072	112,987
12 Mature & Old Growth Habitat	14,074	27,691	23,344	19,185	19,282	13,071	10,648
13 Riparian & Fish Habitat 6/	52,436	46,772	41,288	49,872	47,048	23,219	31,857
14 Deer and Elk Winter Range	0	106,632	158,824	34,239	33,587	39,057	26,622
15 Mountain Goat Habitat							
15A Min Mgt Requirements	9,217	24,291	19,370	15,742	17,110	9,742	6,311
15B Habitat Improvement	0	0	20,158	0	0	3,040	0
Subtotal	9,217	24,291	39,528	15,742	17,110	12,782	6,311
16 Threatened & Endangered Species 7/							
16A Northern Bald Eagle	2,808	2,808	2,808	2,808	2,808	2,808	2,808

Table B-64

Management Area	A (No Action)	I	B (RPA)	H	J (Preferred)	C	G (Modified)
17 Timber Management Emphasis	321,470	273,572	235,711	198,559	166,611	89,267	201,023
18 Research Natural Areas 8/	2,364	2,364	2,364	5,233	5,233	5,233	5,233
19 Mtn Hemlock Zone	0	46,803	62,333	31,812	31,965	16,039	22,761
20 Cedar R. Municipal Watershed							
20A Current Direction, Exchange NF Lands to City	13,398	11,804	0	12,517	0	0	0
20B Exchange NF Lands, City Maintains Old Growth	0	0	0	0	0	12,214	6,212
20C Retain NF Land, Maintain Old Growth Habitat	0	0	13,297	0		0	0
20D Negotiate new Coop Agreement	0	0	0	0	11,724	0	0
21 Green River Municipal Watershed							
21A Current Direction, Tmbr Harvest, Disp Rec. OK	9,799	24,546	0	24,914	24,935	23,931	12,846
21B Timber Harvest OK, Most Public Rec Prohibited	0	0	23,839	0	0	0	0
22 Sultan River Municipal Watershed							
22A Closed Except Protect Water & Hydropower Production, Exchange NF Lands	0	0	0	0	0	8,935	0
22B Current Situation, Exch NF Lands, Moderate Timber Harvest, Restricted Rec	4,646	8,772	0	8,393	8,399	0	5,633
22C Retain NF Lands, Full Multiple Use	0	0	9,260	0	0	0	0
23 Other Municipal Watersheds							
23A Tmbr Harvest, Mod Rec	14,081	19,682	16,124	19,315	13,138	0	9,315
23B No Harvest, Limited Rec	0	0	0	0	0	21,068	0
25 Special Uses - Utilities							
25A Utility Corridors 9/	[1500]	[1500]	[1500]	[1500]	[1500]	[1500]	[1500]
25B Electronic Sites	1,014	1,014	1,014	1,014	1,014	1,014	1,014
26 Administrative Sites	143	143	143	143	143	143	143
27 Alpine Lakes Mgt Area 10/	106,950	97,981	94,606	99,647	95,305	89,991	79,466

1/ Total acres in each alt. vary due to rounding MA 9 not used, MA 24 Min Mgt not assigned in any alternative

2/ Applies only to Alt A, includes mostly unroaded, but some roaded recreation, from exisitng Multiple Use Plans

3/ Parcels of the 1926 area that remain outside of wilderness and the Mt Baker NRA are included here

4/ Acres are protected, at varying levels, in the alternatives, but not shown to protect confidential nature

5/ Includes Cultural-Historic, Geologic, Biologic, Botanic, and Scenic Special Areas.

6/ Many acres of riparian zone fall within other MA's and are protected through those management prescritptions

7/ Management Areas 16B Grizzly Bear, 16C American Peregrin Falcon, and 16D Gray Wolf have no acres assigned at this time, because no specific habitat has been identified or evaluated

8/ Acres of existing or proposed RNA located within wilderness are included in MA 10, not here.

9/ These acres overlap other MA's

10/ Includes acres within the congressionally designated Alpine Lakes Management Unit that are not otherwise assigned to other, compatible management areas (Compatible MA's include 5, 11, 12, 14, 15, and 16)

ranges of potential wild and scenic rivers to be included as candidates for further study for inclusion in the wild and scenic rivers system; ranges of research natural areas to add; ranges of American Indian Religious and Cultural Use sites to be protected; ranges of wildlife enhancement to assign; and so on.

With the completion of the initial mapping, the process of transferring the polygon maps into grid format for input to R2MAP began. As the process went along, numerous questions and inconsistencies had to be clarified with the Management Team members. The process was fluid and dynamic with refinements and improvements made as the group moved ahead.

Along with the alternatives mapped by the Forest Management Team, the Conservation Liaison Group alternative (G) was also completed and input.

Finally, the initial results of all the alternatives were taken before the Forest Management Team. The group chose to create one more alternative that they felt would complete the broad range of alternatives required under NEPA and NFMA for the Forest Plan EIS. The results of those alternative runs and subsequent analysis of effects by the Forest ID Team and Management Team are found in Chapters II and IV of the DEIS. They are also be discussed more briefly in Chapter VIII of Appendix B to the DEIS.

FEIS

After publication of the DEIS, public response, and the analysis of that response, the Forest Management Team and the ID Team again engaged in a series of exercises to determine new alternatives needed to respond to public comment, what alternatives could be dropped from further consideration, and what modifications were needed in the remainder of the existing alternatives. As a result of this process, a new Alternative I was developed in response to strong public support, particularly from the Public Land Users Society (PLUS). This alternative replaced Alternative D as the market-emphasis alternative. Alternatives E and F were dropped for lack of public interest and support. Alternative G was modified significantly to better meet its objectives. The two departure schedules were dropped. And finally, after considering all of these changes, the Forest Management Team developed Alternative J, which the Regional Forester chose as the new Forest Service Preferred Alternative on which the Forest Plan for the Mt. Baker-Snoqualmie National Forest is based.

The results of the alternatives included in the FEIS and the analysis of their environmental effects are discussed in Chapters II and IV of the FEIS. They are also discussed more briefly in Chapter VIII of this Appendix.

The reader interested in more detail of the development, use and analysis of constraints discussed in this Chapter, or in the process of developing the alternatives, is referred to the planning process records on file in the Land Management Planning section at the Supervisor's Office.

CHAPTER VIII - ESTIMATED EFFECTS OF BENCHMARKS, CONSTRAINTS, AND ALTERNATIVES

A. Introduction

This section provides a detailed discussion of the outputs and effects of the planning alternatives. The focus is on the tradeoffs among the alternatives as they provide different levels and mixes of goods and services, and as they address in different ways the ICO's guiding the Forest planning process.

The purpose of this chapter, including discussion of the consequences of the constraints used to help formulate alternatives, and the relationship of the alternatives to the benchmarks, is to facilitate the identification of the alternative that contributes the most to net public benefit. To accomplish this objective, there must be an understanding of the abilities of the Forest to produce different goods and services in response to the ICO's, and of the tradeoffs involved with the decisions to produce one mix of outputs and effects as opposed to another. As such, this comparative analysis provides the basis for selecting a preferred alternative for the Forest Plan. This process of estimating effects, evaluating the alternatives, and selecting the one that contributes the most to net public benefit is the process prescribed by Steps 6, 7, and 8 of the NFMA planning process (see Chapter I discussion).

B. Evaluation of Significant Constraints

The resource objectives of a benchmark or alternative were represented in FORPLAN as a combination of constraints, a coordinated allocation choice (which serves as a large constraint set), and an objective function. In most cases, the objective function for the linear program was Maximize PNV for 15 Decades. In some cases (timber biological potential benchmark, maximize timber with MR's, and Alternative A) an objective function maximizing timber output over some time period (generally five decades) was used; the results were then rolled over into a maximize PNV run to force the initial solution to be achieved as cost-efficiently as possible.

The objective function "drove" the solution of the linear program. Where the objective function was to maximize PNV, the model chose the most cost-efficient combination of management prescriptions, harvest and other output schedules, and levels of outputs within the ranges allowed by the constraints and the coordinated allocation choice. Generally (when running under a maximize PNV objective function), whenever a constraint was added to the model, it resulted in a lower PNV than the same run without the constraint. The reason: the model must meet the constraint first. Meeting that constraint essentially carries an infinite value; from the model's standpoint, it must be done at all costs or the run won't proceed - an infeasible run will result. If the constraint added is truly constraining, it will keep the model from reaching the PNV achieved in the previous run without the constraint. The difference in PNV and in outputs between the two runs, all other things being equal, is the incremental opportunity cost of the constraint and the tradeoff involved from applying it.

During the benchmark analysis, the maximum opportunity costs of the major constraint sets required to meet MR's were analyzed. Also analyzed were the opportunity costs and tradeoffs of the two major policy constraints used in the model: non-declining yield from timber harvest one decade to the next, and timber harvest at 95% of culmination of mean annual increment (95% CMAI).

These results are discussed in detail in the AMS document (May, 1985) and in Chapter VI of this Appendix. In addition, sensitivity analyses were performed to provide information about the effects on modeling of the levels of real price trends on timber that were and could be applied, and the effects on the modeling results of alternative levels of timber management costs (see Chapter VI, Section F of this Appendix). Those results are also detailed in the AMS document. Since all of this analysis is discussed elsewhere in this Appendix and in the AMS, the results will not be repeated here.

The opportunity costs and tradeoffs of some of the constraints applied commonly across all, or almost all, alternatives (e.g., non-declining yield, MR's, 95% CMAI) were analyzed during the AMS process with benchmark runs. Other common constraints (e.g., ending inventory constraint, LTSY link, commercial thin applicability) were <u>not</u> analyzed through FORPLAN, but were taken as givens going into FORPLAN. The relative opportunity costs of the commercial thin applicability constraint and the rotation length constraint were analyzed during the process of developing the timber management intensities through the use of DP-DFSIM (see Chapter III, Section E of this Appendix, and "Documentation of the Development of Managed and Empirical Yield Tables," September 1989 (revised), Forest planning records).

Other than a direct reduction in timber yield tables for varying levels of primary cavity nester populations supported by each alternative, the major constraint sets applied unique to each alternative were the coordinated allocation choices (CAC's) that specified land-use assignment patterns needed to meet the goals and objectives of the alternative, as decided by the Forest Management Team. Overall changes in the coordinated allocation choices indicated the tradeoffs and opportunity costs of moving from one alternative, with its mix of goods, services, and responsiveness to ICO's, to another alternative.

None of the common constraints or the alternative-specific constraints were analyzed on an incremental or sequential basis for each alternative. To do so would have been prohibitively expensive and time consuming. As pointed out in Chapter VI, Section A, the order by which constraints are added changes the apparent opportunity cost of each constraint, unless the constraints are <u>totally</u> independent, which is rarely the case. Any analysis of constraints, constraint by constraint and alternative by alternative, would have left the decision makers with masses of confusing information that would not have been resolvable to some more simple common denominator.

The constraints analysis information from the benchmarks was used to guide the IDT and Management Team in developing the alternatives. The general effects of the constraints and their estimated magnitude of effect in the more constrained situation of the alternatives were kept in mind, in order to achieve the objectives of each alternative in the most cost-efficient and productive manner possible.

The effects of changing the major constraint sets - the coordinated allocation choices - among alternatives are seen by observing the outcomes and effects from each alternative. These total changes represent the opportunity costs and tradeoffs of the alternative-specific constraint sets, i.e., of the alternatives themselves. No attempt was made to disaggregate each CAC and add or subtract various parts sequentially; the run time and costs would have been enormous, with little useful data provided. The level of change having value for the decision-making process was represented by the changes among the goals, objectives, and formulation of the entire alternatives. The information on these comparisons, and the estimated contributions to net public benefit, are discussed in detail in Chapters II and IV of the FEIS. An abbreviated display and discussion of this information comprises the balance of this chapter.

C. Analysis of Tradeoffs Among Alternatives

This section discusses the consequences of each alternative, including response to the Forest ICO's, resource outputs, environmental consequences, social, and economic effects. Economic tradeoffs are analyzed in some detail, including reasons for differences in costs, benefits, and PNV among alternatives. Factors affecting net public benefit that were not carried quantitatively in the model are discussed for each alternative. Alternative objectives and effects are compared and contrasted, with the similarities, differences, and their reasons discussed. The tables and discussion below repeats much of Chapter II of the FEIS; refer to that document for more detailed discussion.

1. Consequences of the Alternatives

The major reason that alternatives differ is that they represent different ways of responding to issues, concerns, and opportunities. In the following Table B-66, the response of each alternative to the major ICO's is displayed.

Inputs, Yields, and Effects of Various Resources and Activities by Alternatives

The following Tables, B-67a through B-67g show the inputs, yields, and effects of various resources and activities, by alternative. The numbers are derived either from analysis completed in the FORPLAN model, or in a few cases, from analysis done outside of the model.

The alternatives are displayed, from left to right across the top, in order of decreasing acres of land suitable for timber production. Total suitable acres are strongly correlated with the goals and objectives of each alternative. For example, Alternative I, with an emphasis on timber and other resources with an established market price, has a high number of suitable acres and also a high ASQ. Alternative C, with a goal of emphasizing primitive and semi-primitive dispersed recreation, has the fewest suitable acres and the lowest ASQ.

This order - by decreasing suitable acres - is useful in understanding how the environmental consequences and effects will vary by alternative. The sequence is strongly correlated to the amount of vegetative management in the alternatives.

Outputs and effects that are generally related, such as timber/roads/sediment or recreation/wilderness/scenery, are grouped and displayed together. There are narratives preceeding each table in Chapter II of the FEIS; they will not be repeated here.

Table B-66
Response, By Alternative, to Major Issues and National Concerns

	National Concerns			Development Vs. Nondevelopment Issue 1/			Timber Supply Issue					
	Average Per Year for Decades 1/5											
Alternatives	Present Net Value	Net Receipts	Noncash Benefits	Existing Roadless Areas Allocated to Nondevelopment		Roadless Areas Assigned to a Roaded Mgt. Prescription But Not Devel. in Next 15 Yrs.	Decade 1 - Average Annual Timber Sale Program Quantity (TSPQ)		Long Term Sustained Yield Capacity	Lands Suitable for Timber Product	Employment: Jobs Supported By the Alts.	Payments to County
	.....Millions of Dollars.. ..			% Total Acres	M Acres	M Acres	MMCF	(MMBF)	MMCF	M Acres	M Jobs	MM Dollars
I	2342.9	5.8/25.6	61.3/85.5	64	256.4	98.2	30.1	(146)	34.0	386	29 1	5.4
B (RPA)	2343.2	5.3/24.8	61.0/86.8	66	266.6	88.0	29.8	(144)	33.4	380	29.1	5.3
H	2260 0	4.8/24.1	60.5/83.8	76	305.0	61.6	27.3	(131)	31.8	359	28.9	4.9
J (Pref.)	2258.8	3.4/23.1	61.2/85.5	77	309.0	61 5	25.5	(122)	30.4	346	28.8	4.6
A (No Act)	2283.5	6.5/29.6	60.9/85.2	70	280.3 2/	70 2	35.0	(168)	38.6	412	29.3	5.9
G-Modified	1997.0	2.4/11 0	60.6/80.2	91	368.4	18.4	20.4	(99)	23.6	247	28.4	3.8
C	1970.9	-2.1/14.1	60.7/78.8	93	375.8	23.1	15.8	(75)	19.9	256	28.0	2.6
NC 3/	N/A	N/A	N/A	NA	NA	NA	45.0	(220)	N/A	547	30.1	9.5

1/ Roadless Areas refer to the 402,930 acres of remaining RARE II parcels.

2/ This is an approximate figure. Alternative A is unique because an unspecified amount of development is permitted in the Upper Forest Resource Zone See description of Management Area 1E.

3/ The TM Plans upon which Alternative NC is based were developed in 1963; they are not integrated resource plans, and consequently did not address all resource uses and outputs. Missing data in this table (NA) cannot be reasonably estimated, since the TM plans were based on yield tables and resource relationships which do not reflect the latest scientific techniques and information, do not reflect standards in the NFMA regulations, or are otherwise inappropriate.

Table B-66
Response, By Alternative, to Major Issues and National Concerns

	Old Growth Ecosystems and Fish, Wildlife, & Plant Diversity Issue					American Indian Religious & Cultural Use Issue	
	Total Old Growth Remaining End of Decade 1/5	Old Growth Remaining on Suitable Acres End of Decade 1/5	Anadromous Fish Production Decade 1	"Effective" Areas Decade 1/5 Habitat for Old Growth Low Elevation Species 4/	Decade 1 Winter Range for Deer & Elk 5/	Inventoried Acres Afforded High/Moderate Protection 6/	
Alternatives	M Acres	M Acres	Thousand Lbs. Fish Per Year	M Acres	M Acres	High Percent	Moderate Percent
I	620 / 516	134 / 30	8,874	308/242	225	43	2
B (RPA)	621 / 513	135 / 27	8,874	309/239	253	43	7
H	623 / 526	125 / 28	8,874	309/246	257	40	17
J (Pref.)	625 / 535	122 / 32	8,874	310/250	280	47	11
A (No Act)	618 / 497	137 / 16	7,809	306/220	113	36	3
G-Modified	629 / 571	66 / 8	8,874	313/275	113	42	23
C	632 / 573	91 / 33	8,874	315/275	281	37	27
NC 7/	601 / 432	190 / 21	7,809	N/A	N/A	N/A	N/A

4/ Includes wilderness and non-wilderness acres of old growth located below 3,000 feet elevation. Indicator species for mature and old-growth habitats are Northern spotted owl, pileated woodpecker, and pine marten.

5/ Acres given include deer and elk winter range, management areas with compatible goals and which will incorporate winter range standards and guidelines, and some mountain goat habitat.

6/ Protection is afforded by those management areas that preclude or limit ground disturbing activities. Differences between "high" and "moderate" derived from expected frequency of human encounters. See Table II-9o.

7/ No management areas assigned in Alternative NC and the above information cannot be reasonably estimated. The TM Plans, upon which the No Change Alternative is based, were developed in 1963.

Table B-66
Response by Alternative, to Major Issues and National Concerns

	Recreation Opportunities Issue						Wild & Scenic Rivers Issue		Effects of Timber Management & Related Activities Issue	
	Demand Satisfied in Wilderness, Primitive, & Semi-Primitive Nonmotorized		Roads Open to Public Use, Passenger Car	Trail Construction/ Reconstruction	Lands Managed for High Visual Quality Level		Recommended for Designation as Wild and Scenic River		Decade 1 Annual Road Construction	Sediment Produced Annually, Decade 1 7/
					Meeting VQO of:					
Alternatives	Decade 1 Percent	Decade 5 Percent	Decade 1 Miles	Decade 1 Constr./Reconst. Miles	Retention M Acres	Partial Retention M Acres	No. Rivers	Total Miles	Miles	M Tons
I	94	45	1032	350 / 120	208	311	0	0	17	97
B (RPA)	76	34	1033	50 / 70	287	285	0	0	16	96
H	67	31	1039	90 / 120	407	181	5	154	14	91
J (Pref.)	79	38	1039	220 / 493	395	204	30	452	13	89
A (No Act.)	75	34	1039	70 / 60	120	342	15	287	19	103
G-Modified	70	35	933	350 / 120	573	56	47	796	8	67
C	64	33	1017	90 / 80	619	148	47	606	10	67
NC	N/A		Similar to A	Similar to A	N/A	N/A	0	0	28	125

7/ From all sources, including timber harvest, new road construction, old roads, and background (which includes sediment from previously disturbed ground and natural sedimentation).

Table B-67a
Long Term Timber, Water, and Sediment Inputs and Yields

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No. Act.)	I	B (RPA)	H	J (Preferred)	C	G-Mod.
Lands Tentatively Suitable for Timber Production	Acres	NA	597,199	597,294	597,307	597,293	597,280	597,303	597,284
Lands Suitable for Timber Production	Acres	546,500	412,508	386,512	380,448	358,754	346,411	256,206	247,091
Allowable Sale Quant. 2/									
Decade 1	MMBF Per Year	204	149	129	127	116	108	66	87
Allowable Sale Quant. 2/									
Decade 1	MMCF	41.7	31.0	26.6	26.3	24.1	22.4	13.8	18.3
Decade 2	Per	41.7	36.7	30.0	29.6	27.5	25.7	16.3	20.7
Decade 5	Year	41.7	39.0	33.7	32.3	31.3	29.7	19.8	22.2
Long Term Sustained Yield Capacity	MMCF Per Year	NA	38 6	34.0	33.4	31.8	30.4	19.0	23.6
For Comparison:	MMBF	1975-88 Average Annual Timber Cut (Chargeable to Potential Yield)					212.8		
	Per	1975-88 Average Annual Timber Sold (Chargeable to Potential Yield)					249.9		
	Year	1975-88 Average Annual Potential Yield - Timber Management Plan					237.4 3/		
Timber Sale Program Quantity 4/									
Decade 1	MMBF Per Year	220	168	146	144	131	122	75	99
Timber Sale Program Quantity 4/									
Decade 1	MMCF	45.0	35.0	30.1	29.8	27.3	25.5	15.8	20.4
Decade 2	Per	44.5	40.8	33.3	32.9	30.6	28.5	18.2	23.0
Decade 5	Year	42.5	41.5	35.8	35.4	33.3	31.6	21.0	23.6
Fuel Wood 5/									
Decade 1	MCF	2,252	1,715	1,467	1,449	1,326	1,234	759	1,007
Decade 2	Per	1,976	1,779	1,449	1,433	1,327	1,238	788	997
Decade 5	Year	560	541	466	460	433	410	273	306

1/ The TM Plans upon which the No Change Alternative is based were developed in 1963. The outputs and effects are generated from previous inventories All other alt. outputs and effects were calculated using updated inventories and yield tables and the latest method of calculating timber harvest levels. For Alt. NC, tentatively suitable lands were not determined and standard plus special commercial forest land is shown as lands suitable for timber production.

2/ ASQ: Quantity of timber that may be sold, from suitable land. Includes only chargeable, live (green) not salvage, fuelwood or other non-industrial wood. Potential yield from the TM Plan is shown for Alternative NC.

3/ Potential yield is a ceiling on amount of chargeable timber volume that can be sold; includes both net live and salvage volume. Current potential yield equals 203.8 MMBF/yr. Potential Yield 1975-1979 = 240.9 MMBF/yr.; 1980-1983 = 259 4 MMBF/yr.; 1984-1988 = 203.8 MMBF/yr. See Table BI-11 for further explanation on potential yield values.

4/ Includes ASQ, nonchargeable mortality volume, volume not meeting utilization standards, and volume used for other than board products from lands suitable for timber production, and volume from unsuitable lands. Includes PY and all other volume for NC.

5/ The fuelwood conversion is 95 cubic feet per cord. Volumes are estimated as a % of submerchantable timber outputs associated with regeneration harvest. This volume is included above in Timber Sale Program Quantity and in 1975-84 Cut and Sold It is not included in ASQ or PY.

Table B-67a
Long Term Timber, Water, and Sediment Inputs and Yields

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No. Act.)	I	B (RPA)	H	J (Preferred)	C	G-Mod.
Reforestation 6/									
Decade 1	Acres	4,360	4,068	3,260	3,221	3,042	2,865	1,873	2,291
Decade 2	Per	4,240	4,231	3,390	3,350	3,163	2,980	1,948	2,382
Decade 5	Year	4,240	4,605	3,879	3,832	3,619	3,409	2,229	2,652
Timber Stand Improvement									
Decade 1	Acres	3,000	1,141	996	989	1,005	996	615	873
Decade 2	Per	3,000	5,603	3,481	3,207	3,106	2,911	1,491	3,022
Decade 5	Year	3,000	3,407	2,605	2,461	2,465	2,124	1,390	1,932
Arterial and Collector Road Construction									
Decade 1	Miles	8.2	1.4	1.8	1.5	0.6	0.8	0.7	0.6
Decade 2	Per	6.7	1.2	1.6	1.3	0.5	0.7	0.8	0.7
Decade 5	Year	0.0	0.0	0 0	0.0	0.0	0.0	0.0	0.0
Timber Purchaser (Local) Road Const./Recon									
Decade 1 Const.		20.4	17.4	15.3	14 6	13.5	12.6	9.6	7.5
Reconstruct	Miles	72.0	73.2	63.0	61.7	56.6	52.8	34.3	40.2
Decade 2 Const.	Per	17.8	15.8	13.6	13.0	11.8	11.1	8.3	7.0
Reconstruct.	Year	72.0	81.9	67.4	66.2	61.1	57.1	37.6	44.1
Decade 5 Const.		6 1	10.8	9.3	8.9	8.4	7.9	5.4	5.7
Reconstruct.		72.0	81.1	69.9	68.8	64.7	61.2	40.9	45.5
Sediment Index									
Decade 1	M Tons	Simi-	102.9	96.7	95.7	91.3	88.5	67.6	66.8
Decade 2	Per	lar to	102 6	96.5	95.4	91 0	88.2	67.5	67.1
Decade 5	Year	Alt. A	100 4	94.6	93.3	88.9	86.2	65.4	65.3
Water Yield									
Decade 1	M Ac Ft	15,616	15,616	15,616	15,616	15,616	15,616	15,616	15,616
Decade 2	Per	15,616	15,616	15,616	15,616	15,616	15,616	15,616	15,616
Decade 5	Year	15,616	15,616	15,616	15,616	15,616	15,616	15,616	15,616
Improved Watershed Condition									
Decade 1	Acres	Sim-	40	35	35	35	35	20	20
Decade 2	Per	lar to	40	35	35	35	35	20	20
Decade 5	Year	Alt. A	40	35	35	35	35	20	20
Fire Management Effectiveness Index									
Decade 1	Annual Dollars	930	930	930	930	930	930	930	930
Decade 2	Per M Acres	930	930	930	930	930	930	930	930
Decade 5	Protected	930	930	930	930	930	930	930	930
Fuel Treatment									
Decade 1	Acres	5,396	4,068	3,260	3,221	3,042	2,865	1,873	2,291
Decade 2	Per	5,394	4,231	3,390	3,350	3,163	2,980	1,948	2,382
Decade 5	Year	4,783	4,605	3,879	3,832	3,619	3,409	2,229	2,652

6/ Acres shown are those planted with seedlings; however all acres regeneration harvested (see Table B-6c) are reforested by planted or natural seedlings.

Table B-67b

Recreation, Wilderness, and Related Inputs and Outputs

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No Action)	I	B (RPA)	H	J (Preferred)	C	G-Modified
Developed Rec. Use									
Current Use (1989)	1,000	Similar	2,324	2,324	2,324	2,324	2,324	2,324	2,324
Current Capacity (1989)	RVD's	to Alt A	5,044	5,044	5,044	5,044	5,044	5,044	5,044
Future Capacity	Per Yr.								
Decade 1		Similar	5,382	5,598	5,382	5,598	5,598	5,382	5,364
Decade 2		to	5,792	6,278	5,702	6,098	6,098	5,882	5,684
Decade 5		Alt. A	6,842	7,598	6,662	7,238	7,238	7,022	6,644
Future Demand									
Decade 1		Similar	----------2,834 to 3,464----------						
Decade 2		to	----------3,848 to 4,702----------						
Decade 5		Alt. A	----------6,718 to 8,210----------						
Non-Wilderness Disp. Rec. Use									
Roaded 2/									
Current Use (1989)	1,000	Similar	2,102	2,102	2,102	2,102	2,102	2,102	2,102
Current Capacity (1989)	RVD's	to Alt.A	3,199	3,199	3,199	3,199	3,199	3,199	3,199
Future Capacity	Per Yr.								
Decade 1		Similar	3,343	3,339	3,317	3,322	3,277	3,130	3,223
Decade 2		to	4,097	4,093	4,068	3,818	3,730	3,374	3,474
Decade 5		Alt. A	4,902	5,069	5,043	4,516	3,991	3,599	3,710
Future Demand									
Decade 1		Similar	----------1,854 to 2,266----------						
Decade 2		to	----------2,837 to 3,467----------						
Decade 5		Alt. A	----------4,817 to 5,887----------						
Non-Wilderness Disp. Rec. Use									
Unroaded 3/									
Current Use (1989)	1,000	Similar to	297	297	297	297	297	297	297
Current Capacity (1989)	RVD's	Alt. A	223	223	223	223	223	223	223
Future Capacity	Per Yr.								
Decade 1		Similar	201	208	200	205	208	222	218
Decade 2		to	164	182	157	174	182	220	210
Decade 5		Alt. A	115	149	102	134	149	218	201
Future Demand									
Decade 1		Similar	----------225 to 293----------						
Decade 2		to	----------328 to 492----------						
Decade 5		Alt. A	----------713 to 890----------						

1/ The TM Plan upon which Alternative No Change is based was developed in 1963. The Plan was not an integrated resource plan, and consequently did not address all resource uses and outputs.
2/ Includes RN, RM, and Rural ROS classes.
3/ Includes P, SPNM, and SPM ROS classes.

Table B-67b

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No Action)	I	B (RPA)	H	J (Preferred)	C	G-Modified
Wilderness Recreation									
Current Use (1989)	1,000	Similar to	459	459	459	459	459	459	459
Current Capacity (1989)	RVD's	Alt A	500	500	500	500	500	500	500
Future Capacity	Per Yr.		500	675	511	422	539	375	440
Future Demand									
Decade 1		Similar	----------388 to 456----------						
Decade 2		to	----------565 to 673----------						
Decade 5		Alt. A	----------921 to 1,107----------						
Wildlife and Fish Use									
Current Use (1989)	1,000	Similar	396	396	396	396	396	396	396
Current Capacity	RVD's	to Alt. A	581	581	581	581	581	581	581
Future Capacity	Per Yr.								
Decade 1		Similar	548	547	552	545	545	531	530
Decade 2		to	581	580	595	575	575	535	527
Decade 5		Alt. A	625	623	654	611	611	538	509
Future Demand									
Decade 1		Similar	----------460 to 562----------						
Decade 2		to	----------609 to 749----------						
Decade 5		Alt. A	----------1,059 to 1,295----------						
Total Recreation Use 4/									
Current Use	1,000	Similar	5,182	5,182	5,182	5,182	5,182	5,182	5,182
Current Capacity	RVD's	to Alt. A	8,966	8,966	8,966	8,966	8,966	8,966	8,966
Future Capacity	Per Yr.								
Decade 1		Similar	9,426	9,820	9,410	9,547	9,622	9,109	9,245
Decade 2		to	10,553	11,228	10,438	10,512	10,549	9,851	9,808
Decade 5		Alt. A	12,359	13,491	12,318	12,310	11,917	11,214	10,995
Future Demand									
Decade 1		Similar	----------5,301 to 6,479----------						
Decade 2		to	----------7,636 to 9,334----------						
Decade 5		Alt. A	----------13,169 to 16,095----------						
Developed Rec. Site Construct./Reconstruction									
Dec. 1	PAOT	Similar	10/800	130/220	10/400	130/220	130/220	10/800	0/0
Dec. 2	Per Yr.	to	50/850	200/100	0/400	100/900	100/900	100/900	0/0
Dec. 5		Alt. A	50/900	200/1200	0/400	100/1000	100/1000	100/1000	0/0
Trail Construction/ Reconstruction									
Dec. 1	Miles	Similar	7/6	35/13	10/8	8/8	22/49	9/8	35/13
Dec. 2	Per Yr.	to	7/6	0/13	11/9	7/8	22/2	9/8	0/13
Dec. 5		Alt. A	0/5	0/5	0/5	1/5	1/5	0/5	0/5

4/ Includes Developed, Roaded & Unroaded Dispersed, and Wilderness Recreation totals. WFUD's are included within these subheads.

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No Action)	I (PLUS)	B (RPA)	H	J (Preferred)	C	G Modified
Visual Quality Objectives									
Preservation 5/	Acres	NA 6/	724,463	724,104	724,083	733,227	771,958	747,461	735,255
Retention		NA	119,889	207,804	287,483	407,309	395,440	618,787	572,961
Partial Retention		NA	341,546	310,819	284,894	181,026	204,214	148,060	56,406
Modification and Maximum Modification		NA	428,765	380,383	327,988	301,527	256,587	119,804	278,712
Alpine Lakes Mgt. Unit VQO Varies 7/	Acres	NA	110,132	101,685	100,375	101,706	96,595	90,682	81,369
Roadless Areas 8/ Assigned Roaded Mgt. Prescript. But Not Developed For Next 15 Years	Acres	NA	70,215	98,181	87,955	61,598	61,482	23,101	18,368
Roadless Areas 8/ Assigned to Unroaded Mgt Prescriptions	Acres	NA	280,334	256,397	266,623	305,068	309,214	375,800	368,445
Roads Suitable for Public Use									
By Passenger Car 9/									
1986	Miles	Similar	1,039	1,032	1,033	1,039	1,039	1,017	933
2000		to	1,214	1,205	1,198	1,193	1,204	1,106	1,017
2030		Alt. A	1,363	1,367	1,351	1,341	1,353	1,188	1,096
By High Clearance Vehicle Only									
1986	Miles	Similar	1,483	1,472	1,476	1,483	1,483	1,451	1,332
2000		to	1,731	1,720	1,711	1,703	1,719	1,578	1,452
2030		Alt. A	1,945	1,951	1,929	1,915	1,932	1,697	1,563
Rivers Recommended for W & S River Designation	No. of Rivers	0	15	0	0	5	30	47	47
Miles	Miles	0	287	0	0	154	452	606	796
Research Natural Areas Recommended for Designation	No. of Areas	0	0	0	0	5	5	5	5

5/ Includes 721,600 acres of preservation VQO in wilderness, which is the same in all alternatives.

6/ The visual quality terms here were not in use in 1963. Modified cutting areas termed "Landscape Management Areas (LMA) were managed to protect other resource values. These LMA's included "Present Occupency Areas" (e.g Mather Memorial Parkway and developed recreation sites); "Proposed Occupancy"; and roadside, streamside, lakeside, and buffer zones where reduced timber harvest was part of the regulated PY. Terminology amendment to the 1963 Plan termed the CFL in LMA's as Special or Unregulated. Actual acres assigned to VQO cannot be reasonably estimated, but would be similar to Alternative A.

7/ VQO for these acres was assigned by the 1981 Alpine Lakes Land Management Plan. These acres vary by alternative depending upon the amount of wildlife habitat assigned in that alternative.

8/ RARE II roadless areas released by the 1984 Washington Wilderness Act.

9/ System roads tentatively closed to all travel are not included.

Table B-67c

Roadless Area Disposition by Alternative

Acres Assigned to Developed or Undeveloped

No	Area Name	Number of Parcels	NC ALT 1/	A (No Action) 2/		I		B (RPA)	
				Devel	Undevel	Devel	Undevel	Devel	Undevel
1A	Mt Baker (Canyon Creek)	1	NA	5,067	19,979	4,687	20 359	3,969	21,077
1B	Mt Baker (North Block)	11	"	8,652	7,773	5,591	10,834	5,613	10,812
1C	Mt Baker (West Block)	5	"	8,760	18 058	10,198	16,620	10,026	16,792
1D	Mt Baker (South Block)	4	"	5,531	844	3,883	2 492	3,864	2,511
1E	Mt Baker (Noisy-Diobsud)	1	"	*18,203*	*32,164*	*19 850*	*30,517*	*21,855*	*28,512*
2	Oales Peak	1	"	633	971	696	908	611	993
3	Alma Copper	1	"	3,336	4,857	4,329	3,864	4 117	4,076
4	Hidden Lake	1	"	1,752	4,900	1,920	4,732	1,477	5,175
5	Glacier Peak H	2	"	2,997	4,942	2,765	5,174	2,005	5,934
6	Glacier Peak I	1	"	3 695	9,060	3,420	9 335	4 117	8,638
7	Glacier Peak G	9	"	2,277	6,460	2,321	6,416	1,581	7,156
8	Glacier Peak J	11	"	11,650	14,321	14,731	11,240	15 025	10,946
9	Glacier Peak M	1	"	654	401	717	338	696	359
10	Glacier Peak A	2	"	42	401	126	317	168	275
11	Glacier Peak L	12	"	3,521	10,706	6,559	7,668	5,968	8,259
12	Glacier Peak B	*2*	"	*2,766*	*15,860*	*3,736*	*14,910*	*4 137*	*14,509*
13	Glacier Peak K	5	"	4,010	41,499	11,231	34,278	8,593	36 916
14	Pressentin	1	"	6,082	8,975	6,588	8,469	6,905	8 152
15	Higgins Mountain	1	"	6,293	6,884	8,002	5,175	7 432	5,745
16	Prairie Mountain	1	"	2,090	1,732	2,027	1,795	2,279	1,543
17	White Chuck Mountain	1	"	929	4 794	1,857	3,866	1,414	4,309
18	Boulder River	10	"	7,557	24,750	9,097	23 210	6,584	25 723
19	Eagle Rock	1	"	4,158	29,018	6,797	26,379	4,559	28,617
20	Tolmie Creek	1	"	168	106	274	0	274	0
21	Clearwater	8	"	6,311	2,492	6,077	2,726	5,401	3,402
22	Lonesome Lake	1	"	63	232	190	105	190	105
23	Sun Top	*1*	"	*1,583*	*803*	*1,794*	*592*	*1,562*	*824*
24	Silver Creek	1	"	189	866	696	359	399	656
25	Norse Peak	4	"	3 608	6,485	6,374	3,719	5,486	4 607
Totals				122,597	280,333	146,533	256 397	136,307	266,623
Percent				30%	70%	36%	64%	34%	66%

1/ The Timber Management Plans upon which the No Change Alternative is based were developed in 1963 They are not integrated resource plans, and consequently did not address all resource uses and outputs *The missing information in this table cannot reasonably be calculated However based on the existing* vegetation, it is unlikely that more than 50% of the total roadless area acres would be developed in the foreseeable future

2/ Estimate Alternative A is unique because an unspecified amount of development is permitted in Upper Forest Resource Zone See the description of MA 1E, earlier in this chapter

Table B-67c

Area	H		J (Preferred)		C		G Modified	
No	Devel	Undevel	Devel	Undevel	Devel	Undevel.	Devel	Undevel
1A	3207	21,839	2,976	22,070	547	24,499	3,399	21,647
1B	5758	10,667	5,612	10,813	1,094	15,331	2,213	14,212
1C	10217	16,601	9,688	17,130	1,707	25,111	2,933	23,885
1D	2784	3,591	2,152	4,223	780	5,595	737	5,638
1E	3483	46,884	5,468	44,899	441	49,926	1,963	48,404
2	612	992	654	950	21	1,583	147	1,457
3	2132	6,061	1,752	6,441	42	8,151	0	8,193
4	421	6,231	569	6,083	231	6,421	442	6,210
5	2068	5,871	2,153	5,786	759	7,180	675	7,264
6	3145	9,610	2,850	9,905	2,828	9,927	696	12,059
7	357	8,380	378	8,359	105	8,632	443	8,294
8	11289	14,682	11,373	14,598	5,462	20,509	5,675	20,296
9	718	337	695	360	0	1,055	0	1,055
10	0	443	0	443	0	443	0	443
11	2233	11,994	2,360	11,867	1,791	12,436	1,096	13,131
12	2891	15,755	3 482	15,164	1,097	17,549	906	17,740
13	6016	39,493	6,776	38,733	2,404	43,105	1,223	44,286
14	7221	7,836	7,157	7,900	633	14,424	2,892	12,165
15	7474	5,703	7 517	5,660	400	12,777	147	13,030
16	2280	1,542	2,237	1,585	274	3,548	2 027	1,795
17	1477	4,246	1,603	4,120	927	4,796	1,161	4,562
18	5169	27,138	5 465	26,842	1,327	30,980	1,538	30,769
19	2415	30,761	1,625	31,551	2,765	30,411	780	32,396
20	274	0	274	0	21	253	105	169
21	5549	3,254	4,092	4,711	422	8,381	1,053	7,750
22	190	105	42	253	42	253	63	232
23	1793	593	1,244	1,142	105	2,281	210	2,176
24	971	84	105	950	189	866	718	337
25	5718	4,375	3,417	6,676	716	9,377	1,243	8,850
Total	97,862	305,068	93,716	309,214	27,130	375,800	34,485	368,445
Percent	24%	76%	23%	77%	7%	93%	9%	91%

Table B-67d

Wild & Scenic Rivers Eligibility and Suitability

Eligible Rivers	Eligible Miles at Highest Classification			Alternatives (X = Suitable for Designation)							(pref)
	Wild	Scenic	Rec.	NC	A	B (RFA)	C	C-Mod	H	I	J
Silesia Creek	10 4	--	--	--	--	--	X	X	--	--	--
North Fork Nooksack	3 5	30.3	9.5	--	X	--	X	X	X	--	X
Wells Creek	2 6	3.4	--	--	X	--	X	X	--	--	--
Middle Fork Nooksack	2 7	10 2	7.1	--	X	--	X	X	--	--	--
South Fork Nooksack/											
Bell Creek	2 3	27 3	12 9	--	X	--	X	X	--	--	X
Baker River	11 2	2 1	--	--	--	--	X	X	--	--	X
Noisy Creek	6 1	--	--	--	--	--	X	X	--	--	X
Diobsud Creek	8 3	--	2 2	--	--	--	X	X	--	--	X
Illabot Creek	4.3	--	11 0	--	--	--	X	X	--	--	X
Buck Creek	10 1	1 0	--	--	--	--	X	X	--	--	X
Downey Creek	10 0	0 8	--	--	--	--	X	X	--	--	X
White Chuck River	10 5	--	12 0	--	--	--	X	X	--	--	X
North Fork Sauk River (Extension)	9.2	--	--	--	--	--	X	X	--	--	X
South Fork Sauk River (Extension)	1 0	7.4	--	--	--	--	X	X	--	--	--
North Fork Stillaguamish	--	--	49 8	--	X	--	X	X	--	--	--
North Branch	--	--	5 1	--	--	--	X	X	--	--	--
Deer Creek	--	--	23 5	--	--	--	X	X	--	--	--
Boulder River	9 0	--	4 0	--	X	--	X	X	--	--	X
South Fork Stillaguamish	--	36 6	15 9	--	X	--	X	X	--	--	X
Canyon Creek/											
South Fork Canyon Creek	1 3	7 1	11 9	--	X	--	X	X	--	--	--
Skykomish River including											
South Fork Skykomish/Tye	--	--	63 1	--	X	--	X	X	X	--	X
North Fork Skykomish	8 2	8 4	12 0	--	X	--	X	X	X	--	X
Troublesome Creek	4 4	0 1	--	--	--	--	X	X	--	--	X
West Cady Creek	4 8	--	2 7	--	--	--	X	X	--	--	X
Miller River (to fork)	--	3 7	--	--	X	--	X	X	--	--	X
West Fork Miller River	2 1	4 2	--	--	--	--	X	X	--	--	X
East Fork Miller River	0 8	6 0	--	--	--	--	X	X	--	--	X
Foss River (to fork)	--	--	4 4	--	X	--	X	X	--	--	X
West Fork Foss River	3 1	1 5	--	--	--	--	X	X	--	--	X
East Fork Foss River	6.7	--	1 2	--	--	--	X	X	--	--	X
Beckler River	--	--	13 5	--	X	--	X	X	--	--	--
Rapid River	7.0	6 0	--	--	X	--	X	X	--	--	--
Deception Creek	9 8	0 5	--	--	--	--	X	X	--	--	X
South Fork Tolt River	--	--	5 4	--	--	--	X	X	--	--	--
North Fork Snoqualmie R.	1 0	17 2	8 0	--	--	--	X	X	--	--	X
Lennox Creek	0 3	6.9	--	--	--	--	X	X	--	--	X
Middle Fork Snoqualmie	6 4	29 1	4 2	--	X	--	X	X	X	--	X
Taylor River	6 6	--	1 6	--	--	--	X	X	--	--	X
Pratt River	9 5	--	--	--	--	--	X	X	--	--	X
South Fork Snoqualmie R	--	--	30 6	--	--	--	X	X	--	--	--
Carbon River	4 0	--	28 4	--	--	--	X	X	--	--	--
White River	--	20.0	17 7	--	--	--	X	X	--	--	X
Clearwater River	3.6	--	6 2	--	--	--	X	X	--	--	--
Greenwater River	8 4	--	13 0	--	--	--	X	X	--	--	--

Table B-67e
Fish and Wildlife Inputs and Outputs 1/

Outputs/Effects	Unit of Measure	NC 2/ (No Change)	A (No Action)	I	B (RPA)	H	J Preferred	C	G Modified
Anadromous Fish Commercial Harvest									
Decade 1	1,000	Similar	7809	8874	8874	8874	8874	8874	8874
Decade 2	Lbs/Yr	to	7809	9000	9000	9000	9000	9000	9000
Decade 5		Alt. A	7809	10,000	10,000	10,000	10,000	10,000	10,000
Anadromous Fish Habitat Improvement									
Decade 1	1,000	Similar	0	1065	1065	1065	1065	1065	1065
Decade 2	Lbs/Yr	to	0	1200	1200	1200	1200	1200	1200
Decade 5		Alt. A	0	1300	1300	1300	1300	1300	1300
Bald Eagle									
Decade 1	Pairs	----------4 (One Active + 3 potential breeding territories)----------							
Decade 2									
Decade 5									
Northern Spotted Owl									
Decade 1	Habitat	108 3/	108	108	108	111	111	115	115
Decade 2	Capability	91	97	98	98	101	103	110	110
Decade 5	for Pairs	54	76	76	76	80	82	99	98
Marten									
Decade 1	Habitat	4210 3/	4207	4214	4216	4327	4337	4489	4479
Decade 2	Capability	3565	3800	3915	3832	3951	4018	4309	4281
Decade 5	for Indiv.	2113	2800	2937	2910	3110	3213	3870	3823
Pileated Woodpecker									
Decade 1	Habaitat	842 3/	841	843	844	865	867	898	899
Decade 2	Capability	713	760	783	766	790	804	862	856
Decade 5	for Pairs	423	560	587	582	622	643	774	765

1/ Values for wildlife species other than bald eagle and primary cavity excavators are population estimates based on maximum habitat potential.
2/ The TM Plans upon which the No Change Alternative is based were developed in 1963. They are not integrated resource plans and consequently did not address all resource uses and outputs
3/ Populations would be expected to decline at a rate faster than Alternative A because no specific provision is made in Alt. NC to maintain viable populations and more of the old growth is suitable for timber harvest and will be fragmented.

Table B-67e

Outputs/Effects	Unit of Measure	NC 2/ (No Change)	A (No Action)	I	B (RPA)	H	J Preferred	C	G-Modified
Primary Cavity Excavators									
Decade 1	% of 4/	Similar	40	20	40	20	40	20	60
Decade 2	Potential	to	40	20	40	20	40	20	60
Decade 5	Population	Alt A	40	20	40	20	40	20	60
Roosevelt Elk									
Winter Range									
Decade 1	Habitat	Similar 3/	780	780	770	770	770	750	740
Decade 2	Capability	to	720	700	690	700	690	670	660
Decade 5	for Indiv.	Alt A	790	740	730	740	710	650	640
Summer Range									
Decade 1	Habitat	Similar 3/	1240	1230	1240	1240	1240	1240	1240
Decade 2	Capability	to	1260	1260	1250	1260	1250	1250	1250
Decade 5	for Indiv.	Alt A	1300	1290	1270	1270	1280	1280	1270
Black-tailed Deer									
Winter Range									
Decade 1	Habitat	Similar 3/	16,520	15,350	15,300	15,250	15,160	14,870	14,610
Decade 2	Capability	to	14,400	13,510	13,410	13,450	13,390	12,950	12,680
Decade 5	for Indiv.	Alt A	15,740	14,300	13,970	14,190	13,580	12,410	12,110
Summer Range									
Decade 1	Habitat	Similar 3/	19,750	19,740	19,730	19,740	19,720	19,680	19,670
Decade 2	Capability	to	19,720	19,690	19,670	19,700	19,670	19,520	19,530
Decade 5	for Indiv.	Alt A	19,970	19,800	19,720	19,740	19,650	19,510	19,400
Mountain Goat									
Decade 1	Habitat	Similar 3/	1430	1440	1450	1440	1450	1450	1450
Decade 2	Capability	to	1400	1440	1440	1440	1440	1450	1450
Decade 5	for Indiv.	Alt A	1330	1400	1410	1410	1420	1450	1440

4/ On acres suitable for timber harvest. Percentages are higher on other portions of the Forest.

Table B-67f

Old-Growth Acres by Alternative 1/

Alternative	Old Growth in Wilderness	Non-wilderness Not Suited for Timber Production Because of Other Resource Objectives 2/	Non-wilderness Not Suited for Timber Production Because of Potential Irretrievable or Irreversible Resource Damage	Non-wilderness, Suited for Timber Production and Allocated to a Prescription Allowing Timber Harvest			
				Start	End Decade 1	End Decade 2	End Decade 5
A (No Act)	232,500	113,469	134,400	163,169	137,131	97,723	16,156
I	232,500	118,978	134,400	157,660	134,385	102,244	29,834
B (RPA)	232,500	118,812	134,400	157,826	134,897	103,339	27,308
H	232,500	130,860	134,400	145,778	125,105	96,335	28,326
J (Pref.)	232,500	135,821	134,400	140,817	121,939	96,634	32,373
C	232,500	173,393	134,400	103,245	91,396	77,180	33,134
G-Mod.	232,500	195,946	134,400	80,692	66,491	47,228	7,824

1/ The total acres of old growth, at the starting point, wilderness and non-wilderness = 643,538. No reasonable estimates for Alt. NC.

2/ Other resource objectives include allocations such as wildlife MR's, riparian MR's, or non-motorized dispersed recreation, etc. These vary by alternative, depending upon the objectives or goal of the alternative.

Table B-67g
Grazing, Minerals, and Energy Yields

Alternatives

Outputs/Effects	Unit of Measure	NC 1/ (No Change)	A (No Action)	I	B (RPA)	H	J (Preferred)	C	G-Modified
Range 2/									
Decade 1	1000	1	1	1	1	1	1	1	1
Decade 2	AUM's	1	1	1	1	1	1	1	1
Decade 5		1	1	1	1	1	1	1	1
Acres Available for Grazing		4000	4000	4000	4000	4000	4000	4000	4000
Energy Minerals Prod.									
Decade 1	Billion	Sim.	....	.....	No Energy Production Anticipated...			.....	.....
Decade 2	BTU's	to	135	97	114	86	86	48	48
Decade 5	Per Yr.	Alt. A	750	537	636	477	477	265	265
Non-Energy Minerals Produced	Percent	Sim.							
Decade 1	Change From	to	0	-10	-8	-16	-16	-19	-19
Decade 2	Present	Alt A	... Increase at a rate of 2% per year through the year 2000. Not estimated beyond 2000.						
Acres Available for Mineral Exploration 3/	Acres	Sim. to Alt. A	924,675	912,954	920,367	916,102	916,102	915,700	864,087

1/ The 1963 Timber Management Plans, upon which Alternative No Change is based, were not integrated resource plans, and consequently did not address all resource uses and outputs

2/ Two sheep allotments with an estimated capacity of 950 AUM's, have been in non-use status the past 5 years.

3/ Area other than Wilderness where MA prescriptions call for withdrawal. These acres include Mt. Baker National Recreation Area, 8,743 acres, which is withdrawn from geothermal entry.

Table B-67h

Budget, Costs, Social and Economic Outputs and Effects

Outputs/Effects	Unit of Measure	Alternative NC 1/ (No Change)	A (No. Act)	I	B (RPA)	H	J (Preferred)	C	G-Mod
Operational Costs									
Decade 1	Million		14 7	13 7	13 8	13 3	13 3	11 6	12 2
Decade 2	Dollars		16.5	14 7	14.7	14 2	15 3	11 9	13 0
Decade 5	Per Yr		16 8	15 5	15 5	15 5	14 7	12 6	13 3
Capital Investment Costs									
Decade 1	Million		5 3	4 7	4 9	5 0	4 7	3 8	3 5
Decade 2	Dollars		4 5	4 2	4 2	4 2	4 0	3 8	3 6
Decade 5	Per Yr		1 6	1 4	1 3	1 2	1 1	8	8
Total Budget									
Decade 1	Million		20 0	18.4	18 7	18 3	18 0	15 4	15 7
Decade 2	Dollars		21 0	18 9	18 9	18 5	19 3	15 7	16 6
Decade 5	Per Yr		18 3	16.8	16 8	16.7	15 9	13 3	14 0
Returns to Treasury									
Decade 1	Million	35 9	21 4	19 8	19 4	18 1	16 8	9 3	14 3
Decade 2	Dollars	36 6	34 9	28 1	27 7	25 6	23 9	14 4	19 6
Decade 5	Per Yr	24 0	46.2	40 3	40 2	38 9	37 7	26 2	24 2
Payments to Counties									
Decade 1	Million		5.9	5 4	5 3	4 9	4 9	2 6	3 8
Decade 2	Dollars		9 2	7 4	7 3	6.8	6 3	3 9	5 1
Decade 5	Per Yr		11 9	10 4	10 3	10 0	9 6	6 7	6 2
Human Resource Program									
Decade 1	Person Yrs	29 0	29 0	29 0	29 0	29 0	29 0	29 0	29 0
Decade 2	Per Yr	29 0	29 0	29 0	29 0	29 0	29 0	29 0	29 0
Decade 5		29 0	29 0	29 0	29 0	29 0	29 0	29 0	29 0
Jobs Supported by the Alts	Thousands of Jobs								
Decade 1	Per Year		29 3	29 1	29.1	28 9	28 8	28 0	28 4
For Comparison		30 1 Thousand Jobs Supported by 1985-86 Average Forest Outputs							
For Comparison		30 0 Thousand Jobs Supported by 1977-86 Average Forest Outputs							
Income Based On Projected Outputs for Alts	Mil $		537	532	531	526	522	501	512
Decade 1	Per Year								
For Comparison		558 Mil $ - Income Based on 1985-86 Average Forest Outputs							
For Comparison		556 Mil $- Income Based on 1977-86 Average Forest Outputs							

1/ The 1963 TM Plans, upon which Alternative NC is based, were not integrated resource plans, and consequently did not address all resource uses and outputs. Alternative NC was not modeled in FORPLAN, information in this table was calculated outside of FORPLAN

Table B-67i

Percentage of Inventoried Acres of American Indian Religious and Cultural Use Sites Assigned to Management Areas Providing High and Moderate Levels of Protection

Type of Site	Alternatives															
	NC 1/ (No Change)		A (No Action)		I		B (RPA)		H		J (Preferred)		C		G-Modified	
	High	Mod.	High	Mod.	High	Mod.	High	Mod.	High	Mod.	High	Mod.	High	Mod.	High	Mod.
Spirit Quest	NA		37	3	44	2	44	6	41	15	48	11	40	26	43	22
Legend Site	NA		16	2	30	2	28	16	25	26	40	17	23	45	18	47
Cedar Areas	NA		22	1	28	1	28	5	27	8	27	8	23	27	29	25
Ceremonial Flora	NA		52	1	56	1	57	6	54	16	56	15	58	24	55	26

1/ The 1963 TM Plans, upon which Alternative NC is based, were not integrated resource plans, and consequently did not address all resource uses and outputs. The missing information in this table cannot be reasonably estimated because, except for cemeteries, the percentages were developed by overlaying inventoried areas with MA's; no MA's were assigned in Alternative NC.

Qualitative Resource Outputs, Environmental Effects, by Alternative

The previous Tables B-67a through B-67i, displayed the quantitative resource outputs, environmental effects, activities and costs by alternative. Not all the outputs and effects can be quantified. In the following Table B-68, those outputs and effects that cannot be adequately covered quantitatively are discussed.

Alternative NC (No Change) is based on the 1963 Timber Management Plans; they were not an integrated resource plans and consequently did not address all resource uses and outputs. Data for this alternative is presented, or estimated, as available.

Note: although the outputs and effects occur over the long-term, the results of this planning process will apply for only 10 to 15 years, the life of this Forest Plan.

Refer to Chapter IV, Environmental Consequences, for a complete discussion of the effects of implementing the alternatives on the physical, biological, social, and economic environments.

Table B-68 Page 1 of 6
Qualitative Resource Outputs and Environmental Effects

Archaeological and Historical Properties

NC (No Change)	Estimated to be similar to Alternative A (No Action), by highest frequency of resource damage.
A (No Action)	High frequency of resource damage in developed areas, with high mitigation costs. Information gained through site discovery and recovery.
I	Intermediate frequency of resource damage in developed areas, with high mitigation costs. Some information gained.
B (RPA)	Similar to Alternative I in developed areas.
H	Similar to Alternative I in developed areas.
J (Pref)	Similar to Alternative I, with more potential for information gain and interpretation.
C	Has the fewest adverse effects on cultural and historic resource, but also fewer opportunities for information gained through site discovery and interpretation
G-Mod	Only Alternative C has fewer adverse effects. Somewhat less opportunity for gaining information.

Visual Quality

Same in All Alternatives: Visual quality in Alpine Lakes Management Area (which includes Snoqualmie Pass and Stevens Pass Highways) and Skagit Wild and Scenic River will be managed as prescribed in approved plans, except where overridden by wildlife MR's. Wilderness is Preservation in all alternatives.

NC (No Change) The foreground of Mather Memorial Parkway is managed as a scenic corridor; timber harvest permitted but not scheduled. Effects of NC on other areas of the Forest are estimated to be similar to Alternative A.

A (No Action) With emphasis on timber harvest at low elevations, coinciding with many heavily used rec. areas, there would be some conflict between commodity production and scenic quality. The cumulative effect of Alt. A would be a "moderately" altered character even in highly scenic areas. Only the foreground of Mather Memorial managed as scenic corridor.

I With an emphasis on managing tentatively suitable lands for timber production, only the foreground of heavily traveled corridors will be managed to retain high visual quality: Mather Memorial Parkway, Mtn. Loop Highway, Mt. Baker Highway, Baker Lake Highway, and North Cascades Highway 20. Outside these viewsheds and the roadless areas, the Forest will be managed at a moderately to heavily-altered state.

B (RPA) With high emphasis on managing all tentatively suitable lands for timber production, scenic quality will deteriorate for almost all lands accessible by road. Only the foreground of Mather Memorial Pkwy will be managed as scenic area; only sites unsuitable for timber production will remain roadless.

H The foreground and middleground of five heavily traveled corridors will be managed to retain high visual quality: Mather Memorial Pkwy, Mtn. Loop Hwy, Mt. Baker Hwy, Baker Lake Hwy, and North Cascades Hwy 20. Outside these viewsheds and the roadless areas, the Forest will be managed at a moderately to heavily altered-state.

J (Pref) The foreground and middleground of 7 heavily traveled corridors will be managed to retain high visual quality: Mather Memorial Pkwy (MA 8, Special Area), Mtn. Loop Hwy, Mt. Baker Hwy, Baker Lake Hwy, North Cascades Hwy 20, Cascade River road, and Crystal Mtn. Hwy. Outside these viewsheds and the roadless areas, the Forest will be managed at a moderately to heavily altered-state. Wild and scenic river recommended (30 rivers) will add to visual quality.

G With low level of timber harvest and emphasis on retaining old growth and wild and scenic rivers, many foreground areas will be visually unaltered. Some scenic acres assigned: upper end of Mt. Baker Hwy, portions of Cascade and N. Fk. Cascade R., portions of Mtn. Loop Hwy, upper Sauk, lower Sultan, and Mather Memorial Pkwy. Middleground views will be "moderately altered". Roadless areas will be undisturbed.

C Nearly all existing roadless areas will remain roadless and be visually undisturbed. Both primary and secondary recreation corridors will be managed as scenic viewsheds. Opportunities for roaded and remote scenic viewing are high.

Table B-68 Page 3 of 6

Water and Riparian Resources

NC (No Change	Emphasis for water quality similar to Alt. A. Some riparian values protected via land stratification in TM Plan (no regulated harvest on Marginal). Mitigation measures - similar to Alt. A.
A (No Action	Emphasis on maintaining water quality. Riparian values managed at MR level. Intensive mitigation measures needed to mitigate effects of high road construction and vegetation disturbance from timber harvest.
I	Water quality maintained or improved slightly from Alternative A. Riparian values managed with special emphasis on enhancement. More intensive mitigation measures than in Alternative A, required to mitigate direct effects of roads and timber harvest on soils which result in sedimentation.
B (RPA)	Water quality will improve slightly over Alt. A due to longer harvest rotations in large areas managed for wildlife habitat improvement. Riparian values managed with special emphasis on enhancement. Fewer acres harvested and miles of road constructed/reconstructed than in Alt. A require less mitigation of direct effects of road construction and timber harvest.
H	Water quality improved over Alt. A due to fewer acres harvested and fewer new roads. Management of riparian values and mitigation measures needed are similar to Alt. I.
J (Pref)	Water quality improved over Alt. A due to fewer acres harvested and fewer new roads. Management of riparian values and mitigation measures needed are similar to Alt. I.
G-Mod	Water quality will improve significantly over Alt. A due to fewer developed areas, reduced road construction and timber harvesting, and closure of about 65 miles of existing road. Riparian values managed with special emphasis on enhancement. Lowest mitigation costs except for Alt. C.
C	Water quality will improve significantly over Alt. A due to reduced timber harvest, road construction, plus closure of 300 miles of existing road. Riparian values managed with the highest emphasis on enhancement of any alternative. Least mitigation required.

Diversity of Plant Communities

Same in All Alternatives: Timber harvest or the lack of timber harvest, will have a great effect on the kinds and distributions of plant communities found on the Forest. On those areas where timber harvest is precluded, natural processes will continue uninterrupted and more late successional communities will prevail. These areas will be dominated by large diameter trees of advanced age and other plant species associated with this condition.

In those areas where timber harvest occurs, there will be a transformation from the late successional communities to early successional communities. These areas will be dominated by small to medium size trees of relatively younger ages, less than 160 years old, and other plant species associated with this condition. These plant communities will take on a mosaic appearance because of the schedule of harvest activities and their distribution across the landscape. In addition, there will be intermingled areas of late successional communities. The amount and distribution of these intermingled older communities will depend on the theme of the individual alternative.

NC (No Change	There will be an increase in early successional plant communities on all commercial forest lands. By the end of the 5th decade, approximately 435,000 total forested acres will be in successional stages 100 years or less in age.
A (No Action	Late successional plant communities will be found on 739,000 forested acres (480,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 147,000 acres will have been converted to earlier successional stages. This combined with the starting acreage of stands in successional stages under 50 years of age (223,000 acres) produces a total of 370,000 total forested acres in successional stages 100 years of age or less.
I	Late successional plant communities will be found on 744,000 forested acres (486,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 128,000 acres will have been converted to earlier successional stages. This combined with the starting acreage of stands in successional stages under 50 years of age (223,000 acres) produces a total of 351,000 total forested acres in successional stages 100 years of age or less.
B (RPA)	Late successional plant communities will be found on 744,000 forested acres (486,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 130,000 acres will have been converted to earlier successional stages. This combined with the starting acreage of stands in successional stages under 50 years of age (223,000 acres) produces a total of 353,000 total forested acres in successional stages 100 years of age or less.
H	Late successional plant communities will be found on 757,000 forested acres (450,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 117,000 acres will have been converted to earlier successional stages. This combined with the starting acreage

of stands in successional stages under 50 years of age (223,000 acres) produces a total of 340,000 total forested acres in successional stages 100 years of age or less.

J (Pref) Late successional plant communities will be found on 763,000 forested acres (503,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 108,000 acres will have been converted to earlier successional stages. This combined with the starting acreage of stands in successional stages under 50 years of age (223,000 acres) produces a total of 331,000 total forested acres in successional stages 100 years of age or less.

C Late successional plant communities will be found on 806,000 forested acres (540,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 70,000 acres will have been converted to earlier successional stages. This combined with the starting acreage of stands in successional stages under 50 years of age (223,000 acres) produces a total of 293,000 total forested acres in successional stages 100 years of age or less.

G-Mod Late successional plant communities will be found on 832,000 forested acres (563,000 acres in age classes 240 years plus) not scheduled for harvest. By the 5th decade, 73,000 acres will have been converted to earlier successional stages. This combined with the starting acreage of stands in successional stages under 50 years of age (223,000 acres) produces a total of 296,000 total forested acres in successional stages 100 years of age or less.

Civil Rights

Same in All Alternatives: Various Civil Rights, Affirmative Action, and Equal Employment Opportunity Acts require that Forest Service hiring, supervisory, and contracting practices be conducted in a manner conducive to meeting established Regional and Nation-wide goals in these areas. In all alternatives, positive steps are included to ensure that facilities, sites, and activities will not be denied to any individual on account of race, color, creed, religion, sex, marital status, age, handicap, or National origin.

Social Environment

Same in All Alternatives: There is no measurable effect on urban communities. See Table II-9n for the economic effects. Jobs lost/gained will often affect residents in the rural and agricultural communities east of the Interstate Highway 5 corridor.

NC (No Change) Lifestyle and minority employment: estimated to be similar to Alternative A (No Action).

A (No Change) No apparent changes in lifestyle. Some of the employment generated in Decade 1 will be filled by minorities.

I Opportunities increases for individual pursuing roaded recreation experiences, although these people will encounter strong evidence of altered landscapes. The most favorable alternative for minority employment.

B (RPA) Similar to Alt. D; less favorable than the current situation for minority employment.

H No apparent changes in lifestyle would occur. Less favorable than the current situation for minority employment.

J (Pref) No apparent changes in lifestyle would occur. Less favorable than the current situation for minority employment.

G-Mod Opportunities are enhanced for those who seek leisure or work in a more natural environment, and diminished for those pursuing roaded recreation experiences. Less favorable than the current situation for minority employment.

C Opportunities increase for those pursuing activities in a natural setting and decrease for those pursuing roaded recreation experiences. Least favorable for minority employment.

2. Benchmark PNV Summary

A detailed discussion of the benchmarks, their outputs, and the opportunity costs of the major constraint sets is given in Chapter VI of this Appendix. That information is used here to develop a summary of the benchmark PNV's and the reasons for the differences among them. Rather than display present net values for all 25 benchmarks analyzed, only those for the required benchmarks, plus the Max PNV with Market Prices Only, will be used. Table B-69 summarizes differences in PNV between these benchmarks. The output table number in this Appendix for each benchmark is referenced in parenthesis. These benchmarks represent the range of benchmark analysis; for additional tradeoffs and opportunity costs of changing individual constraints, non-declining yield, or 95% CMAI, the reader is referred to Chapter VI or the AMS document.

In order to calculate the Discounted Costs and Benefits for Table B-69a, PNV figures from the back of the report file had to be used. There is a difference of approximately 1% in the reported PNV figures.

Following the completion of the benchmark analysis and prior to the development of the alternatives, several improvements were made in the FORPLAN model to better account for road building and recreation related activities and their resulting costs and benefits. Fixed costs and the fish investment levels and benefits were also added to the model. These model improvements resulted in several of the alternatives producing a higher PNV than the max PNV benchmark.

In this FEIS where a comparison is made between the max PNV benchmark and the alternatives, the PNV for the benchmark has been increased from $2,403.1 to $2,590.7 to place it on a comparable basis with the alternatives. This increase was estimated using a least-squares regression. Linear equations were developed to make statistical inferences about revenues and costs, based on timber sale program quantities in each of the alternatives. Given the timber sale program quantities of each decade for the benchmark, these models were then used to predict a more comparable PNV for the max PNV benchmark (7).

Table B-69
Summary of Benchmark PNV's

Benchmark	PNV 1/	Change	Objective Function	Differences/Comments
Maximum PNV with No MMR's (Table B-26)	2630.9	-31 2	Max PNV for 15	Maximum unconstrainted economic benchmark
Biological Timber Potential (Table B-25)	2599.7	-216.3	Max Timber for 1 Max Timber for 15 Max PNV for 15	To achieve max timber, run uses more intensive silvicultural practices such as commercial thin that have negative PNV
Maximum PNV with MMR's (Table B-37)	2381 4	-61.6	Max PNV for 15	Major decrease in PNV caused by holding lands out of timber harvest and using extended rotations for MMR's
Current Direction w/1st Decade Timber Target: no NFMA MMR's (Table B-46)	2319.8	-17.5	Max Timber for 5 Max Timber for 15 Max PNV for 15	Although not having MMR's, 49 owl pairs were supported and cavity nesters were maintained at 40% of their potential population. In addition, there are about 55,000 fewer acres of land available for timber mgmt. because of the current direction land allocations. This offsets the gains from no MMR's resulting in a lower PNV.
Maximum Timber with MMR's (Table B-44)	2302 3	-109.6	Max Timber for 1 Max Timber for 15 Max PNV for 15	Higher cost silvicultural practices and those having negative PNV such as commercial thin are used to achieve max timber.
Current Direction with MMR's and 1st Decade Timber Target (Departure formulation) (Table B-47)	2192.7	-34.2	Max Timber for 5 Max Timber for 15 Max PNV for 15	95,000 fewer acres of suitable land for timber management because of MMR's and the current direction land allocations. NDY constraint dropped for departure formulation to achieve feasible run. Departure allows higher cutting in early decades and higher PNV than would occur under NDY.
Current direction with MMR's; no 1st Decade Timber Target (Table B-48)	2158.5	-108.0	Max Timber for 5 Max Timber for 15 Max PNV for 15	PNV slightly lower because of low 1st decade harvest allowed without timber target. NDY applied, also lowering PNV.
Maximum Primitive and Semi-Primitive Recreation Opp. (Table B-45)	2050.5	-567.6	Max P/SPNM Rec for 15 Max PNV for 15	Suitable acres for timber mgmt. down about 225,000 reflecting land allocations designed to preserve Prim. and SPNM dispersed rec. opportunities. Lower benefits offset somewhat by lower mgmt. and road construction costs.
Maximum PNV with MMR's Market Prices Only (Table B-38)	1482.9		Max PNV for 15	No recreation values included. About $900 MM difference from run with assigned prices.
Minimum Level Management (Table B-24)	Not Estimated		N/A	

1/ PNV objective function value from the LP solution in benchmark runs (See III.F.6.)

Table B-69a
Present Net Value and Discounted Costs and
Benefits of Benchmarks

BENCHMARK	PNV 1/	Change	Costs	Change	Benefits	Change
			Millions of Dollars (1982)			
Max PNV, Assigned Prices, w/o MMR's (BM 3)	2653 4		2008 2		4661 5	
		-31 3		220 1		188 9
Biological Timber Potential (BM 1)	2622 1		2228 3		4850 4	
		-219 0		-654 3		-873 3
Max PNV, Assigned Prices, with MMR's (BM 7)	2403 1		1574 0		3977 1	
		-78 3		427 1		348 8
Maximum Timber Resource Benchmark	2324 8		2001 1		4325 9	
		-259 5		-1112 9		-1372 4
Maximum Prim & Semi-Prim Nonmotorized Benchmark (Max Rec)	2065 3		888 2		2953 5	

1/ PNV reported by the Report Writer program (See Section VIII C 2 and Section III F 6)

3. Comparison of the Economic Effects of the Alternatives

Present Net Value (PNV) is an estimate of the potential economic effectiveness of managing the Forest. Since each alternative is a different way of managing the Forest, each alternative has its own PNV. By comparing PNV of the alternatives, the economic effectiveness of the alternatives can be compared.

PNV is defined as the discounted dollar value of all priced outputs, less the discounted cost of all expenditures for management and investments. Discounting is a way of combining current and future values to show them in todays terms; values are expressed in terms of 1982 dollars and the discount rate used is 4%.

Priced outputs include resource outputs with a market price and those non-market resource outputs that have an assigned price (commensurate with market prices). Market resources include: timber, developed recreation, commercial anadromous fish, minerals, and special uses for which fees are collected. The displayed economic benefits for market resources include actual dollar receipts plus additional assigned dollar benefits for developed recreation. Non-market resource benefits are dollar benefits assigned to dispersed recreation, wilderness, and wildlife and fish-dependent recreation. The purpose of assigning dollar benefits is to reflect the full economic benefit, even though none, or only part, of that benefit associated with particular resources is actually collected as fees under current laws and policies. Economic benefits associated with market and non-market resources are displayed in detail in Appendix B, Table B-16.

As discussed in the text preceding Table B-73, an assumption made concerning the relationship between recreation capacity and use has a significant effect on the economic benefits of recreation discussed here. It was assumed that recreation use will be limited to estimated capacity. Under this assumption, no use would occur above capacity levels; therefore, no economic benefits were assigned above that level.

If this assumption is incorrect and recreation use occurs to the level of predicted demand, recreation benefits have been underestimated by $698 million

to $801 million, depending on the alternative. This potential underestimation would increase PNV by approximately one-third.
Since projected demand in Decade 1 is below estimated capacity for all classes of recreation - except non-wilderness unroaded dispersed, 6 percent of total demand - the possible underestimated economic benefits would not occur until after the first decade, or beyond the life of this plan.

Costs

Two types of costs are included in Forest management: operation and maintenance, and capital investment.

Operation and maintenance costs are the costs of activities required to plan and manage outputs, and maintain existing capital assets at standard levels. These include fixed costs such as general administration, and variable costs which vary with different levels of outputs. Fixed costs are constant across all alternatives, while variable costs differ among the alternatives.

Capital investment costs are the costs of creating or enhancing capital assets, such as roads, trails, or fish habitat improvement structures. Road construction costs are a main component of capital; they are a direct function of the timber program. Other capital investment costs, such as fish and wildlife, vary independently of the timber program.

Table B-70: PNV, Discounted Costs and Benefits of Alternatives

Table B-70 summarizes the economic information used to determine PNV for each alternative, except Alternative NC, and for the Maximum PNV, with MR's Benchmark. This benchmark is not considered to be a viable alternative for the reasons discussed earlier in this chapter; it is shown as a reference point. The alternatives are ranked in order of decreasing PNV.

Discounted costs are the sum of all the costs which would be incurred to implement the alternative, discounted to their present value at a four percent interest rate. Discounted benefits are the sum of all the benefits produced by an alternative, discounted to their present value using a four percent interest rate.

The "change" is the difference in either PNV, discounted costs, or discounted benefits between successionally ranked (in descending order of PNV) pairs of alternatives. The incremental changes in PNV are a measure of the net economic benefits of the priced resources that would be foregone if a lower ranked alternative were to be selected over the preceding one. These priced resources that would be foregone would have to be weighed against the response to public issues and any net difference among the non-priced outputs.

As a general rule, PNV declines because benefits decline faster than costs, mainly due to a decline in timber benefits, although recreation benefits also fall. There are, however, some exceptions to this general rule.

When comparing Alternative A (No Action) to Alternative J (Preferred), Alternative A has markedly higher discounted costs (30%) and benefits (10%) than Alternative J (Preferred) but only slightly higher (1%) PNV. The objective function (in FORPLAN) for Alternative A is to maximize timber outputs in the first five decades. As a result, Alternative A has higher timber outputs with accompanying increased benefits, but these increased outputs are achieved at the cost of less efficient investments in timber management

practices, which increases cost. Alternative A has the highest road construction program of any of the Alternatives, which also increases costs.

Another general trend: as roaded dispersed recreation use declines, so does PNV. Again, there are some minor exceptions. All alternatives have the same roaded dispersed recreation use in Decade 1, as capacity exceeds demand, thus limiting the benefits of roaded recreation to actual use.

Although there is a strong correlation between roaded dispersed recreation and PNV, this relationship is attributable to timber outputs and the accompanying road construction program. Thus, timber outputs are the real driver of PNV.

Table B-70

Present Net Values and Discounted Costs and Benefits of Alternatives

Alternative/Benchmark	PNV	Change	Discounted Costs	Change	Discounted Benefits	Changes
Benchmark	..... Millions of Dollars.....					
Max PNV with MR's (run #7)	2590.7	1/				
		-247.5				
Alternatives						
B (RPA)	2343.2		1091.5		3434.7	
		-0.3		3.9		3.6
I	2342.9		1095.4		3438.3	
		-59.4		178.3		118.9
A (No Act.)	2283.5		1273.7		3557.2	
		-23.5		-242.4		-265.9
H	2260.0		1031.3		3291.3	
		-1.2		-46.9		-48.1
J (Pref.)	2258.8		984.4		3243.2	
		-261.8		-156.2		-418.0
G-Mod.	1997.0		828.1		2825.1	
		-26.1		-103.9		-130.0
C	1970.9		724.3		2695.2	
NC (No Change)2/	NA	NA	NA	NA	NA	NA

1/ Revised for comparison with alternatives (see Appendix B. VIII. C.2.).

2/ The timber management plan upon which the No Change Alternative is based was developed in 1963. The plan was not an integrated resource plan, and consequently did not address all resource uses and outputs. Since Alternative NC was not modeled in FORPLAN, economic measures comparable with the Max PNV Benchmark and other alternatives were not determined.

Comparison by Costs. Table B-71 shows the same data as the previous table, but it has been rearranged to show the ranking of the alternatives according to increasing total discounted costs. In general, the costs increase as PNV increases. This indicates that as constraints are relaxed, primarily the amount of timber harvest allowed, it is possible to increase the investments made in management of the Forest and get a return greater than the amount of the additional investment.

For instance, an additional $104 million in discounted costs going from Alternative C to G results in a total gain in discounted benefits of $130 million, or a net gain in PNV of about $26 million. From an economic standpoint, the incremental benefits are greater than the incremental costs. As long as that is the case, it is justifiable (all other things being equal) to increase the amount of the investment up to the point that the incremental benefits just equal the incremental costs.

Table B-71
Present Net Value, Discounted Costs, and Discounted Benefits By Alternative
Million 1982$

Alternative	Discounted Costs	Change	Discounted Benefits	Change	PNV	Change
Alt. NC 1/	NA	NA	NA	NA	NA	NA
Alt. C	724.3		2695.2		1970.9	
		103.8		129.9		26.1
Alt. G-Mod	828.0		2825.1		1997.0	
		156.3		418.1		261.8
Alt. J (Pref)	984.4		3243.2		2258.8	
		46.9		48.1		1.2
Alt. H	1031.3		3291.3		2260.0	
		60.2		133.4		83.2
Alt. B (RPA)	1091.5		3424.7		2343.2	
		3.9		13.6		-0.3
Alt. I	1095.4		3438.3		2342.9	
		178.3		118.9		-59.4
Alt. A (No Action)	1273.7		3557.2		2283.5	
		422.0		729.2		307.2
Max PNV Benchmark (Run #7)	1695.7		4286.4 2/		2590.7 2/	

1/ The timber management plan upon which the No Change Alternative is based was developed in 1963. The plan was not an integrated resource plan, and consequently did not address all resource uses and outputs. Since Alternative NC was not modeled in FORPLAN, economic measures comparable with the Max PNV Benchmark and other alternatives were not determined.

2/ Revised for comparison with alternatives (see Appendix B. VIII. C.2.).

Comparison by Benefits. Table B-72 again displays the information in the previous two tables, but this time ordered according to declining total discounted benefits. Here again, except for the two runs done under a maximize timber objective function, the total benefits decline along with PNV, timber harvest, road building, and roaded recreation. The two runs done under a maximize timber objective function (A and E-Departure) both display benefits out of line with the normal pattern. This is because a larger amount of timber was harvested, but at an even proportionately larger cost. For instance, E-Departure invested $229.9 million more than Alternative E, but got only $212.3 million more in benefits. In this case the incremental benefits were less than the incremental costs, and PNV declines.

Table B-72
Present Net Value, Discounted Costs, and Discounted Benefits By Alternative
Million 1982$

Alternative	Discounted Benefits	Change	Discounted Costs	Change	PNV	Change
Max PNV Benchmark 1/	4286.4 1/		1695.7 1/		2590.7 1/	
		-729.2		-422.0		-307.2
A (No Action)	3557.2		1273.7		2283.5	
		-118.9		-178.3		59.4
I	3438.3		1095.4		2342.9	
		-13.6		-3.9		0.3
B (RPA)	3424.7		1091.5		2343.2	
		-133.4		-60.2		-83.2
H	3291.3		1031.3		2260.0	
		-48.1		-46.9		-1.2
J (Preferred)	3243.2		984.4		2258.8	
		-418.1		-156.3		-261.8
G-Modified	2825.1		828.1		1997.0	
		-129.9		-103.8		-26.1
C	2695.2		724.3		1970.9	
NC 2/	NA	NA	NA	NA	NA	NA

1/ Revised for comparison with alternatives; see Appendix B, VIII, C.

2/ The TM Plan upon which the No Change Alternative is based was developed in 1963. The plan was not an integrated resource plan, and consequently did not address all resource uses and outputs. Since Alternative NC was not modeled in FORPLAN, economic measures comparable with the Max PNV Benchmark and other alternatives were not determined.

Table B-73: Average Annual Cash Flows, Non-cash Benefits

In Table B-73, the alternatives are ranked in order of decreasing net receipts; all alternatives show a positive cash flow (net receipts) to the treasury in Decade 1 except Alternative C. Alternative A has the highest cash flow, with $6.5 million, while Alternative C has the lowest with a ($2.4) million negative flow. There is an almost identical ranking of the alternatives in terms of cash flow and ASQ, because timber receipts make up nearly all of the total receipts on the Forest.

All of the alternatives have a positive cash flow in the fifth decade. Again the ranking of the alternatives in terms of cash flow mirrors the ranking of alternatives by ASQ.

Net receipts increases from Decade 1 to Decade 5 in all alternatives. In the first decade, the water quality and riparian management requirement result in reduced acres of harvest in some watersheds and thus lower receipts than in later decades when the HCE management requirement allows increased harvest. Alternative A net receipts increase most ($23.1 million) and Alternative G-Modified the least ($8.9 million) between the first and fifth decade.

From Decade 1 to Decade 5, total receipts in Alternative J (Preferred) increase approximately 121%. At the low end, Alternative G-Modified total receipts increase approximately 67%, and at the high end Alternative C total receipts increase approximately 182%.

Non-cash benefits increase from first to fifth decades in all alternatives. This is a function of increased recreation benefits that are valued as demand increases in Decade 5. By the fifth decade, development will have converted more lands from nonmotorized recreation opportunity to motorized recreation. Motorized recreation is more valuable on a per acre basis than nonmotorized. This also explains why Alternative C has the lowest non-cash benefits, as it maintains more land in a nonmotorized condition than any of the other alternatives.

Table B-73

Average Annual Cash Flows and Non-cash Benefits
Decades 1 and 5, By Alternative

Alternatives	Decade 1 Net Receipts	Decade 1 Total Costs	Decade 1 Total Receipts	Decade 1 Non-Cash Benefits to Users	Decade 5 Net Receipts	Decade 5 Total Costs	Decade 5 Total Receipts	Decade 5 Non-Cash Benefits to Users
	Millions of Dollars Per Year							
A (No Action)	6.5	15.3	21.8	60.9	29.6	16.7	46.3	85.2
I	5.8	14.3	20.1	61.3	25.6	15.4	41.0	85.5
B (RPA)	5.3	14.4	19.7	61.0	24.8	15.4	40.2	86.8
H	4.8	13.6	18.4	60.5	24.1	14.9	39.0	83.8
J (Preferred)	3.4	13.6	17.0	61.2	23.1	14.6	37.7	85.5
G-Modified	2.1	12.4	14.5	60.6	11.0	13.2	24.2	80.2
C	-2.4	11.8	9.4	60.7	14.1	12.4	26.5	78.8
NC (No Change) 1/	NA	NA	NA	NA	NA	NA	NA	NA

1/ The 1963 TM Plans, upon which the No Change Alternative is based, were not integrated resource plans, and consequently did not address all resource uses and outputs. Since Alternative NC was not modeled in FORPLAN, economic measures comparable to the other alternatives were not determined.

Table B-74: PNV, Discounted Benefits and Costs By Resource Group

In Table B-74, the total costs and benefits for each alternative are assigned to selected major accounting or budgeting categories. A complete and exact relationship between the dollar benefits associated with a particular priced output and the cost figure assigned to it should not be assumed. Forest-wide production of any specific priced output is generally supported by complex combinations of input costs. As an example, some recreation and wildlife benefits are joint outputs of timber management.

In Table B-74 the total discounted costs and benefits have been disaggregated into the broad resource groups of timber, recreation, and other. "Timber" benefits include sawtimber and fuelwood. "Recreation" benefits include dispersed and developed recreation, and wildlife and fish use. Benefits for commercial fish are included under "other." Discounted costs for roads are shown as a separate entry, since it is very difficult to accurately separate these costs into the resource groups. Costs shown under "other" include fish habitat improvement investments, share-cost road maintenance, and fixed costs.

Table B-74 indicates that almost all of the variation in PNV discounted costs and discounted benefits is due to the variation in timber outputs of the alternatives. First decade timber outputs vary by 125% between Alternative C (13.8 million cubic feet) and Alternatives A (31.0 million cubic feet). The discounted costs and discounted benefits for timber follow the same general trend as timber outputs with some minor exceptions: as timber outputs decline, so do discounted costs and benefits.

Discounted costs and benefits for recreation change very little from one alternative to another. This is partly due to the fact that current recreation use is very close to capacity on the forest for most types of recreation except roaded dispersed. There is little opportunity to significantly increase recreation supply in wilderness or primitive, semi-primitive nonmotorized, or semi-primitive motorized outside of wilderness. Although there is some variation between alternatives in these dispersed recreation capacities, it is a very small percentage of the current capacity and affects discounted recreation benefits only about 6% between the alternatives. Discounted recreation benefits exceed discounted timber benefits in all alternatives.

Alternative C has the lowest discounted recreation benefits of all the alternatives but the highest levels of primitive and semi-primitive nonmotorized recreation capacity. This inverse relationship is true throughout all the alternative rankings. Although primitive and semi-primitive nonmotorized recreation use has a higher value per RVD than motorized use, it has a lower RVD per acre coefficient. The result is that on a per acre basis, motorized use is more valuable than nonmotorized use.

Table B-74

Present Net Values and Discounted Benefits and Costs by Resource Group

Alternatives	PNV	....Discounted Benefits..... Timber	Recreation	Other	.....Discounted Costs ..... Timber	Roads	Recreation	Other
	...Millions of Dollars ...							
B (RPA)	2343.2	1384.3	1904.2	146.2	746.8	147.2	34.8	162.7
I	2342.9	1400.0	1892.1	146.2	754.1	146.9	35.2	159.2
A (No Act.)	2283.5	1643.5	1880.0	33.7	916.2	165.1	34.8	157.6
H	2260.0	1288.6	1856.5	146.2	693.3	144.2	34.7	159.2
J (Pref.)	2258.8	1204.8	1892.1	146.2	650.3	136.2	35.2	162.7
G-Modified	1997.0	940.8	1805.4	78.9	523.1	110.9	34.9	159.2
C	1970.9	760.5	1788.5	146.2	420.5	106.8	34.2	162.7
NC (No Change)	NA	NA	NA	NA	NA	NA	NA	NA

D. MAJOR TRADEOFFS AMONG ALTERNATIVES

This section summarizes the relationships among the economic values (discussed in detail above) and the differing responses of the alternatives to selected issues, concerns, and opportunities (ICO's). The purpose is to highlight major economic tradeoffs and public issue-response tradeoffs and non-economic trade-offs (or combinations of differences) that can be quantified, through the use of indicators of responsiveness to ICO's, as a means of comparing the alternatives. However, a complete understanding of differences among alternatives requires reading all of this chapter and Chapter IV. The ICO's are discussed in detail in Chapter I and Appendix A.

To provide a partial framework for assessing tradeoffs, the long-term resource demands of the nation, region, and local economic area are briefly summarized. In part two, selected economic values and quantified indicators of responsiveness to major ICO's are tabulated (Table B-75). Finally, differences and similarities among individual alternatives are summarized in terms of major tradeoffs among competing objectives or responses to expressed public issues, management concerns, and resource use and development opportunities.

1. National, Regional, and Local Overview

National (RPA) planning estimates that total national demands will rise for all outputs of the National Forest. At the same time, there is a strong demand to protect and enhance the quality of the environment. Many people view the production of goods and services from the National Forests as competing with protection and enhancement of a quality environment.

Demands and prices for commodity products are generally determined in regional and national markets. The nation benefits most when supplies are provided from the most efficient sources of production

The Mt. Baker-Snoqualmie National Forest is an efficient supplier of timber products. The 1980 RPA program assigned approximately 2.5 percent of the total projected timber outputs for the National Forest System in 1990 to the Mt. Baker-Snoqualmie National Forest. The Forests' share of the projected Regional outputs in 1990 is approximately 6 percent. The Mt. Baker-Snoqualmie produces about 15 percent of the logs consumed in the Puget Sound area; forest industry and other private owners are the major producers of logs consumed in the area. Nearly all (97%) of the logs produced on the Forest are processed in the local economic area (Larsen and others 1983). The resulting products are consumed primarily in the Western U.S. market.

The Forest has extremely low capability to produce economically efficient forage for commercial grazing of domestic livestock.

Demands on the Forest for outdoor recreation uses are more localized than the regional and national demands for timber. Most of the Forest recreation users reside in the major population centers along the Interstate 5 highway corridor.

Recreation use and the demand for recreation of many types is growing, and at a rate faster than the population growth of the Puget Sound area. Total recreation use increased approximately 40 percent on the Forest in the 10 year period from 1975-1984. In a similar time period, the population of the five county area of the Forest increased approximately 20 percent. The fastest

growing segment of the recreation spectrum is wilderness use: + 145 percent, compared to an increase of 65 percent in developed recreation use. Wilderness use represents approximately 4.5 percent of the total recreation use on the Forest for the period 1975 to 1984.

The Mt. Baker-Snoqualmie National Forest is a major supplier of National Forest wilderness in the Pacific Northwest and the nation. The Forest contains 16 percent of the National Forest wilderness in the Pacific Northwest Region and 2.2 percent of the total National Forest wilderness system. Available data collected in the late 1970's and early 1980's indicates that 82-94 percent of wilderness use on the Forest originated from Washington State, and 49-65 percent of the users are from the Puget Sound area. Several of the Forest wildernesses are among the most heavily used in the nation.

Salmon, by a large margin, is the most valuable fish or wildlife species, as measured by the market value of the harvest. An estimated 50 percent of the harvest of naturally produced (as opposed to hatchery produced) salmon for the Puget Sound area are produced from Mt. Baker-Snoqualmie National Forest water systems.

2. Economic Values and Responses to Major ICO's

The main reason that alternatives differ is that each alternative is designed to respond differently to the major issues, concerns, and opportunities (ICO's) identified for this Forest. The following section and Table B-75 summarize many of those differences in response by defining indicators of those responses that can be quantified. In addition, indicators of central concern to the nation as a whole are discussed. Appendix A fully discusses each of the ICO's; also refer to Chapter I. Additional information about the effects and tradeoffs is displayed earlier in this chapter and in Chapter IV. The ICO's and indicators of responsiveness found in Table B-75 include:

- **Development versus Nondevelopment of the Forest Issue:**
  - Existing Roadless Areas Allocated to Nondevelopment
  - Roadless Areas Assigned to a Roaded Management Prescription, But Not Developed in the Next 15 Years

- **Timber Supply Issue:**
  - Timber Harvest Level
  - Long-term Sustained Yield Capacity
  - Lands Suitable for Timber Production
  - Employment: Jobs Supported by the Alternative
  - Payments to Counties

- **Old Growth Ecosystems and Fish/Wildlife/Plant Diversity Issue:**
  - Total Old Growth Remaining, at the end of Decades 1 and 5
  - Old Growth Remaining on Suitable Acres, at the end of Decades 1 and 5
  - Anadromous Fish Production
  - Low-Elevation Old Growth Habitat for Wildlife
  - Suitable Winter Range for Deer and Elk, Decade 1

- **American Indian Religious and Cultural Use Issue:**
  - Percent of Inventoried Use Areas with High or Moderate Protection

- **Recreation Opportunities Issue:**
  - Demand Satisfied for Wilderness, Primitive and Semi-Primitive Nonmotorized Recreation, Decades 1 and 5

Roads Open to Public Use, Passenger Car
Trail Construction, Reconstruction, Decade 1
Lands Managed for High Visual Quality Level, Meeting a Visual Quality Objective of Retention, Partial Retention

- **Wild and Scenic Rivers Issue:**
  Recommended for Designation as Wild and Scenic River

- **Management of Municipal Watersheds Issue:** (see note below)
  Timber Harvest Level (see note below)

- **Effects of Timber Management and Related Activities Issue:**
  Timber Harvest Level (see note below)
  Old Growth Remaining on Suitable Acres, Decades 1 and 5 (see note below)
  Annual Road Construction, Decade 1
  Sediment Produced from All Sources, Annually, Decade 1

- **Adjacent and Intermingled Lands Issue:** (see note below)
  Timber Harvest Level (see note below)

Note: Two issues - Management of Municipal Watersheds and Adjacent and Intermingled Lands - are not listed separately in the table, but their indicators are included in other ICO's. When an indicator is used to measure responsiveness for more than one ICO, the indicator is displayed only once.

In addition, the indicators of national interest include the following; they are listed in the first three columns of Table B-75:

- **National Concerns:**

  Present Net Value
  Net Receipts
  Noncash Benefits

Table B-75
Response, By Alternative, to Major Issues and National Concerns

	National Concerns			Development Vs. Nondevelopment Issue 1/			Timber Supply Issue					
	Average Per Year for Decades 1/5											
Alternatives	Present Net Value	Net Receipts	Noncash Benefits	Existing Roadless Areas Allocated to Nondevelopment		Roadless Areas Assigned to a Roaded Mgt. Prescription But Not Devel. in Next 15 Yrs.	Decade 1 - Average Annual Timber Sale Program Quantity (TSPQ)		Long Term Sustained Yield Capacity	Lands Suitable for Timber Product	Employment· Jobs Supported By the Alts.	Payments to County
	.....Millions of Dollars.....			% Total Acres	M Acres	M Acres	MMCF	(MMBF)	MMCF	M Acres	M Jobs	MM Dollars
I	2342.9	5.8/25.6	61.3/85.5	64	256 4	98.2	30.1	(146)	34.0	386	29.1	5.4
B (RPA)	2343.2	5.3/24.8	61.0/86.8	66	266.6	88 0	29.8	(144)	33.4	380	29.1	5.3
H	2260.0	4.8/24.1	60.5/83.8	76	305.0	61.6	27.3	(131)	31.8	359	28.9	4.9
J (Pref.)	2258.8	3.4/23.1	61.2/85.5	77	309.0	61.5	25.5	(122)	30.4	346	28.8	4.6
A (No Act)	2283.5	6.5/29.6	60.9/85.2	70	280.3	2/ 70 2	35.0	(168)	38.6	412	29.3	5.9
G-Modified	1997.0	2.4/11.0	60.6/80.2	91	368.4	18.4	20.4	(99)	23.6	247	28.4	3.8
C	1970.9	-2.1/14 1	60.7/78.8	93	375.8	23.1	15.8	(75)	19.9	256	28.0	2.6
NC 3/	N/A	N/A	N/A	NA	NA	NA	45.0	(220)	N/A	547	30.1	9.5

1/ Roadless Areas refer to the 402,930 acres of remaining RARE II parcels

2/ This is an approximate figure. Alternative A is unique because an unspecified amount of development is permitted in the Upper Forest Resource Zone. See description of Management Area 1E.

3/ The TM Plans upon which Alternative NC is based were developed in 1963; they are not integrated resource plans, and consequently did not address all resource uses and outputs. Missing data in this table (NA) cannot be reasonably estimated, since the TM plans were based on yield tables and resource relationships which do not reflect the latest scientific techniques and information, do not reflect standards in the NFMA regulations, or are otherwise inappropriate.

Table B-75
Response, By Alternative, to Major Issues and National Concerns

	Old Growth Ecosystems and Fish, Wildlife, & Plant Diversity Issue					American Indian Religious & Cultural Use Issue	
	Total Old Growth Remaining End of Decade 1/5	Old Growth Remaining on Suitable Acres End of Decade 1/5	Anadromous Fish Production Decade 1	"Effective" Decade 1/5 Habitat for Old Growth Low Elevation Species 4/	Areas Decade 1 Winter Range for Deer & Elk 5/	Inventoried Acres Afforded High/Moderate Protection 6/	
Alternatives	M Acres	M Acres	Thousand Lbs. Fish Per Year	M Acres	M Acres	High Percent	Moderate Percent
I	620 / 516	134 / 30	8,874	308/242	225	43	2
B (RPA)	621 / 513	135 / 27	8,874	309/239	253	43	7
H	623 / 526	125 / 28	8,874	309/246	257	40	17
J (Pref.)	625 / 535	122 / 32	8,874	310/250	280	47	11
A (No Act)	618 / 497	137 / 16	7,809	306/220	113	36	3
G-Modified	629 / 571	66 / 8	8,874	313/275	113	42	23
C	632 / 573	91 / 33	8,874	315/275	281	37	27
NC 7/	601 / 432	190 / 21	7,809	N/A	N/A	N/A	N/A

4/ Includes wilderness and non-wilderness acres of old growth located below 3,000 feet elevation. Indicator species for mature and old-growth habitats are Northern spotted owl, pileated woodpecker, and pine marten.

5/ Acres given include deer and elk winter range, management areas with compatible goals and which will incorporate winter range standards and guidelines, and some mountain goat habitat.

6/ Protection is afforded by those management areas that preclude or limit ground disturbing activities. Differences between "high" and "moderate" derived from expected frequency of human encounters. See Table II-9o.

7/ No management areas assigned in Alternative NC and the above information cannot be reasonably estimated. The TM Plans, upon which the No Change Alternative is based, were developed in 1963.

Table B-75
Response by Alternative, to Major Issues and National Concerns

	Recreation Opportunities Issue						Wild & Scenic Rivers Issue		Effects of Timber Management & Related Activities Issue	
	Demand Satisfied in Wilderness, Primitive, & Semi-Primitive Nonmotorized		Roads Open to Public Use, Passenger Car	Trail Construction/ Reconstruction	Lands Managed for High Visual Quality Level		Recommended for Designation as Wild and Scenic River		Decade 1 Annual Road Construction	Sediment Produced Annually, Decade 1 7/
					Meeting VQO of:					
Alternatives	Decade 1 Percent	Decade 5 Percent	Decade 1 Miles	Decade 1 Constr./Reconst. Miles	Retention M Acres	Partial Retention M Acres	No. Rivers	Total Miles	Miles	M Tons
I	94	45	1032	350 / 120	208	311	0	0	17	97
B (RPA)	76	34	1033	50 / 70	287	285	0	0	16	96
H	67	31	1039	90 / 120	407	181	5	154	14	91
J (Pref.)	79	38	1039	220 / 493	395	204	30	452	13	89
A (No Act.)	75	34	1039	70 / 60	120	342	15	287	19	103
G-Modified	70	35	933	350 / 120	573	56	47	796	8	67
C	64	33	1017	90 / 80	619	148	47	606	10	67
NC	N/A		Similar to A	Similar to A	N/A	N/A	0	0	28	125

7/ From all sources, including timber harvest, new road construction, old roads, and background (which includes sediment from previously disturbed ground and natural sedimentation).

3. Economic Benefit and Issue Response Tradeoffs Among Alternatives

The alternatives were designed to respond to specific major issues, or a combination of issues. In responding to one set of issues, some potential benefits or responses to other issues may be limited or "traded off". This section discusses the incremental changes in indicators of response of the alternatives as economic efficiency (PNV) declines. This is only one systematic way of examining tradeoffs. It should be noted that there are tradeoffs among indicators of response to the issues as well as with economic benefits.

The alternatives are discussed in order of highest PNV to lowest. Following the discussion of the changes in each alternative from the one with the next highest PNV, is a display that shows which indicators increase in value and which decrease, and the magnitude of the change. These indicators of response *are also displayed in Table B-75.*

Alternative B

The goal of this alternative is to simultaneously produce high levels of timber, anadromous fish, commonly hunted species of big game, and dispersed unroaded recreation as specified in the 1980 RPA Program. With this goal, this alternative results in the highest PNV of all alternatives: $2343.2 million. Net receipts of $5.3 MM in the first decade increase to $24.8 MM by the fifth decade, reflecting the increase in ASQ between the first and fifth decade.

Noncash benefits (primarily dispersed recreation) of $61.0 MM in the first decade increase to $86.8 MM in the fifth decade, as more roaded recreation is valued as a result of increasing demand.

As a result of the emphasis of this alternative, a timber sale program quantity (TSPQ) of 29.8 MMCF is provided on a suitable land base of 380,000 acres. The long-term sustained yield capacity (LTSYC) is approximately 33.4 MMCF. An average of 16 miles of road construction annually is required in the first decade to support the timber harvest level. This high harvest level results in one of the three highest levels of jobs, income, and payments to counties of all the alternatives.

Of the 447,000 acres inventoried for American Indian Religious and Cultural Use, 43% are afforded a high level of protection (no timber harvest or road construction) and 7% are afforded a moderate level of protection (no timber harvest or road construction, but increased probability of human contact). The acres afforded high protection change very little among alternatives; there is more change between alternatives in percent of acres afforded moderate protection.

This alternative would satisfy 76% of the primitive and semi-primitive nonmotorized wilderness and non-wilderness recreation demand anticipated in the first decade and 34% of anticipated demand in the fifth decade, based on currently defined standards for capacity. This decline over time is a result of increasing demand and slower increases in supply, as more of the currently undeveloped areas become developed. There is little change among the alternatives in the Forests ability to meet this demand, due to low per acre yield of this type of recreation. This indicator is not further discussed in the other alternatives.

Alternative B has 287,000 acres assigned to a management prescription that meets the Visual Quality Objectives (VQO) of retention; another 285,000 acres will meet partial retention VQO. The amount of acres managed to meet retention is in the lower part of the range of all alternatives reflecting less emphasis on managing the scenic foreground along travelways. However, the amount of land managed for partial retention is in the higher part of the range for all alternatives reflecting a recognition of the need to maintain a relatively high level of scenic quality forest-wide.

Effective acres of wildlife habitat for mature and old growth management indicator species are reduced by 82,000 acres, or 26% during the first five decades. A total of 225,000 acres of inventoried big game winter range is managed to provide an optimal mix of thermal and forage habitat.

Total old growth remaining at the end of Decade 5 is 513,000 acres, a reduction of approximately 20% over the five decades. This reflects the relatively high level of harvest in this alternative.

Alternative B has a high level of investment in anadromous fish habitat improvements (MA 13C); 8,874 M pounds of fish will be produced.

Alternative I

The PNV for Alternative I is $2342.9 or $0.3 MM lower than PNV for Alternative B. Annual net receipts in Decade 1 are $0.5 MM higher than those in Alternative B, primarily because of the higher timber outputs. Net receipts in Decade 5 are $0.8 MM higher than those of Alternative B, again because of the higher timber outputs.

Alternative I has 6,000 acres more land suitable for timber production than Alternative B, primarily attributable to the emphasis of the alternative on those resources with an established price in the market place. The higher number of suitable acres result in a Decade 1 TSPQ that is 0.3 MMCF above that of Alternative B; LTSYC is 0.8 MMCF higher.

The slightly higher timber harvest levels in Decade 1 in Alternative I also requires a small increase (over Alternative B) in road construction of 1 mile annually. This alternative provides essentially the same levels of jobs, income, and payments to counties.

The acres of American Indian Religious and Cultural Use afforded high levels of protection remain the same in Alternative I while those acres afforded a medium level of protection decrease by 5%. This change reflects an increased probability of human contact as a result of the additional access provided in Alternative I.

Alternative I would satisfy 18% more of the first decade demand for primitive and semi-primitive nonmotorized wilderness and non-wilderness recreation and 11% more of the fifth year demand than Alternative B. This reflects a higher emphasis on dispersed recreation than in Alternative B

Alternative I has 79,000 fewer acres than Alternative B that will meet a VQO of retention, but 26,000 acres more that meet a VQO of partial retention. The shift in VQO is due to the slight increased in acres suitable for timber production.

Alternative I has about the same amount of roadless areas remaining in a roadless condition as Alternative B.

Since there is less emphasis on management of deer and elk habitat in Alternative I, old growth available for indicator species in the fifth decade is 3,000 acres more than in Alternative B; however, there are 28,000 fewer acres managed for big game winter range.

Alternative I has essentially the same amount of old growth included in the land base suitable for timber harvest. The rate of old growth harvest is approximately the same so that at the end of the fifth decade, about the same amount of old growth suitable for timber production will be left in both alternatives.

Alternative I has the same level of investment in anadromous fish habitat improvements and therefore provides the same level of fish production as Alternative B.

Summary of Alternative I

Indicators That Increase From Alternative B

- Decade 1 annual net receipts, +$0.5 MM
- Decade 5 annual net receipts, +$0.8 MM
- Decade 1 annual noncash benefits, +$0.3 MM
- Decade 1 annual TSPQ, +0.3 MMCF
- LTSYC, +0.8 MMCF
- Lands suitable for timber production, +6,000 acres
- Decade 1 annual road construction, +1 miles
- Acres meeting VQO of partial retention, +26,000
- Acres of Old Growth for indicator species in Decade 5, +3,000

Indicators That Decrease From Alternative J (Preferred)

- PNV, -$0.3 MM
- Decade 5 annual noncash benefits, -$1.3 MM
- Acres meeting a VQO of retention, -79,000
- Acres managed for deer/elk winter range, -28,000

Alternative A (No Action)

The PNV for Alternative A is $2283.5 or $59.4 MM lower than PNV for Alternative B. Although Alternative A has a high level of timber outputs, timber harvest prescriptions were selected on the basis of their volume contribution, rather than their contribution to PNV. The high cost of these prescriptions offsets the high timber output contribution to PNV. Annual net receipts in Decade 1 are $0.7 MM higher than those in Alternative I, primarily because of the higher timber outputs. Net receipts in Decade 5 are $4 MM higher than those of Alternative I, again because of the higher timber outputs.

Alternative A has 26,000 acres more land suitable for timber production than Alternative I, primarily attributable to the maximize timber objective function used in the formulation of this alternative. The higher number of suitable acres plus the higher timber production prescriptions result in a Decade 1 TSPQ that is 4.9 MMCF above that of Alternative I; LTSYC is 4.6 MMCF higher.

The higher timber harvest levels in Decade 1 in Alternative A also require an increase (over Alternative I) in road construction of 2 miles annually.

Compared to Alternative I, Decade 1 jobs are 200 higher, income is $5 MM higher, and payments to counties are $0.5 MM higher in Alternative A, also a result of the higher timber harvest levels.

Alternative A has 88,000 fewer acres than Alternative B that will meet a VQO of retention, but 31,000 acres more that meet a VQO of partial retention. The shift in VQO - from retention to partial retention - is due to the emphasis on visuals in the upper resource management zone of the current multiple use plans, along with the protection of all rivers included in the National Rivers inventory, both of which have a VQO of partial retention.

Alternative A has 7% more roadless areas allocated to nondevelopment than Alternative I.

Since there is little emphasis on management of wildlife habitat in Alternative A, old growth available for indicator species in the fifth decade is 22,000 acres less than in Alternative I. There are 112,000 fewer acres managed for big game winter range.

Alternative A has 3,000 acres more old growth remaining in the suitable land base after the first decade. Old growth is harvested at a faster rate than in Alternative I, resulting in Alternative A having 19,000 fewer acres of total old growth in the fifth decade.

Alternative A maintains the current level of investments in anadromous fish habitat improvements (MA 13A), resulting in a production of 1,065 M fewer pounds than Alternative I.

Summary of Alternative A (No Action)

Indicators That Increase From Alternative I

- Decade 1 annual net receipts, +$0.7 MM
- Decade 5 annual net receipts, +$4.0 MM
- Decade 1 annual TSPQ, +4.9 MMCF
- LTSYC, +4.6 MMCF
- Lands suitable for timber production, +26,000 acres
- Decade 1 annual road construction, +2 miles
- Decade 1 annual jobs, +200
- Decade 1 annual income, +5 MM
- Decade 1 annual payments to counties, $0.5 MM
- Acres meeting VQO of partial retention, +31,000
- Acres of old growth in suitable lands end of Decade 1, +3,000

Indicators That Decrease From Alternative I

- PNV, -$59.4 MM
- Decade 1 annual noncash benefits, -$0.4 MM
- Decade 5 annual noncash benefits, -$0.3 MM
- Acres meeting a VQO of retention, -88,000
- Acres of old growth in suitable lands in decade 5, -14,000
- Total acres of old growth in decade 5, -19,000
- Annual anadromous fish production, -1,727 M pounds
- Acres of old growth for indicator species in Decade 5, -22,000

- Acres managed for deer/elk winter range, -112,000

Alternative H

The PNV of Alternative H is $23.5 MM less than Alternative A. While the TSPQ is 7.7 MMCF lower than Alternative A, the timber prescriptions were selected on the basis of their contribution to PNV rather than to volume (as in Alternative A), so the decrease in PNV is not large. In addition fewer miles of road construction in H compared to A result in cost savings that mostly offset the benefits foregone from the reduced timber harvest.

First decade net receipts are $2.3 MM less and fifth decade net receipts are $5.5 MM less than Alternative A primarily as a result of reduced timber sale harvest levels.

Alternative H has 53,000 acres less land suitable for timber production than ALternative A. This reduction in suitable land is the result of increased emphasis on dispersed recreation, Wild and Scenic River recommendations, and more more emphasis on scenery and diversity. The TSPQ in the first decade is 7.7 MMCF lower than Alternative A and the LTSYC is 6.8 MMCF lower. The reduced timber harvest and the emphasis on dispersed recreation results in 5 miles less road construction per year in decade one compared to Alternative A.

Compared to Alternative A, there are 400 fewer jobs, $11 MM less income, and $1 MM less in payments to the counties in this alternative.

Alternative H has 287,000 more acres that will be managed to meet the VQO of retention and 161,000 less acres managed to meet the VQO of partial retention. This shift from partial retention and addition of retention reflect the increased concern of Alternative H for scenic values.

Alternative H has 3,000 more acres of old growth remaining after the first decade, and the total old growth remaining on all lands at the end of the fifth decade is 29,000 acres more than in ALternative A.

Anadromous fish habitat improvement investments are increased with a resultant increase in production of 1,065 thousand pounds per year more than Alternative A.

Summary of Alternative H

Indicators That Increase From Alternative A

- Acres meeting VQO of retention, +287,000
- Total acres of old growth at the end of Decade 1 and 5, +3,000/29,000
- Annual anadromous fish production, +1,065 M Lbs.

Indicators That Decrease From Alternative A

- PNV, -$23.5 MM
- Decade 1 annual net receipts, -$2.3 MM
- Decade 5 annual net receipts, -$5.5 MM
- Decade 1 annual noncash benefits, -$0.4 MM
- Decade 5 annual noncash benefits, -$1.4 MM
- Lands suitable for timber production, -53,000 acres
- Decade 1 TSPQ, -7.7 MMCF

- Decade 1 annual road construction, -5 miles
- Decade 1 annual jobs, -400
- Decade 1 annual income, -$11 MM
- Decade 1 payments to counties, -$1.0 MM

Alternative J (Preferred)

The PNV for Alternative J (Preferred) is $1.2 MM lower than Alternative H. Annual net receipts are $1.4 MM less in the first decade and $1.0 MM less in the second decade. These reductions are all a result of the reduced timber harvest levels of Alternative J (Preferred) compared with Alternative H. The reduced levels of timber harvest also results in a reduction of road construction of 1 mile per year.

Noncash benefits increase in the first decade by $0.7 MM and in the fifth decade by $1.7 MM. These increases reflect the increased emphasis on non market resources from Alternative H.

Alternative J (Preferred) has 13,000 acres less land suitable for timber production than Alternative H. This reduction is primarily the result in increased emphasis on dispersed recreation, Wild and Scenic Rivers, and scenic values.

Compared to Alternative A, there are 400 fewer jobs, $11 MM less income, and $1 MM less in payments to the counties in this alternative.

Alternative J (Preferred) would satisfy 12% more of the first decade demand for primitive and semi-primitive nonmotorized wilderness and non-wilderness recreation and 7% more of the fifth year demand than Alternative H. This reflects a higher emphasis on dispersed recreation than in Alternative H

Alternative J (Preferred) has 10% more roadless areas remaining in a roadless condition than Alternative H. Again this reflect a higher emphasis on dispersed recreation.

Alternative J (Preferred) has 3,000 less acres of old growth included in the suitable land base for timber production and the total old growth remaining on all lands at the end of the fifth decade is 10,000 acres more than in Alternative H.

Summary of Alternative J (Preferred)

Indicators That Increase From Alternative H

- Decade 1 annual noncash benefits, +$0.7 MM
- Decade 5 annual noncash benefits, +$1.7 MM
- Total acres of old growth at the end of Decade 5, +9,000

Indicators That Decrease From Alternative H

- PNV, -$1.2 MM
- Decade 1 annual net receipts, -$1.4 MM
- Decade 5 annual net receipts, -$1.0 MM
- Lands suitable for timber production, -13,000 acres
- Decade 1 TSPQ, -1.8 MMCF
- Decade 1 annual road construction, -1 miles

- Decade 1 annual jobs, -100
- Decade 1 annual income, -$4 MM
- Decade 1 payments to counties, -$0.3 MM
- Acres of old growth on suitable lands, Decade 1, -3,000 acres
- Acres of old growth for indicator species in Decade 5, -0,000 acres

Alternative G-Modified

Alternative G-Modified has a strong emphasis on the maintenance of natural ecosystems and diversity of native flora and fauna. The retention of existing ecosystems reduces the acres suitable for timber production and the TSPQ. Although less road construction is required than in Alternative J (Preferred), PNV is reduced by $261.8 MM.

The reduction in TSPQ of 5.1 MMCF from Alternative J (Preferred) results in net receipts declining by $1.0 MM in the first decade. Fifth decade net receipts decrease by $12.1 MM over Alternative J (Preferred).

Noncash benefits decline by $0.6 MM in the first decade and by $5.3 MM in the fifth decades.

Lands suitable for timber production decline by 99,000 acres from Alternative J (Preferred). Alternative G-Modified has 21% more roadless areas remaining in a roadless condition than Alternative J (Preferred). This reflects the objectives of maintaining natural ecosystems and diversity.

The reduced timber harvest in the first decade of Alternative G-Modified results in 400 fewer jobs than in Alternative J (Preferred), $10 MM less income, and $0.8 MM lower payments to the counties than in Alternative J.

Due to the emphasis on retention of natural ecosystems and the management of larger acres of currently developed lands in an undeveloped condition, the acres meeting a VQO of retention will increase by 178,000 over those in Alternative J (Preferred). Acres meeting a VQO of partial retention will be 148,000 less than in Alternative J (Preferred).

The emphasis on maintaining the natural diversity on the Forest will result in an increase of 25,000 acres of old growth for management indicator species in Decade 5; 167,000 fewer acres would be managed for big game winter range compared to Alternative J (Preferred).

Alternative G-Modified would have 56,000 acres less old growth in the suitable timber land base and 36,000 acres more total old growth by Decade 5 than would Alternative J (Preferred).

Summary of Alternative G-Modified

Indicators That Increase From Alternative J (Preferred)

- Acres meeting a VQO of retention, +178,000
- Acres of old growth for indicator species, +25,000
- Total acres of old growth at the end of Decade 5, +35,000

Indicators That Decrease From Alternative J (Preferred)

- PNV, -$261.8 MM
- Decade 1 annual net receipts, -$1.0 MM
- Decade 5 annual net receipts, -$12.1 MM
- Decade 1 annual noncash benefits, -$0.6 MM
- Decade 5 annual noncash benefits, -$5.3 MM
- Decade 1 annual TSPQ, -5.1 MMCF
- LTSYC, -6.8 MMCF
- Lands suitable for timber production, -99,000
- Decade 1 annual road construction, -5 miles
- Decade 1 annual jobs, -400
- Decade 1 annual income, -$10 MM
- Decade 1 annual payments to counties, -$0.8 MM
- Acres meeting a VQO of partial retention, -148,000
- Acres of old growth in suitable lands in Decades 1/5, -56,000/-24,000
- Acres managed for deer/elk winter range, -167,000

Alternative C

The emphasis of Alternative C includes the non-market outputs of undeveloped dispersed recreation, visual quality, and fish and wildlife habitat. As a result, it has the lowest PNV of all the alternatives: $26.1 MM below that of Alternative G-Modified.

Alternative C has 9,000 more acres of land suitable for timber production than Alternative G-Modified. However, 62% of the total suitable acres produce timber at less-than-full yield to provide for visual quality and wildlife habitat. In combination, these result in a first decade TSPQ that is 4.6 MMCF lower than Alternative G-Modified.

The low level of timber outputs and the constraints on the rate of harvest of the available old growth result in first decade net receipts that are $0.3 MM less than Alternative G-Modified. A 15% increase in the TSPQ by the fifth decade, along with a higher percentage of the harvest coming from old growth stands results in an increase in net receipts of $4.1 MM over that of Alternative G-Modified.

The reduced timber harvest level in the first decade results in 400 fewer jobs, $11 MM less income, and $1.2 MM lower payments to the county than Alternative G-Modified.

The strong emphasis on visuals in Alternative C results in 46,000 more acres meeting a VQO of retention and 88,000 more acres meeting a VQO of partial retention than in Alternative G-Modified.

Habitat available for old growth management indicator species is the same in Alternative C as in Alternative G-Modified. There are 168,000 more acres of deer and elk winter range managed in Alternative C.

Alternative C has 25,000 acres more old growth in the suitable land base than Alternative G-Modified. Alternative C will have 2,000 acres more total old growth in Decade 5 than Alternative G-Modified.

Summary of Alternative C

Indicators That Increase From Alternative G-Modified

- Decade 5 annual net receipts, +$4.1 MM
- Decade 1 annual noncash benefits, +$0.1 MM
- Lands suitable for timber production, +9,000 acres
- Decade 1 annual road construction, +2 mile
- Acres meeting a VQO of retention, +46,000
- Acres meeting a VQO of partial retention, +88,000
- Acres of old growth in suitable lands Decade 1 and 5, +25,000 and +25,000
- Total acres of old growth in Decade 5, +2,000
- Acres managed for deer/elk winter range, +168,000

Indicators That Decrease From Alternative G-Modified

- PNV, -$26.1 MM
- Decade 1 annual net receipts, -$0.3 MM
- Decade 5 annual noncash benefits, -$1.4 MM
- Decade 1 annual TSPQ, -4.6 MMCF
- LTSYC, -3.7 MMCF
- Decade 1 annual jobs, -400
- Decade 1 annual income, -$11 MM
- Decade 1 annual payment to counties, -$1.2 MM

Alternative NC (No Change)

Alternative NC is based on the Timber Management Plans developed in 1963. The Plans are not integrated resource plans and consequently do not address all resource uses and outputs. The data applicable to this alternative was not incorporated into a FORPLAN model; therefore, PNV was not calculated.

The No Change Alternative emphasizes the timber resource. As a result, the acres of land suitable for timber harvest and first decade TSPQ are the highest among the alternatives: an increase of 291,000 acres and 29.2 MMCF per year over that of Alternative C.

The harvest level involves more road construction, increases employment and income, and generates more payments to counties in Decade 1.

Recreation demand satisfied decreases. In addition, the total acres of old growth remaining in Decade 5 decrease from 573,000 in Alternative C, to 432,000 acres in Alternative NC.

Alternative NC continues the current level of investments in anadromous fish habitat capability; production is similar to Alternative A, which is 7,809 M pounds of fish per year, a decrease of 12% from Alternative C.

Summary of Alternative NC

Indicators That Increase From Alternative C

- Decade 1 annual TSPQ, +29.2 MMCF
- Lands suitable for timber production, +290,000 acres
- Decade 1 annual road construction which is +19 miles over Alternative C.
- Acres of old growth in suitable lands in Decade 1, +129,000 acres

Indicators That Decrease From Alternative C

- Total acres of old growth remaining in Decade 5, -141,000
- Annual anadromous fish production, similar to Alt. A, -1,065 pounds

INTRODUCTION

Appendix C includes a site-specific analysis of roadless areas on the Mt. Baker-Snoqualmie National Forest. Changes and modifications made since the release of the DEIS include:

- o adjusted acres, text for new wildlife MR's;
- o updated acres to reflect any timber harvest activities;
- o for clarity, dropped the second map for each parcel and included the information in a table;
- o for each parcel, added a table displaying the acres allocated to each management area prescription, by alternative;

Background

During the second Roadless Area Review and Evaluation (RARE II), about 786,339 acres of roadless, undeveloped land on the MBS were evaluated. In 1984, the Washington State Wilderness Act designated 341,000 acres of these roadless areas as additions to the National Wilderness Preservation System. Appendix C describes the remaining roadless area, which total about 402,930 acres.

The 1984 Act found that these remaining acres "... do not possess outstanding wilderness attributes or which possess outstanding energy, mineral, timber, grazing, dispersed recreation, and other values and which should not now be designated as components of the National Wilderness Preservation System but should be available for nonwilderness multiple uses under the land management planning process..."

The 1984 Act further stated: "...the Department of Agriculture shall not be required to review the wilderness option prior to revisions of these [Forest] plans, but shall review the wilderness option when the plans are revised..."; "... such areas need not be managed for the purpose of protecting their suitability for wilderness designation prior to or during revision of the initial land management plans."

The roadless areas on the MBS are not considered for wilderness designation in this round of forest planning. Prior to any ground-disturbing activity in any roadless area parcel, a site-specific, project-level environmental analysis (with NEPA documentation) will be completed.

Portions of all the original roadless areas remain. Some are large, contiguous areas but many are small parcels, a result of the 1984 wilderness designations. There are 101 separate parcels (compared to the original 25 roadless areas), ranging in size from 21 to 50,400 acres. The original RARE II name and number is used to identify each parcel. For ease of analysis, the Mt. Baker roadless parcels are grouped into five geographic blocks.

Appendix C Organization

Appendix C is divided into two sections. The first section (pages C-1 through C-15) summarizes the individual roadless area facts and figures. One map (page C-3) and five tables provide for rapid review of the individual roadless parcel narratives. Table C-1 displays, by alternative, roadless area acres remaining

unroaded by the end of decades 1, 2, and 5. Table C-2 provides a summary of resource information for the roadless areas as a whole. Table C-3 shows all of the roadless areas, parcel identifier, acres, and the pages where they are described in detail. Table C-4 lists each area's acreage and denotes changes, if any, from the inventoried (RARE II) roadless area boundary. Table C-5 summarizes each area's attributes.

In the second section, each roadless area parcel is described in detail. Maps of each area are found in this section. Each roadless area description will include the following information; details for each varies depending on size of area, resource complexities, and concerns expressed through public involvement.

- General description and overview
- Wilderness capability
- Availability for wilderness
- Wilderness evaluation
- *Environmental consequences*

Table C-1
Acres of Roadless Areas Remaining at End of Decades 1, 2, and 5, by Alternative 1/

Alternative	Acres Remaining End of Decade 1	2	5	Percent Remaining
A (No Act)	361,665	329,773	293,305	73%
B (RPA)	371,619	347,041	317,728	79%
C	397,854	393,564	387,257	96%
G-Mod.	392,421	383,715	375,470	93%
H	377,058	354,602	328,498	82%
I	370,878	344,998	313,914	78%
J (Pref)	382,587	365,565	344,730	86%

1/ No Management Areas are assigned in Alternative NC (No Change). Indirect comparisons between Alternative NC and the other alternatives can be made. This must be done understanding that the 1963 Timber Management Plans, as amended, stratified lands by their availability and suitability for timber harvest, while land in the other alternatives is stratified by its suitability for timber harvest and management strategies, which when combined equate to Management Areas.

Table C-2
Summary of Roadless Area Resource Information

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	402,930
Primitive/Semi-Primitive Recreation ROS	Acres	260,734
Timber		
Tentatively suitable	Acres	164,504
Tentatively suitable minus MR	Acres	137,971
Tentatively suitable inaccessible	Acres	43,586
Tentatively suitable inaccessible minus MR	Acres	32,689
Tentatively suitable standing volume	M bdft	6,254,877
Tentatively suitable standing vol minus MR	M bdft	4,600,087
Old Growth, Total Acres	Acres	232,253
0-2,500 Feet Elevation	Acres	49,833
2,501-4,000 Feet Elevation	Acres	139,853
4,001 + Feet Elevation	Acres	42,567
Management Indicator Species (MIS)		
Spotted Owl MR	Acres dedicated	38,419
Marten MR	Acres dedicated	5,157
Pileated woodpecker MR	Acres dedicated	5,863
Elk-deer winter range total available	Acres	28,259
Goat habitat MR	Acres dedicated	1,872
Goat habitat total available	Acres	43,568
Bald eagle habitat 2/	Acres dedicated	3,519
Old growth habitat (in addition	Acres below 2,500'	35,539
to dedicated acres)	Acres 2,500'-4,000'	114,110
Locatable Mineral Development Potential		
High	Acres	12,834
Moderate	Acres	39,775
Low	Acres	242,489
Claims	# of	1,658
Leasable Energy Minerals		
Geothermal	Acres	238,430
Coal, geothermal	Acres	26,245
Oil, gas, geothermal	Acres	3,611
Coal	Acres	3,927
Oil, gas, coal, geothermal	Acres	949

1/ Native American Religious Freedom areas were analyzed. Site specific information is not disclosed due to its sensitivity.
2/ Includes nest sites, forage areas, and roost areas.

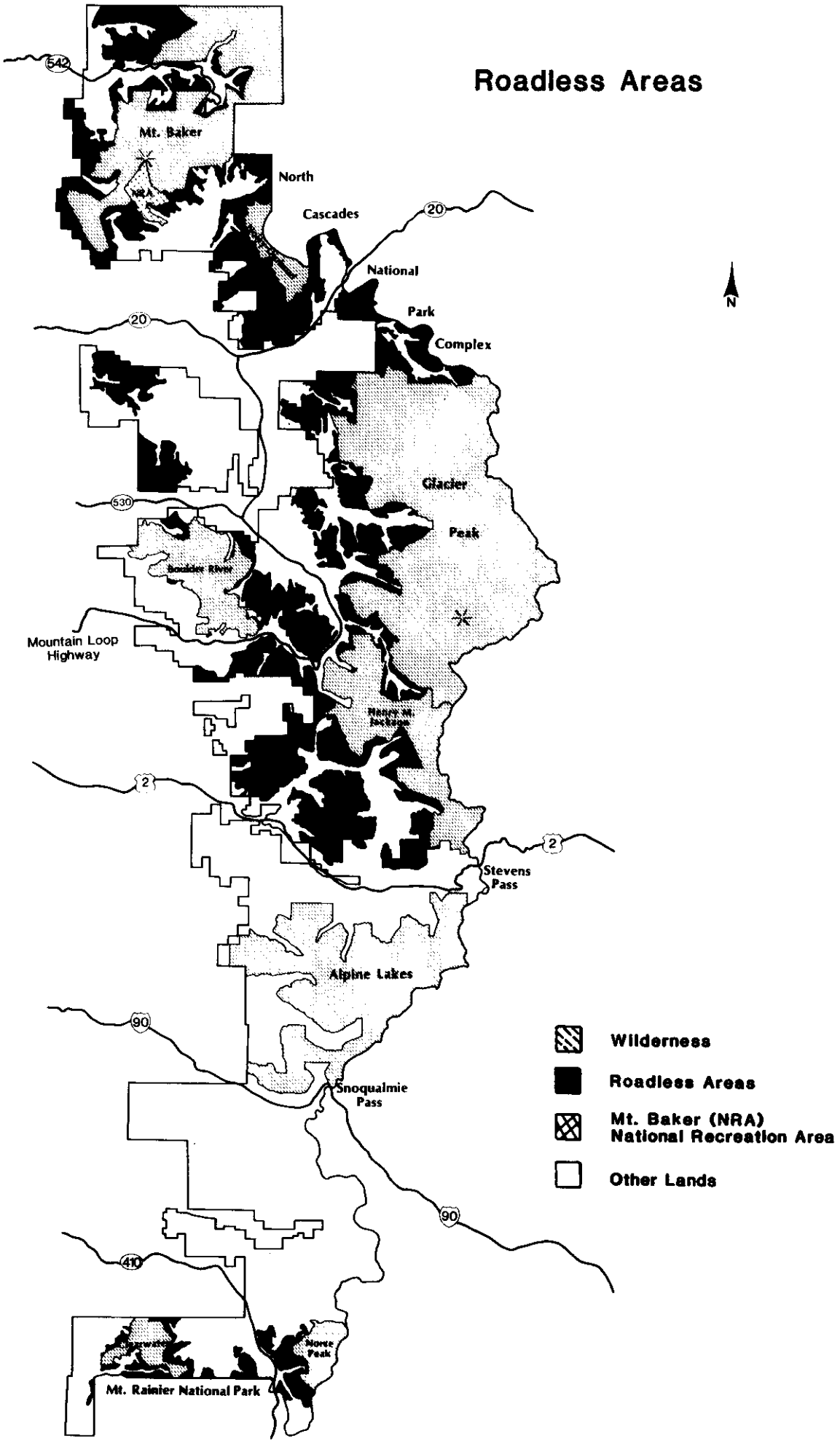

Roadless Areas
Mt. Baker
North
Cascades
National
Park
Complex
Glacier
Peak
Mountain Loop
Highway
Stevens
Pass
Alpine Lakes
Snoqualmie
Pass
Mt. Rainier National Park
542
20
530
2
90
410
N
Wilderness
Roadless Areas
Mt. Baker (NRA)
National Recreation Area
Other Lands

Table C-3
Roadless Area Parcels

Roadless Area	RARE II #	Parcel	Revised Net Acres	Page
1A. Mt. Baker (Canyon Creek)	6041	MA	25,046	C-17
1B. Mt. Baker (North Block)	6041	MJ	1,901	C-25
	6041	MI	2,533	
	6041	MS	1,668	
	6041	MB	1,456	
	6041	MH	4,688	
	6041	MG	1,204	
	6041	MC	84	
	6041	MD	718	
	6041	MY	168	
	6041	ME	1,752	
	6041	MF	253	
			16,425	
1C. Mt. Baker (West Block)	6041	MK	8,468	C-37
	6041	MZ	42	
	6041	ML	591	
	6041	MT	127	
	6041	MR	17,590	
			26,818	
1D. Mt. Baker (South Block)	6041	MN	5,322	C-47
	6041	MO	63	
	6041	MP	146	
	6041	MM	844	
			6,375	
1E. Mt. Baker (Noisy Diobsud)	6041	MQ	50,367	C-55
2. Oakes Peak	6043	-	1,604	C-63
3. Alma Copper	6044	-	8,193	C-69
4. Hidden Lake	6045	-	6,652	C-77
5. Glacier Peak H	H6031	HA	6,186	C-83
	H6031	HB	1,753	
			7,939	
6. Glacier Peak I	I6031	IA	12,775	C-91

Appendix C

Roadless Area	RARE II #	Parcel	Revised Net Acres	Page
7. Glacier Peak G	G6031	GD	655	C-99
	G6031	GT	338	
	G6031	GE	2,133	
	G6031	GH	127	
	G6031	GW	106	
	G6031	GR	84	
	G6031	GF	443	
	G6031	GJ	3,611	
	G6031	GG	1,246	
			8,743	
8. Glacier Peak J	J6031	JD	8,236	C-108
	J6031	JB	2,260	
	J6031	JA	232	
	J6031	JF	1,583	
	J6031	JZ	148	
	J6031	JC	9,880	
	J6031	JJ	591	
	J6031	JI	549	
	J6031	JP	211	
	J6031	JH	106	
	J6031	JG	2,175	
			25,971	
9. Glacier Peak M	M6031	M1	1,055	C-119
10. Glacier Peak A	A6031	AA	253	C-125
	A6031	AC	190	
			443	
11. Glacier Peak L	L6031	LA	2,066	C-131
	L6031	LD	169	
	L6031	LC	676	
	L6031	LM	21	
	L6031	LF	824	
	L6031	LN	507	
	L6031	LG	190	
	L6031	LH	338	
	L6031	LP	549	
	L6031	LK	169	
	L6031	LJ	8,106	
	L6031	LI	612	
			14,227	
12. Glacier Peak B	B6031	B2	8,701	C-141
	B6031	B3	9,945	
			18,646	

Roadless Area	RARE II #	Parcel	Revised Net Acres	Page
13. Glacier Peak K	K6031	KA	45,362	C-149
	K6031	KN	42	
	K6031	KM	21	
	K6031	KP	42	
	K6031	KR	42	
			45,509	
14. Pressentin	6048	-	15,507	C-157
15. Higgins Mountain	6049	-	13,177	C-163
16. Prairie Mountain	6060	-	3,822	C-169
17. White Chuck Mountain	6051	-	5,723	C-175
18. Boulder River	6050	BA	2,724	C-181
	6050	BG	275	
	6050	BF	106	
	6050	BI	84	
	6050	BE	1,901	
	6050	BD	63	
	6050	BH	422	
	6050	BI	84	
	6050	BL	190	
	6050	BJ	26,638	
			32,307	
19. Eagle Rock	6054	-	33,176	C-191
20. Tolmie Creek	6056	-	274	C-199
21. Clearwater	6055	CI	4,664	C-205
	6055	CG	1,521	
	6055	CH	781	
	6055	CF	169	
	6055	CB	190	
	6055	CC	887	
	6055	CE	549	
	6055	CD	42	
			8,803	
22. Lonesome Lake	6057	-	295	C-213
23. Sun Top	6058	-	2,386	C-219
24. Silver Creek	6059	-	1,055	C-227
25. Norse Peak	6034	NC	84	C-233
	6034	NB	570	
	6034	NA	5,089	
	6034	ND	4,350	
			10,093	

Table C-4
Summary of Roadless Area Acreage and Change from Inventoried Roadless Area

RARE II Name	RARE II Number	RARE II Net Acres	Net Acres Revised	Reason for Change
Mt. Baker (Total Area)	6041	271,900	149,224	Area reduced 122,676 acres due to wilderness designation (Mt. Baker Wilderness, Washington Wilderness Legislation, 1984)
[Mt. Baker (Canyon Creek)]	6041	25,046	25,046	No change.
[Mt. Baker (North)]	6041	16,636	16,425	Area reduced 207 acres Nanny Goat TS (1985); 4 acres mapping discrepancy.
[Mt. Baker (West)]	6041	26,820	26,818	Two acre reduction due to mapping discrepancy.
[Mt. Baker (South)]	6041	6,690	6,375	Area reduced 188 acres by harvest activity from the Hi Boy Timber Sale (1984). Area reduced 139 acres by harvest activity from the Tip Top Timber Sale (1985). Area increased 12 acres due to mapping discrepancy.
[Mt. Baker (Noisy Diobsud)]	6041	54,654	50,367	Area reduced by 3252 acres by harvest from three timber sales since 1982 (Scarface, Shan, and 3-Mile). Area reduced by 1,035 acres due to harvest activity from the Bacon Rind Timber Sale (1988) and the Silvertone-Welker Timber Sale (1987).
Oakes Peak	6043	1,200	1,604	Area increased by 404 acre mapping discrepancy.
Alma Copper	6044	8,300	8,193	Area reduced by 107 acre mapping discrepancy.
Hidden Lake	6045	7,000	6,652	Area reduced 73 acres due to harvest activity from the Kincade Timber Sale (1983). Area reduced by 275 acres mapping discrepancy.
Glacier Peak H	H6031	12,483	7,939	Area reduced 3109 acres due to wilderness designation (Glacier Peak Wilderness, Washington Wilderness Legislation, 1984). Area reduced 1286 acres due to harvest activity from the LaRush Timber Sale (1984). Area reduced 149 acres due to mapping discrepancy.

Table C-4
Summary of Roadless Area Acreage and Change from Inventoried Roadless Area
(continued)

Glacier Peak I	I6031	18,397	12,755	Area reduced 1208 acres due to wilderness designation (Glacier Peak Wilderness, Washington Wilderness Legislation, 1984). Area reduced 1625 acres due to harvest activities from the Yellow Timber Sale and White Creek Skyline Timber Sale (1984). Area reduced by 2,387 acres due to harvest activity from the Upper Slope Timber Sale (1987) and the Indian Point Timber Sale (1987). Area reduced by 422 acres due to mapping discrepancy.
Glacier Peak G	G6031	59,755	8,737	Area reduced by 51,018 acres due to wilderness designation (Glacier Peak Wilderness, Washington Wilderness Legislation, 1984).
Glacier Peak J	J6031	31,604	25,971	Area reduced by 1,498 acres due to wilderness designation (Glacier Peak Wilderness, Washington Wilderness Legislation, 1984). Area reduced by 2,065 acres due to harvest activity from the Circle Creek, Pugh Blend, Sloan Creek, and Bowser Timber Sales. Area reduced by 1,158 acres in mapping discrepancy. Area reduced by 912 acres due to harvest activity from the Harriet Creek (1988), Box Mountain II (1986), and Big Creek (1987) Timber Sales.
Glacier Peak M	M6031	1,539	1,055	Area reduced by 483 acred due to wilderness designation (Glacier Peak Wilderness, Washington Wilderness Legislation, 1984). Area reduced by one acre mapping discrepancy.
Glacier Peak A	A6031	11,110	443	Area reduced 10,667 acres due to wilderness designation (Henry M. Jackson Wilderness, Washington Wilderness Legislation, 1984).
Glacier Peak L	L6031	55,220	14,227	Area reduced by 40,993 acres due to wilderness designation (Henry M. Jackson Wilderness, Washington Wilderness Legislation, 1984).
Glacier Peak B	B6031	43,186	18,646	Area reduced by 24,540 acres due to wilderness designation (Henry M. Jackson Wilderness, Washington Wilderness Legislation, 1984).

Table C-4
Summary of Roadless Area Acreage and Change from Inventoried Roadless Area
(continued)

Glacier Peak K	K6031	45,745	45,509	Area reduced by 64 acres due to timber harvest activity from the Timbuktu Timber Sale. Area reduced by 172 acres due to mapping discrepancy.
Pressentin	6048	16,000	15,057	Area reduced by 802 acres due to timber harvest activity from the O'Toole Timber Sale (1986). Area reduced by 141 acres due to mapping discrepancy.
Higgins Mountain	6049	12,800	13,177	Area increased by 377 acres due to mapping discrepancy.
Prairie Mountain	6060	5,500	3,822	Area reduced by 1,668 acres due to harvest activity from the Black Diamond Timber Sale. Area reduced by 10 acres mapping discrepancy.
White Chuck Mountain		6051	6,000	5,723 Area reduced by 211 acres due to harvest activity from the Black Diamond Timber Sale. Area reduced by 66 acres due to mapping discrepancy.
Boulder River	6050	83,700	32,307	Area reduced by 50,274 acres due to wilderness designation (Boulder River Wilderness, Washington Wilderness Legislation, 1984). Area reduced by 1,119 acres due to harvest activity from the Goodbye (1986), Iron Mountain and Goodman Ridge (1988) Timber Sales.
Eagle Rock	6054	33,100	33,176	Area increased by 76 acres due to mapping discrepancy.
Tolmie Creek	6056	650	274	Area reduced by 274 acres due to harvest activity from the Poch Peak West Timber Sale (1982). Area reduced by 102 acres due to mapping discrepancy.
Clearwater	6055	24,900	8,803	Area reduced by 15,951 acres due to wilderness designation (Clearater Wilderness, Washington Wilderness Legislation, 1984). Area reduced by 123 acres due to harvest activity from the McGilvary Salvage Timber Sale and the West Line Salvage Timber Sale (1982). Area reduced by 23 acres due to mappind discrepancy.
Lonesome Lake	6057	1,850	295	Area reduced by 1,440 acres due to harvest activity from the High Mule, Liver Camp, High Mule Resale (1986), and Lower Mule (1988) Timber Sales. Area reduced by 115 acres due to mapping discrepancy.

Table C-4
Summary of Roadless Area Acreage and Change from Inventoried Roadless Area
(continued)

Sun Top	6058	5,200	2,386	Area reduced by 2,850 acres due to harvest activity from the Skookum Doe Timber Sale. Area increased by 36 acres due to mapping discrepancy.
Silver Creek	6059	1,000	1,055	Area increased by 55 acres due to mapping discrepancy.
Norse Peak	6034	28,200	10,093	Area reduced by 15,713 acres due to wilderness designation (Norse Peak Wilderness, Washington Wilderness Legislation, 1984). Area reduced by 2,639 acres due to harvest activity from the One Mile Salvage, High Minnie, Dry Ranger, Snoquera (1986), and Snoquera #2 (1988) Timber Sales. Area increased by 245 acres due to mapping discrepancy.

TOTAL: 402,930 acres

Table C-5
Summary of Roadless Area Attributes

AVAILABILITY - OTHER RESOURCE POTENTIAL

Name of Area	RARE II Number	Recreation	Fish/ Wildlife	Water	Livestk. Opera.	Ecology	Timber	Minerals Oil/Gas	Cultural	Land Use Author.	Non-Fed. Lands	Fire	Insect/ Disease
Mt Baker (Canyon Cr Block)	6041	High	High	High	0	Mod	Mod	Low	Mod	Low	0	Low	0
Mt Baker (North Block)	6041	High	High	Mod	0	Mod	High	Mod	Mod	0	0	Low	0
Mt Baker (West Block)	6041	Mod	High	High	0	High	Mod	High	Mod	0	Mod	Low	0
Mt Baker (South Block)	6041	Mod	Mod	High	0	Mod	High	Low	Mod	0	0	High	0
Mt. Baker (Noisy Diobsud Block)	6041	High	High	High	Low	Mod	Mod	Low	0	Low	High	High	0
Oakes Peak	6043	Low	Low	Low	0	Low	Low	Low	0	0	0	Low	0
Alma Copper	6044	Low	High	Mod	0	Mod	Mod	Low	Mod	0	Low	Mod	0
Hidden Lake	6045	Low	Mod	Low	0	High	Low	Low	Mod	0	0	Low	0
Glacier Peak H	H6031	Low	High	High	0	Mod	Mod	Mod	Mod	0	Low	High	0
Glacier Peak I	I6031	Mod	Mod	Mod	0	Mod	Mod	Low	Mod	0	0	Low	Low
Glacier Peak G	G6031	Low	Mod	Low	0	Mod	Mod	Mod	Low	0	?	High	0
Glacier Peak J	J6031	Mod	Mod	Low	0	Mod	Mod	Mod	Low	?	0	Mod	0
Glacier Peak M	M6031	Low	Low	Low	0	Mod	Mod	Low	Low	?	0	Low	0
Glacier Peak A	A6031	Low	Low	Low	0	Mod	Low	Low	0	?	0	Mod	0
Glacier Peak L	L6031	Mod	High	Low	0	Mod	Low	High	Low	?	0	Low	Low
Glacier Peak B	B6031	Mod	Mod	Mod	0	Mod	Low	Low	Low	?	0	Low	Low
Glacier Peak K	K6031	Mod	Mod	Mod	0	Mod	Low	High	Low	?	0	Mod	0
Pressentin	6048	Low	High	Mod	0	Mod	Mod	Low	0	0	Low	Low	0
Higgins Mountain	6049	Low	Mod	Mod	0	Mod	Mod	Low	0	0	Mod	Low	0
Prairie Mountain	6060	Low	Mod	Low	0	Mod	High	0	0	?	0	Low	0
White Chuck Mountain	6051	Low	Mod	Low	0	Mod	Low	Low	0	?	0	Low	0
Boulder River	6050	Low	Mod	Low	0	Mod	Low	Low	0	?	0	Mod	0
Eagle Rock	6054	Mod	High	Mod	0	Mod	Low	Mod	Mod	0	Mod	Low	Low
Tolmie Creek	6056	Low	Low	Low	0	Mod	High	Low	Low	0	0	Low	0
Clearwater	6055	Low	Mod	Mod	0	Mod	High	Mod	0	Mod	0	Low	0
Lonesome Lake	6057	Low	Mod	Low	0	Mod	Mod	Low	0	0	0	Low	0
Sun Top	6058	Mod	High	Low	0	High	High	Low	0	Low	0	Mod	0
Silver Creek	6059	Low	Low	Low	0	Mod	Mod	Mod	Low	0	0	Low	0
Norse Peak	6034	High	Mod	Low	0	Mod	Mod	Mod	Lo	0	0	Mod	0

Table C-5
Summary of Roadless Area Attributes

CAPABILITY Name of Area	RARE II Number	Manage-ability	Natural Integrity	Opportun. Solitude	Primitive Rec. Opp.	Challeng. Exper.	Special Features
Mt. Baker (Canyon Cr. Block)	6041	Mod	High	High	High	High	High
Mt. Baker (North Block)	6041	Low	High	Low	Low	Mod	Mod
Mt. Baker (West Block)	6041	Low	High	Mod	Mod	Mod	High
Mt. Baker (South Block)	6041	Low	Mod	Low	Low	Low	0
Mt. Baker (Noisy Diobsud Block)	6041	High	High	High	High	Mod	Mod
Oakes Peak	6043	Low	High	Low	Low	Low	Low
Alma Copper	6044	High	High	Mod	High	Mod	Low
Hidden Lake	6045	Low	Mod	Low	High	Low	Mod
Glacier Peak H	H6031	Mod	High	Mod	Mod	Mod	0
Glacier Peak I	I6031	High	High	High	High	High	0
Glacier Peak G	G6031	Low	Low	Low	Low	Low	0
Glacier Peak J	J6031	Low	Mod	Low	Low	Low	Low
Glacier Peak M	M6031	Low	High	Low	Low	Low	0
Glacier Peak A	A6031	Low	Mod	Low	Low	Low	0
Glacier Peak L	L6031	Low	Mod	Low	Low	Low	0
Glacier Peak B	B6031	Mod	High	Mod	Mod	Mod	Low
Glacier Peak K	K6031	Low	High	Mod	Mod	Mod	0
Pressentin	6048	Mod	High	High	Mod	Low	0
Higgins Mountain	6049	High	High	High	Mod	Low	Mod
Prairie Mountain	6060	Low	Low	Low	Low	Low	0
White Chuck Mountain	6051	Low	Mod	Low	Low	Mod	0
Boulder River	6050	Low	Low	Low	Low	Low	Low
Eagle Rock	6054	High	High	High	High	Mod	Low
Tolmie Creek	6056	0	Low	Low	0	0	0
Clearwater	6055	Mod	Low	0	Low	0	0
Lonesome Lake	6057	Low	Mod	0	0	0	0
Sun Top	6058	Low	Mod	Low	Low	0	Low
Silver Creek	6059	Low	Mod	Low	Low	Low	0
Norse Peak	6034	Mod	High	Low	Low	0	Low

Key to Attributes Ratings used in Table C-5.

Manageability and Boundaries - Ability to manage and protect the area's natural character considering such factors as size, shape, and position (including boundary location) relative to external influences.

High - Inherently protected through excellent topographic positioning, favorable external influence (i.e. land allocation, physical conditions), or very limited hazards/risks to natural character.

Mod - Part of area subject to external influences, or overall positioning and physical conditions are at some risk.

Low - Considerable portions at risk or subject to external influences; manageability highly dependent on degree of protection provided in areas outside unroaded part.

0 - Protection largely unattainable due to present activities and conditions that are not inherently mitigated. Risks to natural character and processes high.

Natural Integrity - Extent to which long-term ecological processes are intact and operating, or are free of disturbances; consideration of extent to which human influences have altered natural conditions and are apparent to user.

High - Extremely limited, or not apparent.

Mod - Small portions of area affected by human activity, or recovery of past impacts approaching natural state and not perceived by user.

Low - Considerable area impacted, or perceived recovery of past change incomplete or apparent to user.

0 - Much of present ecosystem is primarily a result of recent or past activity by man; or major portion is directly or indirectly (from periphery) influenced by human activity; readily noticed by user.

Opportunities for Solitude - Area's feeling of solitude (how it provides for remote and backcountry setting).

High - Most of area free of external influence and provides a strong feeling of remoteness and solitude.

Mod - Fringes influenced by sight and/or sound of human activity; solitude aided by vegetative or topographic conditions.

Low - External influences persist over much of area; vegetation and topography generally only aid to providing solitude.

0 - Most of area within sight or sound of human activity; topography and vegetation provides only limited relief.

Opportunities for Primitive Recreation - Opportunities for primitive and unconfined types of recreation activities; how well the area provides outstanding opportunities for unusual adventures or excitement.

High - Varied type (more than those associated with foot travel only); unique experience, or experience of adventure/excitement.

Mod - Varied type (good mix of foot travel associated activity); potential for adventure exists.

Low - Limited type; adventure or challenge related to topographic difficulty and distance from nearest roaded access.

0 - Type and adventure not different than much of adjacent lands.

Special Features - Unique, abundant, or varied flora, fauna, historic, scientific, and physiographic features; where protection from nonconforming activities would enhance management of unusual or sensitive species or features.

High - Existence over much of area or very unique.

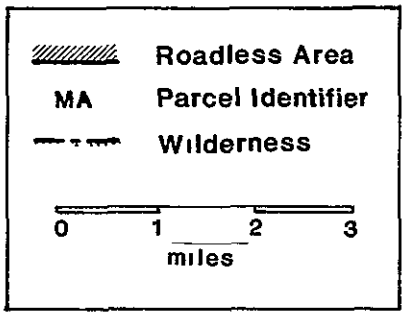
Mod - Existence of species or features over much of area that would be enhanced; limited extent of unique or sensitive elements.

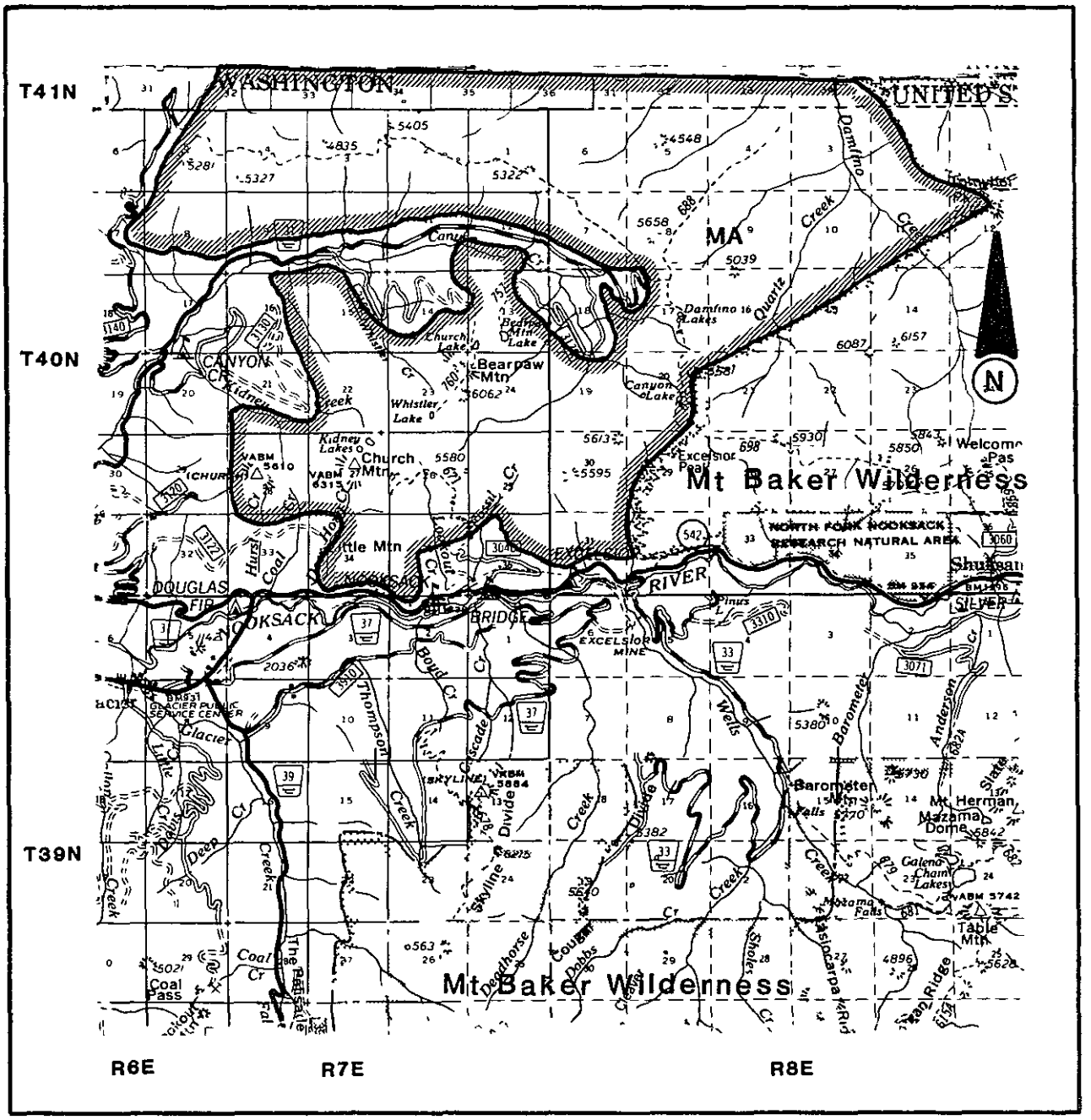
Low - Limited enhancement opportunity; unique or sensitive elements limited to very small areas, or other allocations, standards or guidelines afford adequate protection.

0 - Species and features not different than surrounding areas.

Mt. Baker (Canyon Creek Block)

Roadless Area 6041





Mt. Baker (CANYON CREEK BLOCK) **Roadless Area 6041 (MA)**

The original Mt. Baker RARE II Roadless area contained 271,900 acres. The 1984 Wilderness Act established the Mt. Baker Wilderness (117,528 acres) and the Noisy Diobsud Wilderness (14,133 acres); the remaining parcels of Mt. Baker Roadless Area total 126,201 acres. As mentioned above, for the Appendix C evaluation, the parcels have been grouped into five blocks.

The first block to be discussed - Canyon Creek - consists of one parcel totaling 25,046 acres. It was originally inventoried for study as potential wilderness during the RARE II process. The RARE II final EIS assigned Area 6041 to nonwilderness uses. The following shows the disposition of acres within the Canyon Creek Block roadless area:

Canyon Creek	Net Acres
1984 RARE II	25,046
updated 1988	25,046
Change	0

OVERVIEW

Canyon Creek Block is located north of the Mt. Baker Highway, west of Mt. Baker Wilderness. The Canadian border forms the northern boundary of the area. Canyon Creek drains south into the North Fork Nooksack; Quartz and Damfino Creeks drain north into Canada. As shown on the map (opposite page), Canyon Creek may be accessed by road from the south via the Mt. Baker Highway #542, the West Church Road (#3120), and the East Church Road (#3040) and from the west via the Canyon Creek Road (#31), the Kidney Creek Road (#3130) and the Canyon Ridge Road (#3140).

Two east-west ridges dominate the area: Church Mountain (and associated ridges) and Canyon Ridge. The entire area is steep and highly dissected. Elevation ranges from 2,200 feet near Canyon Creek, to 6,315 feet at the summit of Church Mountain. Other peaks over 5,000 feet elevation are: Bearpaw Mountain (6,062 feet) and West Church (5,610 feet). The parcel also contains a number of small lakes.

Vegetation varies from forested slopes and valleys at lower elevations to rocky peaks, ridges, and meadows at higher elevations. Below 2,800 feet, the predominant cover types are Douglas-fir and western hemlock, with some western red cedar on wetter sites. Above 2,800 feet, predominant types are Pacific silver fir and western hemlock, with some mountain hemlock at the higher elevations of the forested range (4,000-5,500 feet).

Soils are variable, with shallow residual soils on the steep, rocky ridgetop areas and deep glacial tills in the valley bottoms. There is some underlying bedrock instability (inactive faults) in the Church Mountain area and scattered unstable soils in the steep sideslope draws south of Canyon Ridge.

There is a variety of recreational use of the area, particularly in the vicinity of Damfino Lakes, Church Mountain, and Canyon Ridge. Several trails are located here.

WILDERNESS CAPABILITY

Manageability and Boundaries: The Canyon Creek Block is of sufficient size to make it a viable wilderness area and manageable for roadless primitive recreation. The north and east boundaries (adjacent to Canada and Mt. Baker Wilderness) are well-defined; those to the south and west are not. Areas near existing roads experience some motorcycle and snowmobile use, particularly along the Canyon Creek Road which extends into the middle of the area.

Natural Integrity and Appearance: The vast majority of the area has a natural appearance and is free from human disturbances, except for those portions associated with roads.

Opportunities For Solitude: Opportunities for solitude are numerous in those portions associated with peaks, ridges and lakes. These provide interaction between users, closeness to nature, and require self-reliance.

Opportunities For Primitive Recreation: Opportunities exist for high lake fishing, alpine mountaineering, backpacking, and nordic skiing. Parties on extended trips will likely experience minimal interaction with other users.

Challenging Experiences: There is opportunity for challenging experiences such as mountaineering and cross-country skiing.

Special Features: Several peaks of prominence include Church Mountain (6,315 feet elevation), Bearpaw Mountain (6,062 feet), and West Church Mountain (5,610 feet). About eight small lakes are located in Canyon Creek Block.

AVAILABILITY FOR WILDERNESS

Availability for wilderness is covered in two parts a summary table and a discussion of other resource potential of Canyon Creek Block.

Availability - Other Resource Potential

Recreation: The Mt. Baker Canyon Creek parcel is large, and has a variety of recreation opportunities, associated with the many peaks, small lakes, and other attractions in the area. Segments or entire trails include Canyon Ridge #639, Boundary Way #688, Damfino Lakes #625, Church Mountain #671, Church Lake #760, and Bear Paw Lake #757 Heaviest use is in the vicinity of Damfino Lakes and Church Mountain. The Canyon Ridge Trail is open to ORV's. Church Mountain is a notable viewpoint to Mt. Baker, Mt. Shuksan, and the Picket Range Little recreation use occurs in the Quartz Creek drainage or on the slopes draining into Canada. Damfino Trail #625 provides access to High Divide and the Mt Baker Wilderness. Total recreation use of the parcel is estimated to exceed 150 persons per week from July to September.

Fish and Wildlife: Pine marten and pileated woodpecker habitat is located within this parcel. A Spotted Owl Habitat Area (SOHA) occupies most of the Damfino Creek drainage. Critical mountain goat winter range can be found on south-facing slopes below Church Mountain east to the Wilderness boundary. The lower south-facing slopes along the N. Fork Nooksack River and Canyon Creek (below 3,000 feet) provide most of the winter range for resident blacktailed deer. Some elk may be using Canyon Creek for summer range. Higher elevations

provide mountain goats with summer range; winter range occurs along the south slopes of Canyon Creek.

Lower Canyon Creek and the North Fork Nooksack River support several species of salmon and anadromous trout (steelhead, cutthroat, and dolly varden) and provide spawning and rearing habitat.

Due to the size of this parcel and the diversity of topography and vegetation, habitat is also afforded for cougar, lynx, bobcat, black bear, golden eagles, elk, goat, deer, grouse, ptarmigan, and many other animals.

Summary Table - Mt. Baker (Canyon Creek Block) #6041 (MA)

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	25,046
Primitive/Semi-Primitive Recreation ROS	Acres	17,464
Timber		
Tentatively suitable	Acres	6,504
Tentatively suitable inaccessible	Acres	1,583
Tentatively suitable standing volume	M bdft	254,482
"Old Growth", Total Acres	Acres	14,181
0-2,500 Feet Elevation	Acres	401
2,500-4,000 Feet Elevation	Acres	7,940
4,000 + Feet Elevation	Acres	5,840
Management Indicator Species (MIS)		
Spotted owl MR	Acres	3,568
Pileated woodpecker and pine marten MR	Acres	2,069
Elk-deer Winter Range	Acres	527
Goat habitat MR	Acres	485
Bald eagle habitat (nests, forage, roost area)	Acres	84
Locatable Mineral Development Potential		
High	Acres	1,372
Moderate	Acres	253
Low	Acres	23,420
Claims	# of	40
Leasable Energy Minerals (Moderate Potential)		
Oil, Gas, Geothermal	Acres	2,703
Geothermal	Acres	22,343

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Water: Canyon Creek is a major tributary to the North Fork Nooksack River. Tributaries to Canyon Creek include Whistler Creek, Kidney Creek and several other unnamed creeks. Other tributaries to the N. Fork Nooksack include Hurst, Coal, Deer Horn, Lookout, and Fossil Creeks. There are several creeks north of Canyon Ridge that flow north into Canada, including Quartz Creek and Damfino Creek. Small lakes include Bearpaw Mountain Lake, Damfino Lakes, Canyon Lake, Whistler Lake, Church Lake, and Kidney Lakes.

Livestock Operations: None.

Ecology: Most of the area north of Canyon Creek supports forest species typical of the west Cascades (as discussed in the above description). The subalpine crest of Canyon and Boundary Way Ridges, and Damfino Lakes area are steep and rocky, with meadows.

Timber: "Old growth" forested lands are found mainly below 3,500 feet elevation in drainage bottoms. Above this elevation are scattered subalpine forests, rock outcroppings and alpine forest. Considerable logging has occurred outside of the roadless area along the Canyon Creek road

Minerals/Oil and Gas: The Canyon Creek Block is underlain by sedimentary and volcanic rocks of Jurassic, Cretaceous and Permian age, and by both glacial drift and alluvium of Quaternary age. The area is reported to have occurrences of lode gold, placer gold, limestone, copper and quartz, but none of the occurrences are known to have been developed beyond the prospect stage. The entire area is classified "prospectively valuable" for geothermal resources; a small portion of the northwest portion is classified "prospectively valuable" for oil and gas. Forty mining claims have been located within the area, but there are no leases or pending lease applications. The U.S. Geological Survey and U.S. Bureau of Mines have not studied the area's mineral resources, but based upon available data, it appears that the area has a relatively low to moderate potential for the occurrence of mineral resources.

Cultural: Sites along the North Fork Nooksack River and near Church Mountain and Whistler Lake are important for American Indian religious use.

Land Use Authorizations: The Forest Service maintains a Memorandum of Understanding to manage the Canyon Ridge Trail #689 for off-road vehicle use.

Non-Federal Lands: None. The parcel adjoins Canada.

Fire: In the past 100 years, large fires have occurred on the lower south-facing slopes of Church Mountain and Canyon Creek. Fire incidence at higher elevations has been low and limited to isolated lightning strikes.

Insect and Disease: There are no known insect or disease concerns.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: The Canyon Creek Block of Mt. Baker Roadless Area adjoins Mt. Baker Wilderness to the east. Bellingham is 35 miles west and Vancouver, B.C. is 90 miles to the northwest. Many of the recreationists using the area are from B.C., Canada.

Public Interest: This parcel was identified in RARE I and RARE II as part of the Mt. Baker Roadless area. Local and national public response about the entire roadless area at that time (1972 and 1979) was divided between favoring wilderness and development of commodity resources.

In 1984, Congress did not include this area in the Mt. Baker Wilderness.

Following release of the DEIS and Draft Forest Plan, the entire Mt. Baker Roadless Area, plus specific geographic sites and features within the Canyon Creek Block of Mt. Baker Roadless Area received considerable public comment.

The Mt. Baker Roadless Area was mentioned 214 times. The majority of the comments urged the agency to keep the area roadless (mentioned 63 times); protect from logging (27); preserve the forest ecosystem (20); and add more SOHA's (17). Other respondents mentioned the importance of the entire roadless area to American Indian religious and cultural use and for wildlife habitat.

Damfino Creek was one of 15 areas Forest-wide that received the greatest amount of site-specific response. It was mentioned 496 times. Most respondents wanted the area protected from timber harvest (mentioned 118 times), to remain roadless (77), or the old growth ecosystem preserved (65). Other respondents favored protecting Damfino Creek for recreation, for wildlife, or for the scenic value. Several wanted the trail protected from logging. Five respondents favored more roads; one comment said Damfino Creek should be open to multiple use. 1/

Church Mountain was mentioned 301 times; most respondents favored protection from logging (66 comments), keeping the area roadless (41 comments), and saving the old growth ecosystem (30 comments). Protection of wildlife habitat (for spotted owl and mountain goat) was also mentioned. Two respondents wanted the area kept open for snowmobile use; one felt it was a top priority for timber harvest.

Damfino Lakes were mentioned 53 times; most respondents wanted the area added to wilderness or protected from logging.

Bearpaw Mountain was mentioned 40 times. Nearly all of these comments favored keeping the area open to snowmobiles.

Quartz Creek was mentioned 28 times: "no logging" "preserve low-elevation old growth" and "add to wilderness/keep roadless" were the comments most stated.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

MT. BAKER (CANYON CREEK BLOCK)
PARCEL MA

MANAGEMENT AREA NAME	NC/A	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	19,281						
1A Prim.			3,378	2,259	17,718		
1B SPNM		8,468	20,949	13,452			18,964
1C SPM	696	1,562			1,921	12,185	2,280
1D RN		211	84		126		
2A Foregrd.			232		105	443	84
2B Midgrd.			21		21		63
5 Potent W&S	168		147	168	105		147
11 O-G Hab.		3,146		105	1,583	3,167	
12 Mature O-G		1,393	21	950	316	2,365	464
14 D&E Enhanc		316				84	
15 Goat MR		210	126	84	105	211	126
17 Timber	4,899	3,442	63	3,231	2,850	4,160	2,682
19 Mtn. Hemlk		6,293	21	4,793	190	2,428	232

Significant Effects

Recreation: Current roadless recreation opportunities would not be significantly affected by implementation of most of the alternatives. Alternative C would leave the area entirely roadless through the end of the fifth decade. Alternative A, the alternative taking the greatest amount of area from roadless status, retains 93% of the area as roadless through the end of the fifth decade. Alternatives A, NC, B, H, I and J (Preferred) allocate acres to semi-primitive motorized recreation. Alternative A allocates 3% of the area to this prescription and alternative I allocates 49%.

Fish/Wildlife: Fish and wildlife would not be significantly affected by implementation of any of the alternatives. Alternatives B, H and I allocate the greatest area to old growth habitat, mature old growth, deer and elk enhancement and mountain goat management requirement. Alternatives A, NC and J (Preferred) allocated the least.

Water: There are no adverse effects to the water resource of this area associated with implementation of any of the alternatives, due to the low level of proposed development activities

Ecology: The overall ecology of the area would not be significantly affected by implementation of any of the alternatives, due to the low level of proposed development activities.

Timber: Alternative C would have the least affect on the existing timber resource, as it allocates very minimal acreage to Management Area 17 (timber). Alternatives A, NC, B, G-modified and I would have the greatest effects. None of the alternatives would significantly affect the timber resource, as potential development activities would be minimal.

Minerals/Oil/Gas: None of the alternatives would have a significant affect on the availability of minerals, oil or gas for development. Alternatives A, NC and H would provide a slightly higher amount of roaded access through the area for minerals development.

Cultural: Alternatives A, NC, B and I would have the greatest potential to adversely impact cultural resources within the area, due to development activities. Valuable sites would be protected via avoidance or conserved through data recovery. Alternatives C, H and J (Preferred) would have the least potential to adversely impact cultural resources.

Land Use Authorizations: Alternatives C and G-modified would dictate cancellation of the existing Memorandum of Understanding for off-road vehicle use of the Canyon Ridge Trail (#689).

Fire: None of the alternatives would significantly affect fire occurrence within the area.

Insect and Disease: None of the alternatives would significantly affect the occurrence of insects and disease within the area.

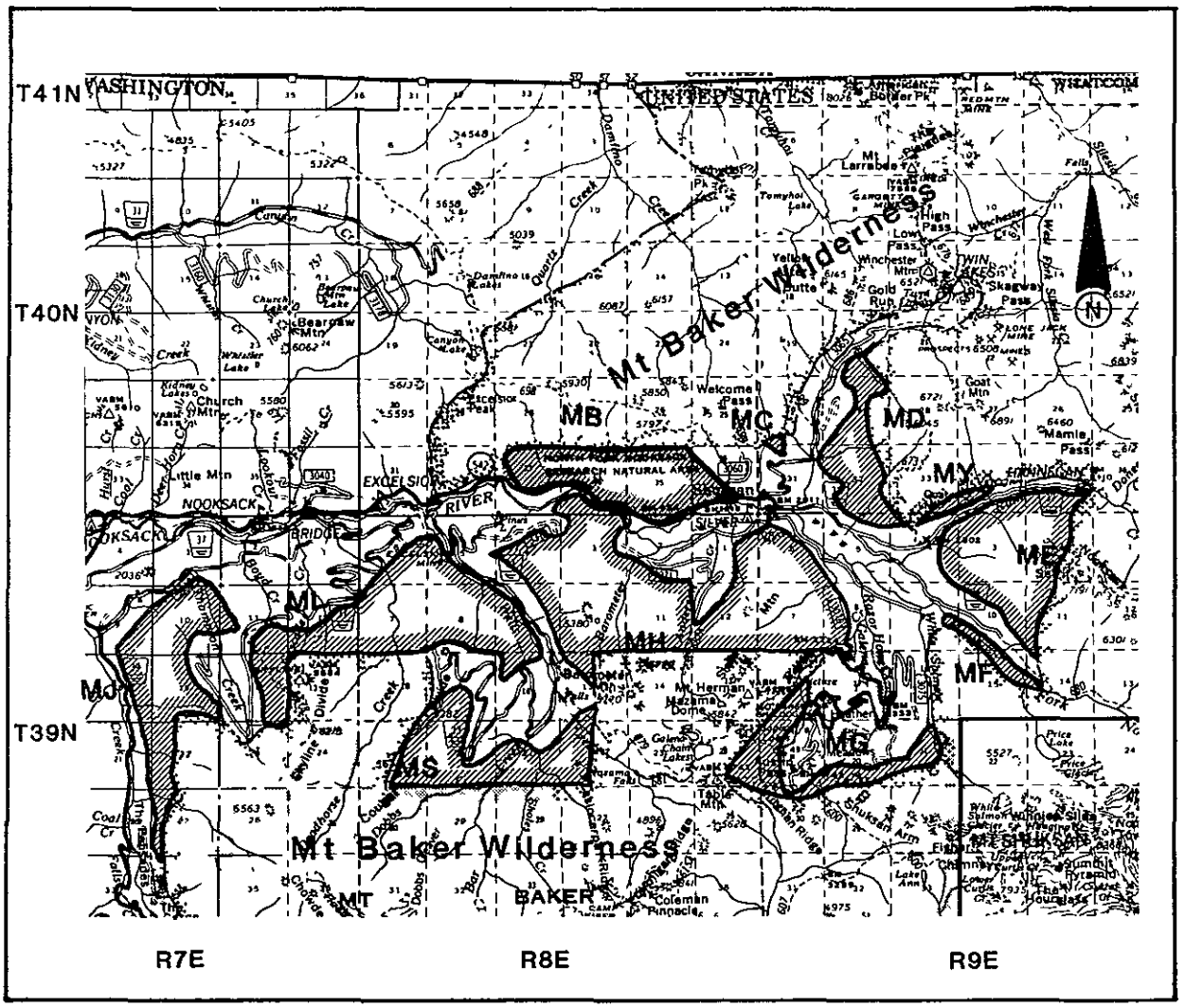
Wilderness Potential: All alternatives, with the exception of I, assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I assigns approximately one-half of the area to the semi-primitive motorized management area and one sixth of the area to timber management. All alternatives would maintain over 93% of the area in a roadless condition through the end of the fifth decade. The wilderness potential would be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

	Undeveloped Acres			Percent
Alternative	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	24,311	23,855	23,411	93%
B (RPA)	24,737	24,423	24,116	96%
C	25,031	25,021	25,009	100%
G-Mod.	24,716	24,372	24,042	96%
H	24,611	24,055	23,526	94%
I	24,746	24,398	24,065	96%
J (Pref).	24,866	24,668	24,482	98%

Mt. Baker (North Block)

Roadless Area 6041



MT. BAKER (NORTH BLOCK) **Roadless Area 6041 (MJ, MI, MS, MB, MH, MG, MC, MD, MY, ME, MF)**

The second block of the Mt. Baker Roadless Area - North Block - consists of 11 parcels totaling 16,425 acres It was originally inventoried for study as potential wilderness during the RARE II process The RARE II decision assigned Area 6041 to nonwilderness uses. The following shows the disposition of acres within the North Block. One timber sale, Nanny Goat, was sold under contract in 1985; it removed 207 acres from roadless status. The area was reduced by four acres due to a mapping discrepancy. The following shows the disposition of acres within North Block:

Mt. Baker (North Block)	**Net Acres**
1984 RARE II	16,636
updated 1988	16,425
Change	**- 211**

OVERVIEW

As shown on the map, the North Block of the Mt. Baker Roadless area includes parcels on either side of the Mt. Baker Highway, adjacent to the wilderness, and on either side of the North Fork Nooksack River. Numerous roads provide access including: Mt.Baker Highway (#542), Thompson Creek Road (#3910), Wells Creek Road (#33), Razor Hone Road (#3070), Smith Basin Road (#3940), North Fork Nooksack Road (#34), Deadhorse Road (#37), and Hannegan Road (#32).

Portions of a number of creeks that drain into the North Fork of the Nooksack run through the eleven parcels, from Glacier Creek on the west to the mid-reaches of Ruth Creek on the east. Included are portions of Thompson, Upper Boyd, Cascade, Deadhorse, Bar, Wells, Barometer, and Anderson Creeks. The terrain is moderate in the valley bottoms and rugged on the higher slopes and ridges. Elevations range from 1,500 feet near Glacier Creek to 6,015 feet on an un-named peak in the eastern-most parcel.

Vegetation type varies from heavily forested slopes and valleys at lower elevations to meadowed ridges along Skyline Divide and adjacent to the Austin Pass-Heather Meadows area (parcel MG). The predominant cover types below 2,800 feet elevation are Douglas-fir and western hemlock, with some western redcedar on wetter sites. Above 2,800 feet, Pacific silver fir and western hemlock are predominant, with some mountain hemlock at the higher elevations of tne forested range (4,000-5,500 feet).

Soils vary with unstable portions adjacent to Thompson Creek and other tributaries to Glacier Creek, Wells Creek, Bar Creek, Barometer Creek, and on the sideslopes southeast of Ruth Creek. There are shallow, residual soils on the upper slopes of Slate Mountain and high elevation alpine soils (ranging from deep glacial till to shallow residual volcanic soil) in parcel MG.

The area provides a variety of recreation opportunity, with heavy use concentrated in parcel MG, which is adjacent to the Mt. Baker Ski Area and other developed recreation sites near Mt. Baker. Parcel MB is the North Fork Nooksack Research Natural Area. The North Block parcels contain a diversity of wildlife habitat and provides several areas of important mountain goat use.

WILDERNESS CAPABILITY

Manageability and Boundaries: The small size of the North Block parcels would not affect their manageability since all are adjacent to Mt. Baker Wilderness. Portions of parcels MJ and MS would be difficult to manage as wilderness since nearby logging spurs and flat terrain make vehicle trespass possible. The North Fork Nooksack Research Natural Area (parcel MB) would have little conflict with wilderness designation, but boundary locations could be difficult to establish due to lack of identifiable features.

Natural Integrity and Appearance: Most of the area has a natural appearance. Parcel MB shows evidence of little to no human disturbance.

Opportunities For Solitude: Opportunities for solitude in most of these parcels are low due to their proximity to existing roads, logging activity, and developed recreation sites.

Opportunities For Primitive Recreation: Opportunities for primitive recreation are minimal due to overall proximity of existing roads and developed recreation sites. Opportunities increase closer to the existing wilderness boundary in the larger parcels such as parcel MH.

Challenging Experiences: The North Block parcels offer challenging experiences such as cross-country hiking, mountaineering, and nordic skiing.

Special Features: The 1,407 acre North Fork Nooksack River Research Natural Area is located within parcel MB. The RNA was set aside in 1934 to represent Douglas-fir and western hemlock forests in a 75 year old burn. Also included is a variety of subalpine, meadow communities. The new Artist Ridge trail crosses parcel MG; part of Phase I, Heather Meadows Capital Investment Program, the trail includes interpretive signs.

AVAILABILITY FOR WILDERNESS

Availability for wilderness is covered in two parts: the summary table on the next page and the following discussions of other resource potential in the North Block roadless area parcels.

Availability - Other Resource Potential

Recreation: There are a variety of recreational opportunities associated with Mt. Baker and the surrounding area. The Skyline Divide Trail #678 provides access to meadows and ridges of Mt. Baker. Parcel MG, near Mt. Baker Ski Area, is characterized by extensive recreational development, including the Artist Ridge Interpretive Trail. There is also very heavy dispersed recreation use (hiking, climbing, cross-country skiing) in Parcel MG. Most other areas are by-passed by recreationists on their way to wilderness.

Summary Table - Mt. Baker (North Block) #6041

Category 1/	Unit	Parcels MJ	MI	MS	MB	MH	MG	MC	MD	MY	ME	MF	Total
Acres (Minus water, private land)	Acres	1,901	2,533	1,668	1,456	4,688	1,204	84	718	168	1,752	253	16,425
Primitive/Semi-Primitive Recreation ROS	Acres	337	781	823	739	2,386	0	0	591	0	1,034	0	6,691
Timber													
Tentatively Suitable	Acres	1,689	1,752	591	105	2,787	63	42	612	168	802	232	8,843
Tent. Suitable, Inaccessible	Acres	0	0	190	63	359	0	0	21	21	63	0	717
Tent. Suitable Standing Volume	M bdft	66,086	68,551	23,124	4,108	109,047	2,465	1,643	23,945	6,573	31,380	9,078	346,000
"Old Growth," Total Acres	Acres	126	2,216	1,329	1,245	3,061	105	21	105	42	886	210	9,346
0-2,500 Feet Elevation	Acres	0	253	0	464	443	0	0	0	0	0	42	1,202
2,500-4,000 Feet Elevation	Acres	63	1,077	675	739	1,837	84	21	105	42	654	168	5,465
4,000 + Feet Elevation	Acres	63	886	654	42	781	21	0	0	0	232	0	2,679
Management Indicator Species													
Spotted owl MR	Acres	0	1,203	337	119	781	0	0	0	0	633	211	4,284
Pileated Woodpecker, Marten MR	Acres	0	0	0	0	0	0	0	0	0	0	0	0
Elk-deer winter range	Acres	485	84	0	253	380	0	0	0	168	0	0	1,370
Goat Habitat MR	Acres	0	612	0	105	570	0	0	42	42	0	0	1,371
Bald Eagle Habitat 2/	Acres	0	0	0	0	0	0	0	0	0	0	0	0
Locatable Mineral Development Potential													
High	Acres	0	84	0	0	0	0	0	0	0	0	0	84
Moderate	Acres	0	570	0	0	126	0	0	0	0	0	0	696
Low	Acres	1,900	1,879	1,668	1,457	4,561	1,203	84	718	0	1,752	253	15,475
Claims 3/	# of	-	-	-	-	-	-	-	-	-	-	-	39
Leasable Energy Minerals (Moderate Potential)													
Oil, Gas, Geothermal	Acres	359	0	0	0	0	0	0	0	0	0	0	359
Geothermal	Acres	1,531	2,534	1,668	1,457	4,688	1,203	84	718	168	1,752	253	16,056

1/ American Indian Religious and Cultural areas were analyzed. Site specific information is not disclosed due to its sensitivity.
2/ Includes nest sites, forage areas, and roost areas.
3/ Number of claims is not broken out by parcel.

Wildlife: Wildlife use of the 11 different parcels is quite diverse.

Parcel MJ contains important mountain goat winter range above the Palisades near Smith Basin. The cliffs and bluffs here are heavily used by goats during the winter and spring; the habitat is critical to the herds survival. Small tributaries to Glacier and Thompson Creeks support odd-year pink salmon runs. Thompson Creek provided spawning habitat for 10% of the total North Fork Nooksack River pink salmon run in 1983. Other salmonoid species include coho and chinook salmon, steelhead, cutthroat trout, and dolly varden charr. Duringruns of pink and coho salmon, bald eagles forage in lower Glacier and Thompson Creeks.

Spotted owl habitat exists in the eastern portion of parcel MI along Wells Creek. Lower portions of Deadhorse, Boyd, and Cascade Creeks provide important steelhead trout, coho, pink and chinook salmon spawning and rearing habitat. Resident rainbow, cutthroat trout, and dolly varden charr utilize the upper portions of most of these streams.

Some resident trout utilize the upper portions of Bar Creek and Wells Creek in parcel MJ.

Parcel MH contains critical winter and spring range for the Barometer Mountain goat herd. There are some resident trout in portions of Barometer, Anderson, and Bagley Creeks. Some of parcel MH lies in Spotted owl habitat.

Parcel MY includes steep, south-facing slopes below 4,000 in elevation which may be entirely mountain goat winter range.

Portions of parcel MB are a Spotted owl habitat.

Parcel MD includes blacktail deer winter range on southwest-facing slopes below 3,000 feet. It may also be excellent habitat for the peregrine falcon, an endangered species.

Water: The entire area is tributary to the North Fork Nooksack River. Included are portions of Thompson Creek and other tributaries to Glacier, Boyd Cascade, Deadhorse, Bar, Wells, Barometer, and Anderson Creeks.

Livestock Operations: None.

Ecology: Vegetation varies from heavily-forested slopes and valleys at lower elevations (including cedar, Douglas-fir, true firs, and hemlock) to subalpine, high-elevation meadows.

Timber: Substantial commercial forest exists at all but the upper elevations. The southwest portion of parcel MH was burned in the mid-1950's (Barometer Mountain fire) and has not yet produced commercial timber; the rest of this parcel supports old growth forest but is steep and inaccessible by road except for the Slate Mountain area. All of parcel MG is alpine.

Minerals/Oil and Gas: The geology of the area is dominated by Jurassic volcanics, Jurassic/Cretaceous sedimentary and volcanic rocks, Permian volcanics, Tertiary granitics and alluvium of recent age. The area is reported to have occurrences of lode gold, copper, iron, lead-zinc, and silver. Of these occurrences, the Wells Creek Gossan (Cu), the Great Excelsior gold-silver deposit, and Iron Cap and Tooker-Leshud iron-gold-silver deposits are of most interest. The Excelsior Mine receives extensive exploration work; a future operational mine is possible.

The entire area is classified "prospectively valuable" for geothermal, but only a very small part of the area is classified "prospectively valuable" for oil and gas resources. The area has had thirty-nine mining claims. The mineral resources of the area have not been inventoried by the U.S. Geological Survey and Bureau of Mines; but based upon available information the above mineralized areas are considered to have a moderate to high potential for future development.

Cultural: Various sites in the North Fork Nooksack River watershed are important for American Indian religious use.

Land Use Authorizations: There are no special land authorizations.

Non-Federal Lands: None.

Fire: There has been a low incidence of large fires in upper-elevation areas. Lower elevations in the vicinity of Thompson Creek, Boyd Creek, and Smith Basin show evidence of an extensive fire about 1885. The large Barometer Mountain fire occurred in the mid-1950's.

Insect and Disease: There are no known insect or disease concerns.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: The Mt. Baker North Block parcels are adjacent to or contiguous with the Mt. Baker Wilderness. Several small communities are located along the Mt. Baker Highway. Bellingham is approximately 45 miles west, and Vancouver, B.C. is approximately 70 miles away.

Public Interest: These parcels were identified as part of the Mt. Baker roadless area in RARE I and RARE II. In 1984, much of the original area was designated as part of the Mt. Baker Wilderness.

Public comment to the DEIS and Draft Forest Plan included site specific comments about the north parcels of Mt. Baker Roadless Area. They were mentioned 144 times, with most people wanting the area to remain roadless (35 comments), be protected from timber harvest (34 comments), and the ecosystem preserved (21). Four letters stated it was a top priority for harvest.

Protection of American Indian religious use, fisheries habitat, wildlife, and mountain goats was also mentioned. Area MG is considered very sensitive due to its proximity to Heather Meadows Recreation Area and the Mt. Baker ski area. 1/

Areas adjacent to the Mt. Baker Wilderness were mentioned 35 times. Eight comments said to keep the area roadless, four wanted the forest ecosystem preserved, and three desired protection of the old growth ecosystem. The majority of the remaining responses said to manage the area for recreation and wildlife habitat.

Thompson Creek was mentioned 9 times; 2 recommended building more roads, the rest wanted the area protected from harvest, etc. Deadhorse Creek was mentioned 8 times: 2 "build more roads" comments plus others to protect old growth, recreation values, wildlife, and fisheries. Protection of mountain goat habitat near Barometer Creek was a concern for 3 respondents.

ENVIRONMENTAL CONSEQUENCES

The following tables display how each roadless parcel is assigned in the alternatives considered. An assignment represents long-term management.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

MT. BAKER (NORTH BLOCK)

PARCEL MB

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
1B SPNM			42				
5 Potent W&S	21						
11 O-G Hab.		42		42	42	42	42
17 Timber	84						
18 RNA	1,351	1,414	1,414	1,414	1,414	1,414	1,414

PARCEL MC

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	42						
1B SPNM			42				
2A Foregrd.			42		63		63
2B Midgrd.					21		21
11 O-G Hab.				63			
17 Timber	42	84		21		84	

PARCEL MD

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	126						
1B SPNM			633	696	84		147
1D RN			42				
2A Foregrd.			21	21	63	84	21
2B Midgrd.					485		527
15 Goat MR		210	21		42	42	21
17 Timber	591	485			21	570	
19 Mtn. Hemlk		21			21	21	

PARCEL ME

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	1,013						
1A Prim.			485	527			
1B SPNM			1,161	1,119	1,626		1,668
1C SPM						760	
1D RN			21				
2A Foregrd.			21	63			
2B Midgrd.							42
3A Public	21	21	21	21	21	21	21
5 Potent W&S	42						
11 O-G Hab.		633	42	21	42	612	21
15 Goat MR		21					
17 Timber	675	464			63	359	
19 Mtn. Hemlk		612					

PARCEL MF

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	63						
1B SPNM			253	253			42
2B Midgrd.					21		
5 Potent W&S	190				21		42
11 O-G Hab.		211			211	211	168
17 Timber		42				42	

PARCEL MG

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Mt. Baker Rec Area	992						
1B SPNW			844	760	823		718
1C SPM		696				844	
1D RN			63				
2A Foregrd.			21	147	21		
2B Midgrd.					84		84
3C Winter	190	380	253	274	253	190	253
3D Private	21	21	21	21	21	21	21
8 Special							126
11 O-G Hab.						84	
17 Timber		84					
19 Mtn. Hemlk		21				63	

PARCEL MH

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	2,175						
Mt. Baker Rec Area	211						
1B SPNM		105	4,287	4,244	1,921		2,027
1C SPM						1,562	
1D RN			21				
2A Foregrd.			21		190	190	211
2B Midgrd.			147		1,520		1,457
5 Potent W&S	253		63	21	42		42
8 Special							21
11 O-G Hab.		718	84	295	739	781	696
14 D&R Enhanc		105					
15 Goat MR		886	42	21	190	443	232
17 Timber	2,048	2,154	21	105	84	1,710	
19 Mtn. Hemlk		718					

PARCEL MI

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	760						
1B SPNM		84	1,964	1,140			
2A Foregrd.			211			21	
2B Midgrd.					739		802
5 Potent W&S	42						
11 O-G Hab.	823	1,119	337	1,098	1,182	1,203	1,203
14 D&R Enhanc		21					
15 Goat MR		506		63	506	506	506
17 Timber	908	443		105	105	443	
19 Mtn. Hemlk		359	21	126		359	21

PARCEL MJ

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	147						
Mt. Baker Rec Area	21						
1B SPNM			1,816	485			
2A Foregrd.			42				
2B Midgrd.			42		1,689		1,900
14 D&E Enhanc		464				295	
15 Goat MR		443					
17 Timber	1,731	929		1,351	147	1,541	
19 Mtn. Hemlk		63		63	63	63	

PARCEL MS

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	929						
Mt. Baker Rec Area	380						
1B SPNM			1,647	1,140	1,562		1,520
1C SPM						570	
11 O-G Hab.	316	337		84	63	337	84
17 Timber	42	464				464	
19 Mtn. Hemlk		865	21	443	42	295	63

PARCEL MY

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	21						
1B SPNM			147	63			
2A Foregrd.				63			
2B Midgrd.					21		126
11 O-G Hab.				42			
15 Goat MR		147	21		42	42	42
17 Timber	147	21			105	126	

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by implementation of any of the alternatives. Alternatives C and G-Modified will, effectively, leave the area roadless through the end of the fifth decade. Alternative I will allocate about one-fifth of the area to semi-primitive motorized recreation. Alternatives A and NC will designate about 10% of the area as the Mt. Baker Recreation Area.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives. Alternatives B, H, I and J (Preferred) allocate the greatest amount of area to old growth habitat, mature old growth, deer and elk enhancement and mountain goat management requirement. Alternatives A,NC and C allocate the least.

Water: There are no adverse effects to the water resource of the area associated with any of the alternatives.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives.

Timber: Alternatives A, NC, B and I will have the greatest affect on the existing timber resources, as these allocate the greatest acreage to management area 17 (timber). Alternatives C and G-Modified will have the least. None of the alternatives will significantly affect the timber resource, as potential development activities will be minimal.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. Alternatives A, NC, B and I will provide a greater amount of roaded access through the area that could be used for minerals exploration and development.

Cultural: Alternatives A, NC, B and I will have the greatest potential for adverse impacts to cultural resources within the area, due to development activities. Alternatives C and G-Modified will have the least potential. Valuable sites will be protected via avoidance or conserved through data recovery.

Land Use Authorizations: None of the alternatives will significantly affect special land use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire within the area.

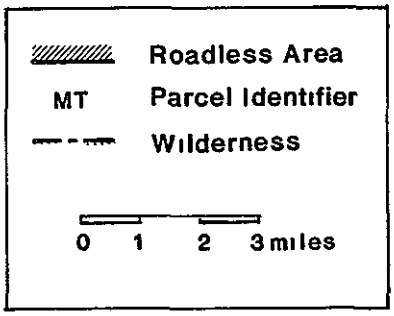
Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

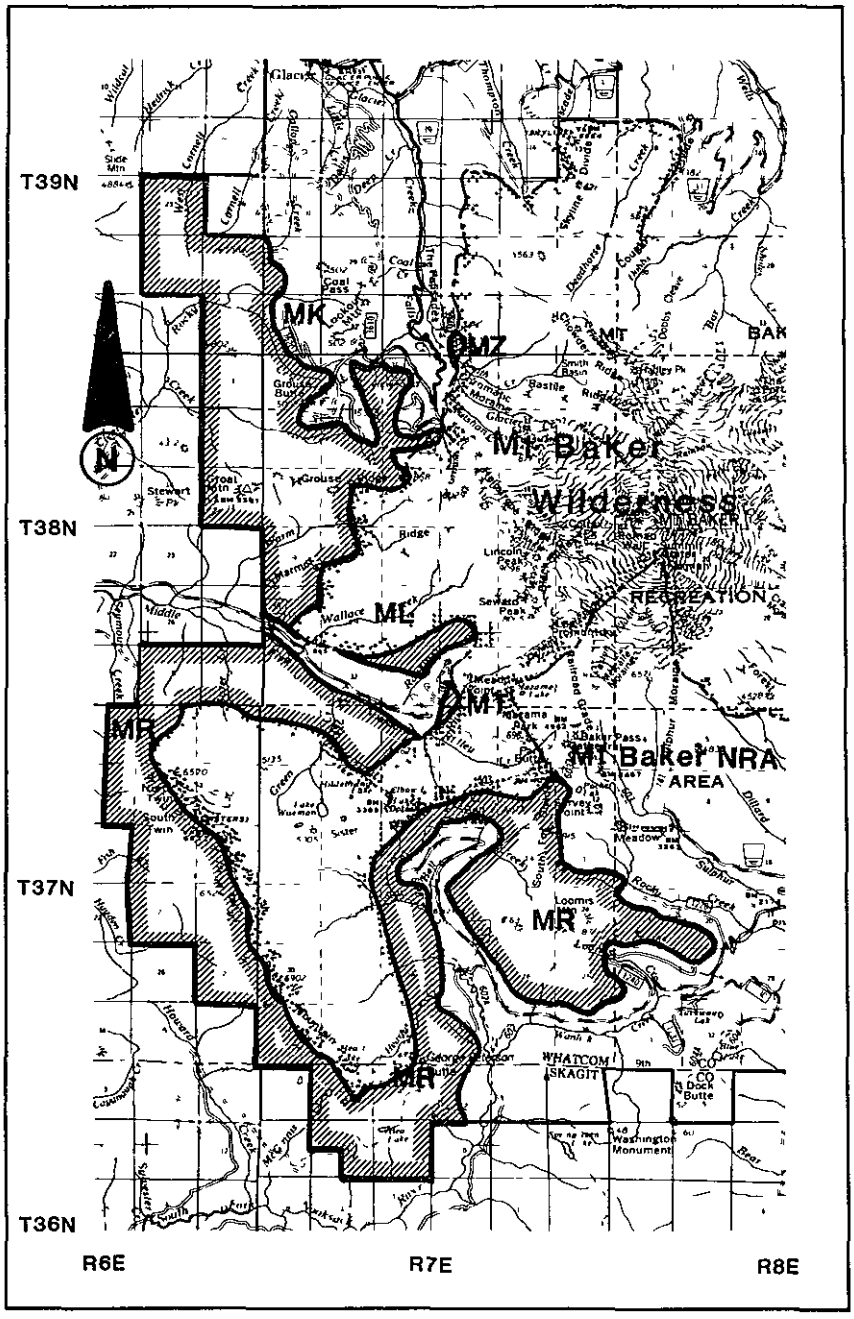
Wilderness Potential: All alternatives assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I assigns about one-fifth of the area to semi-primitive motorized recreation. Alternatives C and G-Modified would, effectively, maintain the area as roadless through the end of the fifth decade, maintaining wilderness potential. Alternatives A and NC, the alternatives which remove the greatest

amount of roadless area, will maintain 68% of the area in roadless status through the end of the fifth decade, thus losing wilderness potential on 1/3 of the acres in the roadless area.
The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	14,850	13,090	11,180	68%
B (RPA)	15,276	14,210	12,988	79%
C	16,266	16,102	15,861	97%
G-Mod.	16,167	15,985	15,800	96%
H	15,345	14,271	13,010	79%
I	15,201	14,025	12,657	77%
J (Pref).	15,714	14,742	13,688	83%

Mt. Baker (West Block)
Roadless Area 6041





MT. BAKER (WEST BLOCK) **Roadless Area 6041 (MK, MZ, ML, MT, MR)**

The third block of the Mt. Baker Roadless Area - West Block - consists of five parcels totaling 26,818 acres. It was originally inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6041 to nonwilderness uses. This area was reduced by two acres from its 1984 RARE II size due to a mapping discrepancy The following shows the disposition of acres within the Mt. Baker West Block roadless area:

Mt. Baker West Block	**Net Acres**
1984 RARE II	26,820
updated 1988	26,818
Change	- 2

OVERVIEW

These five parcels are located west of Mt. Baker Wilderness and southwest of the Mt Baker National Recreation Area Refer to the map on the next page. These lands include drainages to all three forks of the Nooksack River.

Access to the area is via several road systems: from the north by the Glacier Creek Road (#39), the Grouse Butte Road (#3600) and the Rocky Creek Road (#3620); from the west by the Middle Fork Nooksack Road (#38); and from the southeast by the Loomis-Nooksack Road (#12). Access from the west is also provided by several private logging roads.

The West Block parcels includes portions of Rocky, Clearwater, Warm, Rankin, Green, and Bell Creeks plus other tributaries to the Nooksack River system. Parcel MR wraps around the Twin Sisters Mountain range; on the west side, the ridgeline is the Wilderness boundary. Elevations range from 2,500 feet along the Middle Fork Nooksack River, to 6,932 feet at the summit of South Twin Mountain. Several peaks in the area exceed 5,000 feet - Groat Mountain (5,581 feet) and Loomis Mountain (5,587 feet) - and most of the area is located above 3,000 feet.

The predominant vegetative cover below 2,800 feet elevation is Douglas-fir and western hemlock, with some western redcedar on wetter sites. Above 2,800 feet, the predominant types are Pacific silver fir and western hemlock, with some mountain hemlock at the higher elevations of the forested range (4,000-5,500 feet).

To the north, there are unstable soils in the upper reaches of West Cornell Creek and adjacent to Clearwater Creek and Rocky Creek. Bedrock instability (inactive faults) occurs northwest of Wallace Creek and in the Warm Creek drainage adjacent to the Forest Boundary. There are also unstable soils adjacent to the lower reaches of Rankin Creek in parcel ML and on the steep lower slopes above the Middle Fork Nooksack River in parcel MT. To the south, there are localized occurrences of soil instability in the headwaters of Sisters, Green, Rish, Hayden, and McGinnis Creeks. There are also unstable soils south of Bear Lake adjacent to the Forest Boundary, on the sideslopes west of the South Fork Nooksack River, and adjacent to steep sideslope draws on the southwest side of Loomis Mountain.

This area contains a diversity of wildlife habitat, and provides important year-round range for elk and mountain goats.

WILDERNESS CAPABILITY

Manageability and Boundaries: In parcel MK, the meandering boundary adjacent to existing roads would be difficult to locate due to lack of definite landmarks. The north-south boundary of parcel ML lies on a midslope and would be difficult to locate. The Bell Creek parcel (MR) could experience vehicle trespass from elk hunters if designated wilderness or allocated to roadless recreation. The boundary west of the Sisters Range is well-defined.

Natural Integrity and Appearance: There is overall a natural appearance.

Opportunities For Solitude: Opportunities for solitude exist in the Warm Creek-Marmot Ridge parcel (MK), west of the Sisters Range parcel (MR), and in the vicinity of Loomis Mountain parcel (MR). Other parcels are close to existing roads where solitude is less likely.

Opportunities For Primitive Recreation: Parcels MK and MR provide the greatest opportunity for primitive recreation including hunting, cross-country hiking, camping, and mountaineering.

Challenging Experiences: Several peaks offer challenging mountaineering and cross-country skiing opportunities.

Special Features: The most prominent features are the Twin Sisters peaks on the border of the Mt. Baker Wilderness. Groat Mountain (5,581') is located in parcel MK and Loomis Mountain (5,587') is within parcel MR south of the NRA.

AVAILABILITY FOR WILDERNESS

Availability for wilderness is covered in two parts: the summary table on the next page and the following discussions of other resource potential in the Mt. Baker West Block parcels.

Availability - Other Resource Potential

Recreation: The Twin Sisters range is a popular mountain climbing area and a prominent visual attraction. The most often used climbing route is from the west. Elbow Lake Trail #697 receives moderate to low use, about 200 visitor use days per year The Bear Lake-Three Lakes area (accessible by cross-country routes) receives some use. South and southeast portions are heavily hunted for elk. Northern portions receive little recreational use.

Fish/Wildlife: In parcel MK Upper Warm Creek, Clearwater Creek and Rocky Creek are used in summer by elk. This use is expected to increase in the future. South slopes between Grouse Ridge and Warm Creek are heavily used by mountain goats as winter range. There are some resident trout in upper Clearwater and Rocky Creeks. Spotted owl habitat occupies a portion of this parcel.

In parcel MR the north slope forests above the Middle and South Forks Nooksack River contain elk summer range. During the winter the lower slopes along the Middle Fork Nooksack (below 2,300 feet) are used by these same herds. This habitat is important to survival of the herds The southwest-facing, old growth forest slopes of the Twin Sisters range (below 4,000 feet) are heavily used by mountain goats as winter range. This habitat is critical to this herds survival since much of their original winter range lies on private land and has been cut-over. This area may also be heavily used by elk during the summer.

Summary Table - Mt. Baker (West Block) #6041

Category 1/	Unit	Parcels MK	MZ	ML	MT	MR	Total
Acres (Minus water, private land)	Acres	8,468	42	591	127	17,590	26,818
Primitive/Semi-Primitive Recreation ROS	Acres	5,764	0	0	0	9,883	15,647
Timber							
Tentatively suitable	Acres	5,237	21	295	63	6,652	12,268
Tentatively suitable inaccessible	Acres	591	0	168	0	781	1,540
Tentatively suitable standing volume	M bdft	204,908	822	11,542	2,465	260,273	448,010
"Old Growth", Total Acres	Acres	6,187	42	274	0	9,249	15,752
0-2,500 Feet Elevation	Acres	0	0	21	0	1,985	2,006
2,500-4,000 Feet Elevation	Acres	4,920	42	190	0	6,251	11,403
4,000 + Feet Elevation	Acres	1,267	0	63	0	1,013	2,343
Management Indicator Species (MIS)							
Spotted Owl MR	Acres	971	42	0	0	2,259	3,272
Pileated Woodpecker and Marten MR	Acres	337	0	0	0	527	864
Elk-deer winter range	Acres	0	0	0	0	2,048	2,048
Goat Habitat MR	Acres	929	0	274	0	612	1,815
Bald Eagle Habitat 2/	Acres	0	0	0	0	0	0
Locatable Mineral Development Potential							
High	Acres	0	0	0	0	316	316
Moderate	Acres	0	0	0	0	9,629	9,629
Low	Acres	8,468	42	591	126	7,644	16,871
Claims 3/	# of	-	-	-	-	-	365
Leasable Energy Minerals (Moderate Potential)							
Oil, gas, coal, goethermal	Acres	549	0	0	0	0	549
Coal, geothermal	Acres	1,161	0	0	0	0	1,161
Geothermal	Acres	6,757	42	591	126	14,085	21,601

1/ American Indian religious and cultural areas were analyzed. Site specific information is not disclosed due to its sensitivity
2/ Includes nest sites, forage areas, and roost areas
3/ *Number of claims is not broken out by parcel.*

Portions west of the South Fork Nooksack River are also heavily used by summering elk. Many of the small headwater drainages are important elk breeding sites, with elk licks and wallows scattered throughout. The lower slopes below 2,300 feet provide critical elk winter range and succulent forage throughout the dry summers.

The area south of Loomis Mountain (parcel MR also) is used by large herds of mountain goat and elk. It is one of the most important elk areas on the Mt. Baker District, providing elk with breeding areas, wallows, licks, hiding cover, thermal cover, and forage. The upper meadows are used as summer range by mountain goats. These goats winter on steep south and southwest-facing slopes below Loomis Mountain. The Loomis Mountain area also supports cougar, black bear, large deer herds, and may other species. A raptor migration route is apparent. Important salmon and anadromous trout habitat exists here as well.

Water: Drainages include portions of Rocky Creek, Clearwater Creek, Warm Creek, Rankin Creek, Green Creek, Bell Creek and other segments of the Nooksack system. Three Lakes and Bear Lake are located to the south. The Middle Fork Nooksack drainage furnishes a portion of the municipal water supply for the city of Bellingham.

Livestock Operations: None.

Ecology: The predominant forest community types below 4,000 feet are Pacific silver fir and western hemlock. There is a high proportion of mid to high-elevation land which does not support commercial timber. The Grouse Butte-Groat Mountain-Grouse Ridge portion is steep and rocky. The west slopes of the Twin Sisters Range support mountain hemlock/Pacific silver fir at lower elevations, subalpine vegetation on the midslope, and are steep and rocky near the crest. The rugged, upper slopes of Loomis Mountain feature subalpine forest and meadows.

Timber: Northern portions are primarily commercial forest except in the vicinity of Grouse Butte-Groat Mountain-Grouse Ridge. Southern portions have substantial commercial forest except for the slopes of the Twin Sisters Range. Timber harvest has occurred on nearly all the adjacent non-National Forest land.

Minerals/Oil and Gas: The geology of the area is dominated by pre-Upper Jurassic metamorphic rocks, Permian sedimentary and volcanic rocks, Tertiary dunite, Pleistocene to recent volcanics, and by alluvium and glacial drift of Quaternary age. The area has reported occurrences of chromite, asbestos, olivine, and limestone. Of most interest are the olivine and chromite occurrences. The olivine deposits are very large and will serve any foreseeable demand. The known chromite resources are small, and there is little present interest in this type of deposit.

Nearly the entire area is classified "prospectively valuable" for geothermal resources, however, only a small portion of the area is classified "prospectively valuable" for coal, oil, and gas. The area has had 365 mining claims, indicating a continuing interest in the area's potential for olivine and chromite. The area's mineral resources have not been inventoried by the U.S. Geological Survey and Bureau of Mines. But, based upon available data, localized portions of the area have a high potential for olivine development, and according to Lawson and Evarts (1983), the area has "high" potential for the occurrences of chromite resources.

Cultural: Various sites, including some near Bell Creek and Warm Creek, are important for American Indian religious use.

Land Use Authorizations: There are no special land authorizations.

Non-Federal Lands: A total of 320 acres of non-Federal lands are contained within these parcels.

Fire: Fire incidence is generally low. There is evidence of past fires on the south-facing slopes of the Sisters range. There is evidence of some large fires about 100 years ago in lower Cornell Creek.

Insect and Disease: There are no known insect or disease concerns.

WILDERNESS EVALUATION

Proximity to other Designated Wilderness and to Population Centers: These parcels are adjacent to the Mt. Baker Wilderness and Mt. Baker National Recreation Area Sedro Woolley is 30 miles away, Bellingham is 50 miles away and Vancouver, B.C. is 100 miles away.

Public Interest: Following release of the DEIS and Proposed Forest Plan, public comments were received on the Mt. Baker Roadless Area (West Block), as well as on specific geographic sites and features within this area, and on the area in a general sense.

Mt. Baker Roadless Area West was mentioned 18 times. Five comments said to make the area a top priority for harvest . Most of the remaining responses favored managing the area for nonmotorized recreation, and protection of wildlife habitat and visual quality. One comment wanted the area protected as an American Indian Religious Site. 1/

Mt. Baker parcel MR was mentioned four times. Two comments said to preserve the area as valuable low-elevation old growth. One favored designation at MA 1 AB (primitive/semi-primitive nonmotorized). One comment wanted protection for the old growth ecosystem.

The Mt. Baker Roadless Area, in it's entirety, was mentioned 214 times. Responses said to keep the area roadless (63), protect it from harvest (27), preserve the forest ecosystem (20), add more SOHA's in the area (17), protect it as an American Indian Religious Site (16), and protect the old growth ecosystem (15). The majority of the remaining comments favored managing the area for recreation, and protection of wildlife habitat, fisheries, and visual quality

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person **could** mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

Areas adjacent to the Mt. Baker Wilderness Area were mentioned 35 times. Comments said to keep the area roadless (8), preserve the forest ecosystem (4), protect the old growth ecosystem (3), protect the area from harvest (2), and protect it as an American Indian Religious Site (2). Most of the remaining comments said to manage the area for recreation, and protection of wildlife habitat and visual quality. One response expressed the desire to have this area added to the National Park System.

Loomis Mountain was mentioned 226 times. Responses favored protecting the area for elk calving and Mountain Goat winter range (45), protecting it from harvest (42), preserving the forest ecosystem (35), keeping the area roadless (34), protecting wildlife habitat (13), and protecting the old growth ecosystem (10). The majority of the remaining comments said the area should be managed for recreation, and protection of wildlife habitat and scenic quality. One comment favored making this area a top priority for timber harvest.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

MT. BAKER (WEST BLOCK)

PARCEL MK

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp Rec	4,730						
1A Prim.			401				
1B SPNM			1,309	4,941	337		422
1C SPM		1,921				1,942	
2B Midgrd.					506		908
5 Potent W&S	21		21	21			
11 O-G Hab.	105	971	760	464	844	739	760
12 Mature O-G	295	337	337	337	337	337	337
15 Goat MR		1,098	718	21	802	718	718
17 Timber	549	865		971	401	929	
19 Mtn. Hemlk		295	865	253	886	168	886
23A Otr Wtshd	2,766	2,977		1,414	4,350	3,632	4,434
23B Otr Wtshd			4,054				

PARCEL ML

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	105						
Mt. Baker Rec Area	211						
1B SPNM				591			
1C SPM						190	
14 D&E Enhanc		63	63		63		63
15 Goat MR		274	274		274	274	274
19 Mtn. Hemlk		253	253		253	63	253
23A Otr Wtshd	274						63

PARCEL MR

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	11,108						
Mt. Baker Rec Area	929						
1A Prim.							3,843
1B SPNM		5,364	13,051	13,452	9,629		6,251
1C SPM						7,856	633
1D RN		506			527		42
2A Foregrd.			42	21			
2B Midgrd.			105				
5 Potent W&S	696		865	274			400
8 Special				3,104			
11 O-G Hab.	1,520	2,069	105	105	1,436	2,175	950
12 Mature O-G	147	464	63		84	527	84
14 D&E Enhanc		1,921	506	42	1,457	908	1,055
15 Goat MR		569	21	21	21	401	21
17 Timber	2,428	2,639		190	1,668	3,146	1,098
19 Mtn. Hemlk		3,019	1,457	380	1,647	1,119	1,647
23A Otr Wtshd	760	1,034			1,119	1,457	1,562
23B Otr Wtshd			1,372				

PARCEL MT

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	42						
Mt. Baker Rec Area	84						
1B SPNM				126			
5 Potent W&S			105				
15 Goat MR		105					
23A Otr Wtshd		21			126	126	126
23B Otr Wtshd			21				

PARCEL MZ

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Mt. Baker Rec Area	42						
1B SPNM			42	42	42		42
11 O-G Hab		42				42	

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives. Alternatives C and G-Modified will leave the area virtually unroaded through the end of the fifth decade. Alternative I will allocated about 40% of the area to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives. Alternatives B, H and I will allocate the greatest amount of acreage to old growth habitat, mature old growth, and mountain goat management requirement prescriptions. Alternatives A, NC, C and G-Modified allocated the least.

Water: There are no adverse effects to the water resources of this area associated with any of the alternatives, due to the low level of proposed development activities.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives, due to the low level of proposed development activity.

Timber: Alternatives B and I allocate the greatest acreage to timber management. Alternatives C, G-Modified and J (Preferred) allocate the least. None of the alternatives will significantly affect the timber resource due to the low level of harvest activity planned.

Minerals/Oil/Gas: None of the alternatives will significantly affect the availability of minerals, oil or gas for development. Alternatives B and I will provide greater roaded access through the area, which could be used for mineral exploration and development.

Cultural: Alternatives B and I have the greatest potential to adversely impact the cultural resources of the area, due to their level of development activity. Alternatives C and G-Modified will have the least potential. Valuable sites will be protected via avoidance or preserved through data recovery.

Land Use Authorizations: None of the alternatives will significantly affect special land use authorizations.

Fire: None of the alternatives will have a significant affect on the occurrence of fire within the area.

Insect and Disease: None of the alternatives will have a significant affect on the occurrence of insects and disease within the area.

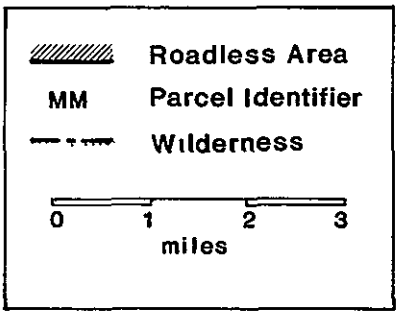
Wilderness Potential: All alternatives, with the exception of I, assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I assigns approximately one-half of the area to semi-primitive motorized recreation and timber management prescriptions. Alternatives C and G-Modified will maintain the majority of the area in a predominately roadless condition through the end of the fifth decade. The wilderness potential will be maintained. Alternatives H and J (Preferred) will maintain approximately three-quarters of the area in a roadless condition through the end of the fifth decade. Alternatives A, B, and I will maintain approximately two-thirds of the area in a roadless condition through the end of the fifth decade.

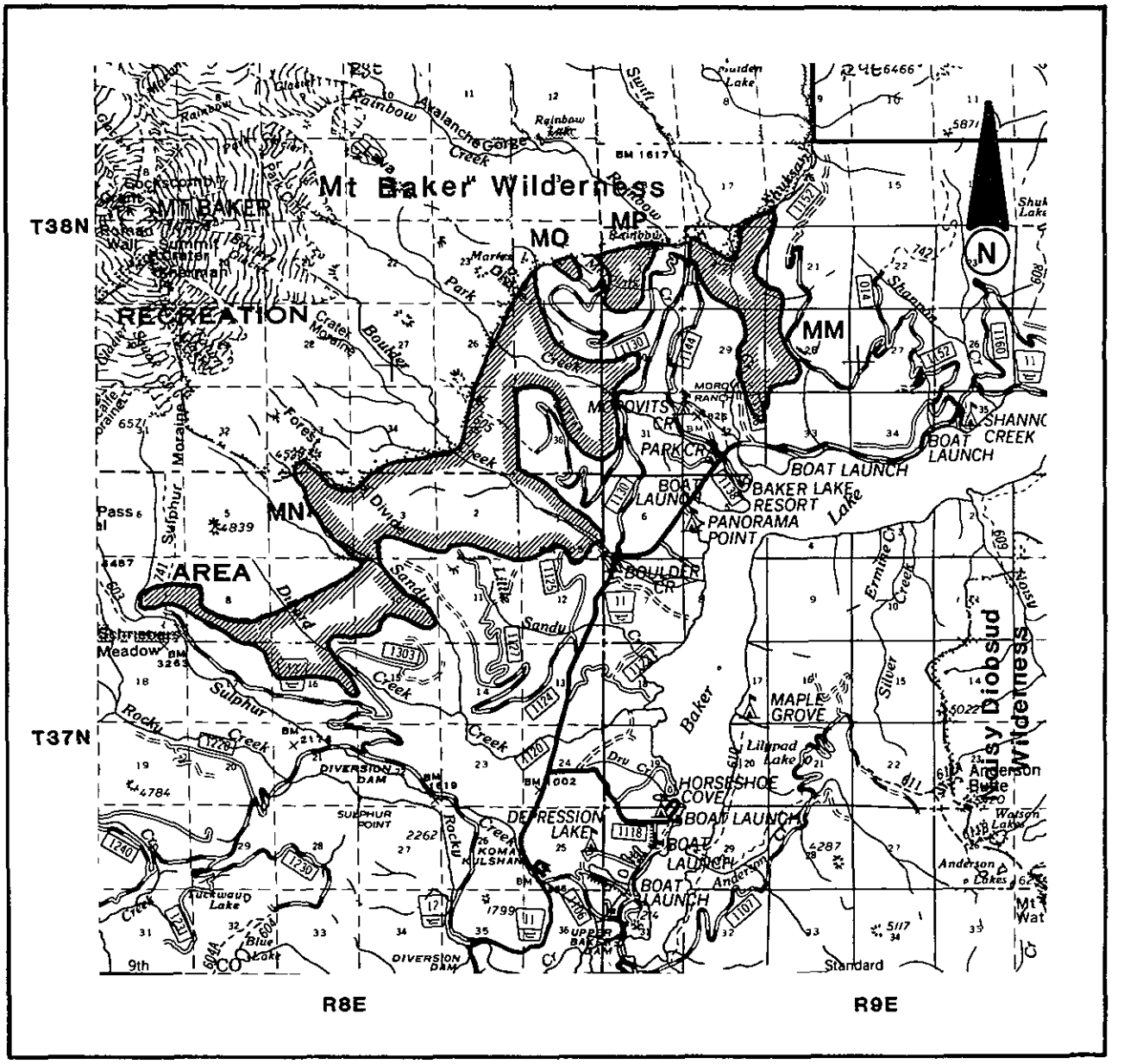
The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	23,797	20,253	16,868	63%
B (RPA)	24,142	21,144	18,203	68%
C	26,620	26,454	26,237	98%
G-Mod.	26,359	25,949	25,487	95%
H	24,649	22,309	19,878	74%
I	24,073	20,959	17,901	67%
J (Pref)	24,898	22,896	20,803	78%

Mt. Baker (South Block)

Roadless Area 6041





MT. BAKER (SOUTH BLOCK) **Roadless Area 6041 (MN, MO, MP, MM)**

The Mt. Baker RARE II area originally contained 271,900 acres. Of this amount, 117,528 acres were legislated Mt. Baker Wilderness and 14,133 acres were legislated Noisy Diobsud Wilderness.

Remaining parcels of the RARE II Mt Baker Roadless Area consist of 126,201 acres This area was divided for ease of analysis into five blocks: Canyon Creek, Mt Baker North, Mt. Baker West, Mt. Baker South, and Noisy Diobsud. The following presents analysis of the Mt. Baker South Block.

This roadless area block consists of four parcels totaling 6,375 acres. It was originally inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6041 to nonwilderness uses.

In 1984, portions of the Hi Boy Timber Sale were sold under contract within this roadless area block. The sale removed 188 acres from roadless status. In 1985, the Tip Top Timber Sale removed 139 acres within the area from roadless status. The area was increased by 12 acres in 1988 due to a mapping discrepancy

The following shows the disposition of acres within the Mt. Baker South Block roadless area:

Mt. Baker (South Block)	**Net Acres**
1984 RARE II	6,690
updated 1988	6,375
Change	**- 315**

OVERVIEW

These parcels are located southeast of the Mt. Baker Wilderness and Mt. Baker National Recreation Area (NRA). The area includes lower and mid-reaches of several streams, all of which drain into the Baker Lake Reservoir.

Several roads provide access from the south and east: the Schriebers Meadows Road (#13), the Sandy Creek Road (#1124), the Marten Lake Road (#1130), the Boulder Ridge Road (#1131), the Morovitz Creek Road (#1144), and the Shuksan Creek Road (#1152).

These parcels include portions of Swift Creek, Morovitz Creek, Park Creek, Boulder Creek, and Dillard Creek. Elevations range from 1,200 feet to 4,500 feet with most of the area at less than 3,000 feet Soils are variable, with shallow, residual soils occurring on upper sideslopes and ridgetops. There are steep unstable soils adjacent to the Boulder Creek channel and sideslope draws, and adjacent to Morovitz Creek and the east side of Swift Creek.

The predominant cover types below 2,800 feet are Douglas-fir and western hemlock, with some western redcedar on wetter sites. Above 2,800 feet, the predominant types are Pacific silver fir and western hemlock, with some mountain hemlock at the higher elevations of the forested range (4,000-5,500 feet).

Critical habitat is provided for several large herds of mountain goats.

WILDERNESS CAPABILITY

Manageability and Boundaries: These parcels are small, and boundaries would be difficult to locate due to lack of definable characteristics on the ground. Manageability would be difficult due to the proximity of several roads.

Natural Integrity and Appearance: These parcels are heavily forested and somewhat isolated by deep valleys and mountain streams.

Opportunities For Solitude: The greatest degree of solitude would be provided in brushy stream bottoms.

Opportunities For Primitive Recreation: There are few opportunities for primitive recreation activities due to adjacent roads.

Challenging Experiences: There are few opportunities for unusually challenging experiences.

Special Features: None.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Availability - Other Resource Potential

Recreation: The Boulder Ridge Trail #605 receives moderate to heavy use for day hiking and as climbing access to Mt. Baker. The Swift Creek Trail #607 is moderately used. Other recreational attractions include Rainbow Falls, and stream fishing in Rainbow, Park and Boulder Creeks. Most areas are hunted extensively during deer season.

Fish/Wildlife: These parcels are very important to several large herds of mountain goats which spend each winter on southwest-facing slopes above Dillard Creek, Sandy Creek, Boulder Creek, and Park Creek. Each one of these drainages is used by a different herd of goats and provides steep-timbered slopes critical to the goats' winter survival. The lower, less steep portions of these same slopes are used by deer throughout the winter and may also be important to their survival.

Elk are becoming very common in the Baker Lake basin and have started wintering in this region. This herd is expected to increase in size and become an important component of the local wildlife. Currently, elk winter in the Baker Hot Springs region and in flat land old growth forest locations near Baker Lake parcel (MM). Swift Creek has important resident trout populations, and there are resident trout in portions of Dillard, Sandy and Park Creeks.

Other special wildlife habitats include habitat for spotted owl, pileated woodpecker and pine marten.

Water: Drainages flowing into Baker Lake Reservoir include Swift Creek, Morovitz Creek, Park Creek, Boulder Creek, and Dillard Creek.

Livestock Operations: None.

Summary Table - Mt. Baker (South Block) #6041

Category 1/	Unit	Parcels MN	MO	MP	MM	Total
Acres (Minus water, private land)	Acres	5,322	63	146	844	6,375
Primitive/Semi-Primitive Recreation ROS	Acres	1,710	0	0	0	1,710
Timber						
Tentatively suitable	Acres	3,568	63	84	760	4,475
Tentatively suitable inaccessible	Acres	908	0	0	0	908
Tentatively suitable standing volume	M bdft	139,605	2,645	3,287	29,737	175,093
"Old Growth", Total Acres	Acres	4,286	42	105	696	5,129
0-2,500 Feet Elevation	Acres	2,175	0	63	696	2,934
2,500-4,000 Feet Elevation	Acres	2,027	42	42	0	2,111
4,000 + Feet Elevation	Acres	84	0	0	0	84
Management Indicator Species (MIS)						
Spotted Owl MR	Acres	549	42	147	443	1,181
Pileated Woodpecker and Marten MR	Acres	21	42	0	0	63
Elk-deer winter range	Acres	1921	0	42	696	2,659
Goat habitat MR	Acres	485	0	0	42	527
Bald Eagle Habitat 2/	Acres	0	0	0	0	0
Locatable Mineral Development Potential						
High	Acres	0	0	0	0	0
Moderate	Acres	0	0	0	0	0
Low	Acres	5,321	63	147	884	6,375
Claims	# of	-	-	-	-	0
Leasable Energy Minerals (Moderate Potential)						
Geothermal	Acres	5,321	63	147	844	6,375

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.
2/ Includes nest sites, forage areas, and roost areas.

Ecology: Forest cover on these parcels is typical of the west Cascades, including cedar, Douglas-fir, true firs, and hemlock.

Timber: Seventy percent of the area supporting tentatively suitable commercial forest lands.

Mineral/Oil and Gas: The geology of the area is dominated by Permian aged sedimentary and volcanic rocks, and by volcanic rocks and glacial drift of Quaternary age The area has no reported occurrences of mineral resources, but it is classified "prospectively valuable" for geothermal resources. The area has no reported mining claims The mineral resources of the area have not been studied in detail by the U.S. Geological Survey and Bureau of Mines; but based upon available data the area has a relatively low potential for the occurrence of mineral resources other than geothermal.

Cultural Resources: Sites are located here which are important for American Indian religious use.

Land Use Authorizations: There are no special land authorizations here.

Non-Federal Lands: None.

Fire: There is a fairly high occurrence of small, isolated high-elevation lightning fires here.

Insect and Disease: There are no known insect or disease concerns.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: These parcels are adjacent to the Mt. Baker Wilderness and Mt. Baker National Recreation Area The town of Concrete is about 20 miles to the south. Larger population centers include Sedro Woolley (40 miles away), Bellingham (60 miles away), Seattle (110 miles away), and Vancouver, B.C. (110 miles away).

Public Interest: Following release of the DEIS and Proposed Forest Plan, public comments were received concerning the Mt. Baker Roadless Area south block, and also on the area to the southeast of Mt. Baker.

Mt. Baker Roadless Area south block was mentioned 13 times. Three responses wanted the area made a top priority for harvest. Other comments favored protection of visuals (2) and old growth ecosystems (2). The remaining responses said to manage the area for recreation and wildlife habitat. 1/

The southeast side of Mt. Baker was mentioned 106 times. Comments said to protect the area for spotted owl habitat (33), protect the old growth ecosystem (23), protect from harvest (8), preserve the forest ecosystem (6), and keep the area roadless (6). Most of the other responses wanted the area managed for recreation, wildlife habitat and visual quality. One response said to to make the area a top priority for harvest.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be

tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

MT. BAKER (SOUTH BLOCK)

PARCEL MM

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	63						
1B SPNM			802	401			
2A Foregrd.			42				
2B Midgrd.					316		316
11 O-G Hab.		443		316	443	443	443
14 D&E Enhanc		359			84	316	84
17 Timber	781	42		126		84	

PARCEL MN

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	485						
Mt. Baker Rec Area	3,083						
1B SPNM			4,223	4,350	1,647		2,724
1C SPM						549	
1D RN			42		84		
2A Foregrd.			549		21	21	359
2B Midgrd.			147		1,562		908
11 O-G Hab.	147	549	359	190	549	549	549
14 D&E Enhanc		1,267		63		823	190
15 Goat MR		591			316	485	316
17 Timber	1,604	2,175		527	696	2,618	274
19 Mtn. Hemlk		739		190	443	274	

PARCEL MO

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	63						
1B SPNM			63				
2B Midgrd.							21
11 O-G Hab.		42		42	42	42	42
17 Timber		21		21	21	21	

PARCEL MP

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	84						
11 O-G Hab.		147	147	147	147	147	147
17 Timber	63						

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives. Alternative C will leave the greatest amount of acres in roadless status through the end of the fifth decade. Alternatives A and NC allocate about one-half of the area to the Mt. Baker Recreation Area. Alternative I assigns about 10% of the area to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives, due to the low level of proposed development activity. Alternatives B, I and J (Preferred) allocate the greatest amount of the area to old growth habitat, deer and elk enhancement and mountain goat management requirement prescriptions. Alternatives A and C allocate the least.

Water: There will be no adverse effects to the water resource of this area associated with any of the alternatives, due to the low level of development activity planned.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives, due to the low level of proposed development activity.

Timber: Alternatives A, NC, B and I assign the greatest area to timber management. Alternatives C and J (Preferred) allocate the least. None of the alternatives will have a significant affect on the timber resource, as potential development activity is minimal.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. Alternatives B and I will provide a slightly greater amount of roaded access through the area, which could be used for mineral exploration and development.

Cultural: Alternatives B and I have the greatest potential to adversely impact cultural resources in the area. Alternatives C and G-Modified have the least. This is based on the planned level of development activity. Valuable sites will be protected via avoidance or conserved through data recovery.

Land Use Authorizations: None of the alternatives will significantly affect land special use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire within the area.

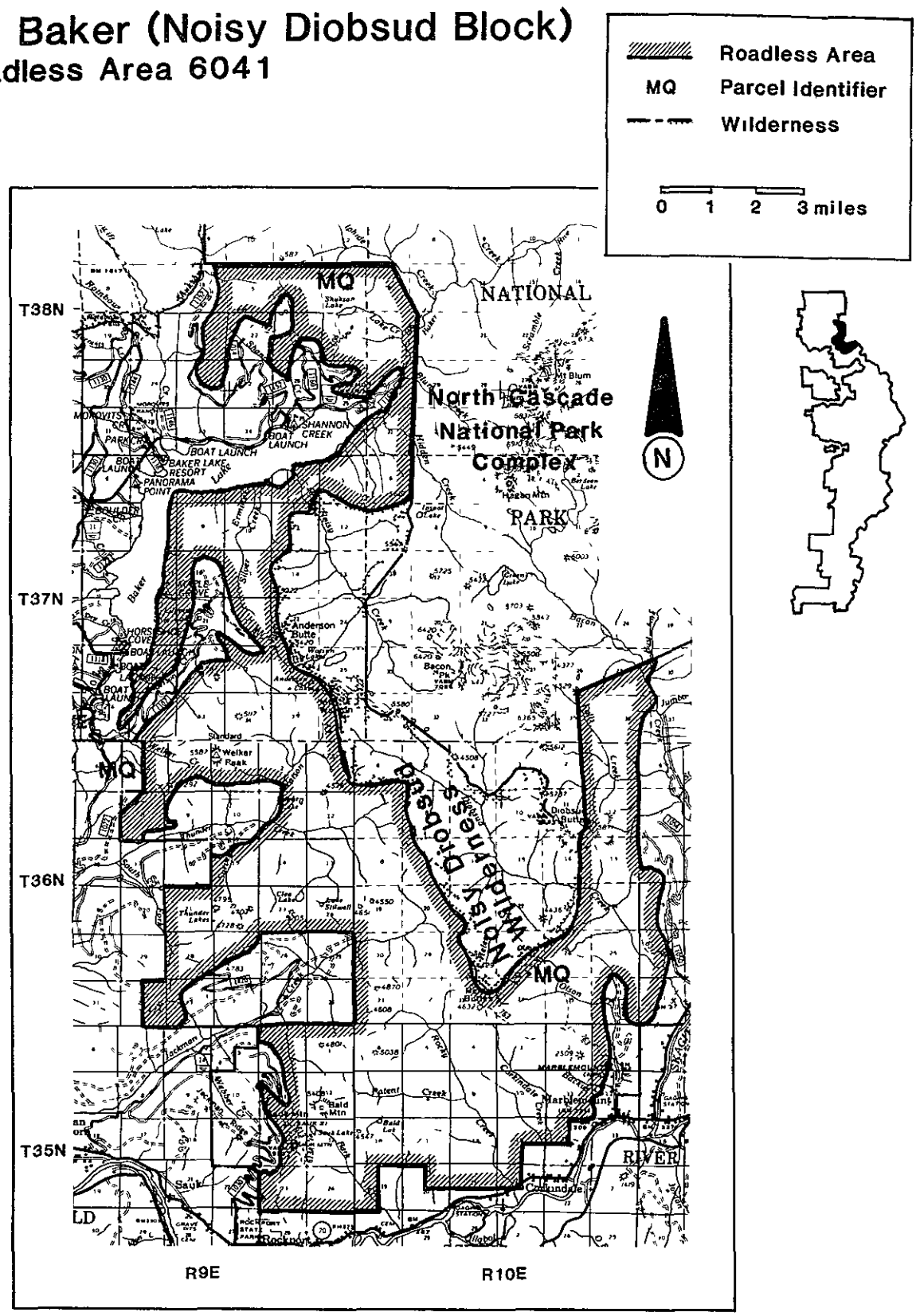
Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

Wilderness Potential: All alternatives, with the exception of I, assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I assigns about 10% of the area to semi-primitive motorized recreation and 40% of the area to timber management. Alternatives C and G-Modified will maintain the majority of the area in a predominately roadless condition through the end of the fifth decade. The wilderness potential will be maintained. Alternative J (Preferred) will maintain approximately 70% of the area in a predominately roadless condition through the end of the fifth decade. Alternatives A, NC, B, H, and I will

maintain approximately one- half of the area in a predominately roadless condition at the end of the fifth decade.
The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	5,235	4,367	3,427	54%
B (RPA)	5,235	4,245	2,922	46%
C	6,228	6,076	5,934	93%
G-Mod.	6,024	5,870	5,509	86%
H	5,238	4,152	3,116	49%
I	5,196	4,148	2,739	43%
J (Pref).	5,736	5,274	4,591	72%

Mt. Baker (Noisy Diobsud Block)
Roadless Area 6041



MT. BAKER (NOISY-DIOBSUD BLOCK) **Roadless Area 6041 (MQ)**

The Mt. Baker RARE II area originally contained 271,900 acres. Of this amount, 117,528 acres were legislated Mt Baker Wilderness and 14,133 acres were legislated Noisy-Diobsud Wilderness. Remaining parcels of the RARE II Mt. Baker Roadless Area consist of 126,201 acres. This area was divided for ease of analysis into five blocks: Canyon Creek, Mt. Baker North, Mt. Baker West, Mt. Baker South, and Noisy-Diobsud. The following presents analysis of the Noisy-Diobsud Block.

This roadless area block consists of one parcel totaling 50,367 acres. It was originally inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6041 to nonwilderness uses.

Between 1982 and 1985, three timber sales were sold under contract within this roadless area block: Scarface, Shan, and 3-Mile Sales These sales removed 3,252 acres from roadless status The Bacon Rind Timber Sale (1988) and the Silvertone-Welker Timber Sale (1987) removed 1,035 acres within the area from roadless status. The following shows the disposition of acres within the Mt. Baker, Noisy-Diobsud Block, roadless area:

Mt. Baker (Noisy-Diobsud Block)	**Net Acres**
1984 RARE II	54,654
updated 1988	50,367
Change	**- 4,287**

OVERVIEW

This parcel is located north and east of Concrete, Washington in portions of Whatcom and Skagit Counties. For 35 miles it borders on North Cascades National Park and the Noisy-Diobsud Wilderness. The area is widespread, extending around Baker Lake to the north, and south and west to the Forest boundary. The entire area drains into the Skagit and Baker Rivers.

Several roads provide access, including the East Shannon Creek Road (#1160), Anderson Road (#1107), Jackman-Thunder Road (#14), Sauk Mountain Road (#1030), Thunder Lakes Road (#1420), Olson Creek Road (#1040), Diobsud Creek Road (#1050), and Bacon Creek Road (#1060)

Drainages include the Baker River system and the Diobsud, Olson, Corkindale, and Rocky Creek drainages (which flow south and east into the Skagit River). The terrain is rugged, with steep slopes and numerous ridges dissected by small streams. Elevation ranges from 500 feet to over 6,200 feet at the summit of Mt Watson. Other peaks include Welker Peak (5,587 feet), Sauk Mountain (5,537 feet), Bald Mountain (5,408 feet), and Diobsud Buttes (5,871 feet).

The predominant cover types below 2,800 feet elevation are Douglas-fir and western hemlock, with some western redcedar on wetter sites. Above 2,800 feet, the predominant types are Pacific silver fir and western hemlock, with some mountain hemlock at higher elevations of the forested range (4,000-5,500 feet). Soils are variable, with steep and/or unstable areas occurring adjacent to many of the sideslope draws and stream channels.

There is a variety of recreational use, particularly in the vicinity of the Anderson-Watson Lake Trail (#611), the Sauk Mountain Trail (#613), and at several small lakes.

Important habitat is provided for a variety of wildlife species, including bald eagles, peregrine falcons, and mountain goats.

WILDERNESS CAPABILITY

Manageability and Boundaries: Most of this large parcel would be manageable as wilderness Some boundaries, particularly those in close proximity to existing roads, may be difficult to locate on the ground due to lack of definable features. The portion north of Baker River would be relatively easy to manage as wilderness due to its rugged topography and trail access. It would be very compatible with adjoining segments of Wilderness and National Park. It provides a logical extension of the Noisy-Diobsud Wilderness.

Natural Integrity and Appearance: Much of this parcel is visible from either Baker Lake or the North Cascades Highway (S.R. 20). It is free from disturbance except for trails and dispersed campsites. Adjacent clearcuts may be seen from ridgetops Location adjacent to the National Park and existing wilderness has aided in the long term continuation of ecological processes that are free of disturbances.

Opportunities For Solitude: Opportunities for solitude are many and greatly increase as one moves away from existing road systems. Portions situated away from the immediate vicinity of Baker Lake receive little recreation use.

Opportunities For Primitive Recreation: There are excellent opportunities for primitive recreation, including camping, hunting, fishing, mountaineering, ski touring, cross-country hiking, and photography.

Challenging Experiences: There are many excellent opportunities for challenging experiences in hiking, mountaineering, hunting, and fishing.

Special Features: Prominent peaks include Welker Peak, Bald Mountain, Diobsud Buttes, and Sauk Mountain

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Availability - Other Resource Potential

Recreation: This extensive parcel has a large variety of recreational use associated with peaks, small lakes, and cultural attractions. Principal recreation activities center around Baker Lake,Anderson-Watson Lakes (Trail #611) and Sauk Mountain. The Sauk Mountain Trail #613 provides access to Sauk Lake and Sauk Mountain which are destinations for many hikers. This peak provides excellent views of the Skagit Wild and Scenic River. Other trails include: the Upper Baker Trail #606 at the north end of Baker Lake providing access into the National Park, the East Bank Trail #610 along the east side of Baker Lake provides a low elevation, year long recreation opportunity; the Shuksan Lake Trail #610, a popular climbing route to Mt. Shuksan; and the Cow Heaven Trail #763 south of Olson Creek.

There is a non-system trail to Welker Peak. Clear Lake receives moderate use, primarily for fishing. Other small lakes in the area (Shuksan, Thunder, Stillwell, Bald, Edgar) receive light use.

Hunting is heavy in the fall. Stream fishing in lower Noisy Creek is a low-to-moderate use activity.

Summary Table - Mt. Baker (Noisy-Diobsud Block) #6041 (MQ)

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	50,367
Primitive/Semi-Primitive Recreation ROS	Acres	36,702
Timber		
Tentatively suitable	Acres	26,989
Tentatively suitable inaccessible	Acres	8,257
Tentatively suitable standing volume	M bdft	1,055,999
"Old Growth", Total Acres	Acres	25,087
0-2,500 Feet Elevation	Acres	7,074
2,500-4,000 Feet Elevation	Acres	15,458
4,000 + Feet Elevation	Acres	2,555
Management Indicator Species (MIS)		
Spotted owl MR	Acres	9,883
Pileated woodpecker and pine marten MR	Acres	1,668
Elk-deer winter range	Acres	8,869
Goat habitat MR	Acres	2,238
Bald eagle habitat (nests, forage, roost area)	Acres	1,604
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	0
Low	Acres	50,367
Claims	# of	73
Leasable Energy Minerals (Moderate Potential)		
Geothermal	Acres	19,555

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Fish/Wildlife: Special wildlife habitats include habitat for spotted owl, pileated woodpecker and pine marten.

There is a bald eagle nest adjacent to salmon rearing ponds at the north end of the parcel. The adults breeding at this nest site forage along the southeast shore of Baker Lake and up Baker River. The undisturbed lakeshore and river habitat are important to the survival of this breeding pair.

There is also excellent peregrine falcon habitat and recently there have been several sightings of this endangered species here. There may be nesting on the cliffs above Baker Lake. These cliffs along Baker River near the rearing ponds are also critical goat winter range for 40 or more mountain goats.

The west-facing shoreline of Baker Lake provides excellent deer winter range for large herds of black-tail deer The lower slopes are mostly covered with old growth forest which is preferred winter forage and cover. The north-facing lower slopes along Baker Lake may also provide winter range. Many of the small streams which flow into Baker Lake provide spawning and rearing habitat for anadromous trout and salmon, as well as resident trout. The steep southwest-facing slopes above Welker Creek (below 3,500 feet) are important winter range for the Welker Peak mountain goat herd.

Forested slopes directly above the Skagit River are used by bald eagles as winter communal night roosts. This is critical habitat for this threatened species.

The lower portions of Barr, Rocky and Corkindale Creeks are used by spawning coho, chum, steelhead and pink salmon. The lower south-facing slopes provide excellent deer winter range

The area in the vicinity of Diobsud Creek was at one time known to be used by nesting peregrine falcons. Important mountain goat winter range lies below Diobsud Buttes on the steep south-facing bluffs above Diobsud Creek. Diobsud Creek is also one of the most important spawning and rearing tributaries in the Skagit River drainage

The Sauk Mountain portion is particularly rich in wildlife. The large open *meadows and forested slopes are known to be heavily used by black bear,* black-tailed deer, cougar, and mountain goats.

Water: The entire nine-mile eastern shoreline of Baker Lake reservoir borders this parcel. Tributaries to the Baker River system include Shannon Creek, lower Noisy Creek, Silver Creek, Anderson Creek, Welker Creek, and Thunder Creek. There are also several creeks that flow directly into the Skagit River, including Jackman Creek, Barr Creek, Rocky Creek, Corkindale Creek, Olson Creek, Diobsud Creek, and Falls Creek Several small lakes are also located within this parcel.

Livestock Operations: The head of Rocky Creek was at one time designated the Cow Heaven cattle allotment. The permittee discontinued this use several years ago, and the area is no longer used for livestock operations. The Cow Heaven area is accessed by the Cow Heaven Trail #763

Ecology: Most of this parcel is forested with species typical of the West Cascades, including cedar, Douglas-fir, true firs, and hemlock. Subalpine vegetation occurs at higher elevations and there are alpine meadows and talus slopes associated with several peaks. Most of the portion north of Baker River (except lower Shannon Creek) is steep and rugged, supporting subalpine vegetation. The portion between Noisy and Hidden Creeks is steep and non-commercial forest.

The portion south and east of Jackman Creek includes commercial forest interspersed with non-commercial sub-alpine vegetation. Upper Rocky Creek and Olson Creek are characterized by steep and rugged terrain supporting non-commercial sub-alpine vegetation.

Timber: Approximately half of this parcel is forested with commercial timber. There are major areas of undeveloped forest in the Thunder, Jackman, Patent, Corkindale, and Olson Creek drainages.

Minerals/Oil and Gas: The geology of the area is dominated by Permian sedimentary and volcanic rocks, mid-Jurassic metamorphics and glacial drift of quaternary age. Even though the area has few reported mineral occurrences, which are limited to limestone and diatomite, and is not known to contain mineral resources of significant interest, it has had 73 mining claims located within it. A large portion of the western part of the area is classified "prospectively valuable" for geothermal resources. The area has not been studied in detail by the U.S. Geological Survey and Bureau of Mines; but based upon available data it appears that, except for geothermal, the area has a relatively low potential for the occurrence of mineral resources.

Cultural: None known.

Land Use Authorizations: There are no special land authorizations. Several small hydro projects are under study on Noisy, Anderson and Rocky Creeks.

Non-Federal Lands: There are approximately 2,400 acres of non-Federal lands here including 640 acres of private land in Sections 4 and 5 (T.35N., R.10E.) and about 60 acres of State land in Section 16 (T.35N., R.10E.) have been helicopter logged. Congress recently appropriated funds for acquisition of these private lands.

Most of the non-Federal land outside and adjacent to the west and southern borders have been logged over or developed.

Fire: The upper Baker Lake basin, in the vicinity of Shannon and Noisy Creeks, has the highest incidence of lightning and human-caused fires on the Forest. Fires have generally been limited to under 350 acres. Most of the parcel east of Baker Lake has burned in large fires over the past 200 years.

Insect and Disease: There are no known insect or disease concerns.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: The parcel is adjacent to North Cascades National Park and the Noisy-Diobsud Wilderness. The small communities of Marblemount, Rockport, and Concrete are located just a few miles to the south along S.R. 20. Larger population centers include Sedro Woolley (35-40 miles away), Bellingham (55-60 miles away), Seattle (110 miles away) and Vancouver, B.C. (110 miles away).

Public Interest: This parcel was identified as part of the Diobsud roadless area #504 during RARE I. It was then inventoried as part of the Mt. Baker roadless area #6041 during RARE II. Portions of these acres were subsequently designated in the Noisy-Diobsud Wilderness in 1984. The Anderson-Watson Lakes area and the east side of Baker Lake has been of high interest to environmental groups in the past. This area is also of interest for peregrine falcon, osprey, and bald eagle habitat. The Nature Conservancy and Washington State Wildlife Department have expressed interest in preserving old growth for bald eagle roosts above the Skagit River.

Mt. Baker (Noisy-Diobsud Block)
Appendix C

Following release of the DEIS and Proposed Forest Plan, public comments were received concerning the Noisy-Diobsud Roadless Area, as well as specific geographic features within the area and its adjacency to other areas.

The Noisy-Diobsud Roadless Area was mentioned 468 times. Responses said to keep the area roadless (125), preserve the forest ecosystem (64), protect the area from harvest (63), protect the old growth ecosystem (42), protect wildlife habitat (24), and protect the area for recreation (16). The majority of the remaining comments favored management of this area for recreation and the protection of wildlife habitat. Five comments wanted the area made a top priority for timber harvest. One comment said to keep the area trailless.

Areas adjacent to North Cascades National Park were mentioned 71 times. Comments favored keeping the area roadless (11), protecting it from timber harvest (9), protecting it for recreation (5), preserving the forest ecosystem (4), protecting the old growth ecosystem (4), and protecting visuals. Most of the other comments wanted the area managed for recreation. One comment said the area should be added to the National Park System. One favored making the area a top priority for timber harvest. 1/

Silver Creek was mentioned 108 times. Responses said to keep the area roadless (28), protect it from harvest (19), protect the old growth ecosystem (11), and preserve the forest ecosystem (11). The majority of the other comments favored managing the area for recreation, wildlife habitat and visual quality. One comment said to build more roads in the area.

Thunder Creek was mentioned 260 times. Comments favored protecting the area from harvest (50), keeping it roadless (45), adding it to wilderness (16), protecting wildlife habitat (14), protecting the old growth ecosystem (14), preserving the forest ecosystem (13), avoiding the building of roads on unstable soils (13), and protecting fisheries (12). Most of the remaining comments said to manage the area for recreation and wildlife habitat. Three comments favored making the area a top priority for harvest. Two comments wanted more roads built in the area.

Falls Creek was mentioned 86 times. Comments said to protect old growth ecosystems (38), preserve the forest ecosystem (8), protect the trail from logging (7), and protect the area from harvest (7). Five comments wanted the are to remain roadless. Most of the other responses said to manage the area for recreation and wildlife habitat. One comment said to add this area to the National Park System.

Rocky Creek was mentioned 22 times. Responses said to protect the area from harvest (3), keep it roadless (3), build more roads (2), and no new road construction (2). The majority of the other responses favored managing the area for recreation and wildlife habitat. One comment said to cut the old growth.

Shukson Lake was mentioned 8 times. Two comments said to add this area to the National Park System, two said to designate the area MA 1AB (primitive/semi-primitive nonmotorized), and two favored not improving the existing trail system.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be

tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

ENVIRONMENTAL CONSEQUENCES

The following table displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

MT. BAKER (Noisy-Diobsud BLOCK)
PARCEL MQ

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	25,996						
1A Prim.			3,737	2,344	654		33,535
1B SPNM		7,201	45,721	43,820	31,867		8,489
1C SPM						14,043	
1D RN		3,188	21		63		
2A Foregrd.			126		21	126	42
2B Midgrd.			105				4,857
5 Potent W&S			42	21			42
8 Special				63			
11 O-G Hab.	4,498	9,524	190	1,583	3,949	9,418	1,499
12 Mature O-G	760	1,077		232	84	1,478	126
14 D&E Enhanc		7,159		42	63	5,765	168
15 Goat MR		3,483	168	168	633	1,288	337
16 T&E Species	908	908			908	908	908
17 Timber	18,013	11,361	147	1,900	3,336	13,959	359
19 Mtn. Hemlk		6,314		190	971	3,209	
23A Otr Wtshd	190	147				168	
23B Otr Wtshd			105				

Significant Effects

Recreation: The majority of the current recreation opportunities will not be significantly affected by any of the alternatives. Alternatives C, G-Modified and J (Preferred) will leave the area effectively roadless through the end of the fifth decade. Alternative I assigns approximately one-quarter of the area to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives. Alternatives B and I allocate the greatest amount of the area to old growth habitat, mature old growth, deer and elk enhancement and mountain goat management requirement prescriptions. Alternatives C, G-Modified and J (Preferred) allocate the least, but effectively protect the most habitat through other more restrictive allocations.

Water: There are no adverse effects to the water resource of this area associated with any of the alternatives, due to the low level of potential development activity.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives, due to the low level of potential development activity.

Timber: Alternatives A, NC, B and I will allocate the greatest amount of area to timber management. Alternatives C and J (Preferred) will allocate the least. None of the alternatives will significantly affect the timber resource, as potential development activities will be minimal.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. Alternatives A, NC, B, H and I will provide a slightly higher amount of roaded access through the area, and could be used for mineral exploration and development.

Cultural: Alternatives A, NC, B, H and I will have the greatest potential to adversely impact cultural resources within the area, due to development activities. Alternatives C, G-Modified and J (Preferred) will have the least potential. Valuable sites will be protected via avoidance or preserved through data recovery.

Land Use Authorizations: None of the alternatives will significantly affect special land use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire within the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease in the area.

Wilderness Potential: All alternatives, with the exception of I, A and NC, assign over 90 percent of this area to management prescriptions compatible with preserving its roadless character. The wilderness potential of a great portion of the area will be maintained by Alternatives C, G-Mod., and J (Pref). Alternative I assigns more than half the area to timber management and semi-primitive motorized recreation prescriptions.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	46,452	43,014	39,012	77%
B (RPA)	47,643	45,015	42,102	84%
C	50,250	50,166	49,982	99%
G-Mod.	50,151	49,995	49,740	99%
H	48,393	46,025	43,590	87%
I	47,598	44,662	40,728	81%
J (Pref)	50,019	49,673	49,293	98%

OAKES PEAK **Roadless Area 6043**

This roadless area originally consisted of 1,200 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6043 to nonwilderness uses. None of this area was designated Wilderness by Congress as a result of the 1984 Washington Wilderness Legislation. This area was increased in 1988 by 404 acres, due to a mapping discrepancy. The following shows the disposition of acres within the Oakes Peak roadless area:

Oakes Peak	Net Acres
1984 RARE II	1,200
updated 1988	1,604
Change	**+ 404**

OVERVIEW

This parcel is located approximately 8 miles north of Marblemount, in portions of Skagit and Whatcom Counties. The area is drained by Bacon Creek, which is a tributary of the Skagit River. It borders North Cascades National Park. Access to the area is by the Bacon Creek Road (#1060) and the Oakes Peak Road (#1062).

The parcel includes Jumbo Creek, Oakes Creek, and other unnamed tributaries to Bacon Creek. Terrain is steep, rugged, and dissected by streams. Elevation ranges from 1,200 feet near Bacon Creek to 5,696 feet at the summit of Oakes Peak. Vegetation is typical of the west slope of the Cascades, and includes Douglas-fir, Pacific silver fir, western hemlock, and mountain hemlock.

WILDERNESS CAPABILITY

Manageability and Boundaries: This parcel is very small in size. Boundary locations would be difficult due to lack of definable characteristics on the ground.

Natural Integrity and Appearance: It is steep, natural appearing, and heavily timbered.

Opportunities For Solitude: There are few opportunities for solitude until one enters the National Park.

Opportunities For Primitive Recreation: There are few opportunities for primitive recreation other than hunting.

Challenging Experiences: There is limited opportunity for challenging experiences; Oakes Peak provides a moderately challenging climb.

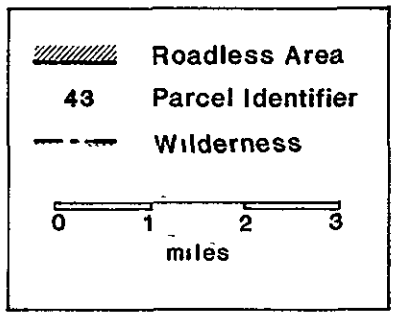
Special Features: Oakes Peak is the most prominent feature in this roadless area.

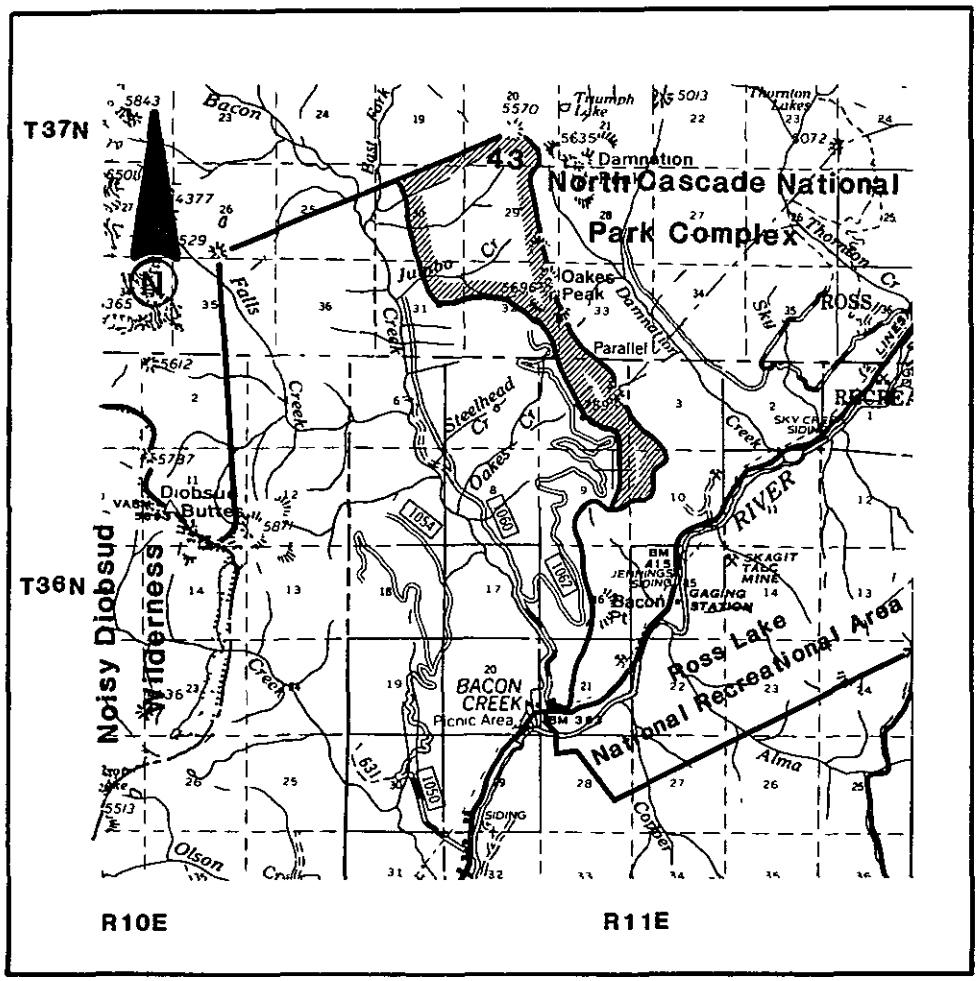
AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Oakes Peak

Roadless Area 6043





Summary Table - Oakes Peak #6043

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	1,604
Primitive/Semi-Primitive Recreation ROS	Acres	696
Timber		
Tentatively suitable	Acres	591
Tentatively suitable inaccessible	Acres	316
Tentatively suitable standing volume	M bdft	23,124
"Old Growth", Total Acres	Acres	506
0-2,500 Feet Elevation	Acres	0
2,500-4,000 Feet Elevation	Acres	359
4,000 + Feet Elevation	Acres	147
Management Indicator Species (MIS)		
Spotted owl MR	Acres	0
Pileated woodpecker and pine marten MR	Acres	0
Elk-deer winter range	Acres	1,562
Goat habitat MR	Acres	0
Bald eagle habitat (nests, forage, roost area)	Acres	0
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	0
Low	Acres	1,604
Claims	# of	3
Leasable Energy Minerals	Acres	0

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: There is very little recreational use due to steep, hazardous topography. The most common use is hunting.

Wildlife: Special wildlife habitats include habitat for deer and elk winter range. The steep north-west slopes of Jumbo Creek below 4,000 feet may be important goat winter range.

Water: Drainages include Jumbo Creek, Oakes Creek, and other unnamed tributaries to Bacon Creek, which drains into the Skagit River.

Livestock Operations: None.

Ecology: There is little commercial forest. Much of the upper area is steep and rugged, supporting sub-alpine vegetation.

Timber: Most of the commercial forest, 37% of the area is classified as tentatively suitable for timber management, would have to be harvested by helicopter. There has been considerable logging activity in the vicinity.

Minerals/Oil and Gas: The geology of the area is dominated by Tertiary granitic rocks. The area has no reported mineral resource occurrences, but 3 mining claims have been located within it or on immediately adjacent lands. The area is not classified "prospectively valuable" for any of the leasable mineral commodities, nor is it encumbered by any leases or pending lease applications. The mineral resources of the adjacent North Cascades National Park were inventoried by the U.S. Geological Survey and Bureau of Mines. Based upon their sampling of sediment along Bacon Creek, the copper and zinc content of the sediment was low and the molybdenum, lead, gold, and silver content was negligible. Considering the results of their sampling and other available data it appears that the area has a relatively low potential for the occurrence of mineral resources.

Cultural Resources: None.

Land Use Authorizations: None.

Non-Federal Lands: None.

Fire: There is a low incidence of fire.

Insect and Disease: There are no known insect or disease concerns.

WILDERNESS EVALUATION

Proximity to other Designated Wilderness and to Population Centers: This parcel is adjacent to North Cascades National Park, and Noisy-Diobsud Wilderness lies a few miles to the west. Several communities along the North Cascade Highway (S.R. 20) are located 15-30 miles away. Larger population centers include Bellingham (70 miles away), Sedro Woolley (50 miles away), and Seattle (120 miles away).

Public Interest: This parcel was not identified in RARE I. It was inventoried as roadless in the RARE II process (#6043). Public comments were few for this parcel during the RARE II process.

Following release of the DEIS and Proposed Forest Plan, Oakes Peak was mentioned 12 times in the public comments received. Two comments wanted the area made a top priority for timber harvest. Most of the remaining comments said to manage the area for recreation and wildlife habitat. 1/

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

Areas adjacent to North Cascades National Park were mentioned 71 times. Comments favored keeping the area roadless (11), protecting it from timber harvest (9), protecting it for recreation (5), preserving the forest ecosystem (4), protecting the old growth ecosystem (4), and protecting visuals. Most of the other comments wanted the area managed for recreation. One comment said the area should be added to the National Park System. One favored making the area a top priority for timber harvest.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

OAKES PEAK

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp Rec	971						
1B SPNM		654	1,583	1,119	992		950
1C SPM						908	
2B Midgrd.			21		570		591
14 D&E Enhanc		105		42	42		63
17 Timber	633	506		105		696	
19 Mtn. Hemlk		337		337			

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives. Alternative I will allocate approximately one-half the area to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives, due to the low level of potential development activity.

Water: There are no adverse effects to the water resource of this area associated with any of the alternatives, due to the low level of potential development activity.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives, due to the low level of proposed development activity.

Timber: Alternatives A, NC, B and I allocate the most area to timber management. Alternatives C, H and J (Preferred) allocate the least. None of the alternatives will significantly affect the timber resource, due to the low level of planned development activity.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development.

Cultural: None of the alternatives will have a significant affect on cultural resources, due to the low level of development activity planned.

Land Use Authorizations: None of the alternatives will have a significant affect on land use authorizations.

Fire: None of the alternatives will have a significant affect on the occurrence of fire within the area.

Insect and Disease: None of the alternatives will have a significant affect on the occurrence of insects and disease within the area.

Wilderness Potential: All alternatives, with the exception of I, assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I assigns the area to semi-primitive motorized recreation and timber management prescriptions. All alternatives will maintain the area in a primarily roadless condition through the end of the fifth decade. The wilderness potential will be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

	Undeveloped Acres			Percent
Alternative	**Decade 1**	**Decade 2**	**Decade 5**	**Remaining**
A (No Act)	1,472	1,472	1,472	92%
B (RPA)	1,562	1,562	1,562	97%
C	1,604	1,604	1,604	100%
G-Mod.	1,604	1,604	1,604	100%
H	1,604	1,604	1,604	100%
I	1,577	1,577	1,577	98%
J (Pref)	1,604	1,604	1,604	100%

ALMA COPPER **Roadless Area 6044**

This roadless area originally consisted of 8,300 acres. It was originally inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6044 to nonwilderness uses. None of this area was designated Wilderness by Congress as a result of the 1984 Washington Wilderness Legislation. This area was reduced by 107 acres in 1988 due to a mapping discrepancy. The following shows the disposition of acres within the Alma Copper roadless area:

Alma Copper	Net Acres
1984 RARE II	8,300
updated 1988	8,193
Change	**- 107**

OVERVIEW

This parcel lies northeast of Marblemount, adjacent to Ross Lake National Recreation Area and North Cascades National Park and extends south to the Forest boundary. To the south and west are the Cascade and Skagit Rivers. The nearest access is via the Cascade River Road to the south, and S.R. 20 to the west. Although close to main travel routes, access is difficult due to rugged terrain and relative lack of trails.

In the northern portion, Alma Creek and Copper Creek drain into the Skagit River, while the southern portion is drained by the Cascade River. The terrain is rugged, with steep slopes and finger ridges dissected by small drainages. Elevations range from 1,000 feet near the Skagit River to 5,719 feet at the summit of Lookout Mountain.

The predominant cover types below 2,800 feet elevation are Douglas-fir and western hemlock, with some western redcedar on wetter sites. Above 2,800 feet, the predominant types are Pacific silver fir and western hemlock, with some mountain hemlock at the higher elevations of the forested range (4,000-5,500 feet). Soils vary, with steep, shallow residual soils along the south and west slopes of Lookout Mountain and adjacent to stream channels in upper Alma and Copper Creeks.

WILDERNESS CAPABILITY

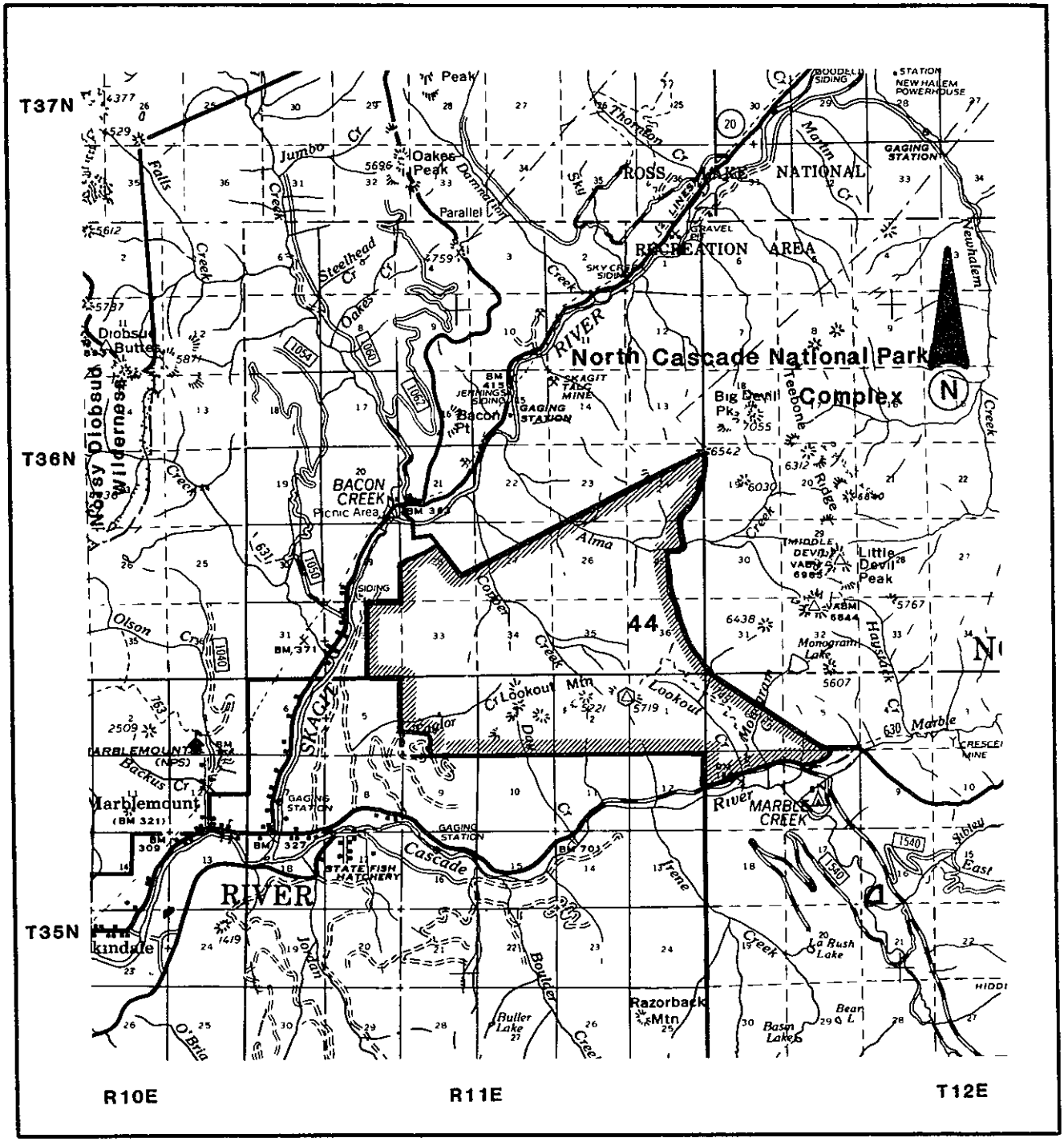
Manageability and Boundaries: Boundaries could be easily identified since the area is located between the National Park, National Forest, State and private lands. The area could be easily managed as wilderness since it is relatively inaccessible with little risk of trespass from nonconforming uses.

Natural Integrity and Appearance: The western portion is readily visible from the North Cascades Highway (S.R. 20). It is also visible from Lookout Mountain. The area is natural in appearance, except for a hiking trail and a fire lookout. There have been heavy impacts by fire. The relative isolation due to topography and location adjacent to the National Park ensure continued ecological processes unhindered by the mans impacts.

Opportunities For Solitude: Opportunities for solitude are readily available because of proximity to the National Park and due to the rugged terrain. Encounters with other users are unlikely.

Alma Copper

Roadless Area 6044


Roadless Area
44
Parcel Identifier
Wilderness
0
1
2
3
miles
T37N
T36N
T35N
R10E
R11E
T12E
North Cascade National Park Complex
Noisy Diobsud Wilderness
ROSS LAKE NATIONAL RECREATION AREA
BACON CREEK Picnic Area
Marblemount
Big Devil Pk
Little Devil Peak
Lookout Mtn
Razorback Mtn
Oakes Peak
Monogram Lake
La Rush Lake
Basin Lakes
Buller Lake
SKAGIT RIVER
CASCADE RIVER
MARBLE CREEK
Alma
Lower Alma Creek
Ridge
Mountain
Thornton Cr
Martin Cr
Jumbo Cr
Falls Creek
Steelhead Cr
Oakes Cr
Dormant Pt
Parallel
Bacon Pt
Olson Cr
Backus Cr
Boulder Cr
Irene Creek
Teebone Creek
Haystack Cr
Sibley Creek
Jordan
Diobsud Butte
Newhalem
Gaging Station
State Fish Hatchery
Skagit Talc Mine
Jennings Siding
Sky Creek Siding
Boudelle Siding
Gravel Pit
Siding
Crescent Mine
Hidden Lake
Bear L
Sibley East
Middle Devil
Marble
Lookout
Irene
Boulder
Cascade
Creek
River
Mtn
Pk
Lake
Pt
Cr
Ridge
Mountain
Creek
Lake
Peak
Pk
Mtn
Cr
Creek
River
Lake
Pt
Cr
Creek
Mtn
Pk

Opportunities For Primitive Recreation: Steep, rugged terrain and dense vegetation make any recreational activity an arduous undertaking. Lack of trails provide the opportunity for cross-country travel with a high degree of self-reliance.

Challenging Experiences: Steep rugged slopes provide challenging cross-country travel, although the terrain coupled with dense vegetation makes such use unlikely.

Special Features: An old fire lookout is located on Hidden Lake peak.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Summary Table - Alma Copper #6044

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	8,193
Primitive/Semi-Primitive Recreation ROS	Acres	7,328
Timber		
Tentatively suitable	Acres	4,392
Tentatively suitable inaccessible	Acres	2,576
Tentatively suitable standing volume	M bdft	171,846
"Old Growth", Total Acres	Acres	4,412
0-2,500 Feet Elevation	Acres	781
2,500-4,000 Feet Elevation	Acres	2,491
4,000 + Feet Elevation	Acres	1,140
Management Indicator Species (MIS)		
Spotted owl MR	Acres	211
Pileated woodpecker and pine marten MR	Acres	253
Elk-deer winter range	Acres	211
Goat habitat MR	Acres	337
Bald eagle habitat (nests, forage, roost area)	Acres	0
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	0
Low	Acres	8,193
Claims	# of	0
Leasable Energy Mineral	Acres	0

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: Recreation use is light, except for moderate use of the Lookout Mountain Trail #743 which accesses both an old Forest Service fire lookout, and the Monogram Lake portion of North Cascades National Park. Steep, rugged terrain and dense vegetation make the area inaccessible, severely restrict recreation use elsewhere.

Fish/Wildlife: Special wildlife habitats include habitat for spotted owl, pine marten and mountain goat. The south-facing slopes below 3,000 feet near Lookout Creek provide deer winter range. The entire area is rich in game such as black-tailed deer, black bear, and grouse.

Water: Alma Creek and Copper Creek flow northwest into the Skagit River. Taylor Creek, Day Creek, Lookout Creek and Monogram Creek flow south into the Cascade River.

Livestock Operations: None.

Ecology: Vegetation is typical of the west slope of the Cascades, including cedar, Douglas-fir, true firs, hemlock, and high elevation, alpine meadows.

Timber: The Alma and Copper Creek basins are heavily forested and very steep at lower elevations, with potential access expected to be difficult. Access for timber management would require use of helicopters. Approximately 50 present of the area is classified as tentatively suitable.

Minerals/Oil & Gas: The geology of this area is dominated by contact zones between Jurassic metamorphic rocks and Paleozoic intrusive rocks. The area has no reported mineral occurrences of interest, and no mining claims have been recorded for the area. The area is not classified "prospectively valuable" for any of the leasable minerals, nor is it encumbered by any leases or pending lease applications. The area has not been studied by the U.S. Geological Survey and Bureau of Mines, but based upon available data it appears that the area has a relatively low potential for the occurrence of mineral resources.

Cultural: There are sites important for American Indian religious and cultural use.

Land Use Authorizations: There are no special land authorizations.

Non-Federal Lands: There are 160 acres of State land in Section 3, which have been completely logged.

Fire: Fire occurrence is low to moderate; most are lightning-caused. Approximately 80 acres burned in the mid-1970's. There is evidence of larger fires at lower elevations within the past 100 years.

Insect and Disease: There are no known insect or disease concerns.

WILDERNESS EVALUATION

Proximity to other Designated Wilderness and to Population Centers: The parcel adjoins Ross Lake National Recreation Area and North Cascades National Park. Glacier Peak Wilderness is six miles to the south. It lies within a few miles of cross-state Highway 20. The small community of Marblemount is a few miles to the west; large population centers are 50-150 miles away.

Public Interest: This parcel was identified in RARE I as roadless area #505. It was also inventoried as roadless in the RARE II process (#6044). Following release of the DEIS and Proposed Forest Plan, no public comments were received regarding the Alma Copper Roadless Area. Comments were received regarding specific geographic sites and features included in the area, as well as on its proximity to other areas of interest.

The Copper Creek Basin was mentioned 228 times. Comments favored protecting the area from harvest (68), preserving the forest ecosystem (41), keeping the area roadless (34), and protecting the old growth ecosystem (12). Five responses said to make this area a top priority for timber harvest; four said to build more roads. Two wanted the area managed for multiple uses; one said to cut the old growth. The majority of the remaining comments said to manage the area for recreation and wildlife habitat. 1/

Alma Creek was mentioned 216 times. Responses said to protect the area from harvest (64), preserve the forest ecosystem (39), keep the area roadless (33), protect visuals (12), and protect the old growth ecosystem (10). The majority of the remaining comments favored management of the area for recreation and wildlife habitat. Five responses said to make this area a top priority for timber harvest; two wanted more roads built. Two comments said to add this area to the National Park System.

Lookout Mountain was mentioned 184 times. Comments favored protecting the area from logging (38), protecting it from harvest (25), keeping it roadless (25), avoiding road construction that will bisect the trail system (18), preserving old growth (14), and protecting the old growth ecosystem (12). Most of the other comments favored managing the area for recreation and the protection of wildlife habitat and scenic quality. Two comments said to make this area a top priority for timber harvest. One favored adding the area to the National Park System.

Areas adjacent to North Cascades National Park were mentioned 71 times. Comments favored keeping the area roadless (11), protecting it from timber harvest (9), protecting it for recreation (5), preserving the forest ecosystem (4), protecting the old growth ecosystem (4), and protecting visuals. Most of the other comments wanted the area managed for recreation. One comment said the area should be added to the National Park System. One favored making the area a top priority for timber harvest.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

ENVIRONMENTAL CONSEQUENCES

The following table displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

ALMA COPPER

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	4,012						
1A Prim.			675	675			
1B SPNM		527	7,454	7,496	5,385		6,082
1C SPM						3,357	
1D RN					21		42
2A Foregrd.			42				
2B Midgrd.					1,626		1,710
11 O-G Hab.	718	147	21	21	147	168	84
12 Mature O-G	126	253			253		274
14 D&E Enhanc		126				401	
15 Goat MR		907			84	337	
17 Timber	3,336	3,991			485	3,928	
19 Mtn. Hemlk		2,238			190		

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives. Alternative I will assign approximately 40% of the area to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives. Alternatives B and I allocate the greatest area to mature old growth, deer and elk enhancement and mountain goat management requirement prescriptions. Alternatives C and G-Modified assign the least.

Water: *There are no adverse effects to the water resource of this area* associated with any of the alternatives, due to the low level of proposed development activity.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives, due to the low level of proposed development activity.

Timber: Alternatives C, G-Modified and J (Preferred) will have the least affect on the existing timber resource, as they do not allocate any area to timber management. Alternatives A, NC, B and I allocate the greatest amount of area to this designation. None of the alternatives will have a significant affect on the timber resource, due to the low level of proposed development activity.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development.

Cultural: None of the alternatives will have a significant affect on the cultural resources of the area, due to the low level of planned development activity.

Land Use Authorizations: None of the alternatives will have a significant affect on land use authorizations.

Fire: None of the alternatives will have a significant affect on the occurrence of fire within the area.

Insect and Disease: None of the alternatives will have a significant affect on the occurrence of insects and disease within the area.

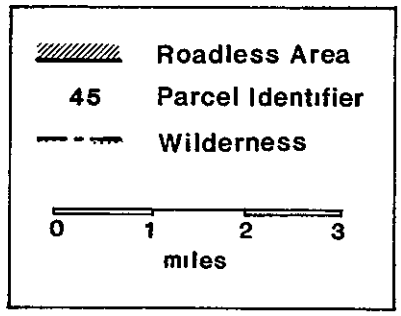
Wilderness Potential: All alternatives, with the exception of I, assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I assigns 40% Of the area to semi-primitive motorized recreation and 48% of the area to timber management. Alternatives C, G-Modified and J (Preferred) will maintain the area in a totally roadless condition through the end of the fifth decade. The wilderness potential will be maintain.

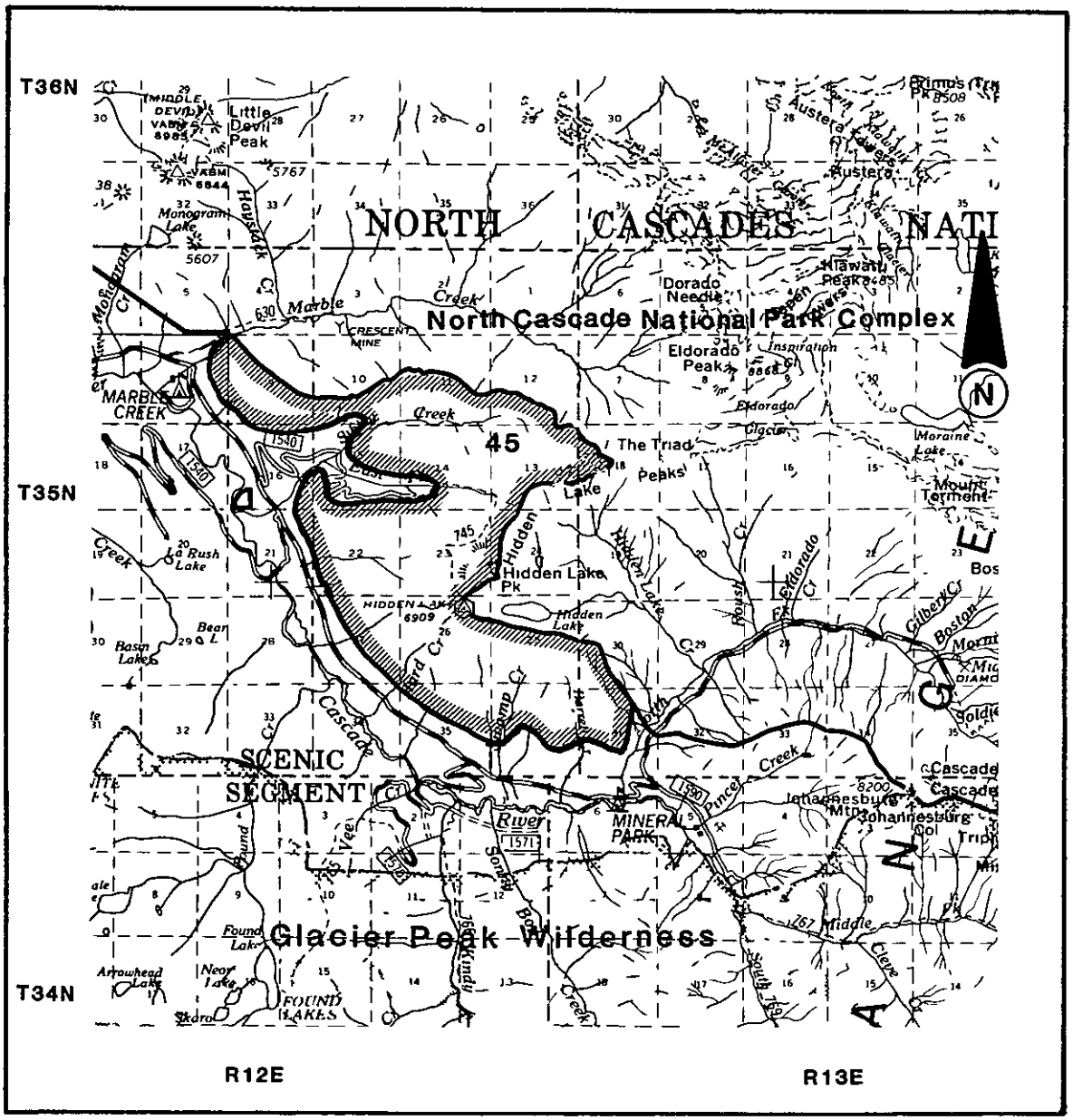
The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

	Undeveloped Acres			Percent
Alternative	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	7,422	7,320	7,133	87%
B (RPA)	7,758	7,658	7,526	92%
C	8,184	8,170	8,162	100%
G-Mod.	8,193	8,193	8,193	100%
H	8,049	7,961	7,788	95%
I	7,845	7,743	7,546	92%
J (Pref).	8,193	8,193	8,193	100%

Hidden Lake

Roadless Area 6045





HIDDEN LAKE **Roadless Area 6045**

This roadless area originally consisted of 7,000 acres. It was originally inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6045 to nonwilderness uses. None of this area was designated Wilderness by Congress as a result of the 1984 Washington Wilderness Legislation.

In 1983, portions of the Kincade Timber Sale were sold under contract within this roadless area block. The sale removed 73 acres from roadless status. In 1988, the area was reduced by 275 acres due to a mapping discrepancy. The following shows the disposition of acres within the Hidden Lake roadless area:

Hidden Lake	**Net Acres**
1984 RARE II	7,000
updated 1988	6,652
Change	**- 348**

OVERVIEW

This parcel is located approximately 9 miles east of Marblemount, between the North Cascades National Park and the Cascade River Road. Its namesake is located to the east, just inside the Park boundary. Included are several tributaries of the Cascade River.

Road access is via the Cascade River Road and the Sibley Creek Road (#1540).

Drainages include the headwaters of Sibley Creek, Hard Creek, and Swamp Creek. On the south is the Cascade River designated under the Wild and Scenic Rivers Act. The terrain is rugged, with steep slopes and dissecting drainages. Elevation ranges from about 1,100 feet to over 6,900 feet at Hidden Lake Peak.

The predominant cover types below 2,800 feet elevation are Douglas-fir and western hemlock, with some western redcedar on wetter sites. Above 2,800 feet, the predominant types are Pacific silver fir and western hemlock, with some mountain hemlock at the higher elevations of the forested range (4,000-5,000 feet elevation).

Soils are variable, with steep and shallow residual soils on the sideslopes northeast of the Cascade River and unstable soils adjacent to Sibley Creek.

The Hidden Lake Peak Trail #745 is one of the most popular trails in the North Cascades, ending at a lookout with a panoramic view of the National Forest and North Cascades National Park.

The Cascade River area provides important habitat for wintering bald eagles.

WILDERNESS CAPABILITY

Manageability and Boundaries: Boundaries to the west may be difficult to locate on the ground. Management of some portions would be complicated due to proximity to existing roads.

Natural Integrity and Appearance: Elevation rises rapidly to high mountain meadows, glacially-scarred rock and small ponds.

Opportunities For Solitude: Opportunities for solitude are reduced due to the amount of recreational trail use associated with the lake and lookout. This opportunity is best north of Sibley Creek where terrain is rugged and brushy.

Opportunities For Primitive Recreation: There are excellent opportunities for primitive recreation, including hiking, hunting, mountaineering, and photography.

Challenging Experiences: Unusually challenging experiences are limited. Most use of the area is used for hiking and dispersed hunting.

Special Features: The Hidden Lake Peak lookout (which may have potential for historic register status) is an intact structure being maintained by a volunteer group. Both the trail and lookout provide panoramic views of surrounding peaks.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Summary Table - Hidden Lake #6045

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	6,652
Primitive/Semi-Primitive Recreation ROS	Acres	5,215
Timber		
Tentatively suitable	Acres	1,921
Tentatively suitable inaccessible	Acres	1,077
Tentatively suitable standing volume	M bdft	75,163
"Old Growth", Total Acres	Acres	1,836
0-2,500 Feet Elevation	Acres	591
2,500-4,000 Feet Elevation	Acres	760
4,000 + Feet Elevation	Acres	485
Management Indicator Species (MIS)		
Spotted owl MR	Acres	84
Pileated woodpecker and pine marten MR	Acres	316
Elk-deer winter range	Acres	422
Goat habitat MR	Acres	422
Bald eagle habitat (nests, forage, roost area)	Acres	42
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	0
Low	Acres	3,864
Claims	Acres	13
Leasable Energy Minerals	Acres	0

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: Most recreation use is associated with the Hidden Lake Peak Trail #745, primarily hiking and climbing. Hunting is popular in the trailless high country.

Fish/Wildlife: This parcel along the Cascade River is used by as many as forty bald eagles in years when food resources on the Skagit River are scarce They feed on coho, chinook, and steelhead salmon which spawn in lower Sibley Creek, Marble Creek, and the smaller tributaries to the Cascade River.

The steep south-facing slopes above Sibley Creek and its east fork are known to be used by mountain goats as winter range. The south-facing slopes below Hidden Lake may be providing deer and goat winter range.

The old growth forested slopes above the Cascade River may be used by bald eagles as communal night roosts during the winter and as special wildlife habitat for spotted owl, pileated woodpecker and pine marten.

Water: This parcel includes the upper reaches of Sibley Creek, Hard Creek, and Swamp Creek.

Livestock Operations: None.

Ecology: Most of the parcel is forested with species typical of the west Cascades, including cedar, Douglas-fir, true firs, and hemlock. There are alpine meadows at higher elevations, and the portion north of Sibley Creek is generally non-forested, steep talus slopes. The northeast corner north of Hidden Lake Peak is heavily meadowed. Where Trail #745 crosses the east fork of Sibley Creek, there is a striking transition from metamorphic rocks supporting grassy-type flora to granitic rocks dominated by heather.

Timber: The lower elevations support commercial timber with only twenty-nine percent of the area classified as tentatively suitable.

Minerals/Oil and Gas: The geology of the area is dominated by Jurassic metamorphic rocks, Tertiary granitic rocks, and Quaternary aged glacial drift. Even though the area has no reported mineral resource occurrences of interest, it has 13 mining claims located within it. The area is not classified "prospectively valuable" for any of the leasable minerals, and it is not encumbered by any mineral leases or pending lease applications. Only a small part of the area has been studied by the U.S. Geological Survey and Bureau of Mines, and they have not identified the area as having a potential for the occurrence of mineral resources. However, adjacent areas on the south have been identified as having a high potential for the occurrence of base and precious metal resources. Based upon geologic inference, the subject area could have the same potential

Cultural Resources: Sites along Cascade River and other high-elevation sites are important for American Indian religious and cultural use.

Land Use Authorizations: There are no special land use authorizations.

Non-Federal Lands: None.

Fire: South facing slopes show evidence of considerable fire activity from mid-slope to timberline about 100 years ago. A fire burned the central portion of the parcel in the 1930's and 1940's.

Insect and Disease: There are no known insect or disease concerns.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: The parcel adjoins North Cascades National Park. The small community of Marblemount is about 10 miles to the west. Bellingham is 65 miles away. Seattle and Vancouver, B.C. are each about 120 miles away.

Public Interest: This parcel was not identified during RARE I. It was inventoried as roadless in the RARE II process. The Fish and Wildlife Service is also interested in this parcel because of concern for bald eagle foraging and night roost spots along the Cascade River.

Following release of the DEIS and Proposed Forest Plan, public comments were received regarding Hidden Lake and, in a general sense, areas adjacent to North Cascades National Park

Hidden Lake was mentioned 204 times. Responses said to not log along the trail (33), keep the area roadless (27), avoid bisecting trails with new road construction (24), protect the area from harvest (17), preserve old growth (16) and no new road construction (15). The majority of the other comments favored managing the area for recreation, wildlife habitat and scenic quality. Four comments expressed the desire for this area to be made a top priority for timber harvest. 1/

Areas adjacent to North Cascades National Park were mentioned 71 times. Comments favored keeping the area roadless (11), protecting it from timber harvest (9), protecting it for recreation (5), preserving the forest ecosystem (4), protecting the old growth ecosystem (4), and protecting visuals. Most of the other comments wanted the area managed for recreation. One comment said the area should be added to the National Park System. One favored making the area a top priority for timber harvest.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

ENVIRONMENTAL CONSEQUENCES

The following table displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

HIDDEN LAKE

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	4,730						
1A Prim.			316				2,449
1B SPNM		1,985	6,103	5,828	6,208		3,526
1C SPM						3,611	
1D RN					84		464
2A Foregrd.			84	63			
2B Midgrd.			42				
6 Skagit W&S	105	84	105	105	105	105	105
11 O-G Hab.		84		359		63	63
12 Mature O-G	168	316			21	316	21
14 D&E Enhanc		401				147	
15 Goat MR		823		21		422	21
17 Timber	1,647	992		274	232	1,668	
19 Mtn. Hemlk		1,964				316	

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives, due to the low level of planned development activity. Alternative I will allocate about one-half of the area to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives. Alternatives B, G-Modified and I allocate the greatest amount of area to old growth habitat, mature old growth, deer and elk enhancement and mountain goat management requirement prescriptions. Alternatives A, NC, C and J (Preferred) allocate the least.

Water: None of the alternatives will significantly affect the water resources of the area, due to the low level of development activity planned.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives, due to the low level of development activity planned.

Timber: Alternatives A, NC, B and I will allocate the greatest area to timber management. Alternatives C and J (Preferred) will allocate the least. None of the alternatives will have a significant affect on the timber resource, as potential development activities would be minimal.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development.

Cultural: None of the alternatives will have a significant affect on cultural resources, due to the minimal amount of development activity planned.

Land Use Authorizations: None of the alternatives will significantly affect special land use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire in the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease in the area.

Wilderness Potential: All alternatives, with the exception of I, assigns the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I assigns more than half the area to semi-primitive motorized recreation and timber management allocations. All alternatives will maintain the area in a primarily roadless condition through the end of the fifth decade. The wilderness potential will be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	*Undeveloped Acres* Decade 1	Decade 2	Decade 5	*Percent* Remaining
A (No Act)	6,397	6,355	6,319	95%
B (RPA)	6,562	6,528	6,501	98%
C	6,652	6,652	6,652	100%
G-Mod.	6,652	6,652	6,652	100%
H	6,652	6,652	6,652	100%
I	6,589	6,549	6,504	98%
J (Pref)	6,640	6,632	6,616	99%

GLACIER PEAK H Roadless Area H6031 (HA, HB)

This roadless area originally consisted of 12,483 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area H6031 to nonwilderness uses. In 1984, 3,109 acres from this area were designated as additions to Glacier Peak Wilderness by Congress as a result of the Washington Wilderness Legislation. Two parcels remain in roadless status.

In 1984, portions of the LaRush Timber Sale were sold under contract within this roadless area. The sale removed 1,286 acres from roadless status. In 1988, this area was reduced by 149 acres due to a mapping discrepancy. The following shows the disposition of acres within the Glacier Peak H roadless area:

Glacier Peak H	Net Acres
1984 RARE II	*12,483*
updated 1988	7,939
Change	**-4,544**

OVERVIEW

These parcels are located in the Cascade River watershed east of Marblemount. Southern portions are adjacent to the Glacier Peak Wilderness, and the Cascade River road is to the north. The eastern portion is adjacent to the North Cascades National Park.

Road access is from the north via the Cascade River Road, the Irene Creek Road (#1550), the Found Creek Road (#1570), and the South Fork Cascade Road (#1590).

Drainages include upper Irene Creek and the lower valleys of Found Creek, Kindy Creek, Sonny Boy Creek, and Pincer Creek. These drainages flow into the Cascade River which is a designated Wild and Scenic River. Topography is generally steep, ranging from extremely rough and precipitous in the Found and Pincer Creek drainages to fairly gentle in Irene Creek. Elevations range from 1,200 to 8,200 feet on Johannesburg Mountain.

There are unstable soils adjacent to lower Kindy and Sonny Boy Creeks. Steep, shallow residual soils occur in the upper Irene Creek drainage and on the slopes on the southwest side of the Cascade River channel. In the Pincer Creek parcel there are steep and shallow residual soils on the upper slopes.

The Cascade River area provides important habitat for wintering bald eagles.

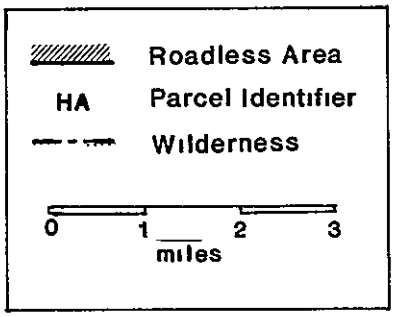
WILDERNESS CAPABILITY

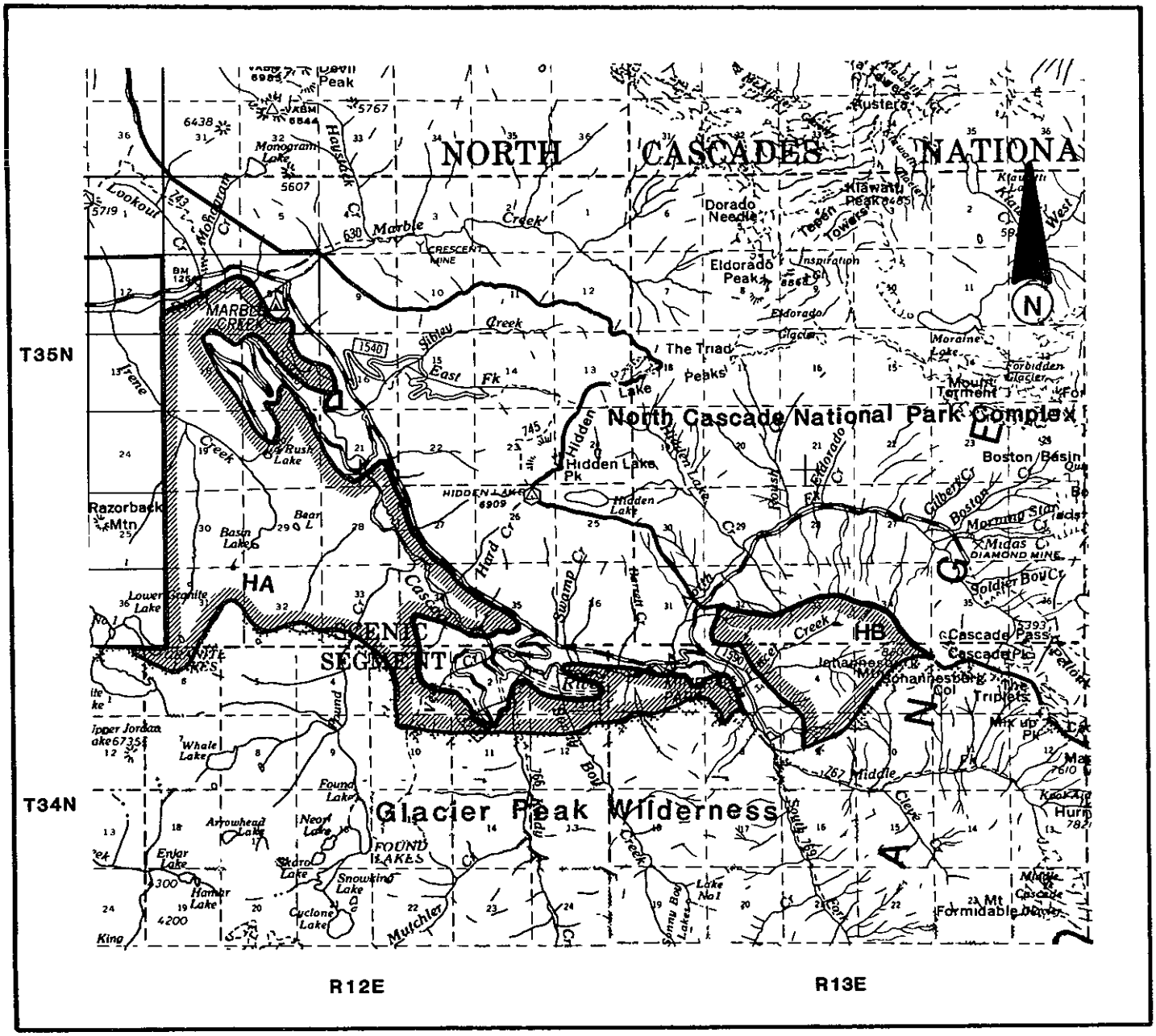
Manageability and Boundaries: Management as wilderness would be enhanced due to steep topography and arduous access. Location of the lower boundaries could be difficult due to proximity of existing roads and lack of definitive ground characteristics.

Natural Integrity and Appearance: Kindy Creek and Sonny Boy Creek are visible from the Cascade River Road. There is an overall natural appearance. The wilderness landscape of Johannesburg Mountain and the surrounding area is extremely rugged and scenic.

Glacier Peak H

Roadless Area H6031





Opportunities For Solitude: Excellent opportunities for solitude exist in upper Irene Creek in the western portion of the area and in the vicinity of upper Pincer Creek and Johannesburg Mountain. The remaining portions are in close proximity to existing roads and heavy recreation use.

Opportunities For Primitive Recreation: Primitive recreation opportunities include hiking, cross-county travel, hunting, fishing, mountaineering.

Challenging Experiences: Johannesburg Mountain offers challenging mountaineering experiences, with spectacular views of the surrounding Glacier Peak Wilderness and North Cascades National Park.

Special Features: None.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Summary Table - Glacier Peak H #H6031

Category 1/	Unit	Parcels HA	Parcels HB	Total
Acres (Minus water, private land)	Acres	6,186	1,753	7,939
***Primitive/Semi-Primitive Recreation* ROS**	Acres	3,442	1,562	5,004
Timber				
Tentatively suitable	Acres	3,547	380	3,927
Tentatively suitable inaccessible	Acres	274	295	569
Tentatively suitable standing volume	M bdft	138,784	14,868	153,652
"Old Growth", Total Acres	Acres	3,926	843	4,769
0-2,500 Feet Elevation	Acres	1,583	126	1,709
2,500-4,000 Feet Elevation	Acres	1,816	337	2,153
4,000 + Feet Elevation	Acres	527	380	907
Management Indicator Species (MIS)				
Spotted owl MR	Acres	1,393	0	1,393
Pileated woodpecker and pine marten MR	Acres	0	147	147
Elk-deer winter range	Acres	2,090	21	2,111
Goat habitat MR	Acres	0	549	549
Bald eagle habitat 2/	Acres	1,203	0	1,203
Locatable Mineral Development Potential				
High	Acres	0	0	0
Moderate	Acres	0	0	0
Low	Acres	675	0	675
Claims	# of	0	12	12
Leasable Energy Minerals (Moderate Potential)				
Geothermal	Acres	-	-	0

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.
2/ Includes nest sites, forage areas, and roost areas.

Availability - Other Resource Potential

Recreation: Recreation use is light to moderate, with most use along user-built trail to LaRush and Bear Lakes. There is a scramble trail up Vee Creek accessing Found Lake, located in Glacier Peak Wilderness.

Fish/Wildlife: These parcels have a high probability of containing one or more bald eagle communal night roosts. Preliminary surveys determined that bald eagles make nocturnal use of the upper slopes of Irene Creek. Bald eagle forage and perching habitat exists all along the Cascade River, and it may be an important wintering area. Eagles have been observed perching and foraging as far up as Vee Creek. The lower reaches of Found Creek Hard Creek, Vee Creek, Kindy Creek, and Sonny Boy Creek provide spawning and rearing habitat for steelhead, chinook, and coho salmon.

Special wildlife habitats include habitat for spotted owl, pileated woodpecker and pine marten. The low elevation, south facing slopes of Pincer Creek may provide winter range for deer and mountain goat.

The Cascade River is bordered by a large riparian area used by a variety of wildlife. It provides habitat for more wildlife species than any other type of habitat found on the District. The frequent meanders and side channels also provide spawning and rearing habitat for coho, chinook, and pink salmon and steelhead.

Water: Drainages include upper Irene Creek and the lower portions of Found Creek, Vee Creek, Kindy Creek, and Pincer Creek, as well as several smaller tributaries to the Cascade River. There are three small lakes (LaRush, Bear, and Basin) in the western portion.

Livestock Operations: None.

Ecology: The predominant cover type is Douglas-fir along the river, western hemlock along the midslopes, and Pacific silver fir on the upper slopes.

Timber: Timber harvest has occurred on non-National Forest land to the west; there has been little harvest activity north of the Cascade River Road. Approximately one-half of the area is classified as tentatively suitable for timber management.

Minerals/Oil an Gas: The geology of this area is dominated by Jurassic metamorphic rocks, Paleozoic granitic rocks, and glacial drift of Quaternary age. The area has reported mineral resource occurrences of significant interest and it does had 12 mining claims located within it. THe area is not classified "prospectively valuable" for any of the leasable minerals, nor is it encumbered by any leases or pending lease applications The east portion of the area was inventoried by the U S Geological Survey and Bureau of Mines. As a result of their investigation, they have concluded that the eastern 3 miles of the area has a high and medium potential for the occurrence of base and precious metal resources.

Cultural Resources: Sites along the Cascade River and selected high-elevation sites are important for American Indian religious use.

Land Use Authorizations: None.

Non-Federal Lands: There are approximately 150 acres of non-Federal land south of Marble Creek Campground.

Fire: Considerable lightning activity occurs in the Kindy Creek drainage every year. Approximately 125 acres burned in 1970.

Insect and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: These parcels are a few miles southwest of North Cascades National Park and adjoin the Glacier Peak Wilderness. The small community of Marblemount is about 15 miles away. Seattle and Vancouver, B.C., are each about 125 miles away.

Public Interest: Local and other public sentiment has been divided between favoring wilderness and development of commodity resources. There is interest in areas for bald eagle foraging and night roosting along the Cascade River. Following release of the DEIS and Proposed Forest Plan, public comments were received on Glacier Peak Roadless Area parcel H, as well as on subparcels, specific geographic sites and features within the area, and on it as being adjacent to other areas.

Glacier Peak parcel H was mentioned 26 times. Four comments each were received saying the area should be made a top priority for timber harvest and that it should be kept open for mining. Other responses included increasing the developed campgrounds (3), building more roads (3), and increasing the opportunity for motorized recreation (3). The majority of the remaining comments said to manage the area for wildlife habitat. 1/

Glacier Peak parcel HA received three comments. The responses said to preserve the forest ecosystem, protect old growth ecosystems, and to protect the area as a low-elevation trail.

Glacier Peak parcel HB was mentioned three times. Comments favored preserving the area as valuable low-elevation old growth, keeping it roadless, and preserving the forest ecosystem.

Irene Creek was mentioned 273 times. Responses said to preserve the forest ecosystem (54), protect the area from harvest (53), protect the old growth ecosystem (36), keep the area roadless (35), protect wildlife habitat (11), and protect the area for recreation (11). The majority of the remaining comments said to manage the area for recreation and wildlife habitat. Two responses said to add it to the National Park System. One said to make it a top priority for timber harvest.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

The Cascade River was mentioned 700 times. Comments favored protecting the area from harvest (141), keeping it roadless (83), preserving the forest ecosystem (75), protecting the old growth ecosystem (51), protecting it for recreation (37), opposing road construction that will bisect trails (28), and preserving the area as a corridor into the backcountry (28). Other comments included no new road construction (27), protecting trails from logging (26), and protecting the area for wildlife habitat (23) and scenic value (23). Most of the remaining responses favored managing the area for recreation and wildlife habitat. One comment said to make this area a top priority for timber harvest; one said to cut the old growth.

Areas adjacent to North Cascades National Park were mentioned 71 times. Comments favored keeping the area roadless (11), protecting it from timber harvest (9), protecting it for recreation (5), preserving the forest ecosystem (4), protecting the old growth ecosystem (4), and protecting visuals. Most of the other comments wanted the area managed for recreation. One comment said the area should be added to the National Park System. One favored making the area a top priority for timber harvest.

Areas adjacent to Glacier Peak were mentioned 293 times. Responses favored protecting the area from harvest (78), preserving the forest ecosystem (52), keeping the area roadless (44), and protecting old growth (20). Other comments said to protect the area for wildlife habitat and recreation values.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

GLACIER PEAK H
PARCEL HA

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	2,597						
1A Prim.							1,583
1B SPNM		1,372	4,983	4,814	1,414		
1C SPM						992	
2A Foregrd.			42				
2B Midgrd.							1,436
3A Public	21	21	21	21	21	21	21
6 Skagit W&S	929		696	464	696	696	696
11 O-G Hab.	42	802	232	464	823	633	718
14 D&E Enhanc		971					
16 T&E Specie	823	823	211	211	823	823	823
17 Timber	1,773	992		190	1,351	1,858	
19 Mtn. Hemlk		1,203		21	1,055	1,161	908

PARCEL HB

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	1,372						
1A Prim.				443			1,752
1B SPNM			1,689	1,309	1,752		
12 Mature O-G	105	147	63			147	
15 Goat MR		801				464	
17 Timber	274	21				190	
19 Mtn. Hemlk		781				950	

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives. Alternative I allocates about 12% of the area to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives. Alternatives B, H, I and J (Preferred) allocate the greatest amount of acres to old growth habitat, deer and elk enhancement and threatened and endangered species (bald eagle nest and forage/roost areas). Alternatives C and G-Modified allocate the least.

Water: There are no adverse effects to the water resource of this area associated with any of the alternatives.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives.

Timber: Alternatives A, NC, H and I allocate the greatest amount of area to timber management. Alternatives C and J (Preferred) allocate the least. None of the alternatives will significantly affect the timber resource.

Minerals/Oil/Gas: None of the alternatives will significantly affect the availability of minerals, oil or gas for development. Alternatives B, H, I and

J (Preferred) will provide a greater amount of roaded access through the area, which could be used for mineral exploration and development.

Cultural: Alternatives B, H, I and J (Preferred) will have the greatest potential to adversely impact cultural resources in the area. Valuable sites will be protected via avoidance or preserved through data recovery. Alternatives A/NC and C will have the least potential to impact cultural resources.

Land Use Authorizations: None of the alternatives will significantly affect special land use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire within the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

Wilderness Potential: Alternative I allocates about 38% of the area to semi-primitive motorized recreation and timber management prescriptions. Alternatives A/NC and C will leave the greatest amount of roadless area remaining at the end of the fifth decade. Alternatives H, I and B will leave the least. Alternatives A and C will leave the majority of the area in a roadless condition throughout the end of the fifth decade, most of the wilderness potential will be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	7,657	7,447	7,277	92%
B (RPA)	5,797	3,965	1,536	19%
C	7,255	6,469	5,445	69%
G-Mod.	6,481	5,081	3,737	47%
H	5,401	3,187	3.140	40%
I	5,653	3,615	1,086	14%
J (Pref).	6,076	4,392	2,268	29%

GLACIER PEAK I Roadless Area I6031 (IA)

This roadless area originally consisted of 18,397 acres It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area I6031 to nonwilderness uses. In 1984, 1,208 acres from this area were designated as additions to the Glacier Peak Wilderness by Congress as a result of the Washington Wilderness Act.

Since the 1984 RARE II inventory, this area has been reduced by 5,642 acres. In 1984, the Yellow Timber Sale and the White Creek Skyline Timber Sale removed 1,625 acres from roadless status. In 1987, the Upper Slope Timber Sale and the Indian Point Timber Sale removed 2,387 acres from roadless status. The area was reduced 422 acres due to a mapping discrepancy.

The following shows the disposition of acres within the Glacier Peak I roadless area·

Glacier Peak I	**Net Acres**
1984 RARE II	18,397
Updated 1988	12,755
Change	**- 5,642**

OVERVIEW

This parcel lies several miles south of Marblemount, Washington with the Glacier Peak Wilderness to the east, the Forest boundary to the north, and existing road systems to the south and west. The northern portion drains into the Skagit and Cascade Rivers, while the southern portion is drained by the Sauk and Suiattle Rivers.

Road access is via the West Boundary Road (#1610), the Illabot Peak Road (#1620), and the Illabot Road (#16) which extends from west to east through the middle of the area)

Drainages include upper Jordan Creek, which drains into the Cascade River; Illabot Creek and tributaries, which drain into the Skagit River; upper Hilt Creek and White Creek, which drain into the Sauk River; and upper Grade Creek, which drains into the Suiattle River. Elevations range from approximately 1,000 feet to the summit of Illabot Peaks at 5,944 feet.

The predominant cover types below 2,800 feet elevation are Douglas-fir and western hemlock, with some western redcedar on wetter sites. Above 2,800 feet, the predominant types are Pacific silver fir and western hemlock, with some mountain hemlock at the higher elevations of the forested range (4,000-5,500 feet).

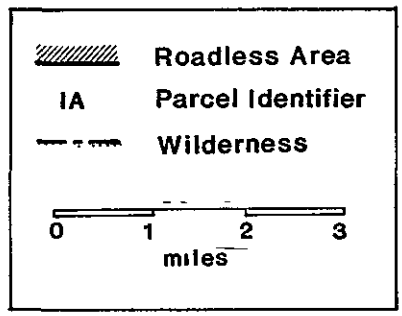
Soils vary, with primarily steep, shallow, unstable areas adjacent to steep sideslope draws in the upper reaches of Jordan Creek, adjacent to the Iron, Bluebell, Illabot, and Arrow Creek channels, at the headwaters of White Creek, and southwest of the White Creek channel.

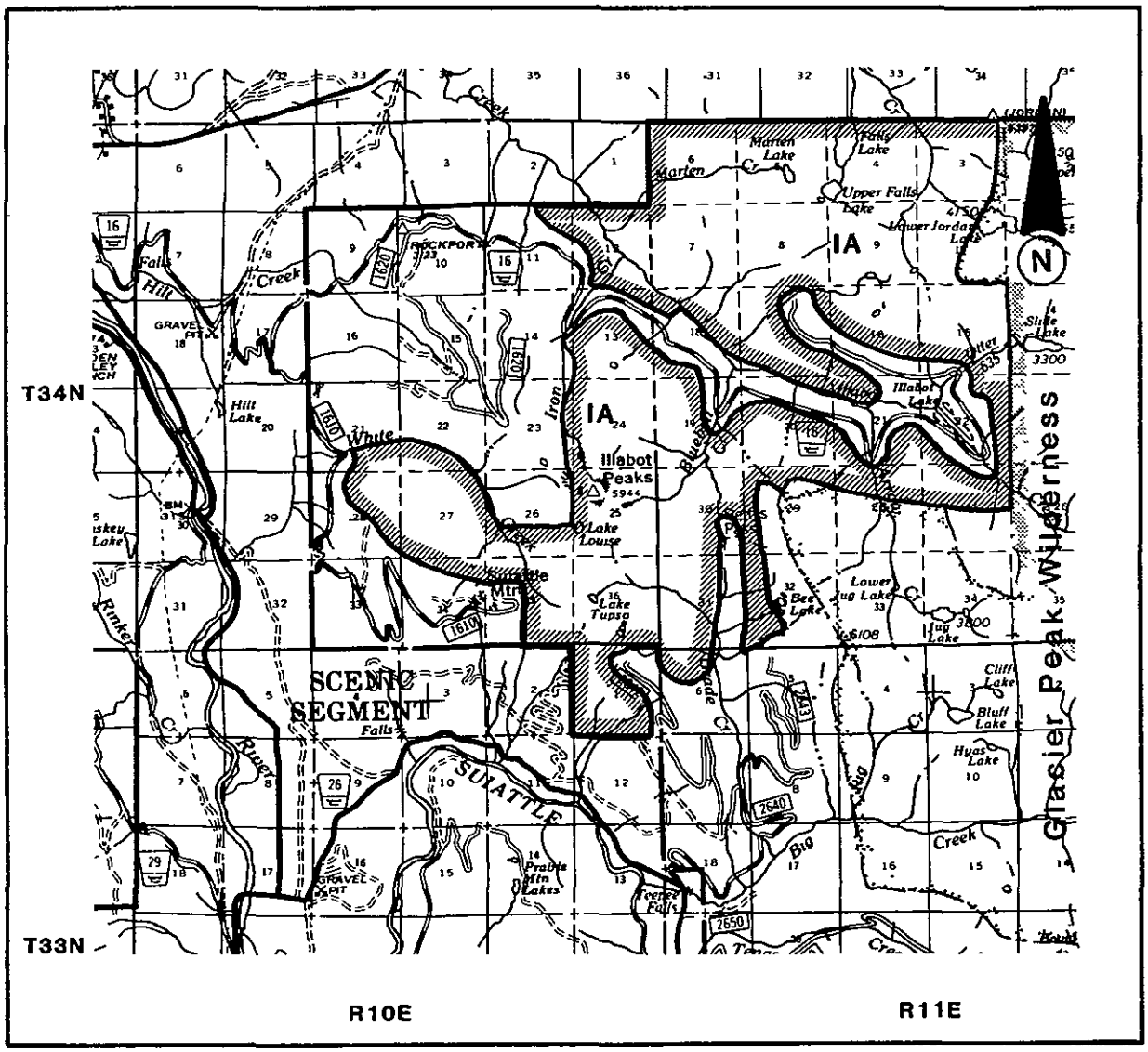
A variety of recreational use centers around high-elevation lakes.

Important habitat is provided for a variety of wildlife species.

Glacier Peak I

Roadless Area I6031





WILDERNESS CAPABILITY

Manageability and Boundaries: Boundaries in close proximity to existing roads may be difficult to manage and locate on the ground. Access in other parts of this parcel is by primitive trails, which would facilitate wilderness management.

Natural Integrity and Appearance: Overall appearance is natural. The portion around Lake Louise and Illabot Peaks is isolated, and the Falls Lake area is a pristine environment.

Opportunities For Solitude: Opportunities for solitude are very good due to large size and rugged terrain.

Opportunities For Primitive Recreation: There are excellent opportunities for primitive recreation activities such as hiking, camping, hunting, fishing, and photography.

Challenging Experiences: There is opportunity for cross-country travel.

Special Features: None.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Availability - Other Resource Potential

Recreation: The Slide Lake Trail #635 is heavily used to access the Glacier Peak Wilderness. Marten Lake, Falls Lake, and Upper Falls Lake receive considerable use via trails off of private roads to the north. Lake Louise and Lake Tupso receive moderate cross-country use. Hunting and fishing use is moderate.

Fish and Wildlife: Special wildlife habitats include habitat for spotted owl, pileated woodpecker and pine marten. A bald eagle night roost has been located on private land near Illabot Creek just downstream from the Forest boundary. Some eagles may head further up Illabot Creek and use some of the old growth stands as communal night roosts.

The low elevation southwest-facing slopes directly above Illabot Creek provide a large deer wintering area. The spacious riparian corridor along Illabot Creek is important to a wide variety of wildlife species. Mountain goats are known to summer on Illabot peaks.

Illabot Creek is used by coho, steelhead, chinook, and chum salmon. It is not clear how far up the creek the fish migrate. Lower White Creek is also used by spawning coho and chinook.

Water: This highly dissected parcel has tributaries into the Skagit, Cascade, Sauk, and Suiattle Rivers. There are several high-elevation lakes.

Livestock Operations: None.

Summary Table - Glacier Peak I #16031 (IA)

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	12,755
Primitive/Semi-Primitive Recreation ROS	Acres	8,658
Timber		
Tentatively suitable	Acres	5,195
Tentatively suitable inaccessible	Acres	1,034
Tentatively suitable standing volume	M bdft	203,265
"Old Growth", Total Acres	Acres	8,467
0-2,500 Feet Elevation	Acres	1,098
2,500-4,000 Feet Elevation	Acres	5,617
4,000 + Feet Elevation	Acres	1,752
Management Indicator Species (MIS)		
Spotted owl MR	Acres	3,083
Pileated woodpecker and pine marten MR	Acres	570
Elk-deer winter range	Acres	1,182
Goat habitat MR	Acres	1,055
Bald eagle habitat (nests, forage, roost area)	Acres	295
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	971
Low	Acres	84
Claims	# of	4
Leasable Energy Minerals (Moderate Potential)		
Oil, Gas, Geothermal	Acres	0

1/ American Indian Religious and Cultural areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Ecology: This is a large, heavily forested parcel divided by high, rugged mountain terrain containing lakes, meadows, and alpine timber. Species include cedar and Douglas-fir at lower elevations and Pacific silver fir and hemlock at higher elevations.

Timber: Most of the parcel supports commercial forest except for the central, high elevation Illabot Peaks portion. Less than half of the area, however, is tentatively suitable for logging.

Minerals/Oil and Gas: The geology of the area is dominated by Jurassic metasedimentary rocks and by Tertiary and Mesozoic granitic rocks. Data shows the area has no reported mineral resource occurrences of significance, and the area has only 4 mining claims recorded for it. The area is not classified "prospectively valuable" for any leasable mineral, nor is it encumbered by any leases or pending lease applications. A portion of the area was studied by the U.S. Geological Survey and Bureau of Mines. As a result of their studies, it is concluded that the southern portion of the area has a low potential for the occurrence of gold resources in hydrothermal quartz veins, and it has some potential for the occurrence of gold placer deposits.

Cultural: There are sites important for American Indian religious and cultural use.

Land Use Authorizations: There are no special land authorizations.

Non-Federal Lands: None.

Fire: There is a low occurrence of fire.

Insect and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: This parcel adjoins the Glacier Peak Wilderness. The communities of Rockport, Marblemount, and Darrington are 10-20 miles away. Seattle is approximately 85 miles away.

Public Interest: Local and other public sentiment has been divided between favoring wilderness and development of commodity resources. There has been interest from American Indians in the Marten Lake area. Following release of the DEIS and Draft Forest Plan, the following specific geographic sites and features within Parcel I of the Glacier Peak Roadless Area, well as Parcel I itself, received public comment.

Illabot Creek was mentioned 766 times. Most responses (191) wanted Illabot Creek designated a Wild and Scenic River. Other responses desired protection of the area from timber harvest (77), protection of bald eagle habitat (56), protection of old growth ecosystems (56) and fisheries (50). The remaining comments, in general, favored protection of wildlife habitat, preservation of the forest ecosystem, no new road construction, and protection of the area for recreation. One response said that the old growth in the area should be harvested. 1/

Falls Lake was mentioned 198 times. Most responses said to protect the area from harvest (44), to have it remain roadless (44), to protect wildlife habitat in general (25), to preserve the forest ecosystem (19), and to preserve old growth (15). Other comments express the desire for enhancing the trail system in the area.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

Jordan Creek received 45 comments. Most responses favored no logging in the area (14), and for the area to remain roadless (7). The remaining responses wanted the area to be protected for recreation purposes and wildlife habitat. One response said the area should be kept trailless; one response desired more trail construction in the area.

Glacier Peak I was mentioned twelve times. The majority of the responses (3) favored designation of this area for timber harvest. Other responses included a desire to increase the opportunity in the area for motorized recreation (2), manage the area for big game (2), protect the trail from logging, manage the area for nonmotorized recreation, protect the area from timber harvest, protect the area for wildlife habitat, and protect the area for spotted owl habitat (one response each).

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

GLACIER PEAK I
PARCEL IA

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	7,201						
1B SPNM		1,351	9,418	10,094	8,299		8,426
1C SPM						4,265	
1D RN		1,098					
2A Foregrd.			126				
2B Midgrd.			126		63		21
5 Potent W&S				21			21
11 O-G Hab.	1,816	2,935	84	1,077	21	2,977	105
12 Mature O-G	42	274	105	464	253	612	232
14 D&E Enhanc		1,055	950	63	992	781	1,013
15 Goat MR		2,512	126	147	274	464	654
17 Timber	3,695	1,964	1,626	612	2,090	2,639	1,795
19 Mtn. Hemlk		1,562	190	274	760	1,013	485

Significant Effects

Recreation: Current recreation opportunities would not be significantly affected by implementation of any of the alternatives. Alternative G-Modified would have the least impact on the roadless character of the area through the fifth decade. Alternative H, the alternative taking the greatest amount of area from roadless status, retains 86% of the area as roadless through the end of the fifth decade. Alternative I allocates 4,265 acres to semi-primitive motorized recreation and retains 96% of the area in a roadless condition through the end of the fifth decade.

Fish/Wildlife: Fish and wildlife would not be significantly affected by implementation of any of the alternatives. Alternative B would provide the greatest emphasis on wildlife, as it allocated the greatest amount of acres to old growth habitat, mature old growth, deer and elk enhancement, and mountain goat habitat areas. Alternatives C and H provide the least.

Water: There are no adverse effects to the water resource of this area associated with implementation of any of the alternatives, due to the low level of proposed development activities.

Ecology: The overall ecology of the area would not be significantly affected by implementation of any of the alternatives, due to the low level of proposed development activities.

Timber: Alternative G-Modified would have the least effect on the existing timber resource, as it allocates very minimal acreage to management area 17 (timber). Alternatives A, NC and I would have the greatest effects. None of the alternatives would significantly affect the timber resource, as potential development activities would be minimal.

Minerals/Oil/Gas: None of the alternatives would have a significant affect on the availability of minerals, oil, or natural gas for development. Alternative A, NC,H and I would provide a slightly higher amount of roaded access through the area for minerals development.

Cultural: Alternatives A, NC and I would have the greatest potential to adversely impact cultural resources within the area, due to development activities. Valuable sites would be protected via avoidance or conserved through data recovery. Alternatives C and G-Modified would have the least potential to adversely impact cultural resources. None of the alternatives would significantly affect cultural resources.

Fire: None of the alternatives would significantly affect fire occurrence within the area.

Insect and Disease: None of the alternatives would significantly affect the occurrence of insects and disease within the area.

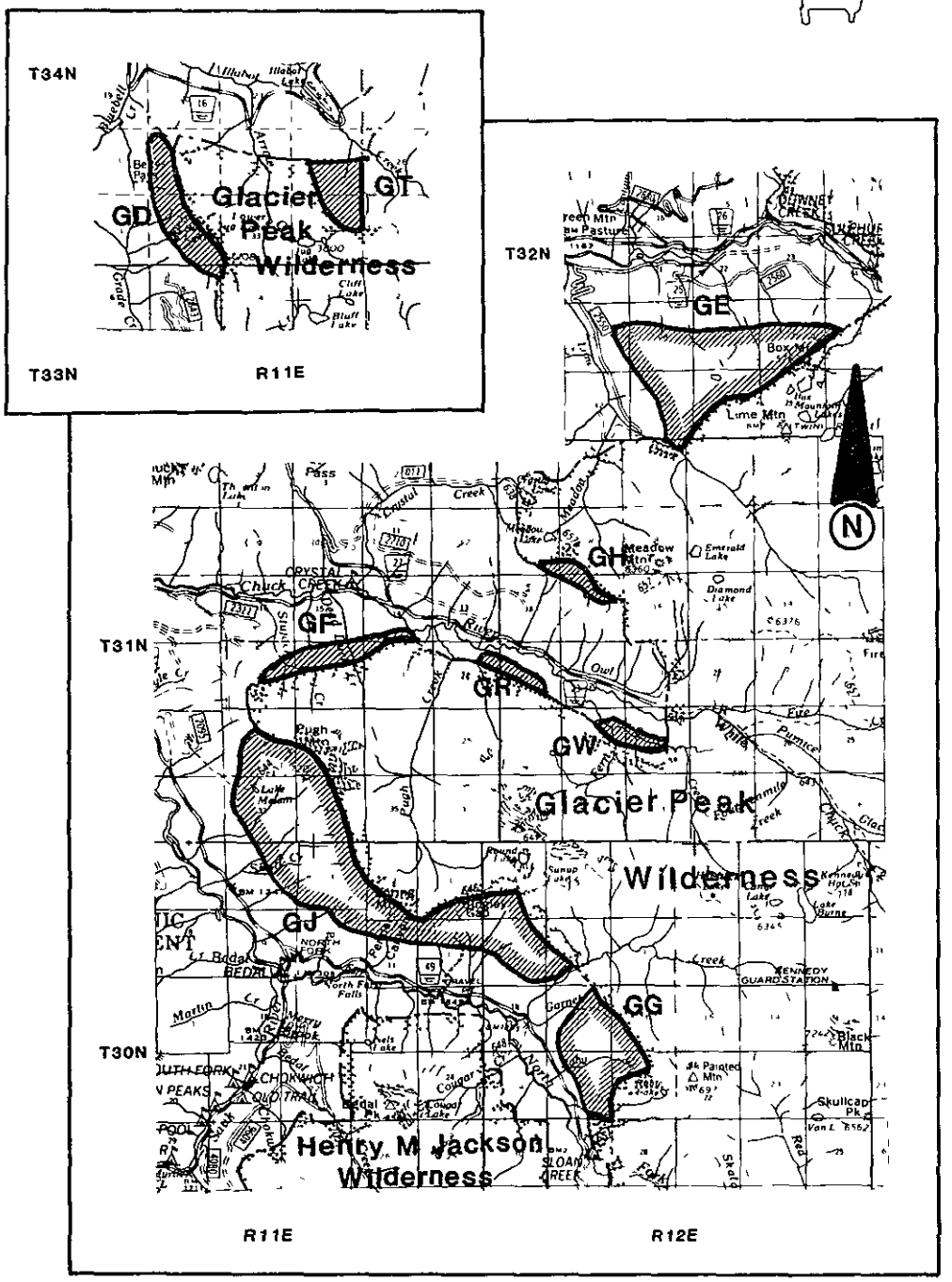
Wilderness Potential: All alternatives, with the exception of I, assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I assigns approximately one-third of the area to semi-primitive motorized management area. All alternatives would maintain the area in a largely roadless condition through the end of the fifth decade. The wilderness potential would be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	12,518	12,308	12,111	95%
B (RPA)	12,557	12,393	12,234	96%
C	12,554	12,456	12,306	96%
G-Mod.	12,557	12,663	12,651	99%
H	12,209	11,613	11,016	86%
I	12,572	12,394	12,226	96%
J (Pref).	12,659	12,559	12,453	98%

Glacier Peak G

Roadless Area G6031



GLACIER PEAK G **Roadless Area G6031**

This roadless area originally consisted of 59,755 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area G6031 to nonwilderness uses. In 1984 51,018 acres from this area were designated as additions to the Glacier Peak Wilderness by Congress as a result of the Washington Wilderness Legislation. Nine parcels remain in roadless status.

The following shows the disposition of acres within the Glacier Peak G roadless area:

Glacier Peak G	Net Acres
1984 RARE II	59,755
updated 1988	8,737
Change	**-51,018**

OVERVIEW

These parcels are adjacent to Glacier Peak Wilderness. Topography is characterized by steep, rugged, forested, and rocky slopes. Many streams drain areas ranging in elevation from 1,600 to 7,200 feet. Collector and local roads provide access to within 1/4 to 1/2 mile of most of the parcels Trails cross some of the parcels.

Plant associations include the western hemlock, Pacific silver fir, and mountain hemlock mature conifer forests. Highest elevations are often bare rock. Mid-elevations are comprised of sparsely forested areas interspersed with brush fields and talus slopes. Alpine meadows are small in size and uncommon.

Soils have formed in coarse-textured, weathered gneiss bedrock that has been altered by glacial and stream processes. Soils are gravelly sandy loam. Steep slopes adjacent to stream courses are prone to earth slides under natural conditions.

WILDERNESS CAPABILITY

Manageability and Boundaries: The nine parcels could be added to adjust wilderness, but they would be illogical additions due to difficulty of managing boundaries on ill-defined features.

Natural Integrity and Appearance: Adjacent cutover lands provide the appearance of a modified landscape.

Opportunities For Solitude: Opportunities are low due to nearby roads and logging activity.

Opportunities Primitive Recreation: Opportunities are low.

Challenging Experiences: Opportunities for challenging experiences are low.

Special Features: None.

Summary Table - Glacier Peak G #G6031

Category 1/	Unit	Parcels GD	GT	GE	GH	GW	GR	GF	GJ	GG	Total
Acres (Minus water, private land)	Acres	655	338	2,133	127	106	84	443	3,611	1,246	8,737
Primitive/Semi-Premitive Recreation ROS	Acres	612	232	1,942	63	105	0	359	3,547	844	7,704
Timber											
Tentatively suitable	Acres	0	42	950	0	63	63	337	781	190	2,426
Tentatively suitable inaccessible	Acres	0	42	359	0	0	0	295	675	21	1,392
Tentatively suitable standing volume	M bdft	0	1,643	37,171	0	2,465	2,465	13,186	30,558	7,434	94,932
"Old Growth", Total Acres	Acres	379	105	1,435	84	63	84	274	1,562	907	4,893
0-2,500 Feet Elevation	Acres	0	0	21	0	63	84	21	253	147	589
2,500-4,000 Feet Elevation	Acres	84	63	612	0	0	0	211	908	570	2,448
4,000 + Feet Elevation	Acres	295	42	823	84	0	0	42	401	190	1,877
Management Indicator Species (MIS)											
Spotted Owl MR	Acres	232	84	0	0	0	42	21	253	865	1,497
Pileated Woodpecker and Marten MR	Acres	0	0	84	0	0	0	0	0	0	84
Elk-deer winter range	Acres	0	0	42	0	0	42	0	485	359	928
Goat Habitat MR	Acres	0	0	0	0	0	0	0	527	632	580
Bald Eagle Habitat (nest, forage, roost area)	Acres	0	0	0	0	0	0	0	0	0	0
Locatable Mineral Development Potential											
High	Acres	0	0	0	0	0	0	0	0	0	0
Moderate	Acres	464	337	0	0	0	0	63	0	1,203	2,067
Low	Acres	0	0	0	0	0	0	0	0	0	0
Claims 2/	# of	-	-	-	-	-	-	-	-	-	5
Leasable Energy Minerals (Moderate Potential)											
Geothermal	Acres	0	0	2,132	126	105	84	443	3,611	1,245	7,746

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

2/ Number of claims not broken out by parcel.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: the summary table below and a discussion of other resource potential.

Availability - Other Resource Potential

Recreation: Trails including the Meadow Mountain #657, Mt. Pugh #644, and Round Lake #646 each receive about 1,500 visits per year by hikers and horsemen who are passing through these areas to destination points in Glacier Peak Wilderness. Areas adjacent to trails are steep and generally unsuitable for recreation except by occasional big game hunters.

Wildlife: Special habitats include habitat for spotted owl, pileated woodpecker and pine marten. The steep slopes south of Mt. Pugh provide year round range for several herds of mountain goats. Habitat is afforded several species of native vertebrates. Streams provide habitat for native trout.

Water: There is little potential for water use.

Livestock Operations: There is no potential or current livestock use.

Ecology: The areas are generally heavily forested with silver fir, hemlock and redcedar. Steeper slopes have exposed rock.

Timber: About 28 percent of the area (2,426 acres) in the parcel is tentatively suitable for logging.

Minerals/Oil and Gas: The geology of these areas is dominated by Jurassic metamorphic rocks, Mesozoic granitic rocks, Tertiary volcanic rocks, and glacial drift of Quaternary age. According to MILS data, the area has no reported mineral resource occurrences of significance, however, five mining claims have been located in T.32N.,R.12E. Except for the two parcels lying within T.34N.,R11E., the entire area is classified "prospectively valuable" for geothermal resources. However, none of the parcels are encumbered by geothermal leases or lease applications. Much of the area has been inventoried by the U.S. Geological Survey and Bureau of Mines as part of their Glacier Peak study. Based upon that evaluation, they have concluded the following:

The parcels in T.34N.,R.11E. are underlain by a granitic pluton, and as a consequence they have a "probable" potential for the occurrence of gold deposits.

The parcels in T.32N.,R12E. may have a limestone deposit (Lime Mountain property) which has a potential for future use, but is presently noneconomic.

Parcels in T.31N.,R12E. may also have limestone deposits, which are presently subeconomic.

The southernmost parcel in T.30N.,R.12E. may have hot spring type deposits, but their potential is low. The same area has a low potential for the occurrence of base-metal (copper, lead, zinc with silver and gold) resources in hydrothermal veins. Little exploration work has been done in the area.

Cultural: There is little cultural significance.

Land Use Authorizations: There are no special land uses.

Non-Federal Lands: None.

Fire: There is a high occurrence of fires (4-5 per decade), with four major fires in the past 30 years.

Insects and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: These parcels adjoin the Glacier Peak Wilderness, and are about 70-100 miles from Seattle

Public Interest: There has been low public comment or interest in these parcels. Following release of the DEIS and Proposed Forest Plan, no public comment was received about this specific area Public comment did mention, in a generic sense, areas adjacent to Glacier Peak 293 times. Responses favored protecting the area from harvest (78), preserving the forest ecosystem (52), keeping the area roadless (44), and protecting old growth (20). Other comments said to protect the area for wildlife habitat and recreation values. 1/

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

GLACIER PEAK G
PARCEL GD

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	612						
1B SPNM		443	654	591	654		654
11 O-G Hab.	42	147				232	
19 Mtn. Hemlk		63		63		422	

PARCEL GE

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	1,203						
1B SPNM		570	2,090	1,647	2,006		2,048
1C SPM						591	
2B Midgrd.			21				
11 O-G Hab.				21			
12 Mature O-G	84	84		84	42	84	
14 D&E Enhanc		63					
17 Timber	844	865	21	380	84	971	84
19 Mtn Hemlk		549				485	

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

PARCEL GF

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	105						
1B SPNM		63	443	443	401		380
1C SPM						63	
2B Midgrd.							63
11 O-G Hab.		21					
17 Timber	337	359			42	380	

PARCEL GG

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	1,119						
1B SPNM		1,098	1,034	886	1,013		1,013
1C SPM		21				422	
2A Foregrd.			21		84		21
3A Public	21	21	21	21	21	21	21
5 Potent W&S							63
6 Skagit W&S	21	21	21	21	21	21	21
11 O-G Hab.		84	147	295	105	781	84
15 Goat MR							21
17 Timber	84			21			

PARCEL GH

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	126						
1B SPNM		42	126	126	126		126
1C SPM						126	
19 Mtn. Hemlk		84					

PARCEL GJ

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	2,850						
1B SPNM		2,893	3,590	3,568	3,611		3,611
1C SPM						1,985	
11 O-G Hab.				42		274	
14 D&E Enhanc		168				42	
15 Goat MR		548	21			527	
17 Timber	760					739	
19 Mtn. Hemlk						42	

PARCEL GR

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
1B SPNM		21	84	84			
11 O-G Hab.		21			42	42	42
17 Timber	84	42			42	42	42

PARCEL GT

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	295						
1B SPNM			337	337	337		337
1C RN						337	
11 O-G Hab.		84					
17 Timber	42						
19 Mtn. Hemlk		253					

PARCEL GW

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	21						
1B SPNM		63	105	105	42		42
17 Timber	84	42			63	105	63

Significant Effects

Recreation: Current recreation opportunities would not be significantly affected by implementation of any of the alternatives. Alternatives C and G-Modified would leave the area roadless through the end of the fifth decade. Alternative A, the alternative taking the greatest amount of area from roadless status, retains 83% of the area as roadless through the end of the fifth decade. Alternatives B allocates minimal acres to semi-primitive motorized (21 acres). Alternative I allocates 3,061 acres to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife will not be significantly affected by implementation of any of the alternatives. Alternatives B and I will allocate the greatest area to old growth habitat, deer and elk enhancement, and mountain goat management requirement. Alternatives A and J (Preferred) allocate the least.

Water: There are no adverse effects to the water resource of this area associated with any of the alternatives, due to the low level of proposed development activity.

Ecology: The overall ecology of the area would not be significantly affected by any of the alternatives, due to the low level of development activity.

Timber: Alternatives C, H and J (Preferred) would have the least affect on the existing timber resource, as it allocates very minimal acreage to management area 17 (timber). Alternatives A, NC, and I would have the greatest effect. None of the alternatives will significantly affect the timber resource, as potential development activities will be minimal.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or natural gas for development. Alternatives A, NC, B and I will provide a higher amount of roaded access through the area for minerals development through the fifth decade.

Cultural: Alternatives A, NC, B and I will have the greatest potential to adversely impact cultural resources within the area, due to development activities. Alternatives C, H and J(Preferred) would have the least potential to adversely affect cultural resources.

Land Use Authorizations: There are no current land use authorizations within the area.

Fire: None of the alternatives will significantly affect the fire occurrence within the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

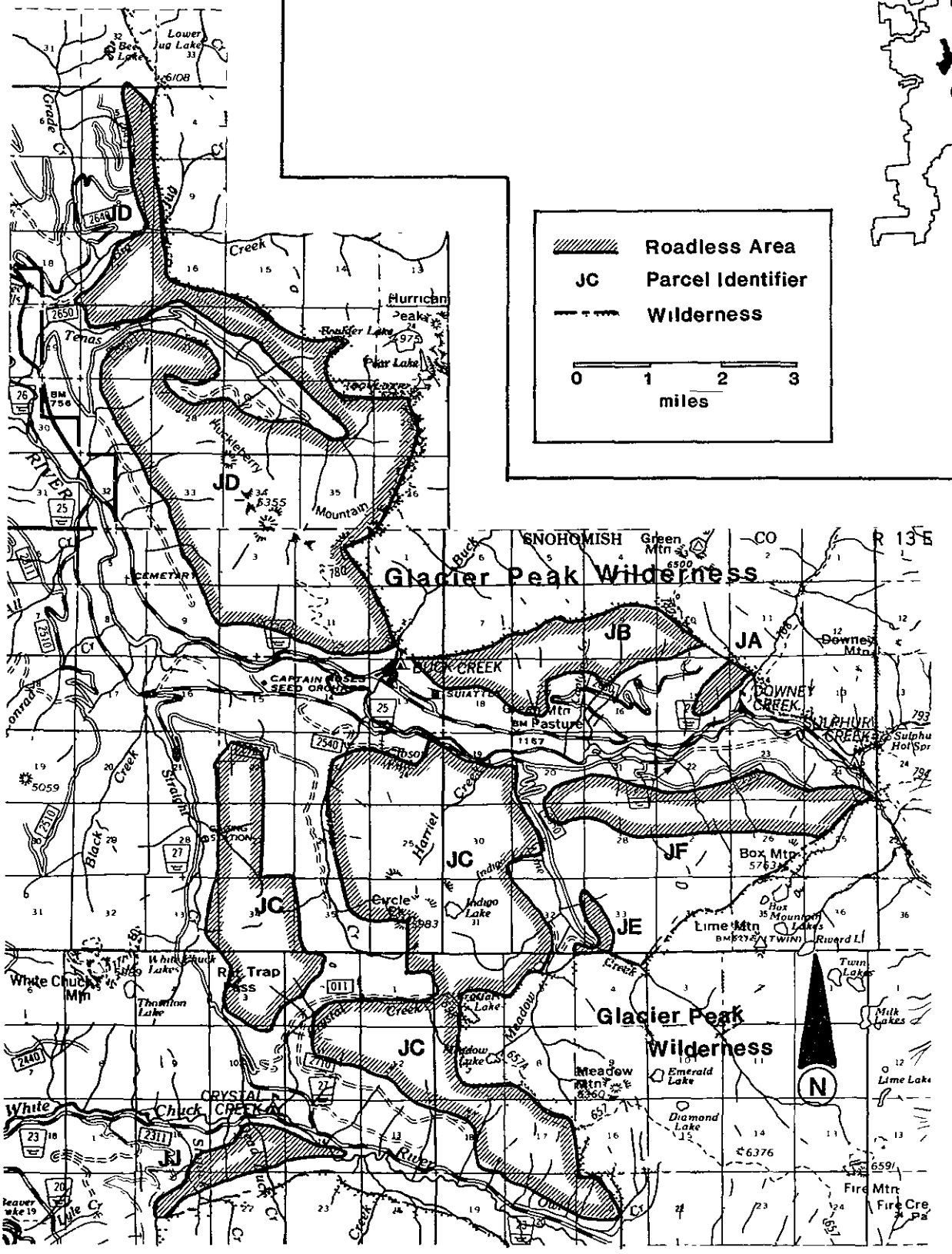
Wilderness Potential: All alternatives, with the exception of alternative I, assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternatives C and G-Modified do not remove any acres from roadless areas through the end of the fifth decade. Alternative A, which will remove the greatest amount of acres from roadless status, will still leave 83% of the area unroaded at the end of the fifth decade. Alternative I assigns approximately 35% of the area to the semi-primitive motorized management area and 25% of the area is allocated to timber management. Alternative I retains 95% of the area in a roadless condition through the end of the fifth decade. The wilderness potential of this area will be maintained in every alternative.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	7,780	7,642	7,283	83%
B (RPA)	8,533	8,395	8,312	95%
C	8,737	8,737	8,737	100%
G-Mod.	8,737	8,737	8,737	100%
H	8,467	8,335	8,179	94%
I	8,647	8,319	8,268	95%
J (Pref).	8,596	8,480	8,480	97%

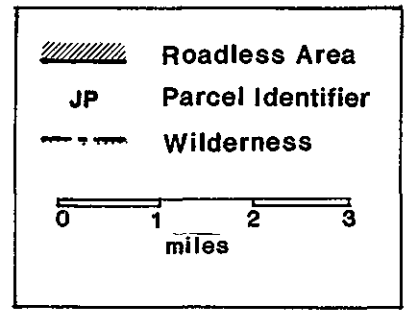
Glacier Peak J

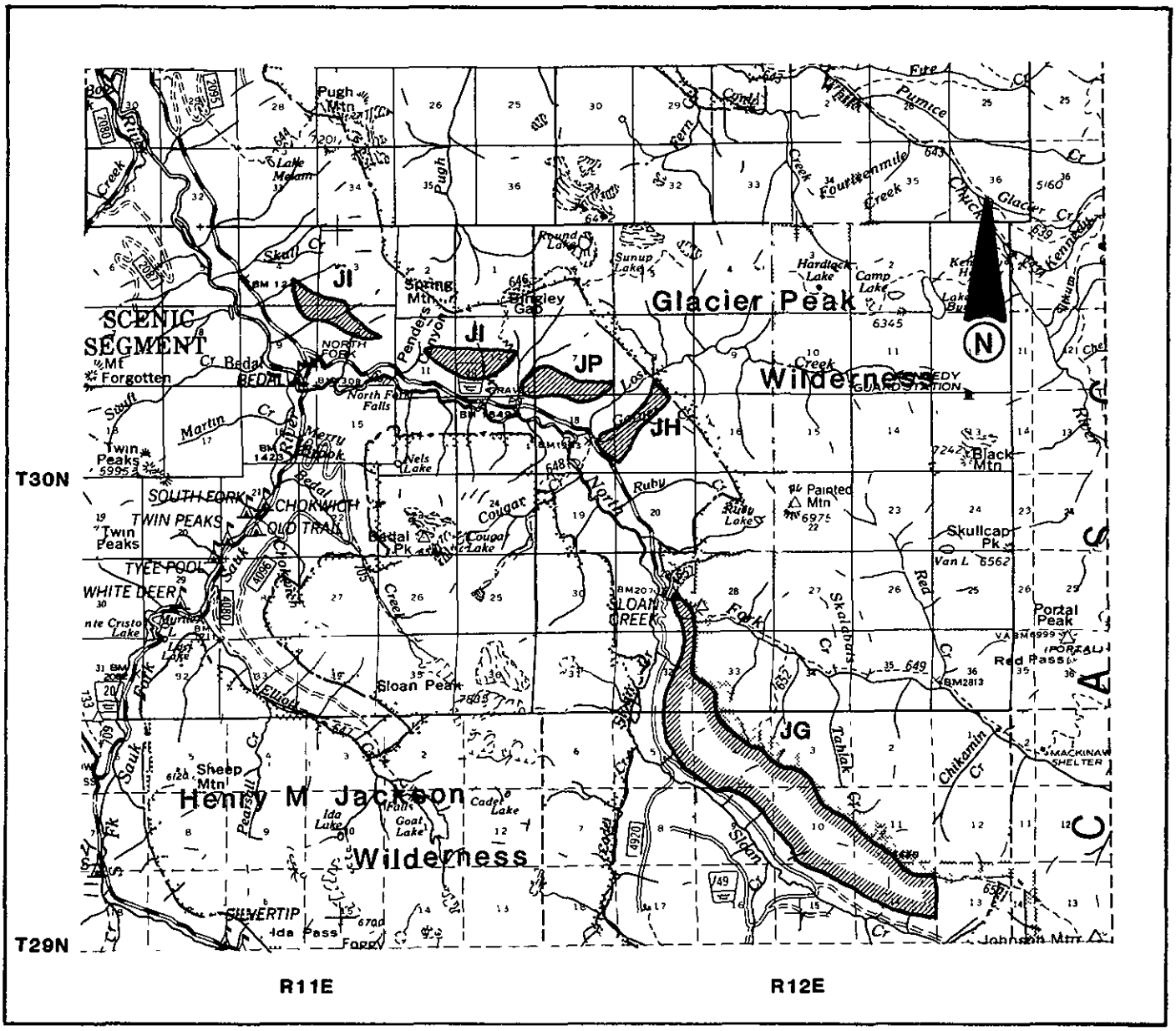
Roadless Area J6031



Glacier Peak J

Roadless Area J6031





GLACIER PEAK J **Roadless Area J6031 (JD, JB, JA, JF, JE, JC, JJ, JI, JP, JH, JG)**

This roadless area originally consisted of 31,604 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area J6031 to nonwilderness uses. In 1984 1,498 acres from this area were designated as additions to the Glacier Peak Wilderness by Congress as a result of the Washington Wilderness Act. Eleven parcels remain in roadless status.

Since the RARE II inventory, this area has been reduced by 5,633 acres. Four timber sales (Circle Creek, Pugh Blend, Sloan Creek, and Bowser Creek Timber Sales) removed 2,065 acres from roadless status. The area was reduced by 912 acres following the Harriet Creek, Box Mountain II, and Big Creek Timber Sales. Total acreage within the area was reduced 1,158 acres due to a mapping discrepancy.

The following shows the disposition of acres within the Glacier Peak J roadless area:

Glacier Peak J	**Net Acres**
1984 RARE II	31,604
updated 1988	25,971
Change	**- 5,633**

OVERVIEW

These eleven parcels are located adjacent to the Glacier Peak Wilderness. They generally have steep, forested, and rocky slopes, with elevations ranging from 1,600 to 6,000 feet. Arterial, collector, and local roads provide direct access to within 1/4 to 1/2 mile of all parcels. Trails cross several parcels including the Huckleberry Mountain trail in parcel JD, Green Mountain trail in parcel JB, and the Crystal Lake trail in parcel JC.

Plant associations include the western hemlock, Pacific silver fir, and mountain hemlock mature conifer forests. Highest elevations are comprised of bare rock and snow fields. Alpine meadows are small in size and uncommon.

Soils have generally formed in coarse-textured, weathered gneiss bedrock that has been altered by glacial and fluvial processes. Soils vary from shallow to moderately deep and consist of sandy loam to very gravelly sandy loam. Extremely steep slopes adjacent to drainages are prone to earth slides under natural conditions.

WILDERNESS CAPABILITY

Manageability and Boundaries: Boundaries for all parcels are not conducive to separate management, except as they may be added to adjoining wilderness.

Natural Integrity and Appearance: Most of the parcels adjoin timber harvest units. Generally the higher elevations appear undisturbed.

Opportunities For Solitude: Opportunities for solitude are low due to nearby roads or logging activities.

Opportunities For Primitive Recreation: Opportunities for primitive recreation are low, except along low use trails to Huckleberry Mountain and Circle Peak.

Challenging Experiences: Opportunities for challenging experiences are low due to the proximity to the works of man.

Special Features: The potential Green Mountain Research Natural Area is partially in parcel JB. See a description under Other Management Considerations below.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Availability - Other Resource Potential

Recreation: The Boulder Lake Trail (#675), Huckleberry Mountain Trail (#710), and Circle Peak Trail (#634) each receive about 500 visitor days use per year by hikers passing through on their way to destination points within the Glacier Peak Wilderness. The Green Mountain Trail (#782) receives about 3,500 visitor use days per year primarily by hikers passing through the area to the meadows and view points in Glacier Peak Wilderness. Indigo Lake, near Circle Peak, attracts less than 500 fishermen per year. Other than big game hunting, the steep topography of the area and dense understory vegetation discourage recreation use.

Wildlife: Special wildlife habitats include habitat for spotted owl, pileated woodpecker and pine marten. Habitat also exists for several species of native vertebrates, and for native trout. Steeper slopes near Pendors Canyon and Lost Creek provide year round range for several herds of mountain goats.

Water: There is little potential for water use.

Livestock Operations: There is no potential or current livestock use.

Ecology: The southeast part of parcel JG contains steep alpine meadows. The rest of the area is steep, forested slopes with many exposed cliffs. Ecological communities include dense forests of tall evergreen trees with patches of shrubby undergrowth. Dominant species include Pacific silver fir, Douglas fir, subalpine fir and mountain hemlock.

Timber: About 49 percent of the parcels 12,834 acres are classed as tentatively suitable for logging.

Summary Table - Glacier Peak J #J6031 Parcels

Category 1/	Unit	JD	JB	JA	JF	JE	JC	JJ	JI	JP	JH	JG	Total
Acres (Minus water, private land)	Acres	8,236	2,260	232	1,583	148	9,880	591	549	211	106	2,175	25,971
Primitive/Semi-Primitive Recreation ROS	Acres	4,582	1,203	0	612	42	6,166	126	464	84	63	1,245	14,587
Timber													
Tentatively suitable	Acres	5,131	359	232	1,393	105	4,413	527	63	126	21	464	12,834
Tent. suitable inaccessible	Acres	1,034	0	0	190	0	380	105	21	0	0	253	1,983
Tent. suitable standing volume	M bdft	200,761	14,047	9,077	54,504	4,108	172,667	20,620	2,465	4,930	822	18,155	502,156
"Old Growth", Total Acres	Acres	4,624	168	126	1,075	105	6,651	358	147	42	42	1,055	14,393
0-2,500 Feet Elevation	Acres	1,077	63	126	147	42	570	274	105	42	0	63	2,509
2,500-4,000 Feet Elevation	Acres	1,795	63	0	760	63	3,590	84	42	0	42	570	7,009
4,000 + Feet Elevation	Acres	1,752	42	0	168	0	2,491	0	0	0	0	422	4,875
Management Indicator Species (MIS)													
Spotted Owl MR	Acres	401	0	21	0	0	0	0	0	63	84	0	569
Pileated Woodpecker and Marten MR	Acres	401	84	0	359	0	211	0	0	0	0	168	1,223
Elk-deer winter range	Acres	1,689	633	190	274	0	760	295	316	168	84	0	4,409
Goat Habitat MR	Acres	168	0	0	0	0	0	0	232	21	0	147	568
Bald Eagle Habitat 2/	Acres	0	0	21	0	0	0	21	0	0	0	0	42
Locatable Mineral Development Potential													
High	Acres	0	0	0	0	0	0	0	0	0	0	0	0
Moderate	Acres	3,146	0	0	0	0	0	0	0	0	63	295	3,504
Low	Acres	5,089	1,140	0	0	0	63	0	0	0	0	1,879	8,171
Claims 3/	# of	-	-	-	-	-	-	-	-	-	-	-	30
Leasable Energy Minerals (Moderate Potential)													
Geothermal	Acres	2,344	2,259	232	1,583	147	9,993	591	549	211	105	2,175	20,079

1/ American Indian Religious and Cultural areas were analyzed. Site specific information is not disclosed due to its sensitivity.
2/ Includes nest sites, forage areas, and roost areas.
3/ Number of claims is not broken-out by individual parcel

Minerals/Oil and Gas: The geology of these parcels is dominated by Mesozoic granitic and metamorphic rocks and glacial drift of Quaternary age. The areas have no reported mineral occurrences of significance, however they do have 30 mining claims located within the parcels or on adjacent lands. Most of these claims are in T.32N.,R12E. All except that portion of the area located in T.33N.,R.12E. is classified "prospectively valuable" for geothermal resources, and parcels J-F are encumbered by 2 pending lease applications. A large part of the area has been inventoried by the U.S. Geological Survey and Bureau of Mines. Based upon their study, they have concluded the following:

> That portion of the area lying within T.33N.,R.11E. has a "probable" potential for the occurrence of gold deposits.
>
> That portion of the area lying within T 32N.,R.12E. has limestone deposits which are presently noneconomic.
>
> That portion of the area lying within T.30N.,R.12E. has reported placer garnet deposits of marginal interest, and it has a "probable" potential for the occurrence of precious and base-metal deposits (Au, Ag, Cu, Pb, Zn).

Cultural: There is little of cultural significance in these parcels.

Land Use Authorizations: There are no special land uses.

Non-Federal Lands: None.

Fire: The parcels have a history of 5-10 fires per decade. Four major fires occurred in the past 40 years. Average fuel accumulation is 40-50 tons per acre.

Insect and Disease: None.

Others: Alternatives G-Modified and H propose a Green Mountain Research Natural Area in Parcel JB. Approximately one-third of this 2,060 acre reserve is in the roadless area; the remainder is in the Glacier Peak wilderness. This RNA represents a subalpine parkland mosaic, heather-huckleberry communities, and subalpine lush herbaceous communities.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: These parcels adjoin or are adjacent to Glacier Peak Wilderness and are located about 70-100 miles from Seattle.

Public Interests: Following release of the DEIS and Proposed Forest Plan, areas adjacent to the Glacier Peak area, as well as specific geographic features within Parcel J, received public comment.

Areas adjacent to Glacier Peak were mentioned in public comments 293 times. Responses favored protecting the area from harvest (78), preserving the forest ecosystem (52), keeping the area roadless (44), and protecting old growth (20).

Other comments said to protect the area for wildlife habitat and recreation values. 1/

Huckleberry Mountain was contained in 303 responses. Most comments expressed a desire to protect the old growth ecosystem (49), exclude timber harvest (49), have the area remain roadless (48), preserve the forest ecosystem (34), and protect the trail from logging (27). Other comments favored managing the area for the protection of recreation, wildlife, and visual quality.

Buck Creek was mentioned 98 times. Thirty-five comments favored Wild and Scenic River designation for the creek; fourteen responses said to protect the area from timber harvest. Other comments expressed a desire to protect the area for wildlife habitat, recreation and visual quality.

Crystal Creek was cited in 40 responses. The majority of the comments favored no logging (10), and no new road construction (6). Five responses said to close existing roads; three comments wanted more roads built.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

GLACIER PEAK J
PARCEL JA

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
1B SPNM			168	105			
1D RN					21		
2A Foregrd.			21				
5 Potent W&S							63
6 Skagit W&S	42	42	42	42	42	42	42
11 O-G Hab.		21			21	21	21
14 D&E Enhanc		126					
17 Timber	190	42		84	147	168	105

PARCEL JB

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	1,710						
1B SPNM		1,710	1,562	1,034	1,393		1,436
2A Foregrd.			105				
6 Skagit W&S	190	84	190	147	190	190	190
11 O-G Hab.				105			42
12 Mature O-G	84	84	84	42	84	126	
14 D&E Enhanc		105					
17 Timber	274	274	316	380	274	1,436	274
18 RNA				549	316		
19 Mtn. Hemlk						506	316

PARCEL JC

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	5,469						
1B SPNM		1,351	9,313	6,145	5,068		4,920
1C SPM						2,576	
1D RN		3,378					295
2A Foregrd.							126
2B Midgrd.			253				1,013
11 O-G Hab.	549			1,161	316		
12 Mature O-G	126	211			211	211	232
14 D&E Enhanc		739				485	
17 Timber	3,737	3,104	316	1,457	3,716	4,519	2,660
19 Mtn. Hemlk		1,098		1,119	570	2,090	633

PARCEL JD

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	3,209						
1B SPNM		2,006	4,202	5,258	2,259		2,132
1C SPM						1,330	
1D RN					126		
2B Midgrd.			2,829				
5 Potent W&S							21
6 Skagit W&S	274	190	253	147	253	253	253
11 O-G Hab.		401	337	675	443	401	401
12 Mature O-G	126	401	190	63	232	359	211
14 D&E Enhanc		1,245			464	1,203	485
15 Goat MR						168	168
17 Timber	4,624	3,357	422	1,626	3,864	3,843	3,928
19 Mtn. Hemlk		633		464	591	675	633

PARCEL JF

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	168						
1B SPNM			1,372	168	211		781
2B Midgrd.			168				
6 Skagit W&S	21		21	21	21	21	21
11 O-G Hab.				84			
12 Mature O-G	359	359	21	359	359	359	126
14 D&E Enhanc		190				63	
17 Timber	1,034	886		950	992	992	654
19 Mtn. Hemlk		147				147	

PARCEL JG

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	1,752						
1B SPNM		1,309	1,900	950	1,604		1,351
1C SPM						1,351	
1D RN		84	63		168		190
2A Foregrd.				126			
2B Midgrd.			105				
6 Skagit W&S	21	21	21	21	21	21	21
11 O-G Hab.				232			
12 Mature O-G						168	63
15 Goat MR		63	84	147	147	147	147
17 Timber	401	316		401	232	485	274
19 Mtn. Hemlk		380		295			126

PARCEL JH

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	84						
1B SPNM		63	84	63	63		63
2A Foregrd.			21		21		21
11 O-G Hab.		21		21	21	84	21
14 D&E Enhanc		21				21	
17 Timber	21			21			

PARCEL JI

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	485						
1B SPNM		549	549	337	527		527
1C SPM						147	
2A Foregrd.				21			21
11 O-G Hab.				63			
14 D&E Enhanc						21	
15 Goat MR				63	21	232	
17 Timber	63			63		147	

PARCEL JJ

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	63						
1B SPNM			359	401	63		105
2A Foregrd.			211				84
2B Midgrd			21				401
11 O-G Hab.				126			
14 D&E Enhanc		295				211	
17 Timber	527	253		21	527	337	
19 Mtn. Hemlk		42		42		42	

PARCEL JP

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	84						
1B SPNM		84	211	84	84		105
1C SPM						42	
2A Foregrd.					126		105
11 O-G Hab.				21		42	
14 D&E Enhanc		126				21	
17 Timber	126			105		105	

PARCEL JZ

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	42						
1B SPNM			63	105	63		21
17 Timber	105	147	84	42	84	147	126

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by implementation of any of the alternatives. Alternative G-Modified would leave the greatest amount of the area (91%) roadless through the end of the fifth decade. Alternative A, the alternative taking the greatest amount of area from roadless status, retains 79% of the area as roadless through the end of the fifth decade. Alternative I will allocate approximately one-fifth of the area to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife will not be significantly affected by implementation of any of the alternatives. Alternatives B, G-Modified and I allocate the greatest area to old growth habitat, mature old growth, and deer and elk enhancement. Alternatives A, NC, C and J (preferred) will allocate the least.

Water: There are no adverse effects to the water resource of this area associated with implementation of any of the alternatives, due to the low level of proposed development activities.

Ecology: *The overall ecology of the area will not be significantly affected by* implementation of any of the alternatives, due to the low level of proposed development activities. Alternatives G-Modified and H will designate the Green Mountain Research Natural Area.

Timber: Alternatives C, G-Modified and J (Preferred) will have the least affect on the existing timber resource, due to minimal allocations of acreage to management area 17 (timber). Alternatives A, NC, H and I will have the greatest effects. Alternatives A and NC allocate 47% of the area to timber management.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. Alternatives A, NC, H and I will provide a higher amount of roaded access through the area for minerals development.

Cultural: Alternatives A, NC, H and I will have the greatest potential to adversely impact cultural resources within the area, due to development activities. Alternative C will have the least potential. Cultural resources will not be significantly impacted by any of the alternatives.

Land Use Authorizations: None of the alternatives will significantly affect special land uses.

Fire: None of the alternatives will significantly affect fire occurrence within the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

Wilderness Potential: All alternatives assign the majority of this area to management prescriptions compatible with preserving its roadless character, with the exception of alternative I. Alternative I assigns approximately one-fifth of the area to semi-primitive motorized recreation and nearly one-half of the area to timber management. All alternatives will maintain the

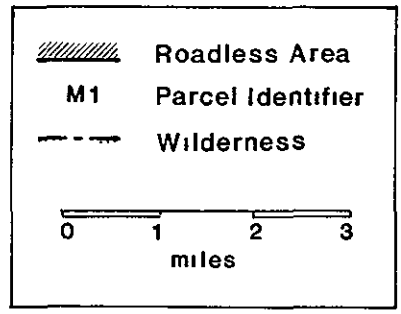
area in a primarily roadless condition through the end of the fifth decade. The wilderness potential of the area will be maintained.

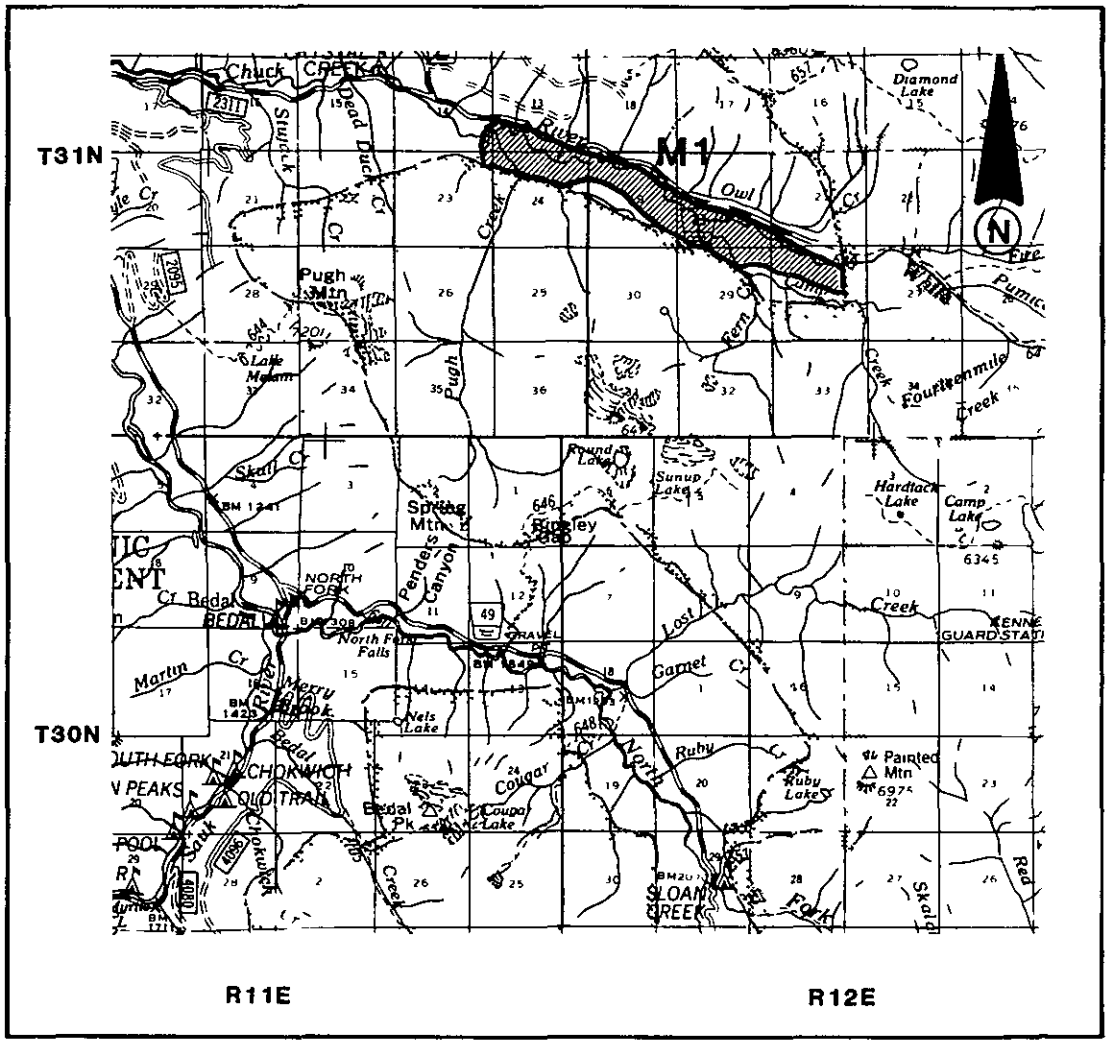
The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	23,439	21,887	20,614	79%
B (RPA)	24,144	22,830	21,472	83%
C	25,221	24,733	23,851	92%
G-Mod.	24,738	24,096	23,555	91%
H	24,348	23,082	21,438	83%
I	24,174	22,804	21,229	82%
J (Pref).	24,525	23,375	21,929	84%

Glacier Peak M

Roadless Area M6031





GLACIER PEAK M **Roadless Area M6031 (M1)**

This roadless area originally consisted of one parcel totaling 1,539 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area M6031 to nonwilderness uses. In 1984, 483 acres from this area were designated as additions to the Glacier Peak Wilderness by Congress as a result of the Washington Wilderness Act. The area was reduced by one acre due to a mapping discrepancy. The following shows the disposition of acres within the Glacier Peak M roadless area:

Glacier Peak M	Net Acres
1984 RARE II	1,539
updated 1988	1,055
Change	**- 484**

OVERVIEW

This parcel is located along the south side of the Whitechuck River before it enters the Glacier wilderness. The terrain is gentle to steep over uneven terraces and slopes. Elevations range from 1,600 to 2,600 feet. There is no direct road or trail access to this parcel There is an arterial road along the north side of Whitechuck River.

Plant associations are confined to Pacific silver fir. Soils have formed from residual and colluvial rock material overlying intrusive igneous and gneiss bedrock. Much of the river terraces and lower sideslopes are overlain by pumice and mudflow from Glacier Peak. Glacial scouring and deposition processes produced the landforms. The steeper slopes are prone to earth slides of the unconsolidated coarse textured material.

WILDERNESS CAPABILITY

Manageability and Boundaries: This parcel has wilderness value only if added to the Glacier Peak wilderness. A boundary on the river would be easy to identify.

Natural Integrity and Appearance: An undisturbed appearance is influenced predominantly by natural processes.

Opportunities For Solitude: Opportunities are low due to its close proximity to Whitechuck River road.

Opportunities For Primitive Recreation: Opportunities are low.

Challenging Experiences: Opportunities for challenging experiences are low.

Special Features: None.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials

Summary Table - Glacier Peak M #M6031 (M1)

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	1,055
Primitive/Semi-Primitive Recreation ROS	Acres	126
Timber		
Tentatively suitable	Acres	591
Tentatively suitable inaccessible	Acres	21
Tentatively suitable standing volume	M bdft	23,124
"Old Growth", Total Acres	Acres	1,034
0-2,500 Feet Elevation	Acres	992
2,500-4,000 Feet Elevation	Acres	42
4,000 + Feet Elevation	Acres	0
Management Indicator Species (MIS)		
Spotted owl MR	Acres	337
Pileated woodpecker and pine marten MR	Acres	0
Elk-deer winter range	Acres	654
Goat habitat MR	Acres	0
Bald eagle habitat (nests, forage, roost area)	Acres	337
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	0
Low	Acres	0
Claims	# of	0
Leasable Energy Minerals (Moderate Potential)		
Geothermal	Acres	1,055

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: This parcel is presently unsuitable for extensive recreation due to dense understory vegetation and lack of trail access. Occasional hunters and fishermen use the area.

Fish/Wildlife: Special wildlife habitats include habitat for spotted owl. Riparian valley bottom habitat is afforded to several species of native vertebrates, including deer winter range. The Whitechuck River and low gradient tributaries support anadromous fish, including spring chinook salmon. Other streams may provide some habitat for native trout.

Water: The Whitechuck River has potential for hydroelectric power development. It is also under study as a wild and scenic river.

Livestock Operations: There is no potential or current livestock use.

Ecology: The parcel is covered with dense and very tall evergreen trees. Dominant species include Douglas fir, western red cedar and western hemlock.

Timber: About 56 percent of the parcel (591 acres) is tentatively suitable for logging. A major bridge across the Whitechuck River would be necessary to manage this area for timber ,

Minerals/Oil and Gas: The geology of this area is dominated by pre-Tertiary metamorphic rocks and by pyroclastic and volcanic sedimentary deposits of Quaternary age. The area has no mining claims recorded for it. The entire area is classified "prospectively valuable" for geothermal resources, but it is not encumbered by any leases or pending lease applications. The mineral resources of adjacent areas have been inventoried by the U.S. Geological Survey and Bureau of Mines, but those areas lying immediately adjacent to the subject area were not identified as having a known mineral resource potential.

Cultural: The parcel has little cultural significance.

Land Use Authorizations: There are no special land uses.

Non-Federal Lands: None.

Fire: There has been one fire in the last decade in this parcel. A larger fire was recorded in the area about 30 years ago.

Insect and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: This parcel is adjacent to Glacier Peak Wilderness, and is about 65 miles from Everett. The nearest town is Darrington some 18 miles away.

Public Interest: Following release of the DEIS and Proposed Forest Plan, Glacier Peak Parcel M, as well as areas adjacent to Glacier Peak and specific geographic sites and features within Parcel M, received public comment. Glacier Peak parcel M was mention 21 times in public responses. Most of the comments favored preserving the area as valuable low-elevation old growth (4), designating the area as MA 1AB (primitive/semi-primitive nonmotorized) (3), adding the area to the adjacent wilderness area (2), and protecting the area from timber harvest (2). 1/

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.Public comment did mention, in a generic sense, areas adjacent to Glacier Peak 293 times. Responses favored protecting the area from harvest (78), preserving the forest ecosystem (52), keeping the area roadless (44), and protecting old growth (20). Other comments said to protect the area for wildlife habitat and recreation values.

The White Chuck River, which flows through a portion of Parcel M, was mentioned 516 times. Most comments favored Wild and Scenic River designation (176), protection from timber harvest (69), keeping the area roadless (43), preserving the forest ecosystem (28), and protecting the old growth ecosystem (25). Other comments favored managing the area for protection of wildlife habitat, fisheries, recreation and visual quality.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

GLACIER PEAK M
PARCEL M1

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp Rec	401						
1B SPNM		211	1,055	1,055	295		316
2A Foregrd.							274
2B Midgrd.							63
5 Potent W&S							147
11 O-G Hab.		147			42	337	42
14 D&E Enhanc		359				422	
17 Timber	654	337			718	295	211

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by implementation of any of the alternatives. Alternatives C and G-Modified will leave the area in a roadless status through the end of the fifth decade. All other alternatives will road the area, providing access to recreational opportunities.

Fish/Wildlife: *Fish and wildlife will not be significantly affected by* implementation of any of the alternatives. Alternatives B and I allocated the greatest area to old growth habitat and deer and elk enhancement. Alternatives A, NC, C, and G-Modified allocate the least

Water: *Alternatives A, NC and I would allow development of the White Chuck* River for hydroelectric purposes. All other alternatives will preclude development.

Ecology: The overall ecology of the area would be altered due to development with all alternatives except C and G-Modified.

Timber: Alternatives C and G-Modified would have the least affect on the existing timber resource, as they allocate no acres to management area 17 (timber) Alternatives A, NC and H would have the greatest affect.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. All alternatives,

with the exception of C and G-Modified, will provide improved roaded access through the area for mineral exploration and development.

Cultural: Alternatives C and G-Modified will have the least potential for adversely impacting the cultural resources of the area. Alternatives A, NC and H have the greatest potential for impacts. Valuable sites will be protected via avoidance or conserved through data recovery.

Land Use Authorizations: None of the alternatives will significantly affect land special uses.

Fire: None of the alternatives will significantly affect fire occurrence within the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease in the area.

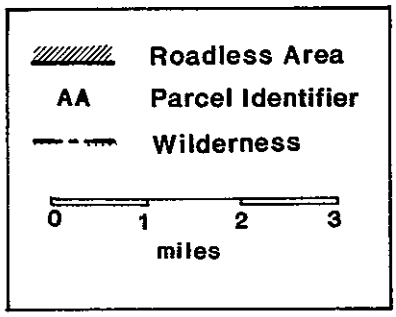
Wilderness Potential: Alternatives C and G-Modified will preserve this area in management prescriptions compatible with preserving its roadless character. These alternatives will retain the area in a roadless condition through the end of the fifth decade. The wilderness potential will be maintained. All other alternatives will retain zero acres in a roadless condition through the end of the fifth decade. These alternatives would preclude future wilderness consideration.

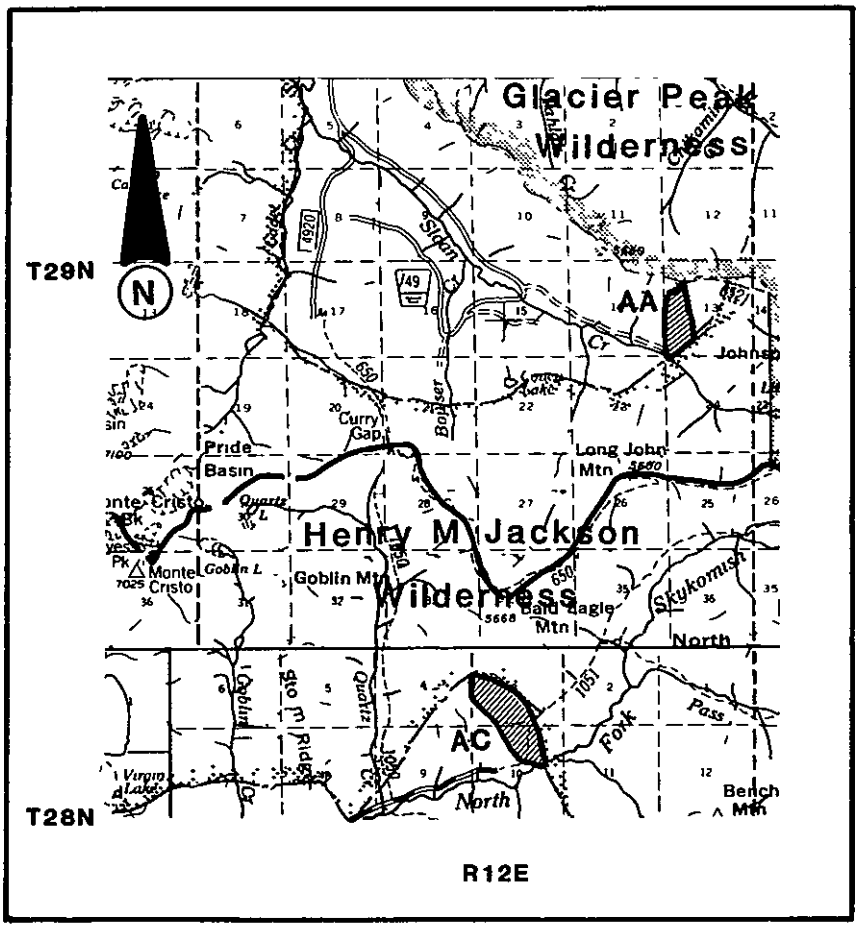
The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	158	0	0	0%
B (RPA)	392	0	0	0%
C	1055	1055	1055	100%
G-Mod.	1055	1055	1055	100%
H	392	0	0	0%
I	260	0	0	0%
J (Pref).	392	0	0	0%

Glacier Peak A

Roadless Area A6031





GLACIER PEAK A **Roadless Area A6031 (AA, AC)**

This roadless area originally consisted of 11,110 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area A6031 to nonwilderness uses. In 1984 10,667 acres from this area were designated the Henry M. Jackson Wilderness by Congress as a result of the Washington Wilderness Act. Two parcels remain in roadless status. The following shows the disposition of acres within the Glacier Peak A roadless area:

Glacier Peak A	**Net Acres**
1984 RARE II	11,110
updated 1988	443
Change	**-10,667**

OVERVIEW

This roadless area consists of two parcels. One is located upslope from Sloan Creek at the juncture of Glacier Peak and Henry Jackson Wildernesses. The other parcel is immediately north of the end of Road #63 in the North Fork Skykomish River Basin adjacent to the Henry M. Jackson Wilderness. The terrain is uniformly steep with a south aspect. Elevations range from 3,600 to 5,200 feet. An abandoned logging road ends 1/2 mile to the west of the Sloan Creek parcel.

Plant associations include Pacific silver fir and mountain hemlock mature coniferous forest. Medium textured soils have formed from residual and colluvial rock material overlying glacially altered intrusive igneous gneiss and metasedimentary bedrock. There is an unpatented mining claim within the Sloan Creek parcel, which provides a source of crude garnets to recreationists.

WILDERNESS CAPABILITY

Manageability and Boundaries: The addition of these parcels to adjacent wilderness would have no significant impact on management activities.

Natural Integrity and Appearance: The parcels adjoin cutover areas, although interior slopes appear natural and undisturbed.

Opportunities For Solitude: Opportunities for solitude are low due to the close proximity of roads.

Opportunities For Primitive Recreation: Opportunities for primitive recreation are low due to the proximity of roads.

Challenging Experiences: Opportunities for challenging experiences are low.

Special Features: None.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Summary Table - Glacier Peak A #A6031

Category 1/	Unit	Parcels AA	AC	Total
Acres (Minus water, private land)	Acres	253	190	443
Primitive/Semi-Primitive Recreation ROS	Acres	253	147	400
Timber				
Tentatively suitable	Acres	0	84	84
Tentatively suitable inaccessible	Acres	0	0	0
Tentatively suitable standing volume	M bdft	0	3,287	3,287
"Old Growth", Total Acres	Acres	210	147	357
0-2,500 Feet Elevation	Acres	0	0	0
2,500-4,000 Feet Elevation	Acres	42	147	189
4,000 + Feet Elevation	Acres	168	0	168
Management Indicator Species (MIS)				
Spotted owl MR	Acres	0	0	0
Pileated woodpecker and pine marten MR	Acres	0	0	0
Elk-deer winter range	Acres	0	0	0
Goat habitat MR	Acres	0	0	0
Bald eagle habitat (nests, forage, roost area)	Acres	0	0	0
Locatable Mineral Development Potential				
High	Acres	0	0	0
Moderate	Acres	0	0	0
Low	Acres	168	0	168
Claims	# of	0	1	1
Leasable Energy Minerals (Moderate Potential)				
Geothermal	Acres	253	190	443

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: Parcel AA receives incidental recreation use from big game hunters. Parcel AC is generally unsuitable for recreation use except the southwestern portion where the North Fork Skykomish trail (#1051) transects the parcel. Use on the trail averages 2,000 recreation visitor days per year.

Wildlife: Old growth forest provides habitat for spotted owls, pine marten, pileated woodpeckers, and native vertebrates. Habitat for native trout is also present in the North Fork Skykomish River.

Water: There is little potential for water use. A few Class III and IV streams exist.

Livestock Operations: None.

Ecology: This parcel is forested with species typical of the west Cascades including cedar, Douglas fir, true firs and western hemlock.

Timber: Only 84 acres (19%) of the 443 acres in this parcel are tentatively suitable for logging.

Minerals/Oil and Gas: These parcels are underlain by Cretaceous metamorphic and granitic rocks. They have no reported mineral occurrences, and have only one mining claim. They are classified prospectively valuable for geothermal resources, but they are not encumbered by any leases or pending lease applications.

Cultural: None.

Land Use Authorizations: There are no special land uses.

Non-Federal Lands: None.

Fire: Fire occurrence is moderate, about 3 fires per decade on the average. Two major fires have occurred in the last 50 years in the Sloan Creek area. Average fuel accumulation is 40-50 tons per acre.

Insect and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: These parcels are about 70 miles east of Everett They are adjacent to the Henry Jackson and Glacier Peak Wilderness Areas.

Public Interest: There is little public interest in these parcels. Following release of the DEIS and Proposed Forest Plan, public comments regarding this area were received. Glacier Peak AA was mention 8 times. Three responses favored making the area a top priority for timber harvest; two responses said to not use the area as a wilderness buffer. The other comments desired the area be managed for its recreation value. 1/

Public comment did mention, in a general sense, areas adjacent to Glacier Peak 293 times. Responses favored protecting the area from harvest (78), preserving the forest ecosystem (52), keeping the area roadless (44), and protecting old growth (20). Other comments said to protect the area for wildlife habitat and recreation values.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person **could** mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

ENVIRONMENTAL CONSEQUENCES

The following table displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

GLACIER PEAK A
PARCEL AA

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	253						
1B SPNM		253	253	253	253		253
1C SPM						211	
19 Mtn. Hemlk						42	

PARCEL AC

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	105						
1A Prim			190		190		
1B SPNM				190			190
1D RN		42					
5 Potent W&S	42						
11 O-G Hab.	42						
17 Timber		126				126	
19 Mtn. Hemlk		21				63	

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by implementation of any of the alternatives. Alternative I will allocate approximately one-half of the area to semi-primitive motorized recreation.

Fish/Wildlife: Alternatives A and NC allocate very minimal acres to old growth habitat. None of the other alternatives make specific fish/wildlife allocations. Fish and wildlife will not be significantly affected by implementation of any of the alternatives.

Water: THere are no adverse effects to the water resource of this area associated with implementation of any of the alternatives, due to the low level of development activity.

Ecology: The overall ecology of the area will not be significantly affected by implementation of any of the alternatives, due to the low level of proposed development activity.

Timber: Alternatives B and I allocated approximately one-quarter of this area to management area 17 (timber). All other alternatives have made no timber

allocation. None of the alternatives would significantly affect the timber resource, as potential development activity is minimal.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development.

Cultural: Alternatives B and I will have some potential to adversely impact cultural resources. All other alternatives, since they propose very minimal development activity, will have no potential to precipitate adverse impacts.

Land Use Authorizations: None of the alternatives will significantly affect land special use authorizations.

Fire: None of the alternatives will significantly affect fire occurrence within the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

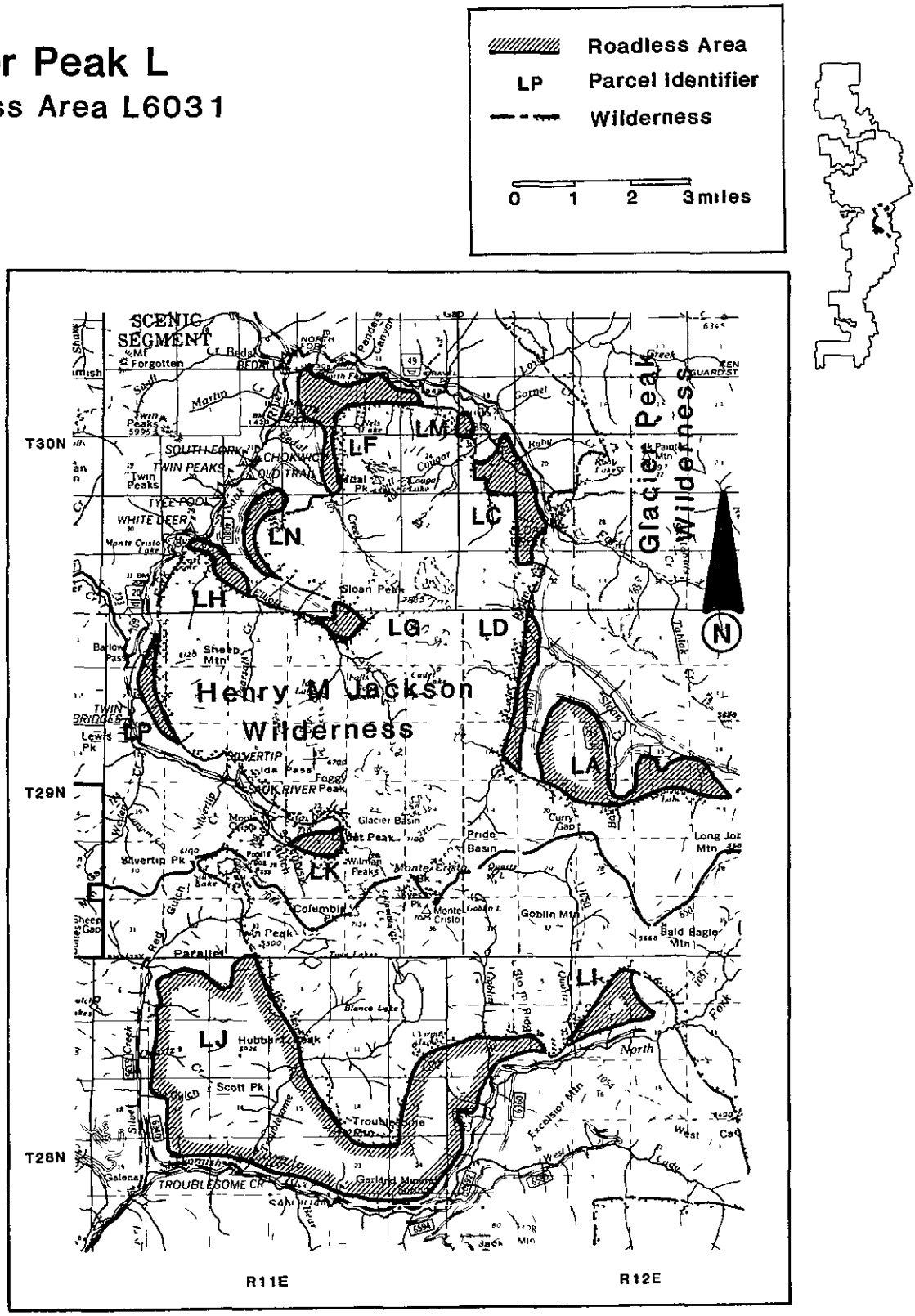
Wilderness Potential: Alternatives A, NC, C, G-Modified and J (Preferred) assign the majority of this area to management prescriptions compatible with preserving its roadless character. These alternatives leave 100% of the area in a roadless condition through the end of the fifth decade. The wilderness potential will be maintained. Alternative I would assign approximately one-half of the area to semi-primitive motorized recreation and one-quarter of the area to timber management. Alternative B allocates 28% of the area to timber management and retains 61% of the area in a roadless condition through the fifth decade.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

	Undeveloped Acres			Percent
Alternative	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	443	443	443	100%
B (RPA)	365	331	270	61%
C	443	443	443	100%
G-Mod.	443	443	443	100%
H	395	355	320	72%
I	362	350	274	62%
J (Pref).	443	443	443	100%

Glacier Peak L

Roadless Area L6031



GLACIER PEAK L **Roadless Area L6031 (LA, LD, LC, LM, LF, LN, LG, LH, LP, LK, LJ, LI)**

This roadless area originally consisted of 55,220 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision designated area L6031 to further planning. In 1984, 40,993 acres from this area were designated the Henry M. Jackson Wilderness by Congress as a result of the Washington Wilderness Act. Twelve parcels remain roadless. The following shows the disposition of acres within the Glacier Peak L roadless area:

Glacier Peak L	Net Acres
1984 RARE II	55,220
updated 1988	14,227
Change	**-40,993**

OVERVIEW

These parcels are located around the periphery of the Sloan Peak, Monte Cristo Peak, Kyes Peak, Columbia Peak, and Troublesome Mountain portions of the Henry Jackson Wilderness. Terrain is moderate to generally steep over forested and rocky slopes. Elevations range from 1,400 to 5,000 feet.

Road access is within 1/4 to 1/2 mile of these parcels. Parts of the North Fork Sauk River, the North Fork Skykomish River and many tributaries flow through these parcels.

Plant associations include the western hemlock, Pacific silver fir and mountain hemlock mature conifer forests. Brushfields are common features on some higher slopes and along Cadet Creek.

Soils along valley bottoms originated from glacial and stream transported local bedrock material, including: phyllite, gneiss and sedimentary rock. Soils are generally shallow to moderately deep gravelly, sandy loam. The soils of the upper Cadet Creek area are formed from residual, colluvial, and glacial materials from metasedimentary and medivolcanic rocks. Extremely steep dissected slopes along Cadet and Sloan Creeks are prone to earth movement under natural conditions.

Parcel LK is near the site of a short lived, but major gold mine, circa 1910. There are current mining claims and residents at the nearby former townsite of Monte Cristo. Patented mining claims covering several hundred acres as well as numerous unpatented claims exist in the Hubbart Peak area of parcel LJ.

WILDERNESS CAPABILITY

Manageability and Boundaries: Boundaries are not logical for separate management, but could be added to the Henry M. Jackson Wilderness.

Natural Integrity and Appearance: Most parcels adjoin cutover areas. Generally the upslope portions appear undisturbed. The portions along the North Fork Skykomish River are essentially undisturbed except for existing trails.

Opportunities For Solitude: Opportunities for solitude are low due to adjacent road corridors.

Opportunities For Primitive Recreation: Opportunities for primitive recreation are very low for the northern most "L" parcels. Parcel LJ has the greatest opportunity for primitive recreation because of its size.

Challenging Experiences: The ten northern parcels have very minimal potential for challenging recreational experiences. Parcel LJ provides excellent opportunities for climbing and hiking in rugged terrain.

Special Features: None.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Availability - Other Resource Potential

Recreation: Parcels LA, LG and LK have recreation trail corridors. The Bald Eagle trail in area LA accommodates about 1,000 hikers and horsemen per year who are travelling to destination points within the Glacier Peak and Henry M. Jackson Wildernesses. The Elliott Creek trail in area LG and LK accommodates about 5,000 hikers per year who are travelling to destination points within the Henry M. Jackson Wilderness.

Trout fishing occurs in Cadet Creek parcel LD and parcels LC, LM, and LF. It also occurs in the South Fork Sauk River in parcels LH and LP. Use is estimated to be relatively low in all areas, except the South Fork Sauk which receives greater use.

Area LN receives only incidental use by big game hunters. These parcels are generally unsuitable for recreation use except in trail corridors due to the steep, rugged terrain. Use on the Blanca Lake trail (#1052) in parcel LJ averages approximately 4,500 recreation visitor days annually. Use levels in remaining portions of this parcel are insignificant.

Fish/Wildlife: Old growth forest provides habitat for spotted owls, pine marten and pileated woodpeckers. Habitat is also afforded for several species of native vertebrates, and for native trout. The south side of Troublesome Mountain includes primary and secondary mountain goat range for three to four families.

Water: There is little potential for water use. Several streams feed the North Fork Skykomish River, an important anadromous fish river in the LJ parcel. There are several power withdrawals with FERC study permits.

Livestock Operations: None.

Ecology: The northern most parcels are brushfields of vinemaple and alder on higher slopes and along Cadet Creek. Steep slopes have cliffs and mature *conifer forests including hemlock, silver fir and mountain hemlock. The* southern half of parcel LJ is forested with species typical of the west Cascades including cedar, Douglas-fir, true firs, and western hemlock. The northern half is composed of numerous steep rock bluffs with scattered parcels of trees and other ground vegetation intermixed.

Summary Table - Glacier Peak L #L6031

Category 1/	Unit	Parcels LA	LD	LC	LM	LF	LN	LG	LH	LP	LK	LJ	LI	Total
Acres (Minus water, private land)	Acres	2,066	169	676	21	824	507	190	338	549	169	8,100	612	14,227
Primitive/Semi-Primitive Recreation ROS	Acres	760	0	253	21	359	0	0	0	0	0	5,786	485	7,664
Timber														
Tentatively suitable	Acres	211	42	147	0	316	211	21	0	211	0	3,273	359	4,791
Tentatively suitable inaccessible	Acres	0	0	21	0	21	21	21	0	42	0	1,393	42	1,561
Tentatively suitable standing volume	Acres	8,256	1,643	5,752	0	12,364	8,256	822	0	8,256	0	128,061	14,047	187,457
"Old Growth", Total Acres	Acres	1,667	42	337	21	548	84	42	316	358	0	3,630	443	7,488
0-2,500 Feet Elevation	Acres	0	42	274	21	295	0	0	274	316	0	2,132	21	3,375
2,500-4,000 Feet Elevation	Acres	1,013	0	63	0	253	84	42	42	42	0	1,393	380	3,312
4,000 + Feet Elevation	Acres	654	0	0	0	0	0	0	0	0	0	105	42	801
Management Indicator Species (MIS)														
Spotted Owl MR	Acres	0	0	0	0	0	0	0	0	274	0	2,576	126	2,976
Pileated Woodpecker and Marten MR	Acres	0	0	0	0	147	0	0	0	0	0	0	0	147
Elk-deer winter range	Acres	0	0	359	0	380	126	0	316	84	0	1,013	0	2,278
Goat Habitat MR	Acres	0	0	21	0	63	168	42	0	63	0	1,224	0	1,581
Bald Eagle Habitat 2/	Acres	0	0	0	0	21	0	0	84	63	0	105	0	273
Locatable Mineral Development Potential														
High	Acres	0	0	0	0	0	0	0	0	0	0	1,182	0	1,182
Moderate	Acres	63	168	675	0	0	0	0	0	0	168	2,597	0	3,671
Low	Acres	739	0	0	0	0	0	0	0	0	0	4,054	0	4,793
Claims 3/	# of	-	-	-	-	-	-	-	-	-	-	-	-	159
Leasable Energy Minerals (Moderate Potential)														
Geothermal	Acres	2,069	168	675	21	823	506	190	337	527	168	5,723	612	11,819
Coal, geothermal	Acres	0	0	0	0	0	0	0	0	21	0	2,386	0	2,407

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.
2/ Includes nest sites, forage areas, and roost areas.
3/ Number of claims not broken out by parcel.

Timber: About 34 percent of these roadless parcels (4,791 acres) are tentatively suitable for logging.

Minerals/Oil and Gas: This area lies within or immediately adjacent to the Monte Cristo, Silver Creek, Troublesome Creek, and Goat Lakes mining districts. The geology of the area, in general, is dominated by Tertiary volcanic and granitic rocks and by Mesozoic metamorphic rocks. Of the subject lands, only LJ has reported mineral occurrences, but the districts in general have numerous occurrences. According to BLM records the subject lands have 159 mining claims. The southwest parcels are classified "prospectively valuable" for coal, but none of the area is encumbered by leases or pending lease applications. The area has been studied by the U.S. Geological Survey and Bureau of Mines, and they have concluded the following:

Parcel LK lies within an area identified as having "substantiated" or a high potential for the occurrence of copper (Cu), lead (Pb), zinc (Zn), gold (Au), and silver (Ag) resources.

Parcels LC, LD, and LA have a moderate potential for the occurrence of the same minerals.

Parcel LJ has numerous mineral resource occurrences and is identified as having a "substantiated" or high mineral resource potential. Not only does it have potential for the occurrence of Au, Ag, Cu, Pb, and Zn in vein type deposits, but it also has a high potential for the occurrence of large disseminated porphyry type copper deposits which includes two deposits that are large enough to employ lower-cost open pit or sub-level caving mining methods.

Cultural: These parcels have little cultural significance. Evidence of mining activity in parcel LJ can be found.

Land Use Authorizations: There are no land special uses.

Non-Federal Lands: None.

Fire: There is an average 2 fires per decade, with two major fires in the past 40 years. Average fuel accumulation is 60 ton per acre.

Insect and Disease: There have been no particular problems with insect infestations or disease.

Others: The Monte Cristo parcel LK has had proposals for mining and recreation development. Access is via a county road which is on National Forest lands and would require reconstruction to permit increased access.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: These parcels are adjacent to the Henry Jackson Wilderness, and are about 85 miles from Seattle.

Public Interest: Following release of the DEIS and Proposed Forest Plan, no public comments were received on Glacier Peak parcel L specifically. This parcel received comments in a more general sense as part of other areas.

Lands adjacent to the Henry M. Jackson Wilderness were mentioned 175 times. Most of the comments favored the area remain roadless (57), protected from timber harvest (38), the forest ecosystem preserved (34), and old growth preserved (11). Most other comments desired to have the area managed for recreation, wildlife habitat and visual quality. 1/ Public comment did also mention, in a general sense, areas adjacent to Glacier Peak 293 times. Responses favored protecting the area from harvest (78), preserving the forest ecosystem (52), keeping the area roadless (44), and protecting old growth (20). Other comments said to protect the area for wildlife habitat and recreation values.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

GLACIER PEAK L
PARCEL LA

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	1,921						
1B SPNM		1,562	1,985	1,816	1,879		1,795
1C SPM						1,773	
1D RN					63		126
17 Timber	147	147	21	105	21	253	42
19 Mtn. Hemlk		337	63	147	105	42	105
25B Elec. Site		21					

PARCEL LC

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	42						
1B SPNM		42	21	63	42		42
2B Midgrd.			21				
6 Skagit W&S	633	211	612	570	612	612	612
11 O-G Hab.				42			
14 D&E Enhanc		401					
15 Goat MR		21	21		21	21	21
17 Timber						42	

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

PARCEL LD

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	126						
1B SPNM			168		126		126
1D RN		126					21
11 O-G Hab.				168			
17 Timber	42	42			42	168	21

PARCEL LF

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	316						
1B SPNM		190	527	401	190		211
2A Foregrd.				84	21	84	
2B Midgrd.					232		253
6 Skagit W&S	232	63	190	190	190	190	190
11 O-G Hab.				126			
12 Mature O-G	63	168	63	21	147	147	126
14 D&E Enhanc		274					
15 Goat MR		21	42		42	42	42
17 Timber	211	105				316	
19 Mtn. Hemlk						42	

PARCEL LG

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	190						
1B SPNM			190	190	190		190
15 Goat MR		189				42	
17 Timber						147	

PARCEL LH

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	316						
1B SPNM			316	147	211		190
2A Foregrd.					105	190	126
6 Skagit W&S			21	21	21	21	21
8 Special				168			
11 O-G Hab.	21						
14 D&E Enhanc		337					
17 Timber						126	

PARCEL LI

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	337						
1A Prim.			612		612		
1B SPNM				612			612
1D RN		190					
5 Potent W&S	126						
11 O-G Hab.		126				126	
17 Timber	147	232				295	
19 Mtn. Hemlk		63				190	

PARCEL LJ

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	5,131						
1B SPNM		3,357	7,328	7,919	7,856		7,581
1C SPM						1,309	
1D RN		2,027	232		232	1,499	274
2A Foregrd.							21
2B Midgrd.			42				
5 Potent W&S	464		190				
11 O-G Hab.	1,457	718	126	147		2,449	
14 D&E Enhanc		337	21			316	
15 Goat MR		379				443	
17 Timber	1,055	971	168	21	21	1,689	232
19 Mtn. Hemlk		316		21		401	

PARCEL LK

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	168						
1B SPNM		168					
1D RN			168		168		
2A Foregrd.							168
8 Special				168			
19 Mtn. Hemlk						168	

PARCEL LM

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
6 Skagit W&S	21	21	21	21	21	21	21

PARCEL LN

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	295						
1B SPNM			443	190	232		253
2A Foregrd.				63			42
2B Midgrd.			42		253		211
8 Special				506			
14 D&E Enhanc		105					
15 Goat MR		273	21		21	168	
17 Timber	211	105				316	
19 Mtn. Hemlk		21				21	

PARCEL LP

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	316						
1B SPNM			443	21	105		105
1D RN		21					
2A Foregrd.			21		63	63	211
3A Public	21	21	21	21	21	21	21
8 Special				506			
11 O-G Hab.		274	63		211	274	211
17 Timber	211	232			147	190	

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by implementation of any of the alternatives. Alternatives C and G-Modified leave the greatest amount of unroaded acres at the end of the fifth decade (89% respectively). Alternative I leaves the least (74%). Alternative I allocates approximately one-fifth of the area to semi-primitive motorized recreation.

Fish/Wildlife: Alternatives B and I allocate the greatest area to old growth habitat, mature old growth, deer and elk enhancement and mountain goat management requirement prescriptions. Alternatives C, G-Modified and H allocate the least. Fish and wildlife will not be significantly affected by implementation of any of the alternatives.

Water: Hydroelectric development would be precluded under Alternatives B, C, G-Modified, H and J (Preferred), due to allocations of land to semi-primitive nonmotorized and wild and scenic river prescriptions. Development would be possible under alternatives A, NC and I.

Ecology: The overall ecology of the area would not be significantly affected by implementation of any of the alternatives, due to the low level of proposed development activity.

Timber: Alternatives C and G-Modified would have the least affect on the existing timber resource, as they allocate minimal acres to management area 17 (timber). Alternatives A, B and I would have the greatest affect. None of the alternatives will have a significant affect on the timber resource, as potential development activity is minimal.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. Alternatives A, NC and I will provide a higher amount of roaded access through the area for minerals exploration and development.

Cultural: Alternatives A, NC, B and I have the greatest potential to adversely affect cultural resources within the area. None of the alternatives will significantly affect cultural resources.

Land Use Authorizations: None of the alternatives will significantly affect land special use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire within the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

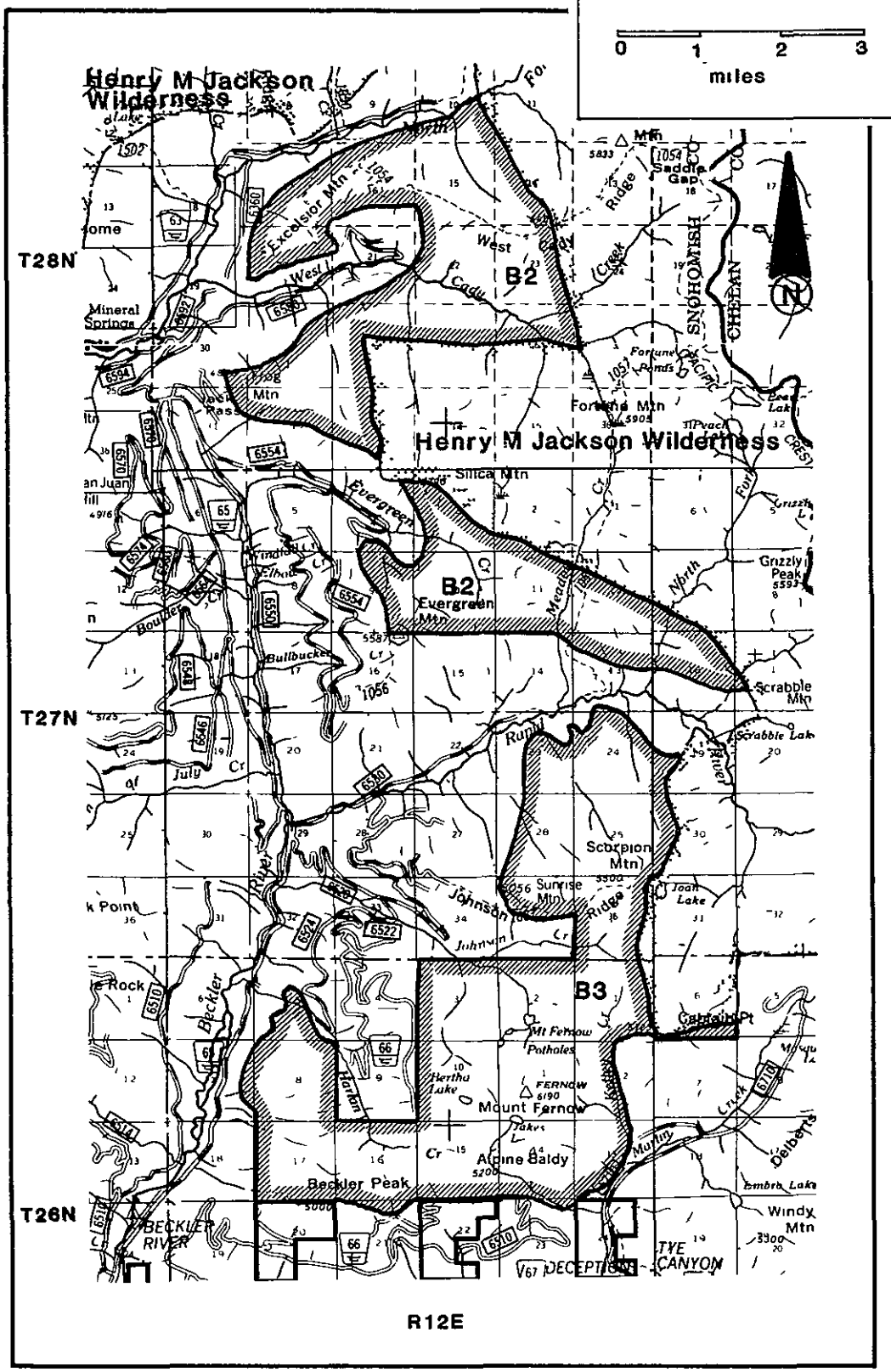
Wilderness Potential: Alternatives C, G-Modified, H and J (Preferred) assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I assigns approximately one-fifth of the area to semi-primitive motorized recreation. All alternatives will maintain the area in a primarily roadless condition through the end of the fifth decade. The wilderness potential will be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

	Undeveloped Acres			Percent
Alternative	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	12,469	11,549	10,723	75%
B (RPA)	12,715	12,007	10,678	75%
C	13,750	13,244	12,681	89%
G-Mod.	13,543	13,017	12,632	89%
H	13,042	12,246	11,428	80%
I	12,658	11,976	10,598	74%
J (Pref).	13,480	12,994	12,220	86%

Glacier Peak B

Roadless Area B6031



GLACIER PEAK B **Roadless Area B6031 (B2, B3)**

This roadless area originally consisted of 43,186 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area B6031 to nonwilderness uses. In 1984, 24,540 acres from this area were designated the Henry M. Jackson Wilderness by Congress as a result of the Washington Wilderness Act. Two parcels remain roadless. The following shows the disposition of acres within the Glacier Peak B roadless area:

Glacier Peak B	Net Acres
1984 RARE II	43,186
updated 1988	18,646
Change	**-24,540**

OVERVIEW

These parcels are adjacent to the Henry M. Jackson Wilderness, extending from Beckler Peak and Alpine Baldy Mountain on the south, and north to the North Fork Skykomish River drainage. They include all currently undeveloped lands west to the Beckler River. Access is provided by Forest Service roads along the North Fork Skykomish and Rapid Rivers, Johnson Ridge, Beckler Peak, and West Cady, Evergreen, and Martin Creeks.

Elevations range from approximately 1,800 to over 6,000 feet. Peaks include Mount Fernow, Sunrise and Scorpion Mountains, Johnson Ridge, Evergreen and Frog Mountains, West Cady Ridge, and Excelsior Mountain. Steep sideslopes are characterized by rock outcroppings, and talus slopes. These parcels are comprised primarily of 30-100% slopes with northerly or southerly aspects along east/west drainages.

Soils on sideslopes are typically shallow sandy loams with moderate to high erosion potential and good drainage. Glacial deposits in valley bottoms provide deep, relatively well drained soils with a sandy loam surface. Bedrock is generally intrusive igneous and gneiss rock.

Vegetation varies with aspect, elevation, and site conditions. The primary cover is mixed Pacific silver fir and western hemlock stands. Higher elevations have Pacific silver fir and mountain hemlock. Typical ground cover is huckleberry, salal, and Oregon grape. Where soils support trees and fire has not disturbed ecological succession, old growth stands exceed 400 years of age. The largest proportion of forest cover is 200-400 years old. Areas on West Cady Ridge and Evergreen Mountain are still recovering from fire disturbances of the last 100 years. Wide variation in tree age classes provide an opportunity to view and study stages of ecosystem development.

Heavy recreation use occurs on trails up the North Fork Skykomish River, Cady Creek, and Meadow Creek. Fernow Potholes and Jakes Lake are regularly fished for trout. Northern Spotted Owl habitat abounds and three Spotted Owl Habitat Areas have been established. Pileated woodpecker, pine marten, and mountain goat are also found here. Some hydroelectric development is proposed, although no proposals have yet shown economic viability or have approved development plans.

The majority of lands in these parcels have the appearance of being in a natural state; however, most vistas are heavily modified by human impacts. The natural landscapes are high-mountain, low timber-producing sites with rock outcroppings and avalanche chutes. Extensive management activities have occurred in the Beckler River and North and the South Fork Skykomish drainages. West Cady Creek has received heavy logging activities.

WILDERNESS CAPABILITY

Manageability and Boundaries: These parcels could be included in the Henry M. Jackson Wilderness. Boundaries would not be easily recognizable or manageable. Sights and sounds uncharacteristic of a wilderness experience are present in approximately 60 percent of the area.

Natural Integrity and Appearance: The parcels are natural in appearance. Trail improvements are the only visible impacts within their borders.

Opportunities For Solitude: Opportunities for solitude are limited by activities on adjacent lands and by heavy recreation use within these parcels.

Opportunities For Primitive Recreation: Primitive recreational use centers on hunting and fishing. Fernow Potholes is the only known destination point.

Challenging Experiences: There is limited opportunity for challenging experiences. A "scrambling hike" requiring endurance rather than skill is available on the highest slopes.

Special Features: The primary feature is ecological succession. The variability of stand-age classes permits appreciation of a wide range of ecosystems. Other interest centers around wildlife, including mountain goats, spotted owls, and bald eagles

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Availability - Other Resource Potential

Recreation: These parcels provide access to the Henry M. Jackson Wilderness. Use is generally restricted to the West Cady Ridge Trail (#1054), Johnson Ridge Trail (#1067), Meadow Creek Trail (#1057) and the Mt. Fernow area and averages approximately 3,000 recreation visitor days annually. The West Cady Ridge and Meadow Creek trails are suitable for pack and saddle stock use.

Wildlife: Old growth forest provides habitat for Spotted owls, pine marten, pileated woodpeckers, and mountain goats. Native trout species, both naturally occurring and introduced, are found in lakes and streams throughout these parcels.

Water: Drainages include Kelly, Johnson, Harlan, and Evergreen Creeks. All but Kelly Creek drain into the Beckler River. Kelly Creek feeds into Martin Creek. Both Beckler River and Martin Creek flow into the South Fork Skykomish which provides anadromous fisheries habitat. Streams with their headwaters in wilderness flow through the area and into these drainages, as well as into the North Fork Skykomish River. Some power withdrawals have been granted, and developers are in the process of gaining FERC permits.

Livestock Operations: None.

Ecology: Most of the parcels are forested with species typical of the west Cascades including cedar, Douglas fir, true firs, and western hemlock. There are alpine meadows in the Alpine Baldy vicinity

Summary Table - Glacier Peak B #B6031

Category 1/	Unit	Parcels B2	Parcels B3	Total
Acres (Minus water, private land)	Acres	8,701	9,945	18,646
Primitive/Semi-Primitive Recreation ROS	Acres	6,757	6,694	13,451
Timber				
Tentatively suitable	Acres	1,773	2,132	3,905
Tentatively suitable inaccessible	Acres	718	316	1,034
Tentatively suitable standing volume	M bdft	69,372	83,419	152,791
"Old Growth", Total Acres	Acres	3,251	6,207	9,458
0-2,500 Feet Elevation	Acres	42	295	337
2,500-4,000 Feet Elevation	Acres	2,576	3,378	5,954
4,000 + Feet Elevation	Acres	633	2,534	3,167
Management Indicator Species (MIS)				
Spotted owl MR	Acres	1,710	9,249	971
Pileated woodpecker and pine marten MR	Acres	316	696	505
Elk-deer winter range	Acres	63	84	147
Goat habitat MR	Acres	190	0	190
Bald eagle habitat 2/	Acres	0	0	0
Locatable Mineral Development Potential				
High	Acres	0	0	0
Moderate	Acres	0	0	0
Low	Acres	168	2,344	2,512
Claims	# of	0	2	2
Leasable Energy Minerals (Moderate Potential)				
Geothermal	Acres	8,700	9,946	18,646

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.
2/ Includes nest sites, forage areas, and roost areas.

Timber: Approximately 21 percent of this area or 3,905 acres is tentatively suitable for logging.

Minerals/Oil and Gas: The geology of the area is dominated by Mesozoic granitic rocks and Jurassic metamorphic rocks. According to available MILS data, the area has no reported mineral resource occurrences of significance, however, it does have two mining claims. The area is classified "prospectively valuable" for geothermal, but it is not encumbered by any leases or pending lease applications. The area has not been inventoried by the U.S. Geological Survey and Bureau of Mines, but based on available data it appears that the areas potential for mineral resource occurrences is low.

Cultural: There are old trapper's cabins and trails located here.

Land Use Authorizations: There are no land special uses.

Non-Federal Lands: None.

Fire: There is low to moderate fire occurrence. Fires start mainly from lightning or abandoned campfires, but they remain small.

Insect and Disease: Insects and diseases endemic to natural ecosystems are present.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: These parcels are 60-80 miles from Everett. They are located west of the Henry M. Jackson Wilderness.

Public Interest: Following the release of the DEIS and Proposed Forest Plan, Glacier Peak parcel B, as well as specific geographic sites and features within this parcel and its more general location, received public comment.

Glacier Peak parcel B was mentioned 15 times. Three response said this area should be a top priority for timber harvest, three said to increase opportunities for motorized recreation there, and two comments wanted the area kept open for multiply use. The remaining comments favored keeping the area roadless, preserving the forest ecosystem, protecting wildlife habitat and managing the area for nonmotorized recreation. One comment expressed the desire to not use this area as a wilderness buffer. 1/

Glacier Peak parcel B2 (a portion of parcel B) was mentioned 4 times. Responses were split between making the area a top priority for harvest and preserving the forest ecosystem.

Glacier Peak parcel B3 (a portion of parcel B) was mentioned 5 times. Responses were split between making the area a top priority for harvest and preserving the forest ecosystem.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

Cady Creek was mentioned 14 times. The comments favored protecting the old growth ecosystem (4), protecting the area from harvest (2), and designating it a Wild and Scenic River (2). One comment received expressed the desire to make this area a top priority for timber harvest.

Johnson Ridge was mentioned 11 times. Most of the comments said to keep the area roadless (3), restrict ORV use (2), and protect it from timber harvest (1). One comment was received that said to make this area a top priority for timber harvest.

Kelly Creek was mention 210 times. The comments expressed the desire to keep the area roadless (68), preserve the forest ecosystem (41), protect it from harvest (37), and protect the old growth ecosystem (16). The remaining comments favored managing the area for recreation and protecting wildlife habitat.

Lands adjacent to the Henry M. Jackson Wilderness were mentioned 175 times. Most of the comments favored the area remain roadless (57), protected from timber harvest (38), the forest ecosystem preserved (34), and old growth preserved (11). Most other comments desired to have the area managed for recreation, wildlife habitat and visual quality.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

GLACIER PEAK B
PARCEL B2

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	7,201						
1A Prim.			3,970		2,597		
1B SPNM		4,265	4,730	8,531	4,033		5,913
1C SPM						2,597	
1D RN		718			591		506
5 Potent W&S	21			84			105
11 O-G Hab.	190	802				1,731	63
12 Mature O-G		211			274	253	147
14 D&E Enhanc		42				84	
15 Goat MR		63			42	126	42
17 Timber	1,288	992		84	253	1,626	570
19 Mtn. Hemlk		1,604			908	2,280	1,351

PARCEL B3

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	8,383						
1A Prim.			549				
1B SPNM		3,505	8,151	8,574	4,582		4,561
1C SPM						4,139	
1D RN		126	211		337		422
5 Potent W&S	63		63	84			
11 O-G Hab.				42			
12 Mature O-G	84	422			781	654	316
14 D&E Enhanc		84		63	63	105	63
17 Timber	1,414	2,175	823	591	1,647	1,921	1,816
19 Mtn. Hemlk		3,632	147	591	2,534	3,125	2,766

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by implementation of any of the alternatives. Alternative C and G-Modified would remove the fewest acres from roadless status through the end of the fifth decade. Alternative A, the alternative taking the greatest amount of area from roadless status, retains 90% of the area as roadless through the end of the fifth decade. Alternative I will allocate slightly over one-third of the area to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife will not be significantly affected by implementation of any of the alternatives. Alternatives B, H and I allocated the greatest area to old growth habitat, mature old growth, deer and elk enhancement and mountain goat management requirement prescriptions. Alternatives A, NC, C and G-Modified allocate the least.

Water: Hydroelectric development will be largely precluded under Alternatives B, C, G-Modified, H and J (Preferred), due to allocations to the semi-primitive nonmotorized and wild and scenic rivers prescriptions. Alternatives A, NC and I will allow development.

Ecology: The overall ecology of the area would not be significantly affected by implementation of any of the alternatives, due to the low level of proposed development activity

Timber: Alternatives C and G-Modified will have the least affect on the existing timber resource, as they allocate very minimal acreage to management area 17 (timber) Alternatives B and I will have the greatest affect. None of the alternatives will significantly affect the timber resource, as potential harvest activity will be minimal.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. Alternatives A, NC, B and I will provide slightly greater roaded access through the area for minerals exploration and development.

Cultural: Alternatives A, NC, B, I and J (Preferred) will have the greatest potential to adversely impact cultural resources in the area, due to development activities. Alternatives C and G-Modified will have the least. Valuable sites will be protected via avoidance or conserved through data recovery.

Land Use Authorizations: None of the alternatives will significantly affect land special use authorizations.

Fire: None of the alternatives will significantly affect fire occurrence within the area.

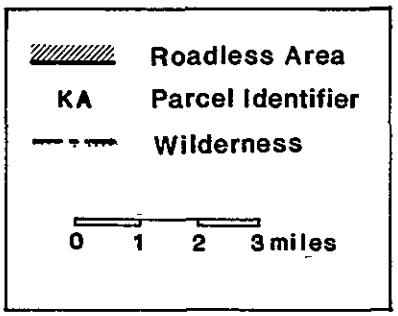
Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

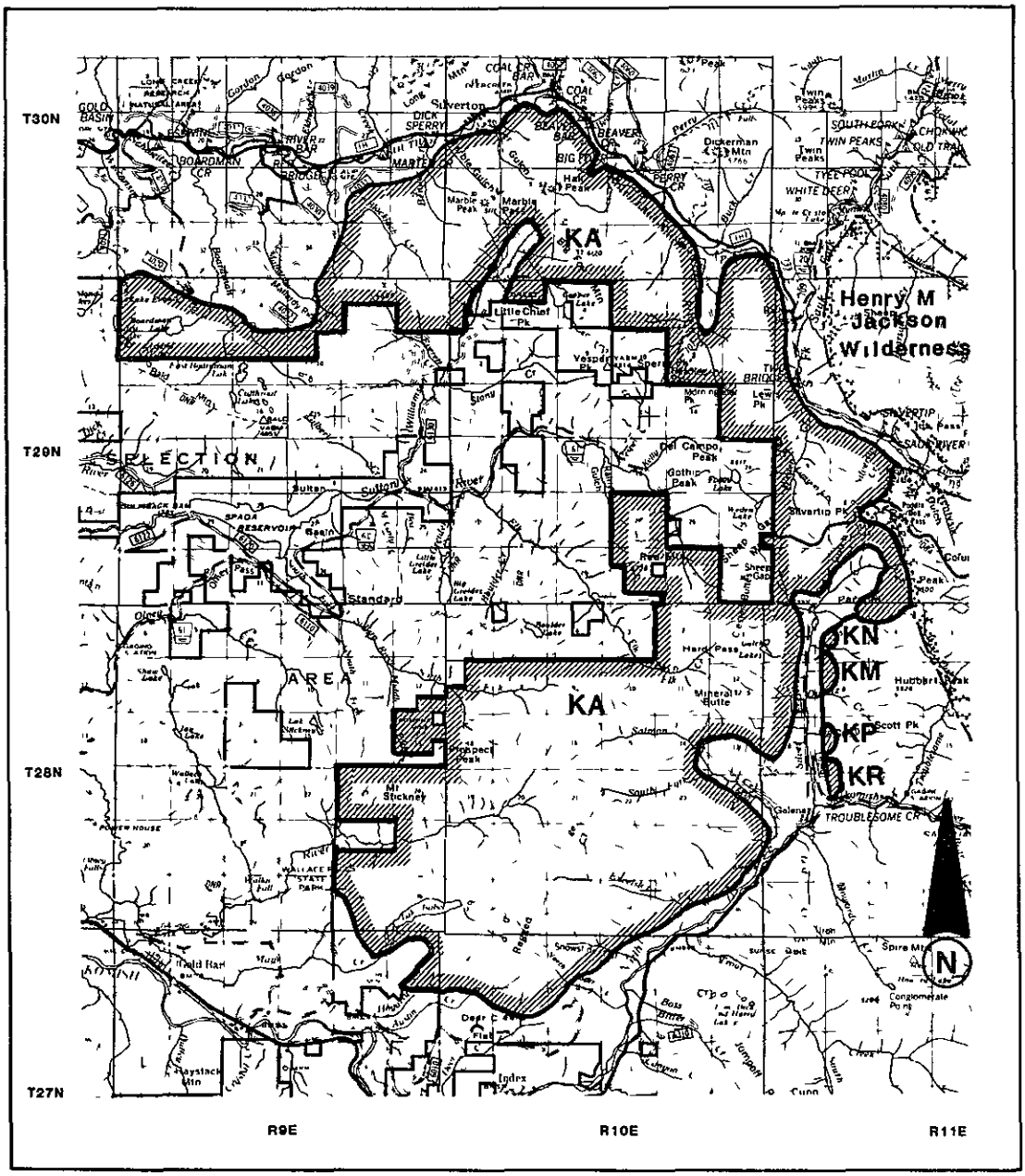
Wilderness Potential: All alternatives assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I allocates slightly over one-third of this area to semi-primitive motorized recreation. All alternatives will maintain the area in a predominately roadless condition through the end of the fifth decade. The wilderness potential will be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	17,863	17,319	16,826	90%
B (RPA)	18,004	17,606	17,200	92%
C	18,589	18,555	18,513	99%
G-Mod.	18,478	18,382	18,294	98%
H	18,337	18,107	17,902	96%
I	18,193	18,011	17,661	95%
J (Pref)>	18,202	17,896	17,603	94%

Glacier Peak K
Roadless Area K6031





GLACIER PEAK K **Roadless Area K6031 (KA, KN, KM, KP, KR)**

This roadless area originally consisted of 45,745 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area K6031 to nonwilderness uses. None of this area was designated Wilderness by Congress as a result of the 1984 Washington Wilderness Act. Five parcels make up the Glacier Peak K roadless area.

The Timbuktu Timber sale contract has been awarded within this roadless area which removed 64 acres from roadless status. The area was reduced by 172 acres due to a mapping discrepancy. The following shows the disposition of acres within the Glacier Peak K roadless area.

Glacier Peak K	Net Acres
1984 RARE II	45,745
updated 1988	45,509
Change	**- 236**

OVERVIEW

These parcels are located along the southern boundary of the Darrington Ranger District (from Boardman Lake to Silvertip Peak), and on the Skykomish Ranger District (southwest from Silvertip Road to Lake Isabel). Terrain is moderate to generally steep over forested and rocky slopes. Elevations range from 1,600 to 6,100 feet. Road access to within 1/4 to 1/2 mile of these parcels occurs in many places. Parts of the South Fork Stillaguamish River and many tributaries comprise the watershed. Some lands are located in the City of Everett municipal watershed.

Plant associations include the western hemlock, Pacific silver fir, and mountain hemlock mature conifer forests. Highest elevations are comprised of bare rock and snow fields. Alpine meadows are small and uncommon.

Soils are shallow to moderately deep, formed in metasedimentary, and sedimentary rock. Soil and landscape formation was influenced by glacial scouring and deposition, weathering, and rock transport by streams and gravity. Extremely steep slopes and areas of lacustrine silty clays are prone to failure under natural conditions.

WILDERNESS CAPABILITY

Manageability and Boundaries: Boundaries are illogical and do not comprise a discrete, manageable area.

Natural Integrity and Appearance: Appearance is mostly natural. Long-term ecological processes are ongoing. Due to size, shape, and location of these parcels, it is doubtful they could remain unaffected by nearby activities.

Opportunities For Solitude: Opportunities for solitude are low due to adjacent travel corridors and timber management activities.

Opportunities Primitive Recreation: Lake Evans and Boardman Lake are popular destinations. Trails to Poodle Dog Pass, Headlee Pass, and Gothic Basin receive heavy use.

Challenging Experiences: Opportunities for challenging experiences are good. This is mostly a day-use area, with potential for longer excursions limited due to the rugged terrain of Ragged Ridge.

Special Features: None.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Availability - Other Resource Potential

Recreation: The trails to Boardman Lake, Headlee Pass and Weden Creek each accommodate about 1,500 hikers per year. Fishing and viewing are the attractions at Boardman Lake. Viewing scenery and mountain climbing are the attractions at Headlee Pass and Weden Creek. The South Fork of the Stillaguamish River receives heavy pressure from sports fishermen due to easy access. In the southern portion of this parcel use is primarily centered on trail corridors leading to lakes and mountain tops, but use levels are very low due to steep, rugged topography.

Fish/Wildlife: Old growth forest provides habitat for spotted owls, pine marten and pileated woodpeckers. Mountain goats inhabit Headlee Pass. Anadromous fish reside in the South Fork Stillaguamish River; other streams support native trout.

Water: Several of the larger streams have potential for hydropower development.

Livestock Operations: None

Ecology: Generally, areas below 4,000 feet elevation are forested with species typical of the west Cascades including cedar, Douglas fir, true firs, and western hemlock. The higher elevations are typically steep rock and open slopes supporting snow a majority of the year.

Timber: Nineteen percent of this area is tentatively suitable for logging.

Minerals/Oil and Gas: The geology of the area is dominated by Jurassic metamorphic volcanic and sedimentary rocks and by Tertiary granitic and ultrabasic rocks. The area has numerous reported mineral resource occurrences, and there are 581 mining claims located within it. The northern part of the area lies within the Squire Creek and Silverton mineral resource areas, which are identified as having a moderate to low potential for the occurrence of copper, lead, zinc, gold and silver resources.

The eastern portion lies adjacent to the Monte Cristo mining district and is within the Silver Creek and Sultan areas, which have numerous reported mineral resource occurrences. The Silver Creek District has a history of past production and is considered to have a moderate to high potential for the occurrence of copper, lead, gold and silver.

Summary Table - Glacier Peak K #K6031

Category 1/	Unit	KA	Parcels KN	KM	KP	KR	TOTAL
Acres (Minus water, private land)	Acres	43,362	42	21	42	42	45,509
Primitive/Semi-Primitive Recreation ROS	Acres	35,035	0	0	0	0	35,035
Timber							
Tentatively suitable	Acres	8,405	42	21	42	42	8,552
Tentatively suitable inaccessible	Acres	5,532	0	21	0	0	5,553
Tentatively suitable standing volume	M bdft	328,863	1,643	822	1,643	1,643	334,614
"Old Growth", Total Acres	Acres	15,942	42	21	21	42	16,068
0-2,500 Feet Elevation	Acres	5,680	42	21	21	42	5,806
2,500-4,000 Feet Elevation	Acres	9,988	0	0	0	0	9,988
4,000 + Feet Elevation	Acres	274	0	0	0	0	274
Management Indicator Species (MIS)							
Spotted Owl MR	Acres	8,405	0	0	0	42	8,447
Pileated Woodpecker and Marten MR	Acres	1,309	21	21	0	0	1,351
Elk-deer winter range	Acres	2,914	0	0	42	21	2,977
Goat Habitat MR	Acres	591	0	0	0	21	612
Bald Eagle Habitat (nests, forage, roost area)	Acres	633	0	0	0	0	633
Locatable Mineral Development Potential							
High	Acres	2,006	42	21	42	42	2,153
Moderate	Acres	10,305	0	0	0	0	10,305
Low	Acres	12,861	0	0	0	0	12,861
Claims 2/	# of	-	-	-	-	-	581
Leasable Energy Minerals (Moderate Potential)							
Coal, geothermal	Acres	12,839	42	21	42	42	12,986
Geothermal	Acres	23,420	0	0	0	0	23,420

1/ American Indian Religious and Cultural areas were analyzed Site specific information is not disclosed due to its sensitivity

2/ Number of claims is not broken out by parcel.

Those parcels lying east of Silver Creek (KA, KN, KP, and KP) lie within an area identified by the U.S. Geological Survey and Bureau of Mines as having a "substantiated" or high potential for the occurrence of copper, silver, gold, lead and zinc in lode type deposits. That portion of KA lying within Section 33, T.29N.,R.11E. and in Section 4 and 5, T.28N.,R.11E. has been identified as having a high potential for the occurrence of large disseminated porphry-type copper deposits, which are large enough to employ lower cost open pit or sub-level caving methods of mining.

That portion of the area lying within T.28N.,R.9 and 10E. within the Sultan Mining District, which also has potential for the occurrence of gold, copper, iron and lead in the form of lode deposits. The area around Red Mountain has a potential for the occurrence of chromite deposit in the form of magmatic segregation type deposits.

A large portion of the area along the Stillaguamish and Sauk Rivers and along Silver Creek are classified "prospectively valuable" for coal, and all but that area lying west of R.10E. is classified "prospectively valuable" for geothermal resources. However, none of the area is encumbered by leases or pending lease applications.

Cultural: A few areas of significance are associated with former mines.

Land Use Authorizations: *There are no special land use authorizations.*

Non-Federal Lands: None.

Fire: There have been 3-4 fires per decade, with three major fires in the past 40 years. Average fuel accumulation is 60-80 tons per acre.

Insect and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: These parcels are approximately 60 miles from Everett. They are south and west of the Boulder River and Henry M. Jackson Wilderness Areas.

Public Interest: Following release of the DEIS and Proposed Forest Plan, Glacier Peak parcel K, plus specific geographic sites and features within the parcel and its adjacency to other areas, received public comment.

Glacier Peak parcel K was mention 17 times. The comments were split between making the area a top priority for timber harvest (3), keeping it open for mining (3), and building more roads (3), and managing it for recreation (3), *the protection of wildlife habitat (2), and retention of old growth (2).* 1/

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

Big Four Mountain was mentioned 31 times. Eight responses favored preserving the forest ecosystem, seven wanted the area to remain roadless, four wanted the area protected from timber harvest, and three said to protect the old growth ecosystem. The remaining comments expressed a desire for the area to be managed for recreation and added to the wilderness.

Mt. Stickney was mentioned 12 times. The comments favored expanding the trail system, protecting the area from harvest, keeping the area roadless, and managing the area for recreation.

Lands adjacent to the Henry M. Jackson Wilderness were mentioned 175 times. Most of the comments favored the area remain roadless (57), protected from timber harvest (38), the forest ecosystem preserved (34), and old growth preserved (11). Most other comments desired to have the area managed for recreation, wildlife habitat and visual quality.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

GLACIER PEAK K
PARCEL KA

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	39,786						
1B SPNM		24,032	32,606	30,473	32,226		31,592
1C SPM						17,823	
1D RN		1,520	654		591	3,547	908
2A Foregrd.					1,140	992	591
2B Midgrd.			696		316		253
3A Public	63	63	63	63	63	63	42
5 Potent W&S	443		718	21			865
8 Special				11,974			
11 O-G Hab.	1,161	4,878	844	147	147	8,531	570
12 Mature O-G	464	570	549	316	1,013	1,267	760
14 D&E Enhanc		1,499	63			105	42
15 Goat MR						21	
17 Timber	2,998	2,196	147	232	908	3,885	1,119
19 Mtn. Hemlk		7,349	6,082	1,267	6,018	6,546	5,723
22A Sultan R.			2,935				
22B Sultan R.	443			865	2,935		2,893
22C Sultan R.		3,252				2,576	

PARCEL KM

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
1B SPNM				21			
12 Mature O-G	21	21	21		21	21	21

PARCEL KN

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
1B SPNM				42			
1D RN			21		21		21
12 Mature O-G	21	21	21		21	21	21
14 D&E Enhanc						21	
17 Timber	21	21					

PARCEL KP

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
14 D&E Enhanc		42	42			42	
17 Timber	42			42	42		42

PARCEL KR

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
1B SPNM		42	42		42		42
11 O-G Hab.	42			42		42	

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by implementation of any of the alternatives. Alternative G-Modified would leave the area effectively roadless through the end of the fifth decade. Alternative I would remove the greatest amount of acreage from roadless status, but still leaves 82% of the area roadless at the end of the fifth decade.. Alternative I would also allocate slightly over one-third of the area to *semi-primitive motorized recreation.*

Fish/Wildlife: Fish and wildlife will not be significantly affected by implementation of any of the alternatives. Alternatives B and I allocate the greatest area to old growth habitat, mature old growth, deer and elk *enhancement and mountain goat management requirement.* Alternative G-Modified allocates the least.

Water: Hydroelectric development will be largely precluded under Alternatives B, C, G, H, and J (Preferred), due to the emphasis in these alternatives on semi-primitive nonmotorized recreation. Development could proceed under Alternatives A, NC and I.

Ecology: The overall ecology of the area will not be significantly affected by implementation of any of the alternatives, due to the low level of potential development activities.

Timber: Minimal acreage is allocated to management area 17 (timber) over all alternatives. Alternatives A, NC, B and I allocate the greatest amount of area to timber management. Alternatives C and G-Modified allocate the least. None of the alternatives will significantly affect the timber resource.

Minerals/Oil/Gas: Alternative G-Modified allocates approximately one-quarter of the area to management area 8 (special). This allocation will withdraw these designated acres from mineral entry. Alternatives A, NC and I will provide a slightly higher level of roaded access through the area for mineral exploration and development.

Cultural: Alternatives A, NC and I will have the greatest potential to adversely impact cultural resources in the area, as they are associated with the greatest development activity. Alternatives C and G-Modified will have the least potential for impact.

Land Use Authorizations: None of the alternatives will significantly affect land special use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire in the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

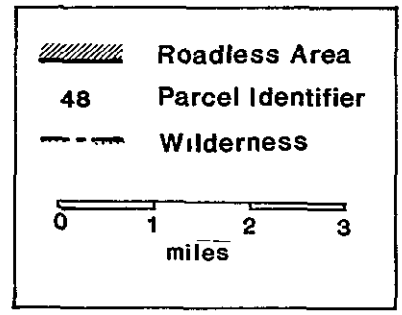
Wilderness Potential: All alternatives assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I assigns slightly more than one-third of the area to semi-primitive motorized recreation. Alternatives C and G-Modified retain the greatest area in roadless status through the end of the fifth decade. Alternative A, NC,B and I retain the least. All alternatives, however, will maintain the area in a primarily roadless condition through the end of the fifth decade. The wilderness potential will be maintained.

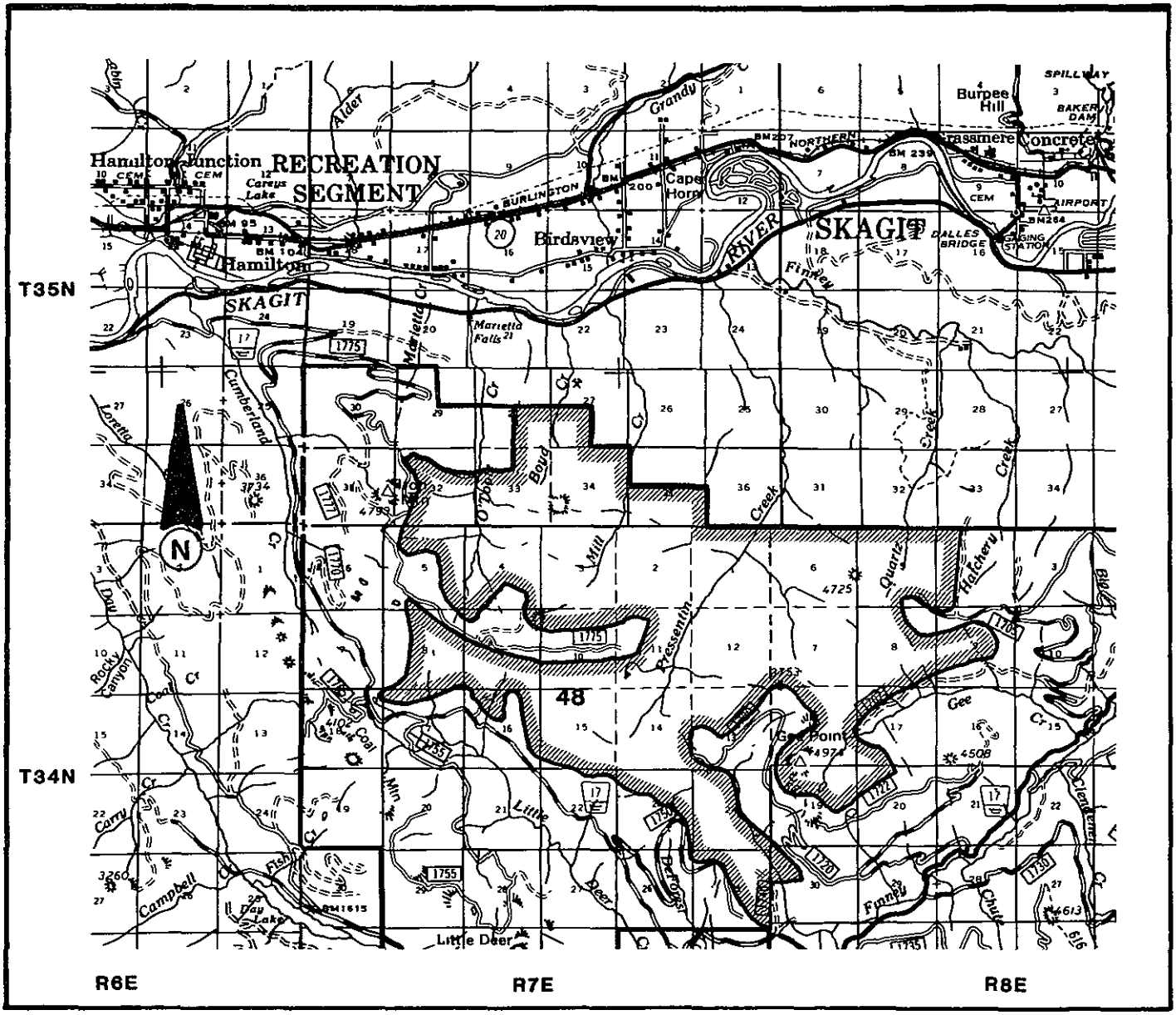
The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

	Undeveloped Acres			Percent
Alternative	**Decade 1**	**Decade 2**	**Decade 5**	**Remaining**
A (No Act)	42,764	40,204	37,492	82%
B (RPA)	43,115	40,793	38,346	84%
C	44,792	44,048	42,960	94%
G-Mod.	45,356	45,204	45,052	99%
H	44,105	42,729	41,201	91%
I	42,860	40,094	37,413	82%
J (Pref).	43,847	42,201	40,342	89%

Pressentin

Roadless Area 6048





PRESSENTIN **Roadless Area 6040**

This roadless area originally consisted of 16,000 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6048 to nonwilderness uses. None of this area was designated Wilderness by Congress as a result of the 1984 Washington Wilderness Legislation.

In 1986 the O'Toole Timber Sale was sold under contract within this roadless area. This sale removed 802 acres from roadless status. The area was reduced by 141 acres due to a mapping discrepancy. The following shows the disposition of acres within the Pressentin roadless area:

Pressentin	**Net Acres**
1984 RARE II	16,000
updated 1988	15,057
Change	**- 943**

OVERVIEW

This parcel is located southwest of Concrete, between the Forest boundary to the north and existing forest road systems to the south. The area drains into the Skagit River. Road access is provided via the Finney-Cumberland Road (#17), the Claims Road (#1775), the Gee Point-Pressentin Road (#1720), and the Gee Creek Road (#1705).

Drainages include the upper portions of O'Toole Creek, Boyd Creek, Mill Creek, Pressentin Creek, and Quartz Creek; the area is highly dissected by these drainages and terrain is moderately rugged. Elevation ranges from 2,000 to 5,080 feet.

The predominant cover types below 2,800 feet elevation are Douglas-fir and western hemlock, with some western red cedar on wetter sites. Above 2,800 feet, the predominant types are Pacific silver fir and western hemlock, with some mountain hemlock at the higher end of the forested range (4,000-5,500)

Soils are variable, with unstable soil adjacent to the steep sideslope along creeks. Scattered pockets of shallow soils on upper sideslopes and ridgetops.

WILDERNESS CAPABILITY

Manageability and Boundaries: This parcel lies in a relatively isolated block of National Forest land. Boundary location and manageability may be difficult due to irregular boundaries adjacent to existing roads, and State and private land located to the north.

Natural Integrity and Appearance: The parcel is heavily forested and natural in appearance.

Opportunities For Solitude: Opportunities for solitude are many due to large size and low recreation use.

Opportunities For Primitive Recreation: There are opportunities for cross-country hiking and hunting.

Challenging Experiences: Opportunities for unusually challenging experiences are minimal.

Special Features: None.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Summary Table - Pressentin #6048

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	15,057
Primitive/Semi-Primitive Recreation ROS	Acres	8,658
Timber		
Tentatively suitable	Acres	9,038
Tentatively suitable inaccessible	Acres	3,104
Tentatively suitable standing volume	M bdft	353,630
"Old Growth", Total Acres	Acres	11,867
0-2,500 Feet Elevation	Acres	1,034
2,500-4,000 Feet Elevation	Acres	8,933
4,000 + Feet Elevation	Acres	443
Management Indicator Species (MIS)		
Spotted owl MR	Acres	3,400
Pileated woodpecker and pine marten MR	Acres	654
Elk-deer winter range	Acres	527
Goat habitat MR	Acres	0
Bald eagle habitat (nests, forage, roost area)	Acres	0
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	0
Low	Acres	15,057
Claims	# of	6
Leasable Energy Minerals	Acres	0

1/ American Indian Religious and Cultural Uses areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: Small amount of recreation use (other than hunting) occurs on the Gee Point Trail #612.

Fish/Wildlife: This parcel contains three spotted owl habitat areas and one pine marten management area.

Water: Several tributaries to the Skagit River include O'Toole Creek, Boyd Creek, Mill Creek, Pressentin Creek, and Quartz Creek.

Livestock Operations: None.

Ecology: Most of the parcel is relatively low elevation and forested with species typical of the west Cascades. The Gee Point vicinity is an island of non-commercial sub-alpine vegetation.

Timber: Timber harvest has occurred on private land adjacent to the northern boundary of this parcel. Some 60 percent of the area is classed tentatively suitable for harvest.

Minerals/Oil and Gas: The geology of the area is dominated by Jurassic aged metamorphic, pre-Tertiary ultrabasics, Tertiary aged nonmarine sedimentary rocks and by glacial drift of Quaternary age. The area has no reported mineral resource occurrences of significance, however, it does have 6 mining claims located within it. A large portion of the area along the west side is classified "prospectively valuable" for coal resources, but the area is not encumbered by any leases or pending lease applications. The area has not been inventoried by the U.S. Geological Survey and Bureau of Mines, but based upon available data it appears that the area has a relatively low potential for the occurrence of mineral resources.

Cultural: No areas of cultural significance are known within this parcel.

Land Use Authorizations: There are no special land authorizations.

Non-Federal Lands: There are 40 acres of non-Federal lands.

Fire: Approximately 300 acres on the northwest-facing slope of O'Toole Creek burned in the early 1950's. Evidence of isolated lightning strikes can be found on ridges in the Pressentin Creek drainage.

Insect & Disease: There are no insect or disease concerns.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: The towns of Concrete and Sedro Woolley are each about 30 miles away, Bellingham is 50 miles away, and Seattle is 100 miles away. This parcel is nearly encircled on three sides by the Mt. Baker, Noisy Diobsud, Glacier Peak, and Boulder River Wilderness Areas.

Public Interest: Local and other public sentiment has been moderately to strongly in favor of multiple-use development of this parcel. Following release of the DEIS and Proposed Forest Plan, public comments mentioning geographic features within the Pressentin Roadless Area were received.

Pressentin Creek was mentioned 367 times. Most of the comments favored protection of old growth ecosystems (61), protection for spotted owl habitat (44), keeping the area roadless (43), protecting it from harvest (41), and preserving the forest ecosystem (41). Most of the remaining comments said to protect the area for recreation, wildlife habitat, fisheries, and scenic value. Five comments were received saying to build more roads in the area; five comments were received saying to make the area a top priority for timber harvest.

Quartz Creek was mentioned 28 times. The comments expressed a desire to protect the area from harvest (7), preserve old growth (4), add the area to wilderness (4), and keep it roadless (4). Other responses said to preserve the forest ecosystem and old growth ecosystem, protect visuals, and enlarge the size of SOHA's. One comment wanted the area closed to horse use. 1/

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

PRESSENTIN

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	6,905						
1B SPNM			13,959	9,693			
1C SPM						1,309	
1D RN							84
2B Midgrd.					886		865
11 O-G Hab.	1,900	3,400	295	1,224	3,273	3,357	3,231
12 Mature O-G	168	654		147	654	591	654
14 D&E Enhanc		42		84	84	42	126
17 Timber	6,082	6,863	633	2,808	6,251	6,546	6,082
19 Mtn. Hemlk		4,096	168	1,098	3,906	3,209	4,012

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by implementation of any of the alternatives. Alternative C will remove the least amount of acres from roadless status through the end of the fifth decade. Alternatives B and I remove the greatest amount. Alt. I will allocate approximately 10% of the area to SPM recreation.

Fish/Wildlife: *Alternatives B, H and J (Preferred) allocate the greatest area* to old growth habitat, mature old growth, deer and elk enhancement and mountain goat management requirement. Alternatives C and G-Modified allocate the least.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. *For example, "protect old growth" and "build a trail here" would be* tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

Water: There are no adverse effects to the water resource of this area associated with implementation of any of the alternatives.

Ecology: The overall ecology of the area would not be significantly affected by implementation of any of the alternatives.

Timber: Alternative C will have the least affect on the existing timber resource, as it allocates very minimal acreage to management area 17 (timber). Alternatives A, NC, B, H, I and J allocate more than 40% of the area to timber.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. Alternatives A, NC, B, H, I and J (Preferred) will provide greater roaded access through the area that could be used for minerals exploration and development.

Cultural: Alternatives A, NC, B, H, I and J (Preferred) have the greatest potential to adversely impact cultural resources within the area, due to development activity. Alternatives C and G-Modified have the least potential. Valuable sites will be protected via avoidance or conserved through data recovery.

Land Use Authorizations: None of the alternatives will have a significant affect on land special use authorizations.

Fire: None of the alternatives will have a significant affect on the occurrence of fire within the area.

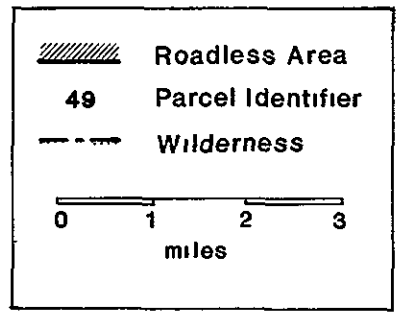
Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

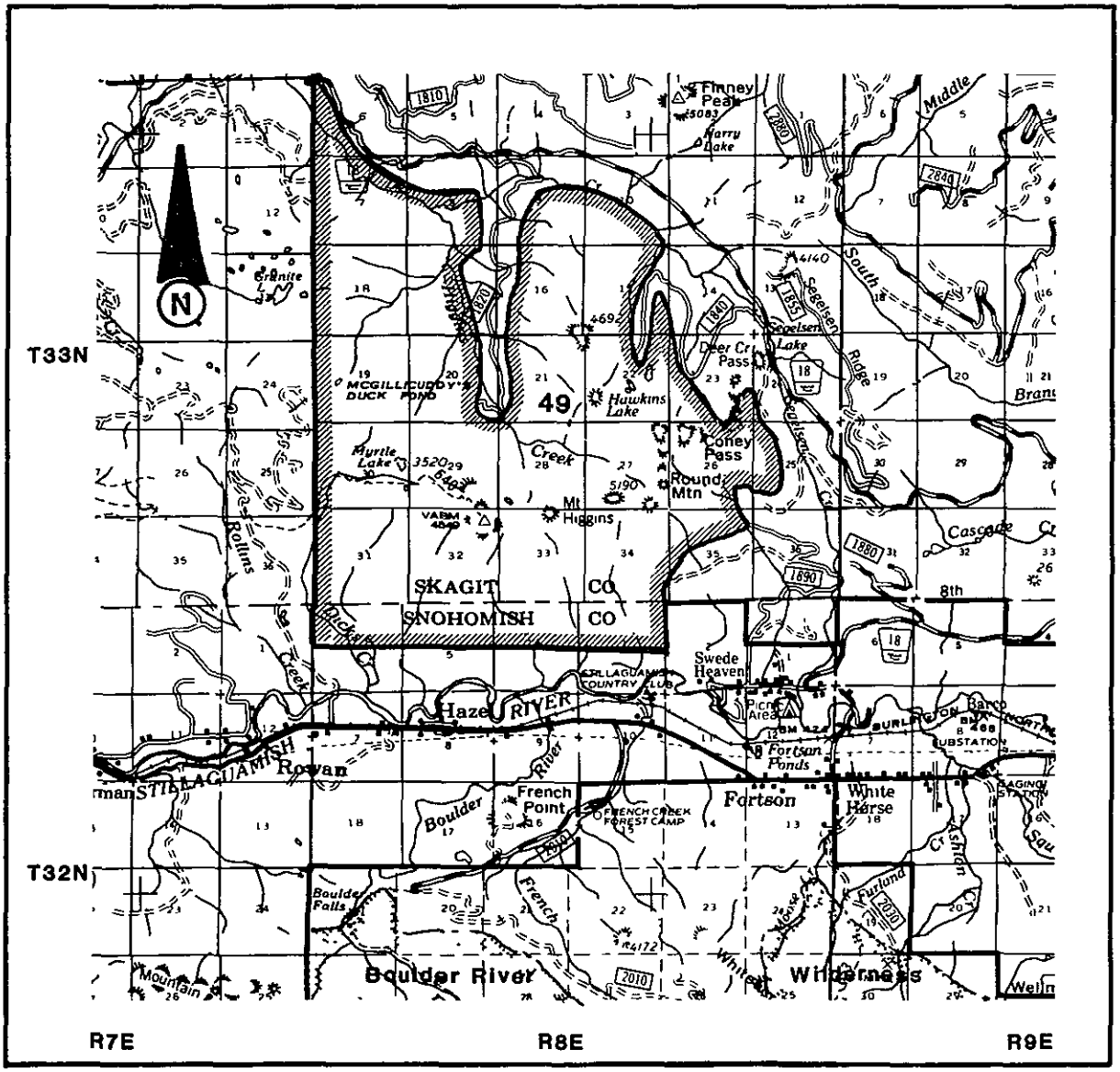
Wilderness Potential: Alternative C retains the greatest amount of roadless area at the end of the fifth decade. The wilderness potential will be maintained. Alternative I assigns approximately 10% of the area to the semi-primitive motorized prescription and approximately 40% to timber management. Alternatives A, NC and G-Modified leave less than 50% of the area in a roadless condition at the end of the fifth decade. Alternatives B, H and J (Preferred) leave just over 50% of the area in a roadless condition at the end of the fifth decade.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	11,706	7,722	4,004	27%
B (RPA)	12,357	11,507	7,720	51%
C	14,811	14,559	14,185	94%
G-Mod.	11,940	8,842	5,771	38%
H	12,825	10,381	7,929	53%
I	12,324	9,280	6,528	43%
J (Pref).	12,867	10,577	8,110	54%

Higgins Mountain
Roadless Area 6049





HIGGINS MOUNTAIN **Roadless Area 6049**

This roadless area originally consisted of 12,800 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6049 to nonwilderness uses. None of this area was designated Wilderness by Congress as a result of the 1984 Washington Wilderness Legislation.

In 1988, this area was increased by 377 acres due to a mapping discrepancy. The following shows the disposition of acres within the roadless area:

Higgins Mountain	**Net Acres**
1984 RARE II	12,800
updated 1988	13,177
Change	**+ 377**

OVERVIEW

This parcel is located north of the North Fork Stillaguamish River, about ten miles northwest of the community of Darrington. It lies partly in Snohomish and Skagit Counties and is administered by both Darrington and Mt. Baker Ranger Districts. The Forest boundary skirts to the south and west, Deer Creek to the north, and existing Forest road systems to the east.

Road access is provided via Segelson Road (#18), the Hawkins Lake Road (#1840), and the Westside Higgins Road #1820, which extends south into the center of the area.

Drainages include the headwaters of Deer Creek and several tributaries which flow into the North Fork Stillaguamish River. Terrain is rugged, with steep slopes and numerous ridges dissected by tributary drainages. Elevations range from 2,000 to 5,000 feet. Higgins Mountain and Round Mountain are located astride the south boundary. Higgins Mountain has unusual tilted rock formations and a rock face which is visible from S.R. 530.

Heavy forest occurs throughout, except for subalpine areas in the immediate vicinity of Higgins and Round Mountains. Soils are variable with unstable glaciolacustrine soils on the west side of Higgins Creek and south side of Deer Creek. There are also unstable soils adjacent to the steep sideslope channels east of Higgins Creek.

WILDERNESS CAPABILITY

Manageability and Boundaries: This parcel is in a relatively isolated block of National Forest land, and boundary location and manageability would be fairly easy. There is potential for motorized access from adjacent road systems.

Natural Integrity and Appearance: Southern slopes are visible from S.R. 530. This route leads from Interstate 5 to Darrington, thus scenic qualities are experienced. The Higgins Mountain range is very rugged. This rugged topography and moderately large size of the parcel provide the area protection, allowing an unaltered, natural ecosystem to exist.

Opportunities For Solitude: Opportunities for solitude are excellent since the parcel is large and receives light recreation use.

Opportunities For Primitive Recreation: *Primitive recreation opportunities* include hiking, hunting, and mountaineering.

Challenging Experiences: Unusually challenging experiences are minimal.

Special Features: Higgins Mountain has unusual tilted rock formations and a striking slab face which is visible from S.R. 530. Fossils can be found high on Higgins Mountain.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Summary Table - Higgins Mountain #6049

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	13,177
Primitive/Semi-Primitive Recreation ROS	Acres	8,637
Timber		
Tentatively suitable	Acres	8,024
Tentatively suitable inaccessible	Acres	1,055
Tentatively suitable standing volume	M bdft	313,955
"Old Growth", Total Acres	Acres	7,306
0-2,500 Feet Elevation	Acres	1,541
2,500-4,000 Feet Elevation	Acres	5,575
4,000 + Feet Elevation	Acres	190
Management Indicator Species (MIS)		
Spotted owl MR	Acres	1,393
Pileated woodpecker and pine marten MR	Acres	781
Elk-deer winter range	Acres	2,977
Goat habitat MR	Acres	0
Bald eagle habitat (nests, forage, roost area)	Acres	316
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	0
Low	Acres	13,177
Claims	# of	29
Leasable Energy Minerals	Acres	0

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: Myrtle Lake, the Higgins Mountain ridge, and the high pocket valley of Higgins Creek are accessed by the Mt. Higgins Trail #640; this trail receives moderate use. Other recreation use is limited primarily to hunting.

Fish/Wildlife: Special wildlife habitats include habitat for spotted owl, pileated woodpecker and pine marten. South-facing slopes below Higgins Mountain provide excellent deer winter range. Bear are seen here also. Mountain goats are found year round on northwest slopes of Higgins Mountain. Steelhead, coho salmon, and trout utilize Higgins Creek and Deer Creek.

Water: Drainages include the upper reaches of Deer Creek and all of Higgins Creek, a major tributary to Deer Creek. The southern portion includes several smaller tributaries to the North Fork Stillaguamish River, as well as Myrtle Lake and McGillicuddy's Duck Pond.

Livestock: None.

Ecology: This parcel is heavily forested, except for rocky sub-alpine portions of Higgins Mountain Ridge, which features meadows and tarns. Commercial species are those typical of the West Cascades at this elevation, and include Douglas-fir, Pacific silver fir, western hemlock, and mountain hemlock.

Timber: Most of the parcel is forested with commercial timber with 61 percent classed as tentatively suitable. There are scattered stands of mountain hemlock at the higher elevations. Most of the non-Federal lands adjacent to the south and west boundaries have been harvested.

Minerals/Oil and Gas: The geology of this area is dominated by Paleozoic metamorphics, Cretaceous volcanic rocks, Paleocene-Cretaceous nonmarine rocks and glacial drift of Quaternary age. The area has reported occurrences of lead, zinc, and copper but none are considered to be of significance. The area does have 29 mining claims located within it, most of which are located in Sections 22, 23, 25, 26, 27, and 28. Most of the area is classified "prospectively valuable" for coal, but it is not encumbered by any leases or pending lease applications. The area has not been studied in detail by the U.S. Geological Survey and Bureau of Mines, but based upon available data it appears the area's mineral potential is low.

Cultural: No areas of significant cultural interest are present.

Land Use Authorization: There are no special land authorizations.

Non-Federal Lands: There are 240 acres of non-Federal lands located within this parcel.

Fire: Fire incidence is low, and is limited to isolated lightning strikes.

Insect & Disease: There are no insect or disease concerns.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: The towns of Concrete and Sedro Woolley are each about 40 miles away, Bellingham is 60 miles away, and Seattle is 110 miles. This parcel is nearly encircled by the Glacier Peak, Mt. Baker, and Boulder River Wilderness Areas.

Public Interest: Following release of the DEIS and Proposed Forest Plan, public comments on the Higgins Mountain Roadless Area, as well as geographic features within the area, were received.

Higgins Mountain was mentioned 373 times. The comments favored keeping the area roadless (75), protecting it from harvest (68), preserving the forest ecosystem (50), protecting the old growth ecosystem (23), and having the area added to the wilderness (15). The majority of the remaining responses said to manage the area for recreation, protection of wildlife habitat, and for its scenic value.

Three comments wanted the area to remain open for snowmobile use, three wanted it made a top priority for timber harvest, and three wanted the area kept open for mining. 1/

Higgins Creek was mentioned 12 times. Two responses favored building more roads, two said to protect the old growth ecosystem, two wanted protection from timber harvest.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

HIGGINS MOUNTAIN

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	5,786						
1B SPNM		3,484	12,713	12,755	3,695		3,928
1C SPM						2,745	
2B Midgrd.			42		3,463		3,590
5 Potent W&S				21			
11 O-G Hab.	950	1,140	21	232	1,055	1,330	696
12 Mature O-G	147	527	42	21	485	760	506
14 D&E Enhanc		2,998	126	21	168	2,660	147
17 Timber	6,293	4,434	232	105	3,843	5,342	3,780
19 Mtn. Hemlk		591		21	464	337	527

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by alternatives C and G-Modified which will leave the area predominately roadless through the end of the fifth decade. Alternatives A, NC and I leave no area roadless at the end of the fifth decade. Alternative I would allocate about 21% of the area to semi-primitive motorized recreation.

Fish/Wildlife: Alternatives B and I allocate the greatest area to old growth habitat, mature old growth, and deer and elk enhancement. Alternative C and G-Modified allocate the least.

Water: There are no significant adverse effects to the water resources of this area due to implementation of any of the alternatives.

Ecology: Alternatives A, NC, B and I have the greatest potential to affect the overall ecology of the area. Alternatives C and G-Modified have the least potential.

Timber: Alternatives C and G-Modified will have the least affect on the existing timber resource, as they allocate very minimal acreage to management area 17 (timber).

Alternatives A/NC and I allocate the greatest amount of area to timber. None of the alternatives will significantly affect the timber resource.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. Alternatives A, NC, B and I will provide a greater amount of roaded access to areas that could be used for minerals exploration and development.

Cultural: Alternatives A, NC, B and I will have the greatest potential for adverse impacts to the cultural resources of the area, due to development. Alternatives C and G-Modified will have the least potential. Valuable sites will be protected via avoidance or conserved through data recovery.

Land Use Authorizations: None of the alternatives will have a significant affect on land special use authorizations.

Fire: None of the alternatives will have a significant affect on the occurrence of fire within the area.

Insect and Disease: None of the alternatives will have a significant affect on the occurrence of insects and disease within the area.

Wilderness Potential: Alternatives C and G-Modified assign the majority of this area to management prescriptions compatible with preserving its roadless character, the wilderness potential will be maintained. Alternative I assigns about one-fifth of the area to semi-primitive motorized recreation. Alternative B leaves 3% and alternatives H and J (Preferred) leave approximately 15% in a predominately roadless condition at the end of the fifth decade. Alternatives A, NC,and I leave none of the area in a roadless condition at the end of the fifth decade. Wilderness potential will be lost should one of these five alternatives be implemented.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	6,850	2,898	0	0%
B (RPA)	8,467	5,461	349	3%
C	13,138	13,098	13,050	99%
G-Mod.	13,177	13,177	13,177	100%
H	9,244	6,520	2,107	16%
I	8,266	4,970	0	0%
J (Pref).	9,037	6,147	1,723	13%

PRAIRIE MOUNTAIN **Roadless Area 6060**

This roadless area originally consisted of 5,500 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6060 to nonwilderness uses. None of this area was designated Wilderness by Congress as a result of the 1984 Washington Wilderness Legislation.

One timber sale contract has been awarded within this roadless area. The Black Diamond Timber Sale removed 1,668 acres from roadless status. The area was reduced ten acres due to a mapping discrepancy. The following shows the disposition of acres within the Prairie Mountain roadless area:

Prairie Mountain	Net Acres
1984 RARE II	5,500
updated 1988	3,822
Change	**-1,678**

OVERVIEW

This parcel is located on the summit and surrounding ridges of Prairie Mountain which dominates the river flats known as Sauk Prairie. Logging roads surround and intrude into the parcel. The Sauk and Suiattle Rivers are major drainages just outside the parcel. The terrain is generally steep with forested and rocky slopes. Elevations range from about 1,800 to 5,700 feet.

Forest cover is composed of western hemlock, Pacific silver fir, and mountain hemlock plant associations. There are scattered brushfields and talus slopes, and a few small subalpine meadows near the summit of Prairie Mountain.

Soils have developed from residual and colluvial rock material, glacial till and aerial volcanic deposits. Rock types are generally schist, gabbro, and other igneous rock, with minor areas of serpentine material. There are pockets of unstable soil and landforms adjacent to Conrad Creek and on the west-facing slopes of Prairie Mountain.

WILDERNESS CAPABILITY

Manageability and Boundaries: Boundaries do not follow natural land forms thus making them difficult to manage. The parcel is not adjacent to an existing wilderness and the acreage is marginal for wilderness consideration.

Natural Integrity and Appearance: Appearance is strongly influenced by extensive timber harvest surrounding the area.

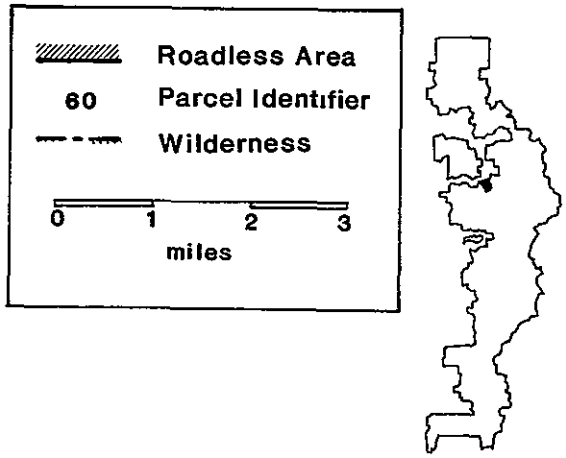
Opportunities For Solitude: Opportunities are low.

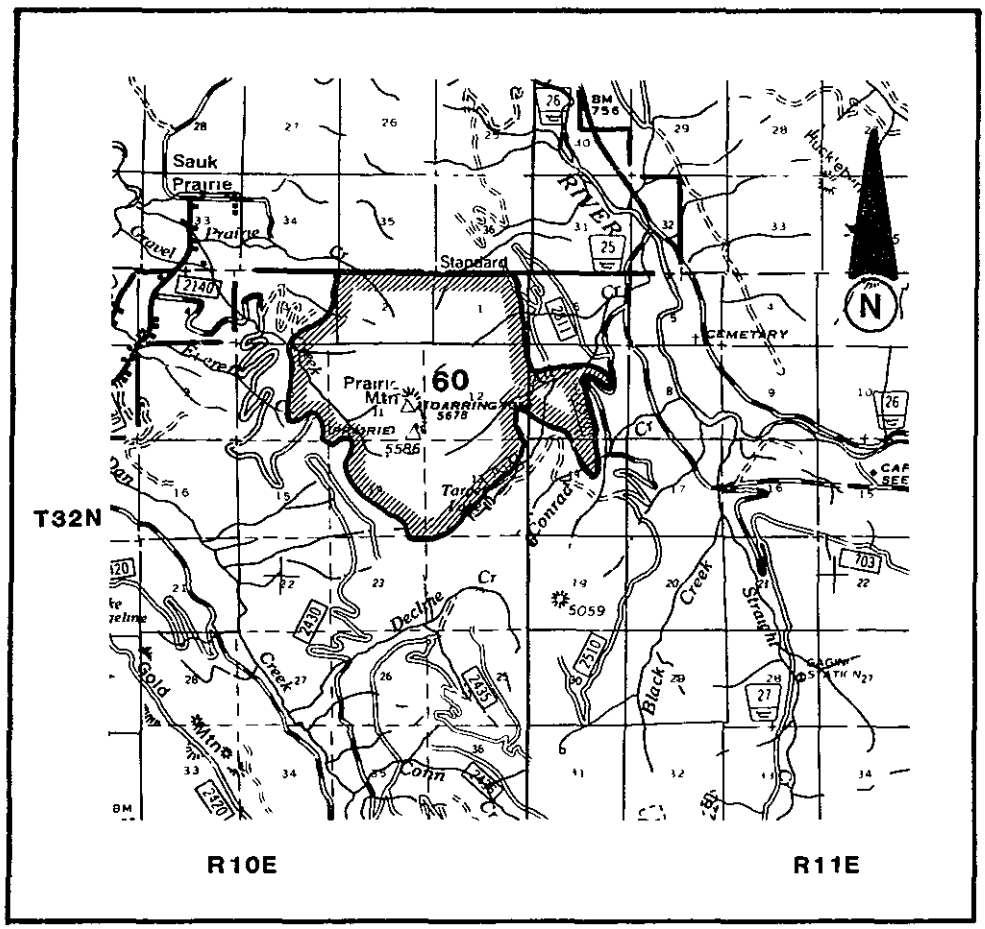
Opportunities For Primitive Recreation: Opportunities are low.

Challenging Experiences: There are few if any challenging experiences.

Special Features: None.

Prairie Mountain
Roadless Area 6060





AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Summary Table - Prairie Mountain #6060

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	3,822
Primitive/Semi-Primitive Recreation ROS	Acres	0
Timber		
Tentatively suitable	Acres	2,154
Tentatively suitable inaccessible	Acres	42
Tentatively suitable standing volume	M bdft	84,280
"Old Growth", Total Acres	Acres	2,301
0-2,500 Feet Elevation	Acres	464
2,500-4,000 Feet Elevation	Acres	1,436
4,000 + Feet Elevation	Acres	401
Management Indicator Species (MIS)		
Spotted Owl MR	Acres	1,182
Pileated Woodpecker and pine marten MR	Acres	168
Elk-deer winter range	Acres	316
Goat Habitat MR	Acres	506
Bald Eagle Habitat (nests, forage, roost area)	Acres	0
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	0
Low	Acres	147
Claims	# of	0
Leasable Energy Minerals (Moderate Potential)		
Geothermal	Acres	3,882

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: Resource values are considered low. Incidental big game hunting occurs in this area.

Fish/Wildlife: Special wildlife habitats include habitat for the pileated woodpecker, pine marten, spotted owl, and mountain goat. The area also supports blacktail deer seasonally.

Water: No power withdrawals are noted. One stream, Gravel Creek, W.R.I.A. #04-1071, provides domestic water for several households. No other special uses related to water are noted.

Livestock Operations: No potential or current livestock use noted.

Ecology: Dense evergreen forests occur on this area. Dominant species include Douglas fir, western red cedar, western hemlock, Pacific silver fir on the lower elevations. Higher elevations support subalpine fir and Mt. hemlock plant communities.

Timber: About 56 % of the area (2,154 acres) is tent. suitable for logging.

Minerals/Oil and Gas: There are no mining claims filed within this area and there is little potential for production of oil and gas.

Cultural: The area is considered to be of little cultural significance.

Non-Federal Lands: None.

Fire: The occurrence is approximately 2 fires per decade with no major fires in the past 30 years. Average fuel accumulation is 60-80 tons per acre.

Insect and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: This parcel is within 10 miles of the Boulder River, Glacier Peak, and Henry M. Jackson Wildernesses. Seattle is approximately 80 miles away.

Public Interest: Following release of the DEIS and Proposed Forest Plan, Prairie Mountain was mentioned 29 times in the public comments received. The responses said to make the area a top priority for timber harvest (5), manage it for big game (3), keep ORV's out of the area (2), protect the trail from logging (2), and protect the old growth ecosystem (2). Most of the remaining responses favored managing the area for recreation, wilderness, and wildlife habitat. One response desired roads in the area be left open for public use.1/

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

PRAIRIE MOUNTAIN

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	1,710						
1B SPNM			3,209				
1D RN		1,161			1,203		1,203
2B Midgrd.			211				
11 O-G Hab.		1,182	337	1,182	1,182	1,183	1,203
12 Mature O-G	21	168		168	168	168	190
14 D&E Enhanc		147	63			63	
15 Goat MR		84		84	84	84	84
17 Timber	2,090	971		2,027	1,077	1,964	1,034
19 Mtn. Hemlk		105		359	105	359	105

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives. Alternatives A, NC and H will provide a very slightly higher level of roaded recreation. The other alternatives will leave the entire area in a roadless state.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives, due to the low level of development activity proposed.

Water: None of the alternatives will significantly affect the water resource of the area, due to the low level of potential development activity.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives, due to the low level of potential development activity.

Timber: Alternatives B, H, and J (Preferred) will not significantly affect the existing timber resource, due to the low level of development activity. Alternatives A, NC, G-Modified and I allocate the greatest number of acres to timber management, approximately 53%.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development.

Cultural: None of the alternatives will have a significant affect on the cultural resources of the area, due to the low level of potential development activity.

Land Use Authorizations: None of the alternatives will have a significant affect on land special use authorizations.

Fire: None of the alternatives will have a significant affect on the occurrence of fire within the area.

Insect and Disease: None of the alternatives will have a significant affect on the occurrence of insects and disease within the area.

Wilderness Potential: Alternatives A, NC, C and H remove an extremely limited amount of area from roadless area by the end of the fifth decade. None of the other alternatives remove any area from roadless status by this time. The wilderness potential will be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

	Undeveloped Acres			Percent
Alternative	**Decade 1**	**Decade 2**	**Decade 5**	**Remaining**
A (No Act)	3,786	3,732	3,680	96%
B (RPA)	3,822	3,822	3,822	100%
C	3,813	3,803	3,791	99%
G-Mod.	3,822	3,822	3,822	100%
H	3,798	3,768	3,738	98%
I	3,822	3,822	3,822	100%
J (Pref).	3,822	3,822	3,822	100%

WHITE CHUCK MOUNTAIN **Roadless Area 6051**

This roadless area originally consisted of 6,000 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6051 to nonwilderness uses. None of this area was designated Wilderness by Congress as a result of the 1984 Washington Wilderness Legislation. The Black Diamond Timber Sale has removed 211 acres from roadless status The area was reduced by 66 acres due to a mapping discrepancy. The following shows the disposition of acres within the White Chuck Mountain roadless area:

White Chuck Mountain	Net Acres
1984 RARE II	6,000
updated 1988	5,723
Change	**- 277**

OVERVIEW

This parcel is located on the summit and surrounding slopes of White Chuck Mountain, which is named for the glacial river at its base. Logging roads surround the parcel, which is dissected by many streams that feed into the White Chuck River and tributaries and the Suiattle River. Terrain varies from steep to very steep, mainly forested slopes below narrow rocky ridges. Elevations range from about 1,400 to 7,000 feet.

Plant associations include western hemlock, Pacific silver fir, mountain hemlock, and mature second growth riparian deciduous trees found along the White Chuck River. Upper elevations are comprised of bare rock and ice, including a 30 acre glacier. Mid-elevations are sparsely forested rocky areas interspersed with brush fields and talus slopes.

Soils have formed from residual and colluvial material and glacial till. Rock types are generally phyllite, sedimentary, and volcanic rock. Shallow soils cling to 75% slopes, which are prone to movement under natural conditions.

WILDERNESS CAPABILITY

Manageability and Boundaries: Boundaries are illogical and do not allow for a discrete, manageable area.

Natural Integrity and Appearance: Appearance is strongly influenced by adjacent cutover lands.

Opportunities For Solitude: Opportunities are low.

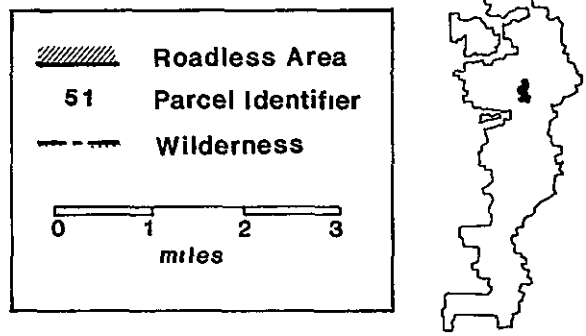
Opportunities For Primitive Recreation: Opportunities are low.

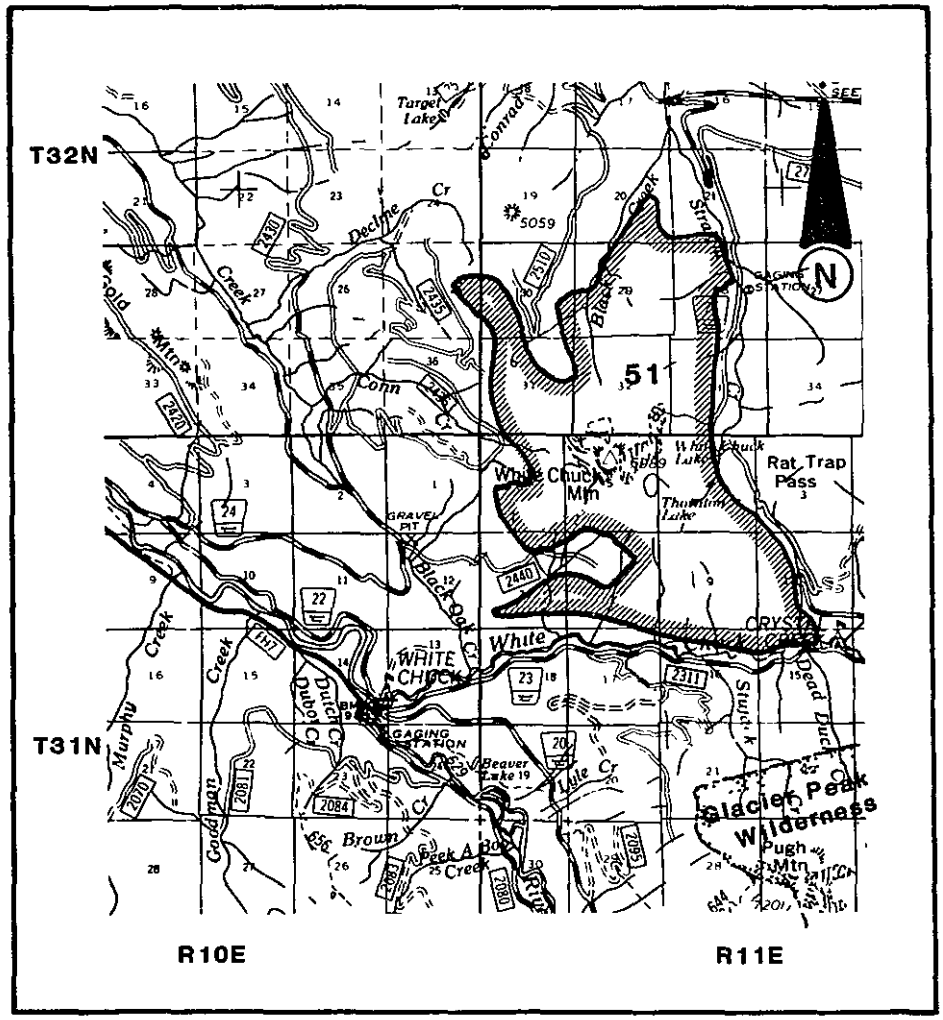
Challenging Experiences: The climb to the summit of White Chuck Mountain is considered by many to be challenging.

Special Features: None.

White Chuck Mountain

Roadless Area 6051





AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Summary Table - White Chuck Mountain #6051

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	5,723
Primitive/Semi-Primitive Recreation ROS	Acres	2,787
Timber		
Tentatively suitable	Acres	1,647
Tentatively suitable inaccessible	Acres	211
Tentatively suitable standing volume	M bdft	64,442
"Old Growth", Total Acres	Acres	2,428
0-2,500 Feet Elevation	Acres	591
2,500-4,000 Feet Elevation	Acres	1,077
4,000 + Feet Elevation	Acres	760
Management Indicator Species (MIS)		
Spotted owl MR	Acres	0
Pileated woodpecker and pine marten MR	Acres	168
Elk-deer winter range	Acres	443
Goat habitat MR	Acres	929
Bald eagle habitat (nests, forage, roost area)	Acres	42
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	0
Low	Acres	0
Claims	# of	2
Leasable Energy Minerals (Moderate Potential)		
Geothermal	Acres	51

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: *An occasional mountain climber ascends White Chuck Mountain.* Use is estimated at less than 100 climbers. Big game hunters of approximately 500 each year use the area.

Wildlife: Special wildlife habitats include habitats for the pileated woodpecker, pine marten, mountain goat, and blacktail deer. Also present are blacktail deer. The Whitechuck and Suiattle Rivers provide anadromous fish habitat.

Water: No power withdrawals or special users related to water exist.

Livestock Operations: None.

Ecology: Dense evergreen forests occur on this area. Dominant species include Douglas fir, western red cedar, western hemlock, Pacific silver fir on the lower elevations. Higher elevations support subalpine fir and mountain hemlock plant communities. Many cliffs and brushfields of red alder occur on the north slope of White Chuck Mountain.

Timber: About 29 percent or 1,647 acres of this parcel is classed tentatively suitable for logging.

Minerals/Oil and Gas: The area is primarily underlain by Jurassic metamorphic rocks and Permian sedimentary rocks. It has no reported occurrences of mineral resources, but does have 2 recorded mining claims. The area is classified "prospectively valuable" for geothermal resources, but it has no leases or pending lease applications. It has not been studied in detail by the U.S. Geological Survey and Bureau of Mines, but based upon available data it appears the area has a low potential for the occurrence of mineral resources.

Cultural: Nothing of cultural significance is found within this parcel.

Land Use Authorization: There are no special land use authorizations.

Non-Federal Lands: None.

Fire: There have been two major fires in the last 40 years with an average 5-10 fires per decade. Average fuel accumulation is 40-50 tons per acre.

Insect and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: This parcel is about 80 miles from Seattle. It is nearly encircled on three sides by Henry M. Jackson, Glacier Peak, and Boulder River Wildernesses.

Public Interest: Following release of the DEIS and Proposed Forest Plan, White Chuck Mountain was mentioned 35 times in the public comments received. The responses favored protecting old growth ecosystems (6), preserving the forest ecosystem (5), making the area a top priority for timber harvest (4), and keeping the area roadless (2). Most of the remaining comments said to protect the area for wildlife habitat, visual quality and recreation. 1/

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

ENVIRONMENTAL CONSEQUENCES

The following table displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

WHITE CHUCK MOUNTAIN

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	4,033						
1B SPNM		2,998	4,160	3,378	3,526		3,231
1C SPM						2,745	
2A Foregrd.			168				147
2B Midgrd.			591		527		675
5 Potent W&S				42			
11 O-G Hab.	760			211	63		
12 Mature O-G		63	42	84	63	126	42
14 D&E Enhanc		380	42			168	
15 Goat MR		654	590	527	591	929	844
17 Timber	929	1,034	126	1,119	950	1,689	781
19 Mtn. Hemlk		591		359		63	

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives, due to the low level of potential development activity. Alternative I allocates approximately one-half of the area to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives. Alternatives B and I allocated the greatest amount of acreage to mature old growth, deer and elk enhancement, and mountain goat management requirement prescriptions. Alternatives A, NC, C and H allocate the least.

Water: There are no adverse effects to the water resource of this area associated with any of the alternatives, due to the low level of proposed development activity.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives, due to the low level of proposed development activity.

Timber: Alternative C will have the least effect on the existing timber resource, as it allocates very minimal acreage to management area 17 (timber). Alternatives B, G-Modified and I allocate the greatest acreage. None of the alternatives will significantly affect the timber resource, as potential development activity will be minimal.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development.

Cultural: None of the alternatives will have a significant affect on the cultural resources of the area, due to the very low level of development activity proposed.

Land Use Authorizations: None of the alternatives will have a significant affect on the cultural resources of the area, due to the very low level of development activity proposed.

Fire: None of the alternatives will have a significant affect on the cultural resources of the area.

Insect and Disease: None of the alternatives will have a significant affect on the cultural resources of the area.

Wilderness Potential: All alternatives, with the exception of I, assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I assigns three-quarters of the area to semi-primitive motorized and timber allocations. All alternatives will maintain the area in a predominately roadless condition through the end of the fifth decade. The wilderness potential will be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	5,387	5,281	5,077	89%
B (RPA)	5,651	5,441	5,294	93%
C	5,657	5,621	5,525	97%
G-Mod.	5,600	5,488	5,366	94%
H	5,567	5,413	5,219	91%
I	5,567	5,411	5,223	91%
J (Pref).	5,606	5,512	5,367	94%

BOULDER RIVER — **Roadless Area 6050 (BA, BG, BF, B1, BE, BD, BH, BI, BL, BJ)**

This roadless area originally consisted of 83,700 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6050 to nonwilderness uses. In 1984, 50,274 acres from this area were designated the Boulder River Wilderness by Congress as a result of the Washington Wilderness Act. Ten parcels remain in roadless status. The Goodbye (1986), Iron Mountain (1988) and Goodman Ridge (1988) Timber Sales removed 1,119 acres from roadless status. The following shows the disposition of acres within the Boulder River roadless area:

Boulder River	Net Acres
1984 RARE II	83,700
updated 1988	32,307
Change	**-51,393**

OVERVIEW

These parcels are located along rugged peaks and ridges between the Boulder River and the Henry M. Jackson Wilderness, and between Clear Creek to the west and South Fork Sauk River to the southwest. Arterial and collector roads encircle the parcels, which are heavily dissected by many streams draining to the Sauk and South Fork Stillaguamish Rivers.

Terrain varies from gentle to quite steep, with elevations ranging from 800 to 6,000 feet.

Plant associations include western hemlock, Pacific silver fir, and mountain hemlock mature conifer forests. Upper elevations feature bare rock and snow fields, mid-elevations are sparsely forested areas interspersed with brush fields and talus slopes.

Soils have formed from phyllite, various other metasedimentary rock, and igneous rock altered by glaciation, stream cutting and gravity transport. Upper slope soils are very shallow residual or moderately deep glacial till deposits of loams and gravelly loams. The lower slopes of French and Clear Creeks, and the Sauk and Stillaguamish Rivers have deep deposits of poorly drained silty clay formed from glacial lake bed material. The lake deposit material is naturally unstable. Groundwater seepage and very steep slopes are factors effecting natural earth slides.

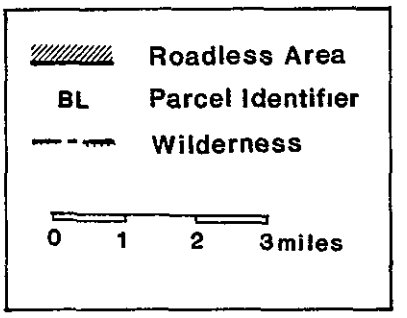
Many of the peaks and lakes are popular for hiking and scrambling with new ones being "discovered" every year. Well established trails lead to Forgotten and Dickerman Mountains. This back country is also used by hunters, anglers, and berry-pickers.

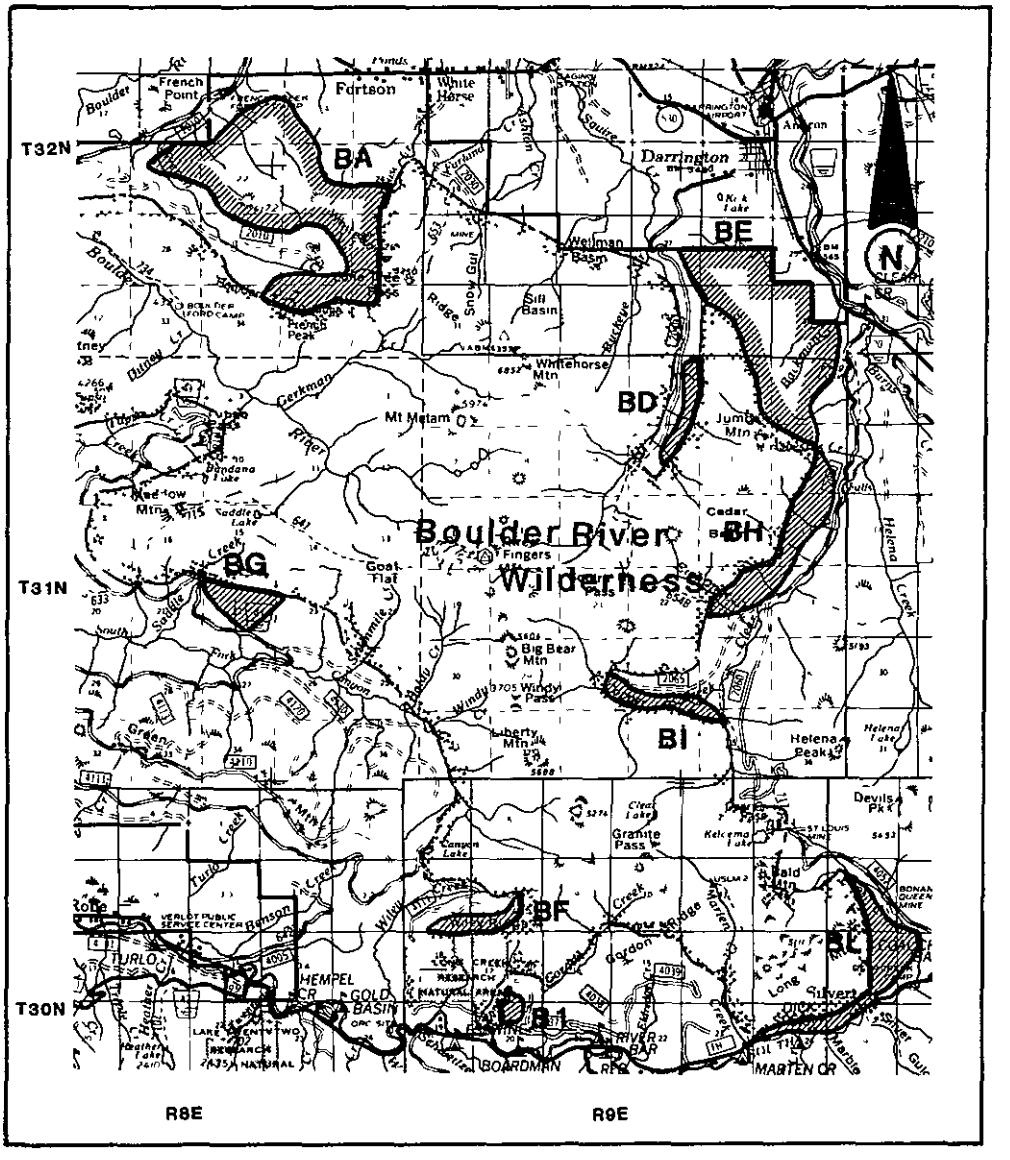
WILDERNESS CAPABILITY

Manageability and Boundaries: Boundaries of each of these parcels are generally illogical for separate management. Their addition to adjacent wilderness would not simplify management.

Natural Integrity and Appearance: Except for parcel BJ, adjacent cutover lands give the overall appearance of a modified landscape.

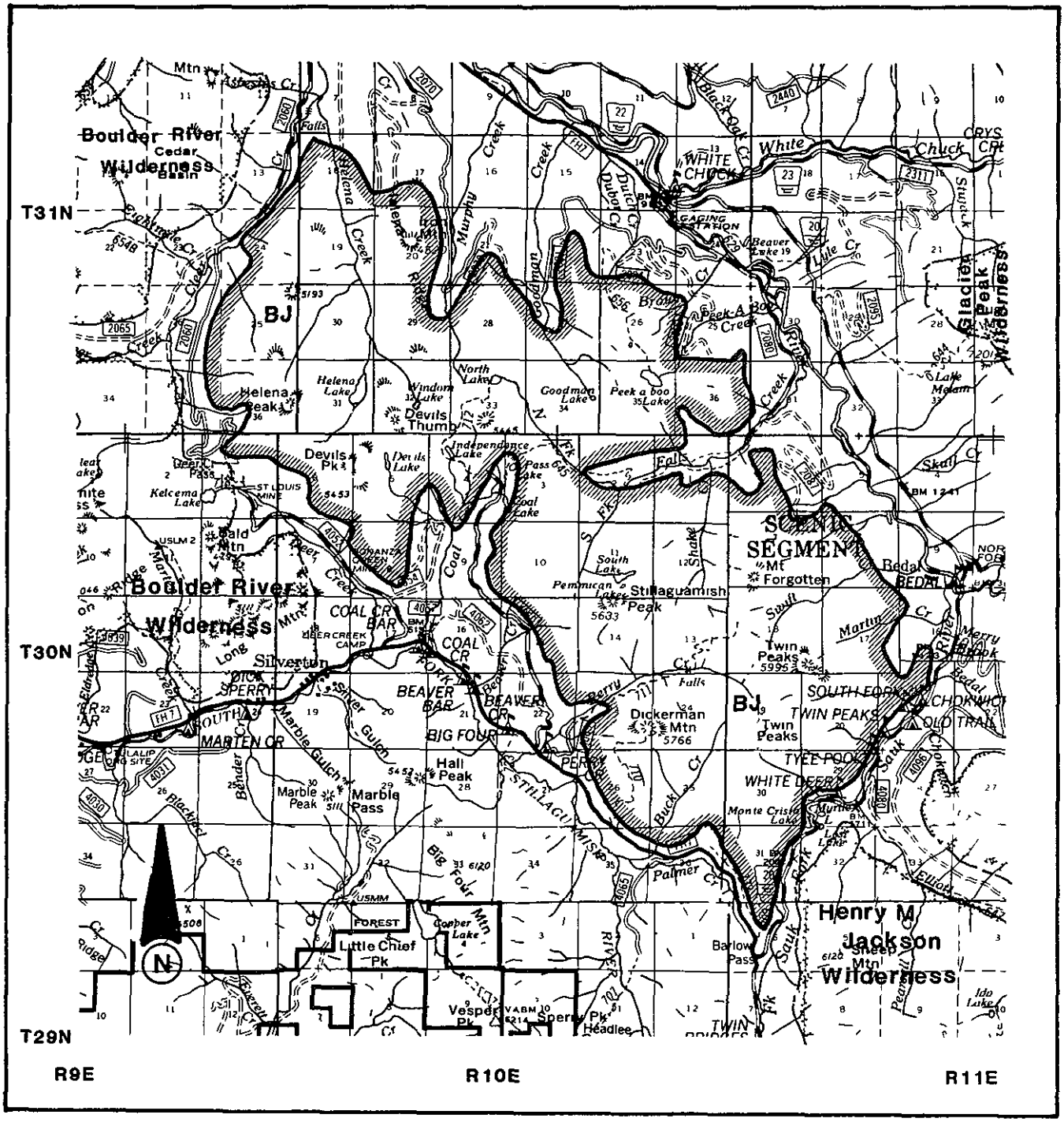
Boulder River
Roadless Area 6050





Boulder River

Roadless Area 6050



Opportunities For Solitude: Opportunities for solitude are low, except for portions of parcel BJ where potential is good.

Opportunities For Primitive Recreation: Opportunities for primitive recreation are generally poor, except for parcel BJ where potential is good.

Challenging Experiences: Only parcel BJ provides good opportunities for challenging experiences.

Special Features: The potential Research Natural Area at Perry Creek is located in Parcel BJ. See description under Other Management Considerations below.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Availability - Other Resource Potential

Recreation: Parcel BJ offers trail, fishing, hunting, primitive camping, and rockclimbing opportunities.

Fish/Wildlife: These parcels provide habitat for blacktail deer and mountain goats. Perry Creek and other streams support anadromous fish and native trout. Parcel BJ contains most of one SOHA and part of another. It contains all or part of three pine marten MR. It also contains acres allocated as pileated woodpecker MR. There are small parts of two other SOHA's in parcels BD and BF. Mountain goats are common throughout parcel BJ and some herds also live in parcels BH and BA.

Water: Several of the larger streams have potential for hydropower development.

Livestock Operations: None.

Ecology: Dense forests are interspersed with cliffs and brushfield. Dominant species include Douglas fir, western red cedar, western hemlock, and Pacific silver fir.

Timber: About 27 percent of the total acreage is classed tentatively suitable for logging.

Minerals/Oil and Gas: These parcels lie adjacent to the Boulder River Wilderness. Their geology is dominated by Jurassic metamorphic, Tertiary granitic rocks, pre-Tertiary volcanics, and glacial drift of Quaternary age. Only parcel BL is reported to have significant resource occurrences and is considered to lie within the Silverton and Squire Creek mineral resource areas. These have a moderate to low potential for the occurrence of copper, lead, zinc, gold and silver resources. The small parcels BA through BL are reported to have 15 mining claims. The eastern part of the area along Clear Creek and the Stillaguamish River are classified "prospectively valuable" for coal, however, the area is not encumbered by any leases or pending lease applications. Based upon the available data it appears the area has a relatively low potential for the occurrence of mineral resources.

The large BJ parcel has 196 mining claims. According to Lawson and Evarts (1983) the area may contain gold, silver, copper, and lead resources. Most of

Summary Table - Boulder River #6050

Category 1/	Unit	Parcels BA	BG	BF	B1	BE	BD	BH	BI	BL	BJ	Total
Acres (Minus water, private land)	Acres	2,724	275	106	84	1,901	63	422	84	190	26,638	32,307
Primitive/Semi-Primitive Recreation ROS	Acres	1,858	84	0	0	1,267	0	0	0	0	19,133	22,342
Timber												
Tentatively suitable	Acres	1,457	105	0	63	1,098	63	295	63	126	5,680	8,950
Tentatively suitable inaccessible	Acres	422	105	0	0	84	0	42	0	21	1,351	2,025
Tentatively suitable standing volume	M bdft	57,008	4,108	0	2,465	42,961	2,465	11,542	2,465	4,950	222,243	350,187
"Old Growth", Total Acres	Acres	1,688	231	105	63	1,309	63	253	84	63	11,276	15,135
0-2,500 Feet Elevation	Acres	570	63	0	63	1,098	63	253	84	42	2,618	4,854
2,500-4,000 Feet Elevation	Acres	1,013	168	105	0	211	0	0	0	21	7,560	9,078
4,000 + Feet Elevation	Acres	105	0	0	0	0	0	0	0	0	1,098	1,203
Management Indicator Species (MIS)												
Spotted Owl MR	Acres	0	0	0	0	570	63	84	0	0	2,006	2,723
Pileated Woodpecker and Marten MR	Acres	337	190	0	0	0	0	0	0	0	1,013	15409
Elk-deer winter range	Acres	844	84	0	84	1,013	42	422	84	126	1,541	4,240
Goat Habitat MR	Acres	506	0	0	0	63	0	168	84	0	2,301	3,122
Bald Eagle Habitat (nests, forage, roost area)	Acres	0	0	0	0	0	0	0	0	0	0	0
Locatable Mineral Development Potential												
High	Acres	0	0	0	0	0	0	0	0	0	0	0
Moderate	Acres	0	0	0	0	0	0	0	0	147	0	147
Low	Acres	2,724	274	105	84	1,900	63	422	84	42	11,636	17,334
Claims 2/	# of	-	-	-	-	-	-	-	-	-	-	211
Leasable Energy Minerals (Moderate Potential)												
Geothermal	Acres	0	0	0	0	0	0	0	0	84	18,394	18,478
Coal, geothermal	Acres	0	0	0	0	0	0	0	0	84	5,680	5,764
Coal	Acres	0	0	0	0	1,520	63	380	0	0	1,964	3,927

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

2/ Number of claims is not broken out by parcel.

the area is classified "prospectively valuable" for geothermal resources and a large portion of the west side of the area is classified "prospectively valuable" for coal resources. However, none of the area is encumbered by leases or pending lease applications. Based upon available data it appears that the area's mineral potential is low.

Cultural: Nothing of cultural significance is present within these parcels.

Land Use Authorizations: There are no special land use authorizations.

Non-Federal Lands: None.

Fire: These parcels have a moderate fire occurrence which averages 3 fires per decade. There has been one major fire in the past 30 years. Average fuel accumulation is 40-50 tons per acre.

Insect and Disease: None.

Others: There are mining claims which are currently inactive. In addition, the proposed Perry Creek Research Natural Area is planned in Parcel BJ This 2,555 acre RNA represents a unique assemblage of rare fern species and Alaska cedar in a stand with mountain hemlock and subalpine fir, and a heather-huckleberry plant community.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: Each of the parcels are contiguous with the Boulder River Wilderness. They are roughly 75 miles from Seattle.

Public Interest: Following release of the DEIS and Proposed Forest Plan, public comments were received on the several parcels included in the Boulder River Roadless Area, as well as more general comments on areas adjacent to the Boulder River Wilderness.

Boulder River parcel BJ received 11 comments. Three responses wanted the area made a top priority for timber harvest, two wished to have it dedicated as a backcountry recreation area, two said it should be protected for recreation, and two favored protection of the area for winter habitat for deer and elk. 1/

Boulder River parcel BE received 6 comments. The responses favored protecting visual quality, preserving the forest ecosystem, and keeping the area roadless.

Areas adjacent to the Boulder River Wilderness were mentioned 18 times. The most common comments were to keep the area roadless (4) and to protect it from timber harvest (2) Most of the remaining responses favored managing the area for recreation and wildlife habitat

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1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

PARCEL BA

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	1,267						
1B SPNM		316	2,196	2,111	527		380
2B Midgrd.			168		1,098		844
11 O-G Hab.				21			
12 Mature O-G	274	337			295	337	337
14 D&E Enhanc		739	21			718	
15 Goat MR		675	295	126	359	464	464
17 Timber	1,182	591	42	401	337	865	591
19 Mtn. Hemlk		63		63	105	337	105

PARCEL BD

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
11 O-G Hab.	63	63	63	63	63	63	63

PARCEL BE

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	802						
1B SPNM		823	1,900	1,879	1,161		1,182
1C SPM						274	
2B Midgrd.					591		570
11 O-G Hab.		443			147	570	105
14 D&E Enhanc		570				42	
15 Goat MR						63	21
17 Timber	1,098	63		21		950	21

PARCEL BF

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	105						
1B SPNM			42		42		21
11 O-G Hab.				42			
17 Timber		21				21	
19 Mtn. Hemlk		84	63	63	63	84	84

PARCEL BG

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	168						
1B SPNM		105	274		274		274
11 O-G Hab.				42			
12 Mature O-G	63	105		190		168	
17 Timber	42	42		42		84	
19 Mtn. Hemlk		21				21	

PARCEL BH

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	126						
1B SPNM		21	401		42		
1D RN					168		190
11 O-G Hab.		84		359	63	84	84
14 D&E Enhanc		126				190	
15 Goat MR		189	21		147	147	147
17 Timber	295			63			

PARCEL BI

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	21						
1B SPNM			84	42			
11 O-G Hab.				42			
15 Goat MR		84			84	84	84
17 Timber	63						

PARCEL BJ

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	20,864						
1B SPNM		17,359	22,659	21,815	19,724		18,964
1C SPM						15,036	
1D RN		570			105		126
2A Foregrd.			380		316	612	274
2B Midgrd.			84		992		1,119
5 Potent W&S	21		21				21
6 Skagit W&S	422	232	401	337	401	401	401
8 Special				105			
11 O-G Hab.	633	1,858	42	274	718	1,964	992
12 Mature O-G	211	549		42	126	886	253
14 D&E Enhanc		844	63			422	
15 Goat MR		1,055	210	126	190	1,985	211
17 Timber	4,308	2,534	42	443	1,098	4,540	1,224
18 RNA			2,555	3,231	2,491		2,555
19 Mtn Hemlk		1,457		84	295	612	316

PARCEL BL

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	126						
1B SPNM			105		126		105
1D RN					63		63
2A Foregrd.			84	63		21	21
14 D&E Enhanc		126				126	
17 Timber	63	63		126		42	

PARCEL B1

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	21						
1B SPNM			42				
2A Foregrd.			21		42	42	42
2B Midgrd.					21		
11 O-G Hab.		21	21	42	21	21	21
14 D&E Enhanc		63				21	
17 Timber	63			42			21

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives, due to the low level of proposed development activities. Alternative I allocated approximately one-half of the area to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives. Alternatives B and I allocate the greatest acreage to old growth habitat, mature old growth, deer and elk enhancement and mountain goat management requirement prescriptions. Alternatives A, NC, C and G-Modified allocate the least.

Water: Hydroelectric development will be largely precluded under Alternatives B, C, G-Modified, H and J (Preferred), due to the emphasis on semi-primitive nonmotorized recreation. Development could proceed under Alternatives A, NC and I.

Ecology: The overall ecology of the area would not be significantly affected by any of the alternatives, due to the low level of potential development activity.

Timber: Alternatives A, NC, B and I would allocate the greatest area to timber management. Alternatives C, G-Modified, H and J (Preferred) allocate the least. None of the alternatives will have a significant affect on the timber resource, due to the low level of development activity planned.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. Alternatives A, NC, B and I will provide a slightly higher amount of roaded access through the area, which could be used for minerals exploration and development.

Cultural: Alternatives A, NC, B and I have the greatest potential to adversely impact cultural resources, due to their higher development levels. Alternatives C, H, G-Modified, and J (Preferred) have the least. Valuable sites will be protected via avoidance or preserved through data recovery.

Land Use Authorizations: None of the alternatives will have a significant affect on special use authorizations.

Fire: None of the alternatives will have a significant affect on the occurrence of fire within the area.

Insect and Disease: None of the alternatives will have a significant affect on the occurrence of insects and disease within the area.

Wilderness Potential: All alternatives, with the exception of I, will assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I assigns about two-thirds of the area to semi-primitive motorized recreation and timber management prescriptions. All alternatives will maintain the area in a predominately roadless condition through the end of the fifth decade. The wilderness potential will be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

	Undeveloped Acres			Percent
Alternative	*Decade 1*	*Decade 2*	*Decade 5*	*Remaining*
A (No Act)	30,243	29,633	27,638	86%
B (RPA)	31,122	30,736	29,576	92%
C	32,145	31,981	31,806	98%
G-Mod.	31,485	30,793	30,217	94%
H	31,350	30,926	29,831	92%
I	31,116	30,704	29,385	91%
J (Pref).	31,461	30,959	30,159	93%

EAGLE ROCK **Roadless Area 6054**

This roadless area originally consisted of 33,100 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision designated area 6054 to further planning. None of this area was designated Wilderness by Congress as a result of the 1984 Washington Wilderness Legislation. This area was increased by 76 acres due to a mapping discrepancy. The following shows the disposition of acres within the Eagle Rock roadless area:

Eagle Rock	Net Acres
1984 RARE II	33,100
updated 1988	33,176
Change	**+ 76**

OVERVIEW

This parcel is located in the center of the Skykomish Ranger District. Access is from State Route 2 on the south, the Beckler River road on the east, and the Snohomish County/North Fork Skykomish Road on the northwest.

The North Fork Skykomish River borders on the north, with the South Fork Skykomish River on the south; the Beckler River borders on the east, with Heybrook Ridge on the west. It is dissected by several drainages including: Barclay, Trout, Howard, Bear, San Juan, Boulder, Fourth of July, and Eagle Creeks.

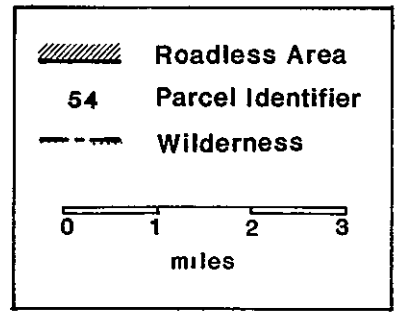
This parcel features numerous high, rugged peaks (including Eagle Rock, 5,612 feet; El Capitan, 5,100 feet; Spire Mountain, 6,065; Conglomerate Point, 5,200 feet; Gunn Peak, 6,245 feet; Merchant Peak, 5,827 feet; and Baring Mountain, 6,125 feet), and steep-sloped, deep valleys (including Barclay, Fourth of July, San Juan, and Boulder Creeks). Barclay, Tom, Dick, Harry, Gunn, Eagle, Grotto, Klinger, Stone, Simms, Sunset, Howard, and Boulder Lakes are within the area. Elevations range from 900 feet in Trout Creek to 6,245 feet on Gunn peak about three and one-half miles away.

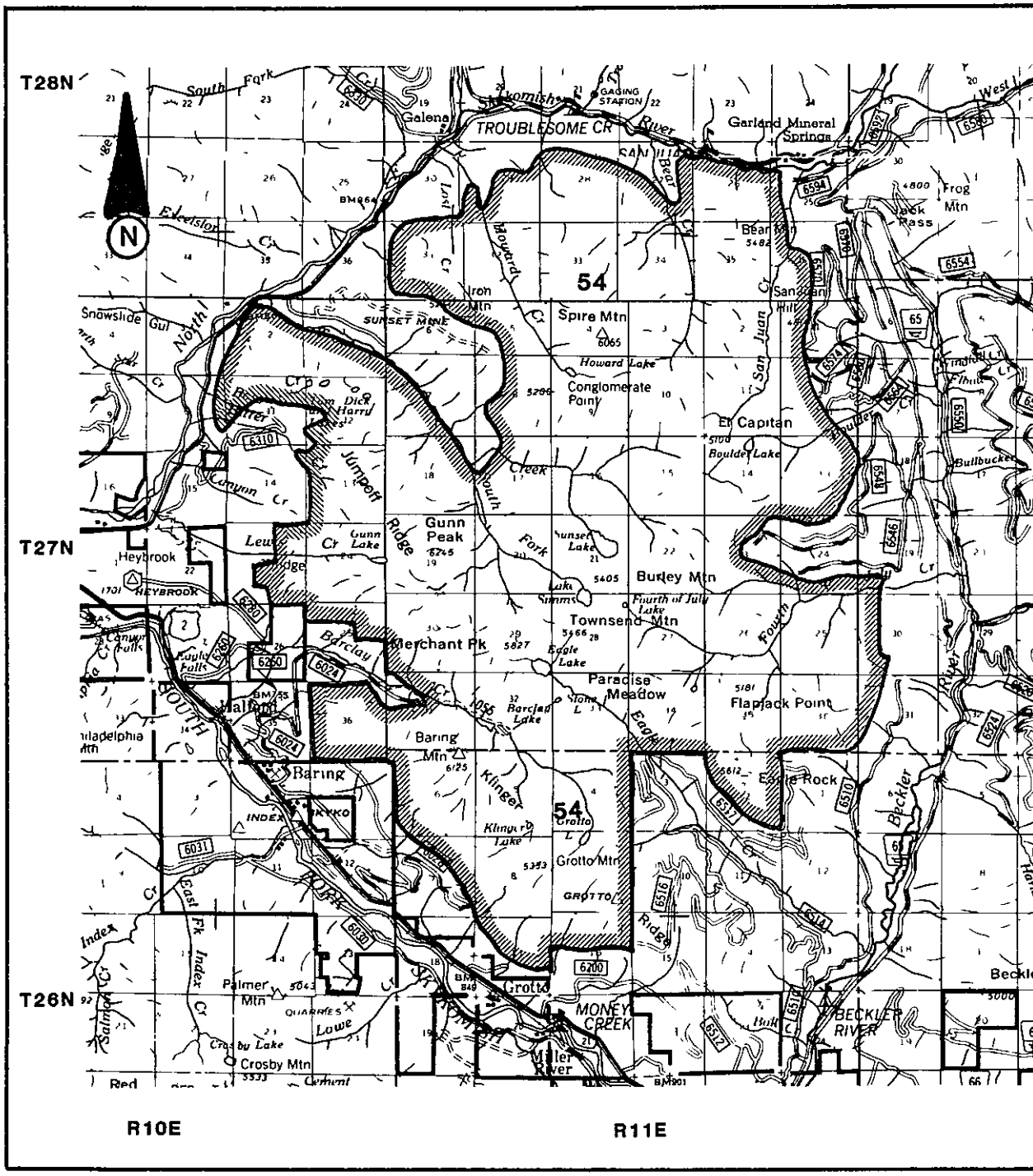
Soils vary from shallow, gravelly-stony, sandy loams, to loams on the slopes, to deep glacial tills in valley bottoms. The glacial tills are a mixture of silts and clays, with rock components ranging from lenses of gravel to scattered large boulders.

When present on the upper slopes, vegetation is typically scattered, low-growing trees and shrubs, including western hemlock, Pacific silver fir, Douglas-fir, Alaska yellowcedar, western redcedar, alder, willow, heather, huckleberry, and devil's club. Grasses and forbs create a few small meadows scattered throughout the area. Lower slopes have dense forest cover consisting of western hemlock, Douglas-fir, Pacific silver fir, and western redcedar. Alder, maple, and cottonwood trees are found in wet sites and previously logged areas. The most common shrubs are salal, vine maple, willow, salmonberry, elderberry, and devil's club.

Eagle Rock

Roadless Area 6054





Recreational use is heavy. Easy access to Barclay Lake, Eagle Lake, and Boulder Lake make them popular day hike destinations. The "easy" routes on Baring Mountain, Gunn Peak, and Merchant Peak attract technical rock and mountain climber use. There have been some logging and mining claim improvements in the Trout Creek and Bitter Creek drainages on privately owned land. In the Trout Creek drainage, several claims were developed for mining copper and gold.

Recently, much of the private acreage was added to the National Forest System through a land exchange.

This parcel has an appearance similar to the nearby Henry M. Jackson and Glacier Peak Wildernesses. It is largely undisturbed by human development. It has numerous high peaks, deep valleys, and small alpine lakes. Adjacent lands do display evidence of timber harvest, mining activities, roads, developed recreational facilities, and summer homes.

In addition to popular recreational destinations, five mountain goat families attract visitors to the area.

WILDERNESS CAPABILITY

Manageability and Boundaries: Due to the nature of the terrain, this parcel is of marginal size to make a viable wilderness. Sights and sounds uncharacteristic of a wilderness are present in 80 percent of the area. The boundaries are ill-defined by natural features.

Natural Integrity and Appearance: Disturbances include mining activity, timber harvesting (units are less than 200 acres), and several mining cabins (including Eagle Lake cabin). Long-range ecological processes are ongoing. Past activities are not readily apparent and would be unnoticed unless sites were actually visited.

Opportunities For Solitude: Opportunities for solitude are limited due to travel corridors and forest management activities outside the parcel.

Opportunities For Primitive Recreation: Primitive recreational use includes hiking, camping, fishing, hunting, backpacking, and mountain climbing. High avalanche hazards restrict backcountry skiing. Poor trails, as well as lack of trails limit horse use. Streams are too small to support rafting.

Challenging Experiences: There are outstanding opportunities for mountain climbing. Thirteen peaks over 5,000 feet require significant effort and a fair degree of skill and judgement.

Special Features: One Spotted Owl Habitat Area (SOHA) is located here. A bald eagle roost site has been identified adjacent to the parcel. Mountain goats are present during both summer and winter.

Most of the old mining claims were not worked after initial exploration, and therefore do not exhibit a full range of early era mining practices.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Summary Table - Eagle Rock #6054

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	33,176
Primitive/Semi-Primitive Recreation ROS	Acres	26,397
Timber		
Tentatively suitable	Acres	7,750
Tentatively suitable inaccessible	Acres	5,490
Tentatively suitable standing volume	M bdft	303,234
"Old Growth", Total Acres	Acres	13,451
0-2,500 Feet Elevation	Acres	2,323
2,500-4,000 Feet Elevation	Acres	8,869
4,000 + Feet Elevation	Acres	2,259
Management Indicator Species (MIS)		
Spotted owl MR	Acres	4,329
Pileated woodpecker and pine marten MR	Acres	802
Elk-deer winter range	Acres	359
Goat habitat MR	Acres	1,098
Bald eagle habitat (nests, forage, roost area)	Acres	21
Locatable Mineral Development Potential		
High	Acres	7,222
Moderate	Acres	8,447
Low	Acres	17,507
Claims	# of	69
Leasable Energy Minerals (Moderate Potential)		
Geothermal	Acres	29,269
Coal, geothermal	Acres	3,906

1/ American Indian Religious and Cultural areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: This parcel receives approximately 6,000 visitor days per year of hiker and fishing use. When compared to the Henry M. Jackson and Alpine Lakes Wildernesses, this parcel has a more restricted range of recreational attributes due to the lack of trails. The Barclay Lake trail is the only trail in this area.

Fish/Wildlife: One SOHA has been designated. This parcel is used as summer range and partial winter range by at least five separate mountain goat families. Planted fish are present in all lakes and most streams. Special wildlife habitats include habitats for the pileated woodpecker and pine marten.

Water: Drainages include Barclay, Trout, Howard, Bear, San Juan, Boulder, Fourth of July, and Eagle Creeks; all are tributaries to Beckler River and the South Fork and North Fork Skykomish Rivers.

There are several power withdrawals with FERC study permits.

Livestock Operations: None.

Ecology: Generally, areas below 4,000 feet elevation are forested with species typical of the west Cascades including cedar, Douglas-fir, true firs, and western hemlock. The higher elevations are typically steep rock and open slopes supporting snow a majority of the year.

Timber: Some 7,750 acres or 23 percent of this area is classed tentatively suitable for timber harvest.

Minerals/Oil and Gas: This area lies within the Index Mining District, and it is underlain by Tertiary aged granitic, volcanic and sedimentary rocks, and by Jurassic aged metamorphic rocks. The area has numerous reported mineral occurrences, and BLM records indicate that it has 69 mining claims. The area has been studied by the U.S. Geological Survey and Bureau of Mines and they have concluded that the west one-third of the area has a "substantial" or probable "potential" for the occurrence of copper, gold, silver, lead and zinc. However, the demonstrated resources are generally small tonnages, of low grade, and located in areas where access is difficult. Based upon the available data, the area is considered to have a moderate potential for the occurrence of copper and silver resources in vein type deposits.

A small portion of the area is classified "prospectively valuable" for coal and the entire area is classified "prospectively valuable" for geothermal. However, none of the area is encumbered by leases or pending lease applications.

There is no oil and gas potential.

Cultural: There are several mine shafts, mining cabins, trails, and tramways dating from the early 1900's.

Land Use Authorizations: None.

Non-Federal Lands: The Sunset Mines inholding was recently acquired by the National Forest System (except mineral rights).

There are 320 acres of private land in section 21, T.27N., R.11E., WM. There is also a potential mining claim in sections 11 and 12, T.27N., R.10E., WM.

Fire: There is low fire incidence. Large fires occur about once in a hundred years.

Insect and Disease: Insects and disease typical of nature and old growth timber stands are present at a low level. No control is anticipated.

Others: Private land in Section 21 has no road access. The Sunset Mines parcel is accessed by a County mine-to-market road. The patented claims in Sections 11 and 12 are accessed by a road. Acquisition of these inholdings would require a land exchange or condemnation by the federal government.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and Population Centers: The Henry M. Jackson, Alpine Lakes, and Glacier Peak Wildernesses are less than 10 miles away. It is approximately 40 miles to Everett and 50 miles to Seattle.

Public Interest: Following release of the DEIS and Proposed Forest Plan, the Eagle Rock Roadless Area, as well as specific geographic sites and features within the parcel, received public comments.

Eagle Rock Roadless Area was mentioned 313 times. Comments favored keeping the area roadless (76), expanding the trail system (40), protecting the area from harvest (39), preserving the forest ecosystem (39), and making it a backcountry recreation area (27). Most of the remaining comments favored managing the area for recreation, wildlife habitat and scenic quality. One comment said no new trails should be built. 1/

Eagle Rock was mentioned 236 times. Responses favored dedicating the area as a backcountry recreation area (68), expanding the trail system (22), keeping it roadless (17), preserving the forest ecosystem (17), building trails (16), and adding it to wilderness (12). Most of the remaining comments said to manage the area for recreation, wildlife habitat, and visual quality. Four responses favored keeping the area open to mining. One response wanted the area made a top priority for timber harvest.

Jumpoff Ridge was mentioned 121 times. Responses favored keeping the area roadless (36), protecting old growth ecosystems (23), preserving the forest ecosystem (13), expanding the trail system (13) and protecting the area from harvest (10). The majority of the rest of the comments said to manage the area for recreation, wildlife habitat, fisheries, and scenic quality.

Fourth of July Creek was mention 14 times. Comments said to protect the area as prime winter habitat for deer and elk (4), protect old growth ecosystems (4) and preserve the area as a scenic corridor into the backcountry (3).

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

EAGLE ROCK

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	25,975						
Disp. Rec Alp	1,288	1,288	1,288	1,288	1,288	1,288	1,288
1B SPNM		21,772	28,615	29,269	28,805		28,889
1C SPM						17,507	
1D RN		781	950		506	675	
2A Foregrd.			190	84		126	
2B Midgrd.			971				21
5 Potent W&S	231			21	157		
11 O-G Hab.	1,562	2,217	401	1,077	612	3,928	485
12 Mature O-G	190	464				485	
14 D&E Enhanc		295		42	84	506	168
15 Goat MR		147		63	21	337	84
17 Timber	3,885	3,336	654	612	1,668	5,364	1,436
19 Mtn. Hemlk		2,724	84	696	42	2,829	802
23A Otr Wtsh.	42	147		21		126	
23B Otr Wtsh.			21				

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by most of the alternatives. The exception is alternative I which allocates 53% of the area to semi-primitive motorized recreation and 16% of the area to timber management.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives, due to the low level of proposed development activities.

Water: Alternatives B, C, G-Modified, H and J (Preferred) will largely preclude hydroelectric development, due to the emphasis each of these alternatives place on the semi-primitive nonmotorized management prescription. Alternatives A, NC and I would allow hydro development.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives, due to the low level of proposed development activities.

Timber: None of the alternatives will significantly affect the existing timber resource, due to the low level of harvest activity proposed over the next fifty years. Alternative I allocates the greatest amount of acreage to management area 17 (timber); this alternative dedicates about 16% of the area to timber. Alternatives C and G-Modified allocate the least acres (less than 2%).

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. Alternatives A, NC, B, and I will provide a slightly higher amount of roaded access through the area that could be used for mineral exploration and development.

Cultural: Alternatives A, NC, B and I will have the greatest potential to adversely impact cultural resources within the area, due to development activities. Alternative G-Modified will have the least potential. Valuable sites will be protected via avoidance or conserved through data recovery.

Land Use Authorizations: None of the alternatives will significantly affect special land use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire within the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

Wilderness Potential: All alternatives, with the exception of I, assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I allocates approximately one-half of the area to the semi-primitive motorized management prescription. All alternatives maintain the area in a predominately roadless condition through the end of the fifth decade. The wilderness potential will be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

	Undeveloped Acres			Percent
Alternative	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	31,850	30,944	30,066	91%
B (RPA)	32,042	31,228	30,572	92%
C	32,663	32,385	31,884	96%
G-Mod.	33,176	33,176	33,114	100%
H	32,504	32,060	31,595	95%
I	32,000	31,200	30,461	92%
J (Pref).	32,585	32,235	31,828	96%

TOLMIE CREEK **Roadless Area 6056**

This roadless area originally consisted of 650 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6056 to nonwilderness uses. None of this area was designated Wilderness by Congress as a result of the 1984 Washington Wilderness Legislation.

In 1982, the Poch Peak West Timber Sale removed 274 acres from roadless status. In 1988, the area was reduced by 102 acres due to a mapping discrepancy. The following shows the disposition of acres within the Tolmie Creek roadless area:

Tolmie Creek	**Net Acres**
1984 RARE II	650
updated 1988	274
Change	**- 376**

OVERVIEW

This parcel is located adjacent to the northeast corner of Mt. Rainier National Park. Road access is via Mowich Lake Highway and the Forest Service Evans Creek Road System #7920. Terrain is mostly steep mountain sideslopes with Tolmie Creek forming the major drainage system. Two ridges extend northwest from Mt. Rainier National Park. Elevations range from 3,400 to 5,128 feet at the summit of Poch Peak.

Soils are shallow to moderately deep, non-plastic, silty sands, and silty gravels derived from andesite and pyroclastic rocks. Soils derived from weathered granite are moderately deep, slightly plastic, sandy silts, and sandy clays.

The predominant cover type is old growth Pacific silver fir, with minor components of western hemlock and Douglas-fir found at lower elevations. No threatened or endangered plants have been identified.

The parcel is bordered on the east by Mt. Rainier National Park, which is managed as primitive backcountry. The surrounding National Forest land is managed for multiple-use and appears heavily modified. There are no known special attractions within this area.

WILDERNESS CAPABILITY

Manageability and Boundaries: Boundaries do not follow natural features or contours. Due to its small size, it is not manageable as wilderness.

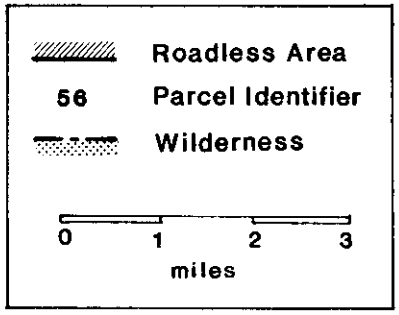
Natural Integrity and Appearance: The heavily modified appearance outside the area can be attributed to extensive logging and road building activities.

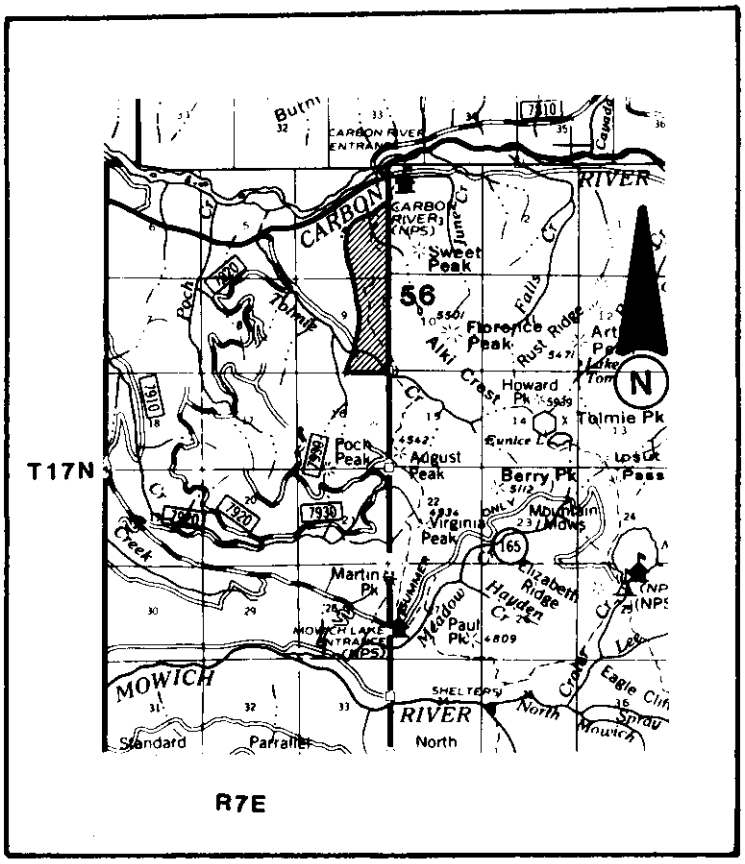
Opportunities For Solitude: Opportunities for solitude are very limited because of past management activities.

Opportunities For Primitive Recreation: Opportunities for primitive recreation are non-existent because of the small land area and existing forest developments.

Tolmie Creek

Roadless Area 6056





Challenging Experiences: None.

Special Features: None.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Summary Table - Tolmie Creek #6056

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	274
Primitive/Semi-Primitive Recreation ROS	Acres	0
Timber		
Tentatively suitable	Acres	147
Tentatively suitable inaccessible	Acres	105
Tentatively suitable standing volume	M bdft	4,862
"Old Growth", Total Acres	Acres	105
0-2,500 Feet Elevation	Acres	0
2,500-4,000' Feet Elevation	Acres	105
4,000 + Feet Elevation	Acres	0
Management Indicator Species (MIS)		
Spotted owl MR	Acres	0
Pileated woodpecker and pine marten MR	Acres	0
Elk-deer winter range	Acres	0
Goat habitat MR	Acres	0
Bald eagle habitat (nests, forage, roost area)	Acres	0
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	0
Low	Acres	274
Claims	# of	1
Leasable Energy Minerals (Moderate Potential)		
Oil, gas, coal, geothermal	Acres	274

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: Recreational activity is mostly hunting. Use of the trail along the Park boundary is limited.

Wildlife: The entire parcel affords summer range for blacktail deer and a small herd of elk due to the elevations involved. No threatened or endangered species have been identified.

Water: There are no power withdrawals or domestic water users.

Livestock Operations: None

Ecology: This Pacific silver fir zone is characterized by cool, moist soils, persistent winter snowpack, a general lack of summer plant moisture stress, and a short, cool growing season.

Timber: Old growth forest on half this area is classed tentatively suitable for timber harvest.

Minerals/Oil and Gas: This area is underlain primarily by Tertiary volcanic rocks, and is reported to have occurrences of cooper, gold, lead and silver. However, only one mining claim is recorded to have been located within the area. The area is classified "prospectively valuable" for oil and gas and geothermal, but is encumbered only by one oil and gas lease. The area has not been studied by the U.S. Geological Survey and Bureau of Mines, but based upon available data it appears that the area has a relatively low potential for the occurrence of mineral resources.

Cultural: The potential for cultural resources is low due to the steep topography in the area.

Land Use Authorizations: None

Non-Federal Lands: None

Fire: Fire occurrence is rare.

Insect and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: The Clearwater and Norse Peak Wildernesses and Mt. Rainier National Park are located within six miles of the parcel. Seattle and Tacoma are within 50-70 miles.

Public Interest: Following release of the DEIS and Proposed Forest Plan, the Tolmie Creek Roadless Area was mentioned 28 times in the public comments. Seven responses said to maintain the roadless area as a buffer to wilderness. Four wanted to have the area made a top priority for harvest. Three comments favored keeping the area open for multiple uses, and two desired the area be protected from logging. Most of the remaining comments favored managing the area for recreation, wildlife habitat, and scenic quality. 1/

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

In a general sense, the area adjacent to Mt. Rainier National Park was mentioned 402 times. Responses said to protect the area from harvest (96), preserve the forest ecosystem (58), keep the area roadless (50), that the devastation (logging, clearcutting, road building) was appalling (30), protect old growth (22), maintain the roadless area as a buffer to wilderness (21), protect wildlife habitat (16), and protect the area for recreation (14). The majority of the remaining comments favored managing the area for recreation, and protecting wildlife habitat, fisheries, and visual quality.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

TOLMIE CREEK

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	105						
1B SPNM			253	168			
1D RN		126					21
2A Foregrd.			21				
17 Timber	168	147		105	274	274	253

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives.

Water: The water resource of the area will not be significantly affected by any of the alternatives.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives.

Timber: The timber resource of the area will not be significantly affected by any of the alternatives, due to the low level of planned development activity.

Minerals/Oil/Gas: None of the alternatives will significantly affect the availability of minerals, oil or gas for development.

Cultural: None of the alternatives will significantly affect the cultural resources of the area, due to the low level of proposed development.

Land Use Authorizations: None of the alternatives will significantly affect special land use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire within the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

Wilderness Potential: Alternatives H, I and J (Preferred) assign the majority of the area to management area 17 (timber). Alternatives A, NC, B and G-Modified assign about half of the area to timber. Alternative C assigns none of the area to it. All alternatives will maintain the area in a roadless condition through the end of the fifth decade. The wilderness potential will be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	274	274	274	100%
B (RPA)	274	274	274	100%
C	274	274	274	100%
G-Mod.	274	274	274	100%
H	274	274	274	100%
I	274	274	274	100%
J (Pref).	274	274	274	100%

CLEARWATER **Roadless Area 6055 (CI, CG, CH, CF, CB, CC, CE, CD)**

This roadless area originally consisted of 24,900 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6055 to nonwilderness uses. In 1984 15,951 acres from this area were designated the Clearwater Wilderness by Congress as a result of the Washington Wilderness Legislation. In 1982, the McGilvary Salvage and West Line Salvage Timber Sales were sold under contract which removed 123 acres from roadless status. The area was reduced by 23 acres due to a mapping discrepancy. Eight parcels remain in roadless status. The following shows the disposition of acres with the Clearwater roadless area:

Clearwater	**Net Acres**
1984 RARE II	24,900
updated 1988	8,803
Change	**-16,097**

OVERVIEW

These parcels are located along the north boundary of Mt. Rainier National Park adjacent to Clearwater Wilderness. The area extends north to the Forest Boundary. Soils are shallow to moderately deep silty sands and well graded gravels primarily from andesite and pyroclastic rock origin. Sideslope gradients range from 50% to 90%. Elevation ranges from 2,000 to 5,000 feet above sea level.

The predominant cover type is old growth Pacific silver fir and western hemlock above 3,000 feet, changing to Douglas-fir and western hemlock below this elevation. No rare and endangered plants have been identified.

Dispersed recreation is the primary use; amount of use is low to moderately high. The moderately high use is limited to the area around Coplay and Summit Lakes. Coplay Lake has road access. The Summit Lake trail system receives heavy use. The ROS classification is split between semi-primitive non-motorized, roaded natural, and roaded modified.

Mt. Rainier National Park borders on the south of these parcels and is managed as primitive backcountry. The area to the north is privately owned cutover land and appears heavily modified. The surrounding National Forest lands are managed for multiple-use and appears modified.

WILDERNESS CAPABILITY

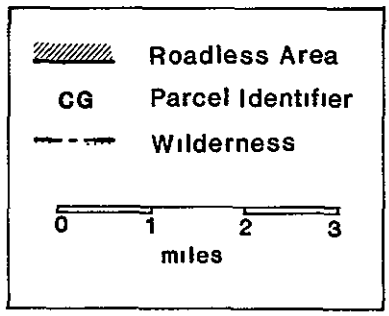
Manageability and Boundaries: The eight parcels are heavily influenced by adjacent logging and road building. No parcel could stand on its own, but would make logical additions to the Clearwater Wilderness.

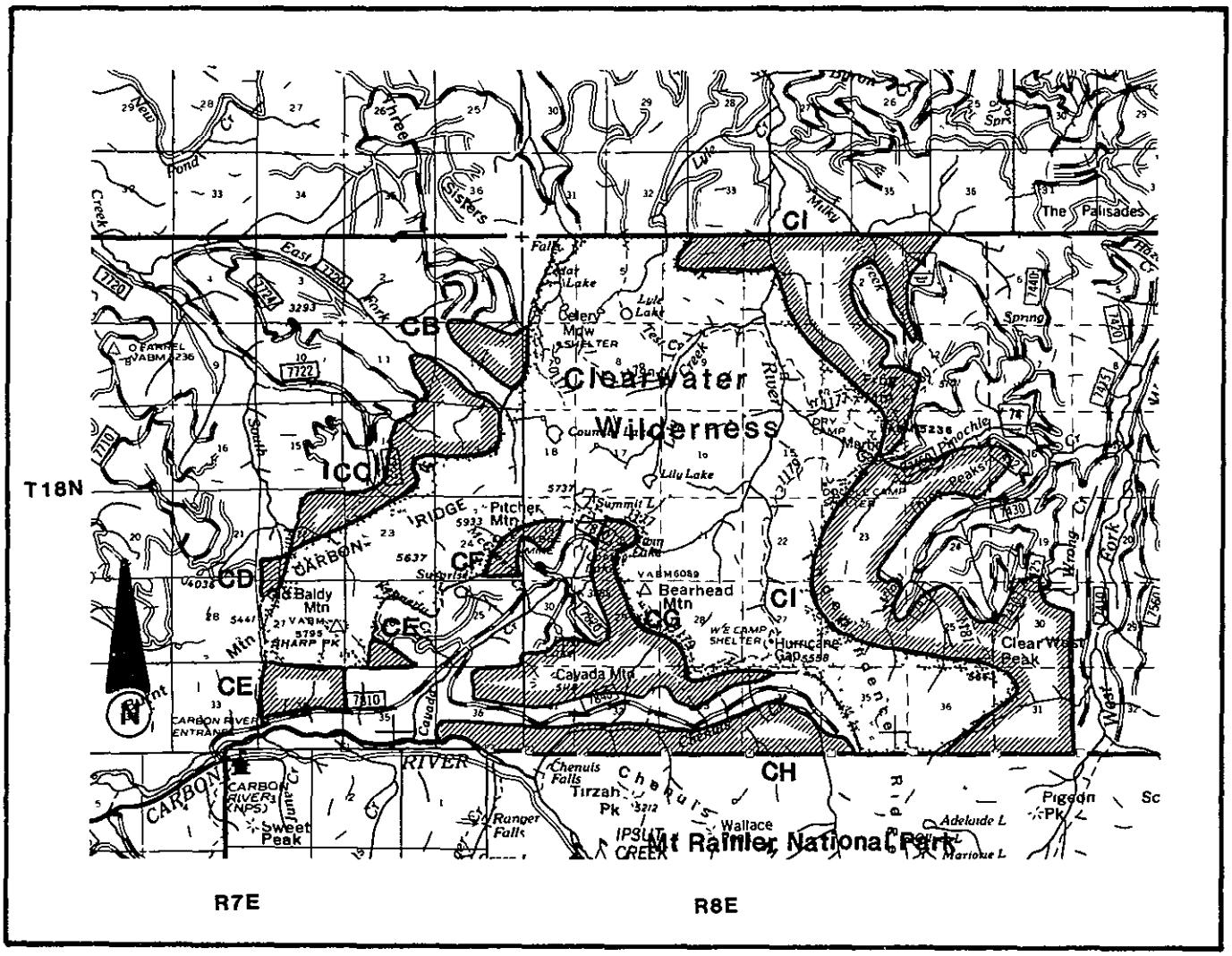
Natural Integrity and Appearance: Long-term ecological processes would be influenced greatly by existing forest management activities.

Opportunities For Solitude: None due to roads and past harvesting practices on lands outside the roadless area. No site within these parcels is more than one mile from an existing road.

Clearwater

Roadless Area 6055





Opportunities For Primitive Recreation: Few due to proximity of existing roads.

Challenging Experiences: None.

Special Features: None.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Availability - Other Resource Potential

Recreation: Very little recreation use occurs except during hunting season. The trail to Clearwest lookout site receives approximately 100-200 visits annually. The Chenius Creek road system has dispersed recreation during the summer. The Coplay and East Lake areas receive heavy motorized use during the summer months.

Fish/Wildlife: These parcels provide summer range for approximately 100-150 elk. Portions also provide summer range for blacktailed deer. Mountain goat use has been identified along Carbon and Independence Ridges as well as on Cayada Mountain and Clearwest Peak. An adjacent area within the Clearwater Wilderness is being managed as mountain goat habitat. A spotted owl MR is present.

Water: These parcels have several streams with resident trout. These drainages flow into the glacial Carbon River, West Fork White River systems. The major streams include Chenuis, South Prairie, Milky, Pinochile, Viola, and Pigeon Creeks and the Clearwater River. All have documented resident fish use, and the East Fork of South Prairie Creek is a domestic water source for the City of Buckley. No power withdrawals exist on any of these streams.

Livestock Operations: None.

Ecology: The Pacific silver fir zone on these parcels is characterized by cool moist soils, persistent winter snow packs, and a short growing season. The lower elevation hemlock zone generally occurs up to 3,900 feet on warm aspects to 3,200 feet on cooler aspects.

Timber: Old growth forest stand volumes average 50-60 thousand board feet per acre; 80% of the area is classed tentatively suitable for timber harvest.

Minerals/Oil and Gas: This area is underlain primarily by Tertiary granitic and volcanic rocks, and by Quaternary aged alluvium. It lies partly within the Carbon River Mining District, and is reported to have 11 mining claims located within it. It has reported occurrences of copper, molybdenum, and silver. According to Lawson and Evarts (1983), the southern portion has high potential for occurrence of porphyry type copper deposits. It is classified "prospectively valuable" for geothermal. Based upon available data, it appears that the area has a moderate to high potential for the occurrence of copper deposits, which would presently be noneconomic.

Cultural: Nothing of cultural significance could be found in this parcel.

Summary Table - Clearwater #6055

Category 1/	Unit	Parcels CI	CG	CH	CF	CB	CC	CE	CD	Total
Acres (Minus water, private land)	Acres	4,664	1,521	781	169	190	887	549	42	8,803
Primitive/Semi-Primitive Recreation ROS	Acres	1,795	190	0	0	84	401	126	0	2,596
Timber										
Tentatively suitable	Acres	3,716	1,203	718	147	190	675	380	42	7,071
Tentatively suitable inaccessible	Acres	337	0	211	0	0	84	105	0	737
Tentatively suitable standing vol.	M bdft	122,918	39,793	23,750	4,862	6,285	22,328	12,570	1,389	233,895
"Old Growth", Total Acres	Acres	2,237	674	506	0	105	463	63	42	4,090
0-2,500' Feet Elevation	Acres	126	0	0	0	0	0	0	0	126
2,500-4,000' Feet Elevation	Acres	1,372	168	506	0	42	316	63	42	2,509
4,000' + Feet Elevation	Acres	739	674	0	0	63	147	0	0	1,455
Management Indicator Species (MIS)										
Spotted Owl MR	Acres	1,541	0	0	0	0	0	0	0	1,541
Pileated Woodpecker and Marten MR	Acres	0	0	0	0	0	0	0	0	0
Elk-deer winter range	Acres	253	0	0	0	0	0	0	0	253
Goat Habitat MR	Acres	485	485	0	84	42	0	63	0	1,159
Bald Eagle Habitat 2/	Acres	0	0	0	0	0	0	0	0	0
Locatable Mineral Development Potential										
High	Acres	0	337	0	168	0	0	0	0	505
Moderate	Acres	0	0	0	0	0	0	0	0	0
Low	Acres	4,667	1,182	781	0	190	886	549	42	8,297
Claims 3/	# of	-	-	-	-	-	-	-	-	11
Leasable Energy Minerals (Moderate Potential)										
Geothermal	Acres	4,477	1,520	168	168	190	886	422	42	7,873
Oil, gas, coal geothermal	Acres	0	0	0	0	0	0	126	0	126

1/ Includes nest sites, forage areas, and roost areas.
2/ Native American Religious Freedom areas were analyzed. Site specific information is not disclosed due to its sensitivity
3/ Number of claims not broken out by parcel

Land Use Authorizations: Mining claims are located within these parcels; geothermal testing has occurred in the Chenuis and Cayada Creek drainages. Apiary permits are issued on a yearly basis.

Non-Federal Lands: None.

Fire: Potential for fire from natural occurrences is low in this Pacific silver fir zone. Wildfire ignitions are twice as likely to occur in the lower elevation hemlock stands. There have been no large fires in recent times.

Insect and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: This parcel is adjacent to the Clearwater Wilderness and Mt. Rainier National Park. Seattle and Tacoma are within 50-70 miles.

Public Interest: Following release of the DEIS and Proposed Forest Plan, comments were received concerning the several parcels within the Clearwater Roadless Area, as well as responses on areas adjacent to the Clearwater Wilderness and specific geographic sites and features within the Clearwater Roadless Area.

Clearwater parcel CI was mentioned four times. The responses said to preserve the forest ecosystem, protect visuals, avoid road building on these unstable soils, and protect corridors of old growth linking SOHA's (one each). 1/

Clearwater parcel CE was mentioned twice. One response favored protecting the area for recreation; one said to preserve it as valuable low-elevation old growth.

Clearwater adjacent areas were mentioned 256 times. The responses favored keeping the area roadless (69), protecting it from harvest (49), and preserving the forest ecosystem (42). The majority of the remaining comments said the area was most valuable for recreation, and for protection of old growth, wildlife habitat, and scenic quality. Five comments said to make this area a top priority for timber harvest; three said to not use it as a buffer to wilderness.

Chenius Creek was mentioned 401 times. Responses favored protecting the area from harvest (118), adding it to the National Park System (60), preserving the forest ecosystem (44), keeping it roadless (44), making the road into a trail (29), and protecting old growth (17). Most of the remaining comments said to manage the area for recreation, wildlife habitat and scenic quality.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

Clear West Peak was mentioned 11 times. Six comments said it should be a Wild and Scenic River.

Areas adjacent to Mt. Rainier National Park were mentioned 402 times. Responses said to protect the area from harvest (96), preserve the forest ecosystem (58), keep the area roadless (50), that the devastation (logging, clearcutting, road building) was appalling (30), protect old growth (22), maintain the roadless area as a buffer to wilderness (21), protect wildlife habitat (16), and protect the area for recreation (14). The majority of the remaining comments favored managing the area for recreation, and protecting wildlife habitat, fisheries, and visual quality.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

CLEARWATER

PARCEL CB

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
1B SPNM				84			
15 Goat MR		42	42	105	42	42	42
23A Otr Wtsh.	190	147			147	147	147
23B Otr Wtsh.			147				

PARCEL CC

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	253						
1B SPNM			527	739			380
23A Otr Wtsh.	633	886		147	886	886	506
23B Otr Wtsh.			359				

PARCEL CD

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
1B SPNM			42				42
23A Otr Wtsh.	42	42		42	42		42

PARCEL CE

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	168						
1B SPNM			63				
1D RN							485
2A Foregrd.			359				
2B Midgrd.			63				
5 Potent W&S				274			
15 Goat MR		84	63	63	63	63	63
17 Timber	380	464		211	485	485	

PARCEL CF

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	21						
1A Prim.			147				
1B SPNM			21	168			
1D RN							84
15 Goat MR		84			84	84	84
17 Timber	147	84			84	84	

PARCEL CG

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	337						
1A Prim.			1,414	63			
1B SPNM		295	105	1,351	295		506
1D RN		21					591
15 Goat MR		337			337	485	422
17 Timber	1,182	865		105	886	1,034	

PARCEL CH

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	42						
1A Prim.			21	190			
1B SPNM			760	549			760
1D RN							21
2A Foregrd.				42			
17 Timber	739	781			781	781	

PARCEL CI

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	1,119						
1B SPNM		823	4,646	3,526	1,436		802
11 O-G Hab.	549	1,436	21	908	886	1,520	1,161
14 D&E Enhanc		42			84		126
15 Goat MR		295			105	485	485
17 Timber	2,998	2,069		232	2,154	2,660	2,090

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives. Alternatives B, I and J (Preferred) allocate the greatest area to old growth habitat, deer and elk enhancement and mountain goat management requirement management areas; Alternatives A, NC, C and G-Modified allocate the least.

Water: There will be no adverse effects to the water resource of this area associated with any of the alternatives, due to the low level of development activity.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives, due to the low level of development activity.

Timber: Alternative C will have the least affect on the existing timber resource, as it does not allocate any acreage to management area 17 (timber). Alternatives A, B, H and I allocate the most. Alternatives G-Modified and J (Preferred) will not significantly affect the timber resource, as potential development activities will be minimal.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. Alternatives A and NC will provide a slightly higher amount of roaded access through the area, which could be used for minerals exploration and development.

Cultural: None of the alternatives will significantly affect the cultural resources of the area.

Land Use Authorizations: None of the alternatives will significantly affect special land use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire within the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

Wilderness Potential: Alternatives C, G-Modified and J (Preferred) assign the majority of this area to management prescriptions compatible with preserving its roadless character. These alternatives will maintain the area in a predominately roadless condition through the end of the fifth decade, maintaining the wilderness potential. Alternatives A, NC, B, H and I maintain at least three-quarters of the area in a predominately roadless condition through the end of the fifth decade.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

	Undeveloped Acres			Percent
Alternative	**Decade 1**	**Decade 2**	**Decade 5**	**Remaining**
A (No Act)	7,834	7,232	6,617	75%
B (RPA)	8,107	7,715	7,244	82%
C	8,797	8,797	8,618	98%
G-Mod.	8,803	8,803	8,784	100%
H	8,269	7,865	7,503	85%
I	8,167	7,899	7,412	84%
J (Pref).	8,680	8,584	8,454	96%

LONESOME LAKE **Roadless Area 6057**

This roadless area originally consisted of 1,850 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6057 to nonwilderness uses. In 1984 no acres from this area were designated Wilderness by Congress as a result of the Washington Wilderness Legislation. Two timber sales are under contract within this roadless area. The High Mule and Liver Camp Timber Sales removed 1,440 acres from roadless status. The area was reduced by 115 acres due to a mapping discrepancy. The following shows the disposition of acres within the Lonesome Lake roadless area:

Lonesome Lake	**Net Acres**
1984 RARE II	1,850
updated 1988	295
Change	**-1,555**

OVERVIEW

This parcel is located along the north boundary of Mt. Rainier National Park, with access provided by the West Fork Roads #74 and #7530 and Huckleberry Creek Road #73. Soils are shallow to moderately deep non-plastic, silty sands and silty gravels primarily from andesite and pyroclastic rocks occurring on steep, high-elevation sideslopes. Terrain is steep, heavily dissected, with sideslope gradients ranging from 50 to 90 percent. Elevation ranges from 2,800 to 5,400 feet. A ridge system running north out of Mt. Rainier National Park forms the divide between the West Fork and Huckleberry Rivers.

The predominant cover type is old growth Pacific silver fir and western hemlock above 3,000 feet, changing to Douglas-fir and western hemlock below 3,000 feet. No threatened and endangered plants have been identified.

Dispersed recreation is the primary use. Moderate amounts of use occur during the fall hunting season. Lonesome Lake has road access to within several hundred yards from the north. No officially recognized trails exist. The ROS classifications are roaded modified and roaded natural. Mt. Rainier National Park on the south boundary of this parcel is managed as primitive backcountry. The surrounding National Forest lands are managed for multiple use; past harvesting and road development are readily apparent.

WILDERNESS CAPABILITY

Manageability and Boundaries: This parcel is too small to manage as Wilderness, but does offer roadless recreation potential.

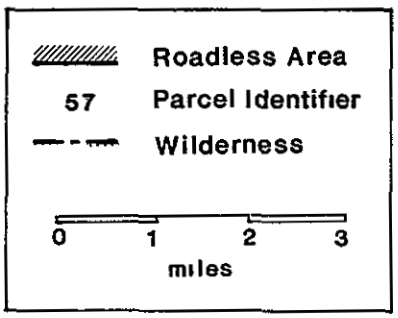
Natural Integrity and Appearance: Due to proximity to Mt. Rainier National Park, continuing long-term ecological processes can be assured. Appearances however are influenced by Forest practices to the north.

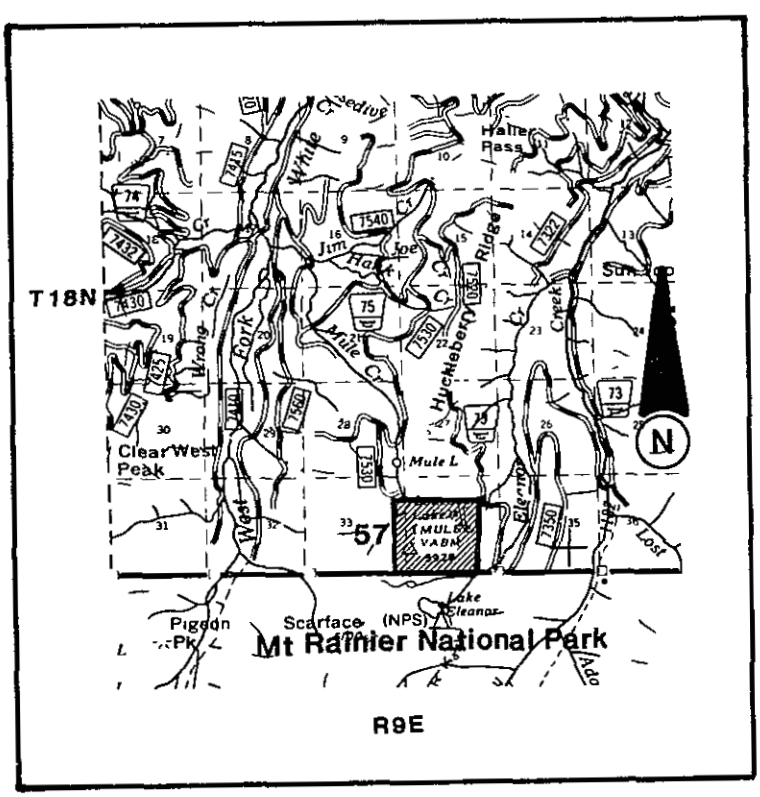
Opportunities For Solitude: None due to roads and past harvesting activities. No site within the area is more than 1/2 mile from an existing road.

Opportunities For Primitive Recreation: None because of minimal amount of unroaded area.

Lonesome Lake

Roadless Area 6057





Challenging Experiences: None.

Special Features: None.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Summary Table - Lonesome Lake #6057

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	295
Primitive/Semi-Primitive Recreation ROS	Acres	84
Timber		
Tentatively suitable	Acres	84
Tentatively suitable inaccessible	Acres	0
Tentatively suitable standing volume	M bdft	2,779
"Old Growth", Total Acres	Acres	126
0-2,500 Feet Elevation	Acres	0
2,500-4,000 Feet Elevation	Acres	0
4,000 + Feet Elevation	Acres	126
Management Indicator Species (MIS)		
Spotted owl MR	Acres	0
Pileated woodpecker and pine marten MR	Acres	0
Elk-deer winter range	Acres	84
Goat habitat MR	Acres	21
Bald eagle habitat (nests, forage, roost area)	Acres	0
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	0
Low	Acres	296
Claims	# of	0
Leasable Energy Minerals (Moderate Potential)		
Geothermal	Acres	190

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: This parcel receives predominately roaded dispersed use although some unroaded use occurs on a trail to Lake Eleanor in Mt. Rainier National Park.

Fish/Wildlife: This parcel affords summer-fall range for approximately 150 elk and numerous deer. It has a small amount of suitable habitat for mountain goats; sightings of single animals have been reported. No threatened or endangered animals have been identified.

Water: Drainages include intermittent streams which feed Huckleberry Creek and the West Fork River. No domestic use or power withdrawals exist.

Livestock Operations: None.

Ecology: This Pacific silver fir zone is characterized by cool moist soils, persistent winter snowpack, and a short growing season.

Timber: Twenty-eight percent of this area is classed tentatively suitable for timber harvest. Old growth stand volumes average 45 thousand board feet per acre with 20 percent defect from disease.

Mineral/Oil and Gas: This area is primarily underlain by Tertiary intrusive and volcanic rocks, and it is reported to have occurrences of copper and molybdenum. It, however, has no reported mining claims. The area is classified "prospectively valuable" for geothermal resources, but it is not encumbered by any leases or pending lease applications. The area has not been studied in detail by the U.S. Geological Survey and Bureau of Mines, but based upon available data it appears the area has a low potential for the occurrence of mineral resources.

Cultural: Nothing of cultural significance has been found in these parcels.

Land Use Authorizations: None.

Non-Federal Lands: None.

Fire: Potential for natural ignition fires is low. Stand age for the old growth is between 450 and 850 years.

Insect and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: Within 4 miles of this parcel are located the Clearwater and Norse Peak Wildernesses. The southern boundary of this parcel adjoins Mt. Rainier. Seattle and Tacoma are approximately 50-70 miles away.

Public Interest: Following release of the DEIS and Proposed Forest Plan, the Lonesome Lake Roadless Area was mentioned 36 times in the public comments. Responses said to make the area a top priority for harvest (5), preserve the forest ecosystem (4), increase opportunities for motorized recreation (4), maintain the roadless area as a buffer to wilderness (4), and protect wildlife habitat (4). Most of the remaining comments favored managing the area for recreation and wildlife habitat. One comment said to add this area to the National Park System. 1/

In a general sense, areas adjacent to Mt. Rainier National Park were mentioned 402 times. Responses said to protect the area from harvest (96), preserve the forest ecosystem (58), keep the area roadless (50), that the devastation (logging, clearcutting, road building) was appalling (30), protect old growth (22), maintain the roadless area as a buffer to wilderness (21), protect wildlife habitat (16), and protect the area for recreation (14). The majority of the remaining comments favored managing the area for recreation, and protecting wildlife habitat, fisheries, and visual quality.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

LONESOME LAKE

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	232						
1B SPNM			232	211			147
1D RN			42				
2B Midgrd.							42
12 Mature O-G		84			84	84	84
15 Goat MR		21	21	21	21	21	21
17 Timber	63	190		63	190	190	

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives.

Water: There are no adverse effects to the water resource of this area associated with any of the alternatives, due to the low level of proposed development activities.

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

Ecology: *The overall ecology of the area will not be significantly affected by* any of the alternatives, due to the low level of proposed development activities.

Timber: Alternatives C and J (Preferred) do not allocate any acreage to management area 17 (timber). Alternatives B, H and I allocate 64% of the area to timber. Alternatives A, NC and G-Modified allocate 21% of the area to timber management. None of the alternatives will significantly affect the timber resource, as no harvest activity is planned through the fifth decade.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development.

Cultural: *None of the alternatives will have a significant affect on the* cultural resources of the area, as no development activity is planned.

Land Use Authorizations: None of the alternatives will significantly affect special land use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire within the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

Wilderness Potential: Alternatives B, H and I allocate 64% of the area to management area 17 (timber). Alternatives C and J (Preferred) do not allocate any of the area to timber. All alternatives will maintain the area in a roadless condition through the end of the fifth decade. The wilderness potential will be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres Decade 1	Decade 2	Decade 5	Percent Remaining
A (No Act)	295	295	295	100%
B (RPA)	295	295	295	100%
C	295	295	295	100%
G-Mod.	295	295	295	100%
H	295	295	295	100%
I	295	295	295	100%
J (Pref).	295	295	295	100%

SUN TOP **Roadless Area 6058**

This roadless area originally consisted of 5,200 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6058 to nonwilderness uses. None of this area was designated Wilderness by Congress as a result of the 1984 Washington Wilderness Legislation. Since then, 2,850 acres have been removed from roadless status because of the Skookum Doe Timber Sale under contract. The area has been increased by 36 acres due to a mapping discrepancy. The following shows the disposition of acres within the Suntop roadless area.

Sun Top	Net Acres
1984 RARE II	5,200
updated 1988	2,386
Change	**-2,814**

OVERVIEW

This parcel is located adjacent to the northeast corner of Mt. Rainier National Park. Access is by the Huckleberry Creek Road (#73) on the north and west side, and the Buck Creek Road (#7160) on the east. Topography is varied, from flat river bottoms along the White River to the open flat ridges of Sun Top Lookout. Portions south of Sun Top Lookout include a prominent vertical rock face. Drainages include Huckleberry, Lost, Doe, Buck and Skookum Creeks, with all but Skookum Creek originating in Mt. Rainier National Park. Sun Top Lookout sits on a high ridge that extends north from the Park and divides Huckleberry Creek and the White River. Elevations range from 2,400 feet to 5,600 feet.

Rock types are andesite flows and andesite breccias with pyroclastic material. The andesite rocks are hard, moderately to highly fractured, and are competent. The volcanic sediments and pyroclastic materials are moderately hard to soft, highly fractured, and are moderately competent to incompetent.

Soils are shallow to moderately deep, non-plastic, silty sands and silty gravels. Soils derived from the pyroclastic material are moderately deep to deep, slighty plastic, sandy silts and sandy clays.

Vegetation ranges from large, old growth Douglas-fir in valley bottoms to Pacific silver fir-subalpine fir near ridgetops. East exposure ridges have several meadows and open slopes Mountain hemlock is found in the upper basins on north slopes. No threatened or endangered plants have been identified.

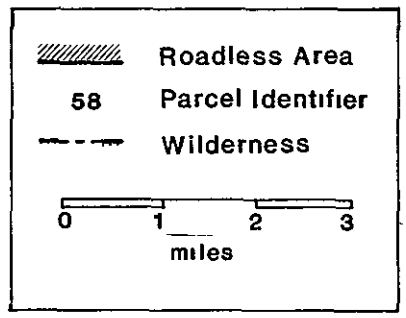
Dispersed recreation use ranges from fishing along Huckleberry Creek to hiking Sun Top Lookout ridges. There are approximately 8 miles of maintained hiking trails. The ROS classifications are: roaded natural, semi-primitive motorized, roaded modified and semi-primitive non-motorized.

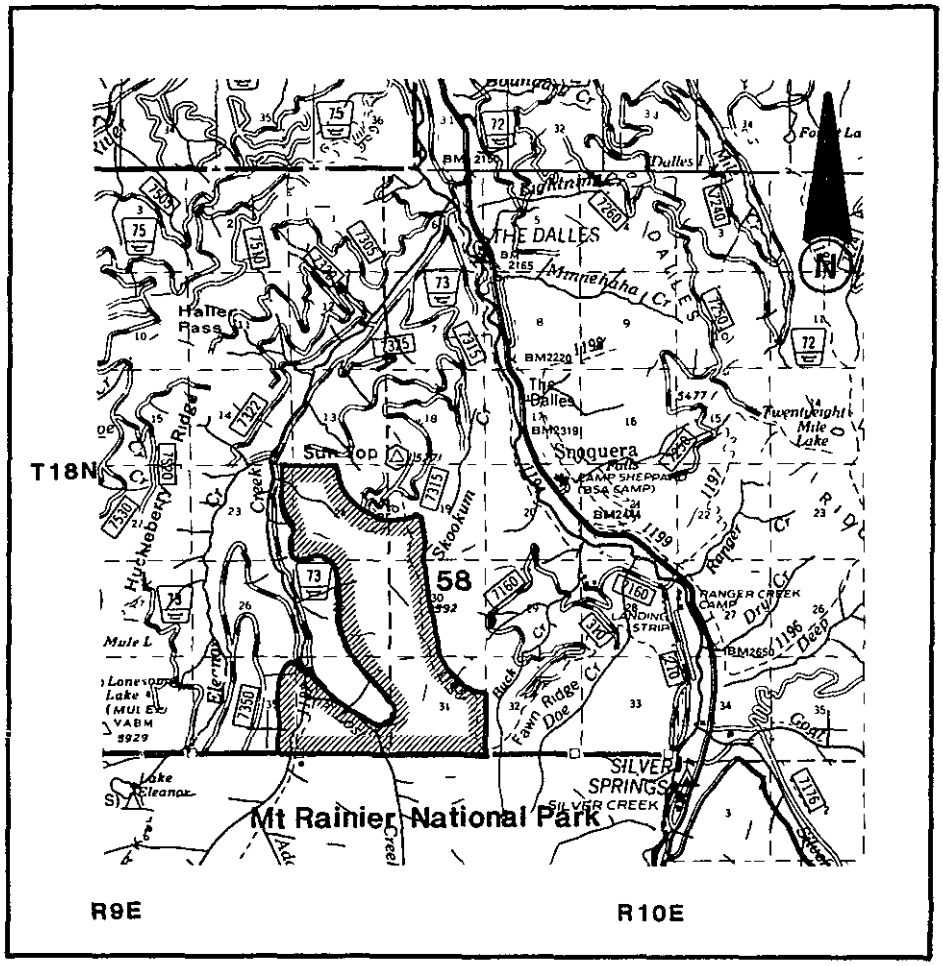
Mt. Rainier National Park forms the southern boundary. The surrounding National Forest land is managed as multiple use.

The major attraction is Sun Top Lookout.

Sun Top

Roadless Area 6058





WILDERNESS CAPABILITY

Manageability and Boundaries: This area is marginal in size as wilderness unless combined with Mt. Rainier National Park. Area is suitable for highly accessible roadless recreation. Some boundary adjustments are desirable to reduce the impact of adjacent roads.

Natural Integrity and Appearance: Long-term ecological processes can be maintained due to proximity to the Park. The appearance is a natural setting except near the boundaries where the influence of logging is readily apparent.

Opportunities For Solitude: Potential for solitude is low. The trail south from Sun Top provides a limited chance for solitude.

Opportunities For Primitive Recreation: The opportunity is low due to road accessibility.

Challenging Experiences: None.

Special Features: Sun Top Lookout.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Summary Table - Sun Top #6058

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	2,386
Primitive/Semi-Primitive Recreation ROS	Acres	0
Timber		
Tentatively suitable	Acres	2,048
Tentatively suitable inaccessible	Acres	0
Tentatively suitable standing volume	M bdft	67,744
"Old Growth", Total Acres	Acres	1,161
0-2,500 Feet Elevation	Acres	0
2,500-4,000 Feet Elevation	Acres	612
4,000 + Feet Elevation	Acres	549
Management Indicator Species (MIS)		
Spotted owl MR	Acres	0
Pileated woodpecker and pine marten MR	Acres	84
Elk-deer winter range	Acres	21
Goat habitat MR	Acres	527
Bald eagle habitat (nests, forage, roost area)	Acres	0
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	0
Low	Acres	2,386
Claims	# of	0
Leasable Energy Minerals (Moderate Potential)		
Geothermal	Acres	1,626

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: This parcel receives high levels of dispersed recreational use, especially during hunting season. Several migration routes for elk leaving Mt. Rainier National Park are known. The Skookum Flats Trail along the White River receives approximately 3,000-4,000 annual visitors and the Suntop Trail receives approximately 1,000-2,000 annual visitors.

Fish/Wildlife: This parcel features a high diversity of wildlife. Approximately 13 mountain goats winter on the rock slopes south of Sun Top It affords summer range for blacktail deer and transition range for approximately 300 elk leaving the Park. Pileated woodpecker and pine marten MR habitat is present. Huckleberry and Lost Creeks have a resident trout populations.

Water: Buck Creek Lodge takes domestic water from its namesake (which originates in this parcel). The water intake is approximately 1 1/2 miles outside the parcel. There are no power withdrawals.

Livestock Operations: None.

Ecology: The Pacific silver fir zone here is characterized by cool, moist soils, persistent winter snowpacks, and a short growing season. The hemlock-Douglas-fir zone is found on lower elevations and warmer sites. Because of the vast elevation differential, this parcel has a diversity of ecosystems, ranging from large old-growth Douglas-fir to alpine meadows.

Timber: Forest stand volumes range from 90 thousand board feet per acre to 15 thousand board feet per acre near ridgetops Stand defect is 25 percent to 30 percent. Understory is limited mostly to north slopes. Harvest units adjacent to this parcel are well stocked with Douglas-fir and noble fir. Nearly all this area is tentatively suitable for timber harvest.

Minerals/Oil and Gas: This area is primarily underlain by Tertiary volcanics. It has no reported mineral resource occurrences, nor does it have any recorded mining claims. The area is classified "prospectively valuable" for geothermal resources. It has not been studied in detail by the U.S. Geological Survey and Bureau of Mines, but based upon available data, it appears the area has a relatively low potential for the occurrence of mineral resources.

Cultural: Nothing of cultural significance is known to exist within this parcel.

Land Use Authorizations: Approximately 1,800 acres are designated as the Sun Top Recreation Area. This is along the ridgetop south of Sun Top Lookout.

Non-Federal Lands: None.

Fire: Fire occurrence is moderate. Lightning strikes occur every 4 or 5 years, and human caused fires occur frequently.

Insect and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: This parcel is within 7 miles of both the Clearwater and Norse Peak Wildernesses. It is also adjacent to portions of Mt. Rainier National Park managed as primitive backcountry. Seattle and Tacoma are within 50-70 miles.

Public Interest: Following release of the DEIS and Proposed Forest Plan, the Sun Top Roadless Area did not receive any public comments. However, in a more general sense, areas adjacent to Mt. Rainier National Park were mentioned 402 times. Responses said to protect the area from harvest (96), preserve the forest ecosystem (58), keep the area roadless (50), that the devastation (logging, clearcutting, road building) was appalling (30), protect old growth (22), maintain the roadless area as a buffer to wilderness (21), protect wildlife habitat (16), and protect the area for recreation (14). The majority of the remaining comments favored managing the area for recreation, and protecting wildlife habitat, fisheries, and visual quality 1/

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person **could** mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management

SUN TOP

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	570						
1B SPNM			1,795	2,048			443
2A Foregrd.	42	105	63		105	84	316
2B Midgrd.					380		675
5 Potent W&S			42				
8 Special				21			147
11 O-G Hab.	232	42	21	21	42	42	
12 Mature O-G		42	42	21	42	42	42
15 Goat MR		738	63	63	506	506	506
17 Timber	1,140	1,077		63	1,055	1,330	253
23A Otr Wtsh	401	380		147	253	380	
23B Otr Wtsh.			359				

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected in most of the alternatives. Alternatives G-Modified and H leave the area unroaded. Alternatives B and I remove the largest amount of area from roadless status at the end of the fifth decade (67% and 73% remaining, respectively).

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives, due to the low level of proposed development. Alternatives B, H, I and J (Preferred) allocate the greatest amount of acres to old growth habitat, mature old growth, and mountain goat management requirement management areas. Alternatives A, C and G-Modified allocate the least.

Water: There will be no adverse effects to the water resource of this area associated with any of the alternatives, due to the low level of development activity proposed.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives, due to the low level of proposed development activity.

Timber: Alternatives A, NC, B, H and I allocate approximately one-half of the area to management area 17 (timber) Alternatives C, G-Modified and J (Preferred) allocate very minimal acres to timber. None of the alternatives will significantly affect the timber resource, due to the minimal amount of harvest activity planned.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. Alternatives B and H will provide a slightly higher level of roaded access, which could be used for *mineral exploration and development.*

Cultural: Alternatives B and H will have the greatest potential to adversely impact cultural resources within the area, due to development activities. Valuable sites will be protected via avoidance or conserved through data recovery. Alternatives C, G-Modified and H will have the least potential to impact.

Land Use Authorizations: None of the alternatives will significantly affect land special use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire within the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

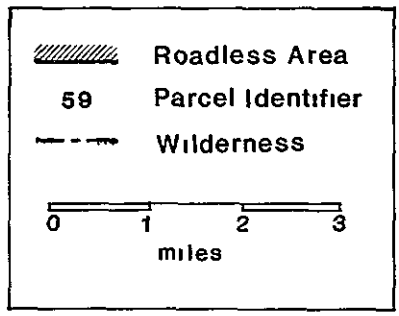
Wilderness Potential: Alternatives C, G-Modified, and J (Preferred), assign the majority of this area to management prescriptions compatible with preserving its roadless character. In the alternatives above the wilderness potential will be maintained. Alternative A, NC assigns 48% of the area to timber management. Alternative B assigns 45% of the area to timber management. Alternative H assigns 44% of the area to timber management and alternative I assigns 56% of the area to timber management.

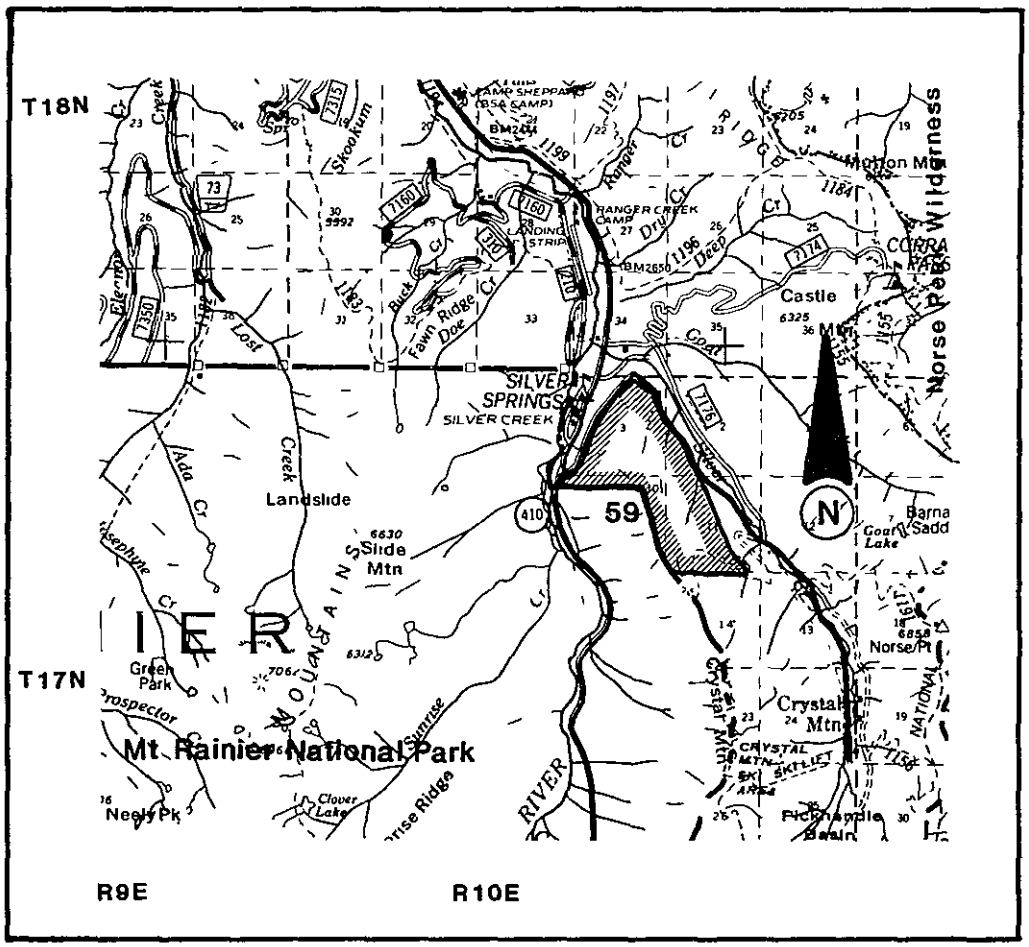
The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

	Undeveloped Acres			Percent
Alternative	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	2,278	2,254	2,073	87%
B (RPA)	2,038	1,970	1,590	67%
C	2,323	2,273	2,237	94%
G-Mod.	2,386	2,386	2,386	100%
H	2,386	2,386	2,386	100%
I	2,056	2,032	1,734	73%
J (Pref).	2,182	2,132	1,958	82%

Silver Creek

Roadless Area 6059





SILVER CREEK **Roadless Area 6059**

This roadless area originally consisted of 1,000 acres. It was inventoried for study as potential wilderness during the RARE II process. The RARE II decision assigned area 6059 to nonwilderness uses None of this area was designated Wilderness by Congress as a result of the 1984 Washington Wilderness Act. The area was increased by 55 acres due to a mapping discrepancy. The following shows the disposition of acres within the Silver Creek roadless area:

Silver Creek	Net Acres
1984 RARE II	1,000
updated 1988	1,055
Change	**+ 55**

OVERVIEW

This parcel is located adjacent to the northeast corner of Mt. Rainier National Park. The southern boundary borders on the Crystal Mountain Ski Area Access is via the Crystal Mountain Highway #33.

Rock types are andesite flows and andesite breccias with pyroclastic material. The andesite rocks are hard, moderately to highly fractured and are competent. The volcanic sediments and pyroclastic materials are moderately hard to soft, highly fractured, and are moderately competent to incompetent. Soils are shallow to moderately deep, non-plastic, silty sands and silty gravels. Soils derived from the pyroclastic materials are moderately deep to deep, slightly plastic, sandy silts and sandy clays.

Terrain is uniformly steep sideslopes which run to ridgetops extending north from Mt. Rainier National Park. Drainages include White River, Silver Creek, and tributaries. Elevations range from 3,000 to 6,100 feet. The west facing slopes support old growth western hemlock with Douglas-fir up to about 4,000 feet. The east facing slopes are colder and support Pacific silver fir. There are no threatened or endangered plants identified. No timber harvest has occurred.

Dispersed backcountry recreation is the primary use. There is one ridgetop trail (it is not currently maintained nor shown on Forest Service maps). The ROS classifications are roaded natural and semi-primitive non-motorized. There have been no previous management activities and overall appearance is of old growth forest.

The Mt. Rainier National Park adjoins on the south and east, and is managed as primitive backcountry. The surrounding National Forest land is managed as roaded natural and rural in the Silver Springs Summer Home Area

WILDERNESS CAPABILITY

Manageability and Boundaries: This small isolated parcel is not suitable for wilderness consideration unless combined with Mt. Rainier National Park.

Natural Integrity and Appearance: This area is highly influenced by road corridors and the nearby ski development. Its appearance is dominated by outside activities rather than the naturalness of its interior.

Opportunities For Solitude: Opportunities for solitude are limited due to the adjacent Crystal Mountain Highway, although the old, unmaintained trail offers a slight potential.

Opportunities For Primitive Recreation: None due to the close proximity of Highway 410, Crystal Mountain Highway, and the developed ski area.

Challenging Experiences: None.

Special Features: None.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Summary Table - Silver Creek #6059

Category 1/	Unit	Total
Acres (Minus water, private land)	Acres	1,055
Primitive/Semi-Primitive Recreation ROS	Acres	316
Timber		
Tentatively suitable	Acres	337
Tentatively suitable inaccessible	Acres	0
Tentatively suitable standing volume	M bdft	11,147
"Old Growth", Total Acres	Acres	211
0-2,500 Feet Elevation	Acres	0
2,500-4,000 Feet Elevation	Acres	211
4,000 + Feet Elevation	Acres	0
Management Indicator Species (MIS)		
Spotted owl MR	Acres	0
Pileated woodpecker and pine marten MR	Acres	0
Elk-deer winter range	Acres	1,056
Goat habitat MR	Acres	0
Bald eagle habitat (nests, forage, roost area)	Acres	0
Locatable Mineral Development Potential		
High	Acres	0
Moderate	Acres	0
Low	Acres	1,055
Claims	# of	1
Leasable Energy Minerals	Acres	0

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

Availability - Other Resource Potential

Recreation: Current use is dispersed recreation.

Wildlife: This parcel affords summer range for blacktail deer and elk. There are no threatened or endangered species identified.

Water: There are no power withdrawals or domestic water uses; streams are all small and intermittent.

Livestock Operations: None.

Ecology: Cover type varies from old growth timber forest at lower elevations to small meadows on or near ridgetops. The entire parcel is characterized by cool, moist soils, persistent winter snowpack, and a short, cool growing season The understory is predominately Pacific silver fir as this is the climax species for most of this area of the Cascade Range.

Timber: Forest stand volumes vary from 50 to 15 board feet per acre with 32 percent classed as tentatively suitable for timber harvest.

Minerals/Oil and Gas: This area is primarily underlain by Tertiary aged volcanics, and it lies within the Silver Creek Mining District. It is reported to have occurrences of lead, zinc, gold, silver, and copper but it has only one recorded mining claim. It is classified "prospectively valuable" for geothermal resources, but it is not encumbered by any leases or pending lease applications. The area has not been studied in detail by the U.S. Geological Survey and Bureau of Mines, but based upon available data it appears the area has a moderate potential for the occurrence of mineral resources

Cultural: Potential for cultural resources is low due to the steep topography.

Land Use Authorization: None.

Non-Federal Lands: None.

Fire: Fire occurrence is low One documented lightning strike has occurred in the last 10 years.

Insect and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: This parcel is within 2 miles of Norse Peak Wilderness, and about 10 air miles from the Clearwater Wilderness. Seattle and Tacoma are within 50-70 miles.

Public Interest: Following release of the DEIS and Proposed Forest Plan, Silver Creek was mentioned 29 times in the public comments received. Responses favored protecting visuals (6), keeping the area open for multiple uses (3), reducing logging in the area (3), managing for nonmotorized recreation (2), designating the area MA 1AB (primitive/semi-primitive nonmotorized) (2), keeping it roadless (2), and rebuilding the trail (2). The remaining comments were split between

making the area a top priority for harvest and building more roads, and managing it for recreation, building no new roads, and protecting it for wildlife habitat.

Areas adjacent to Mt. Rainier National Park were mentioned 402 times. Responses said to protect the area from harvest (96), preserve the forest ecosystem (58), keep the area roadless (50), that the devastation (logging, clearcutting, road building) was appalling (30), protect old growth (22), maintain the roadless area as a buffer to wilderness (21), protect wildlife habitat (16), and protect the area for recreation (14). The majority of the remaining comments favored managing the area for recreation, and protecting wildlife habitat, fisheries, and visual quality.

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management

SILVER CREEK

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp Rec	865						
1B SPNM		654	105	190	84		760
1C SPM						359	
2A Foregrd	147	147	147	718	190	190	105
5 Potent W&S			42				
8 Special							190
11 O-G Hab.				147			
17 Timber		126					
23A Otr Wtsh.	42	126			781	506	
23B Otr Wtsh			760				

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives. Alternative I allocates approximately one-third of the area to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife would not be significantly affected by any of the alternatives, due to the very low level of development activity planned.

Water: There are no adverse effects to the water resource of this area associated with any of the alternatives, due to the no development activity planned.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives, due to no development activity planned.

Timber: Only Alternative B allocates area to timber management. None of the alternatives will significantly affect the existing timber resources, as no harvest activity is planned.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development.

Cultural: None of the alternatives will have a significant adverse impact on the cultural resources of the area, due to no development activities planned.

Land Use Authorizations: None of the alternatives will significantly affect special land use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire within the area.

Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

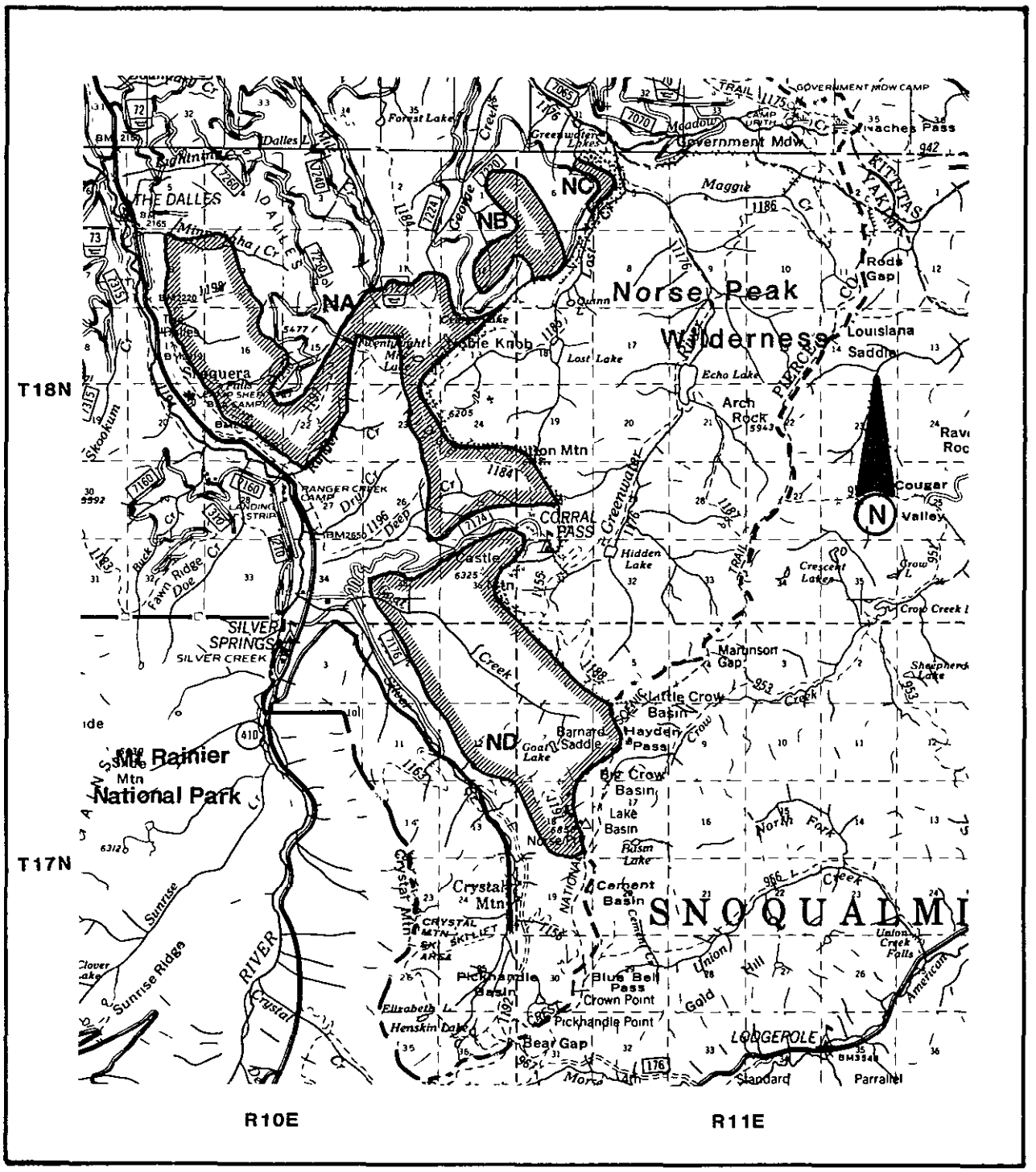
Wilderness Potential: All alternatives assign the majority of this area to management prescriptions compatible with preserving its roadless character. Alternative I allocates about one-third of the area to semi-primitive motorized recreation. All alternatives will maintain the area in a roadless condition through the end of the fifth decade. The wilderness potential will be maintained.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

Alternative	Undeveloped Acres			Percent
	Decade 1	Decade 2	Decade 5	Remaining
A (No Act)	1,055	1,055	1,055	100%
B (RPA)	1,055	1,055	1,055	100%
C	1,055	1,055	1,055	100%
G-Mod.	1,055	1,055	1,055	100%
H	1,055	1,055	1,055	100%
I	1,055	1,055	1,055	100%
J (Pref)	1,055	1,055	1,055	100%

Norse Peak

Roadless Area 6034



NORSE PEAK **Roadless Area 6034 (NC, NB, NA, ND)**

This roadless area originally consisted of 28,200 acres. It was inventoried for study as potential wilderness during the *RARE II* process. The *RARE II* decision assigned area 6034 to nonwilderness uses. In 1984, 15,713 acres from this area were designated the Norse Peak Wilderness by Congress as a result of the Washington Wilderness Legislation. Four parcels remain roadless.

Three timber sales have been sold under contract within this roadless area. The One Mile Salvage, The High Minnie and the Dry Ranger Timber Sales have removed 2,639 acres from roadless status. The area was reduced by 245 acres due to a mapping discrepancy. The following shows the disposition of acres within the roadless area:

Norse Peak	**Net Acres**
1984 RARE II	28,200
updated 1988	10,093
Change	**-18,107**

OVERVIEW

These parcels are directly east of Highway 410, and Crystal Mountain Highway #33. The eastern boundary is adjacent to the Norse Peak Wilderness. A small portion of the Pacific Crest National Trail is astride the southeastern boundary. Access is via the Corral Pass, 28 Mile Creek, George Creek, and Echo Lake road systems.

Rock types are andesite flows and andesite breccias with pyroclastic material. The andesite rocks are hard, moderately to highly fractured, and are competent. The volcanic sediments and pyroclastic materials are moderately hard to soft, highly fractured, and are moderately competent to incompetent. Soils are shallow to moderately deep, non-plastic, silty sands and silty gravels. Soils derived from the pyroclastic material are moderately deep to deep, slightly plastic, sandy silts and sandy clays.

Topography is varied, but is generally steep, dissected mountain sideslopes. Drainages include Goat Creek, Deep Creek, Dry Creek, Ranger Creek, Minniehaha Creek, plus several small unnamed tributaries. The portion on the eastern edge around Noble Knob and Mutton Mtn. through Corral Pass south is open meadow ridgetop. Elevations range from 2,300 to over 6,000 feet. Snoquera Creek Falls accents a large rock fence and is a notable feature.

Vegetation ranges from old growth trees on the lower two thirds of the slopes to bear grass meadows along the higher ridges. Pacific silver fir dominates the north slopes with western hemlock at lower elevations and subalpine fir at upper elevations. There is extensive evidence of large fires around 1890 - 1900, which created the subalpine fir - alpine parklands ecosystem. No threatened or endangered plants identified.

Current uses are varied. Activities range from sightseeing from roads to hiking the Pacific Crest National Trail. Corral Pass campground gets heavy day use along with the trails that lead from there to Castle Mountain and the Noble Knob Lookout site. The Mather Memorial Parkway skirts this area on the western edge. The ROS classifications are roaded natural, roaded modified, semi-primitive motorized and semi-primitive non-motorized.

Norse Peak Wilderness is adjacent to the east. The surrounding National Forest land is managed as multiple use.

Major attractions are Snoquera Falls, Castle Mountain, and the campground at Corral Pass. The Pacific Crest National Trail crosses a small portion of the southern boundary.

WILDERNESS CAPABILITY

Manageability and Boundaries: The NA and ND parcels are large enough to be managed for dispersed and primitive forms of recreation. The natural character can be maintained.

Natural Integrity and Appearance: Long-term ecological integrity can be assured with human influences minimal.

Opportunities For Solitude: Potential for solitude is low. No site within these parcels is more than one mile from an existing road.

Opportunity For Primitive Recreation: Opportunity is low due to road and trail accessibility.

Challenging Experiences: None.

Special Features: Snoquera Falls and the Castle Mountains area are noteworthy features.

AVAILABILITY FOR WILDERNESS

Availability is covered in two parts: a roadless area summary table and a discussion of various resource potentials.

Availability - Other Resource Potential

Recreation: These parcels have high dispersed recreation use. The trail system and Corral Pass Campground get moderate to heavy use. During hunting season, the general area is heavily impacted.

Fish/Wildlife: These parcels exhibit a high diversity of wildlife. Castle Mountain and environs afford mountain goat habitat, and summer range for blacktail deer and elk. A resident herd of elk summer in the general area. Northern spotted owls have been located and a management area has been established. Pileated woodpecker and pine marten MR habitat is present.

Water: Several summer home sites rely on Minnehaha, Dry, Deep, and Goat Creeks for water. However, these are not permanent water systems. The gradient of these streams is too great to support a resident fish population. There are no power withdrawals.

Livestock Operations: None.

Summary Table - Norse Peak #6034

Category 1/	Unit	Parcels NC	NB	NA	ND	Total
Acres (Minus water, private land)	Acres	84	570	5,089	4,350	10,093
Primitive/Semi-Primitive Recreation ROS	Acres	0	0	1,457	3,378	4,835
Timber						
Tentatively suitable	Acres	21	570	3,843	1,161	5,595
Tentatively suitable inaccessible	Acres	0	0	0	696	696
Tentatively suitable standing volume	M bdft	695	18,854	127,119	38,403	185,071
"Old Growth", Total Acres	Acres	42	549	3,146	400	4,137
0-2,500 Feet Elevation	Acres	0	0	0	0	0
2,500-4,000 Feet Elevation	Acres	42	0	1,520	105	1,667
4,000 + Feet Elevation	Acres	0	549	1,626	295	2,470
Management Indicator Species (MIS)						
Spotted Owl MR	Acres	21	0	0	0	21
Pileated Woodpecker and Marten MR	Acres	0	0	781	168	949
Elk-deer winter range	Acres	0	0	316	0	316
Goat Habitat MR	Acres	0	0	380	865	1,245
Bald Eagle Habitat (nests, forage, roost area)	Acres	0	0	0	0	0
Locatable Mineral Development Potential						
High	Acres	0	0	0	0	0
Moderate	Acres	0	0	0	0	0
Low	Acres	84	570	5,089	4,350	10,093
Claims 2/	# of	-	-	-	-	1
Leasable Energy Minerals (Moderate Potential)						
Geothermal	Acres	84	570	5,089	549	6,292

1/ American Indian Religious and Cultural Use areas were analyzed. Site specific information is not disclosed due to its sensitivity.

2/ Number of claims not broken out by parcel.

Ecology: The Pacific silver fir zone is characterized by cool, moist soils, persistent winter snowpacks, and a short growing season. Old growth Douglas-fir is found at the lower elevations. Hemlock and true fir are found at mid-elevations. There are high elevation subalpine fir and alpine meadows. Understory is varied, occurring more frequently on the northern, wetter sites.

Ground cover is sporadic and ranges from small amounts of Oregon grape and salal to moderately heavy huckleberry.

Timber: Forest stand volumes range from 70 to 15 thousand board feet per acre. Fifty-one percent or 4,729 acres is classed tentatively suitable for timber harvest. Stand defect is 30 percent - 35 percent.

Minerals/Oil and Gas: This area is underlain primarily by Tertiary aged volcanics. The southern portion of the area lies in the Silver Creek Mining District, and it is reported to have occurrences of lead, zinc, silver, gold and copper. However, it only has one recorded mining claim. The area is classified "prospectively valuable" for geothermal. It has not been studied in detail by the U.S. Geological Survey and Bureau of Mines, but based upon available data it appears the area has a moderate potential for the occurrence of mineral resources.

Cultural: The potential for cultural resources is low due to steep topography.

Land Use Authorizations: None.

Non-Federal Land: None.

Fire: Fire occurrence is moderate. Lightning fires occur every 4 to 5 years and human-caused fires occur frequently.

Insect and Disease: None.

WILDERNESS EVALUATION

Proximity to Other Designated Wilderness and to Population Centers: These parcels are adjacent to the Norse Peak Wilderness. Mt. Rainier National Park is 4 miles away. Seattle and Tacoma are within 50-70 miles.

Public Interest: Following release of the DEIS and Proposed Forest Plan, the Norse Peak Roadless Area received no public comment. However, areas adjacent to Norse Peak Wilderness and geographic features within the Norse Peak Roadless Area did receive comment.

Areas adjacent to Norse Peak were mentioned 210 times. Responses favored keeping the area roadless (56), protecting it from harvest (50), preserving the forest ecosystem (32), and protecting old growth (10). Most of the remaining comments said to protect the area for recreation, wildlife habitat and visual quality. Two comments expressed the desire to make this area a top priority for timber harvest. One comment said to build more roads. One comment wanted the area added to the National Park System. 1/

ENVIRONMENTAL CONSEQUENCES

The table below displays how each roadless parcel is assigned in the alternatives considered. An assignment represents the long-term management.

PARCEL NA

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	1,436						
1B SPNM		21	2,280	4,202			1,203
1C SPM					485	380	
2A Foregrd.	211	549	464		168	591	
2B Midgrd.					316		2,111
5 Potent W&S			105				
8 Special				211			908
11 O-G Hab.	1,203			105	2,618		
12 Mature O-G	253	781	570	42	211	760	422
14 D&E Enhanc		63					
15 Goat MR		527	232	63	84	232	126
17 Timber	971	1,583		295	337	1,541	316
23A Otr Wtsh.	1,013	1,562		168	865	1,583	
23B Otr Wtsh.			1,436				

PARCEL NB

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	42						
1B SPNM			570	147			105
2A Foregrd.		42					
17 Timber	527	527		422	570	570	464

1/ As discussed in the Summary of Public Response to the DEIS in Appendix A of this document: the number of times an area is "mentioned" does not equal the number of inputs mentioning a site, as one person could mention an area several times. For example, "protect old growth" and "build a trail here" would be tallied as "2" in the number of times an area is mentioned. However, most people only mentioned a specific area once.

PARCEL NC

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	63						
1B SPNM			21	84			84
1D RN		21					
2B Midgrd.			42				
11 O-G Hab.	21	21	21		21	21	
17 Timber		42			63	63	

PARCEL ND

MANAGEMENT AREA NAME	A/NC	B	C	G-Mod.	H	I	J(Pref).
Disp. Rec	3,463						
1B SPNM		1,245	63	3,611			3,336
1C SPM						1,393	
2A Foregrd.				274			105
2B Midgrd.							84
3C Winter		168	105		211	337	337
11 O-G Hab.				21	21		
12 Mature O-G		84	168		168	147	
15 Goat MR		1,921	760	359	760	781	485
17 Timber	21					42	
23A Otr Wtsh.	865	929		84	3,188	1,647	
23B Otr Wtsh.			3,252				

Significant Effects

Recreation: Current recreation opportunities will not be significantly affected by any of the alternatives. Alternative C will leave the largest amount of area (90%) of this parcel unroaded through the end of the fifth decade. Alternative I allocates about 18% of this area to semi-primitive motorized recreation.

Fish/Wildlife: Fish and wildlife will not be significantly affected by any of the alternatives. Alternatives A, NC, B, C, H and I allocate the greatest amount of area to old growth habitat, mature old growth, deer and elk enhancement and mountain goat management requirement prescriptions. Alternatives G-Modified and J (Preferred) allocate the least.

Water: There will be no adverse effects to the water resource of this area associated with implementation of any of the alternatives, due to the low level of development planned.

Ecology: The overall ecology of the area will not be significantly affected by any of the alternatives, due to the low level of potential development activity.

Timber: Alternatives B and I allocate the greatest amount of acres to timber management. Alternatives C, G-Modified and J (Preferred) allocate the least.

None of the alternatives will significantly affect the timber resource, as potential harvest activity will be low.

Minerals/Oil/Gas: None of the alternatives will have a significant affect on the availability of minerals, oil or gas for development. Alternatives B, H and I would provide a slightly greater amount of roaded access through the area that could be used for mineral exploration and development.

Cultural: None of the alternatives will have a significant adverse impact on cultural resources in the area. Alternatives B, H and I will have the greatest potential for impact, as they propose the greatest amount of development activity. Alternative C will have the least potential for impact.

Land Use Authorizations: None of the alternatives will significantly affect special land use authorizations.

Fire: None of the alternatives will significantly affect the occurrence of fire within the area.

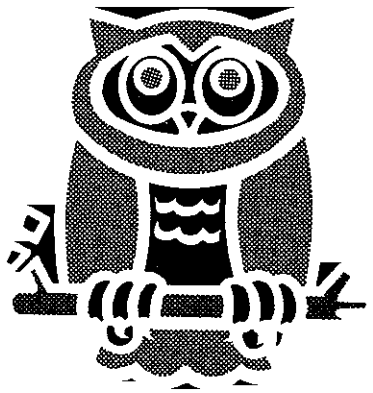
Insect and Disease: None of the alternatives will significantly affect the occurrence of insects and disease within the area.

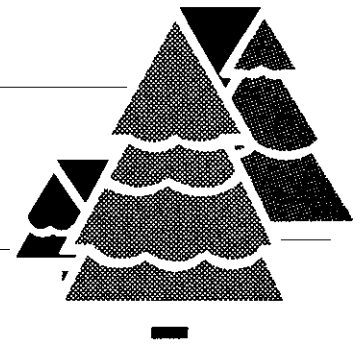
Wilderness Potential: Alternatives C, G-Modified, and J (Preferred) assign the majority of this area to management prescriptions compatible with preserving its roadless character. The wilderness potential in the above alternatives will be maintained. Alternative I assigns approximately 18% of the area to semi-primitive motorized recreation and maintains 60% of the area in a roadless condition through the end of the fifth decade. Alternatives A, B, and H maintain approximately two-thirds of the area in a roadless condition through the end of the fifth decade.

The following table provides an estimate of acres remaining unroaded at the end of specific decades by alternative.

	Undeveloped Acres			Percent
Alternative	**Decade 1**	**Decade 2**	**Decade 5**	**Remaining**
A (No Act)	8,068	7,024	7,047	70%
B (RPA)	7,942	6,798	5,805	58%
C	9,652	9,444	9,111	90%
G-Mod.	8,974	8,246	7,966	79%
H	8,479	7,361	6,472	64%
I	7,921	7,063	6,027	60%
J (Pref).	9,169	8,519	7,899	78%

Appendix D





APPENDIX D

STANDARDS AND GUIDELINES THAT DIFFER FROM THE FOREST PLAN

Standards and guidelines state the bounds or constraints within which all practices will be carried out in achieving the resource objectives of the alternatives The management of the Mt. Baker-Snoqualmie is subject to all applicable laws and regulations Standards and guidelines are intended to help the manager achieve the goals and objectives, while staying within constraints prescribed by law.

Some of the management activities on the Forest would cause significant environmental damage if they were practiced without a means of mitigating that potential harm Many potential, adverse effects can be anticipated. Measures can be designed and prescribed, in advance, to mitigate that damage. These mitigation measures consist of a broad scope of actions that avoid, minimize, rectify, reduce, or compensate for environmental impacts. The standards and guidelines provide those means of mitigating adverse environmental impacts.

There are two categories of standards and guidelines: Forest-wide, applying to all management areas; and standards and guidelines specific to individual management areas.

Development of Standards and Guidelines

The Forest-wide standards and guidelines and management prescriptions were developed according to Regional Direction, for the purpose of: 1) identifying anticipated potential direction for activities on the MBS, and 2) assist in directing formulation of the Forest's planning model and alternatives. Both Forest-wide and management area standards and guidelines were developed by the Forest Management Team, and Forest Plan Interdisciplinary Team.

Forest-wide standards and guidelines are applicable to all areas of the Forest unless specifically stated in the management prescriptions. Forest-wide standards and guidelines contain two parts: Management Requirements (MR's) and other important direction. The management prescriptions apply to specifically identified land areas.

Both the Forest-wide standards and guidelines and the management prescriptions contain a goal statement, reflecting the expected results for a forest resource, activity, or land area. They provide direction emphasis for the Mt. Baker-Snoqualmie, supplementing Forest Service manuals, handbooks, and the Regional Guide. Both respond to Forest ICO's, appropriate laws, regulations and existing direction, land capabilities, and professional judgement.

Standards and Guidelines for the Preferred Alternative

The standards and guidelines for the preferred alternative are found in Chapter 4 of the Forest Plan, accompanying this final EIS. Most of these standards and guidelines apply to all other Forest Plan alternatives with two exceptions: there are two MA prescriptions that only apply to Alternative A. Secondly, the Alternative NC (No change) would not adopt the Standards and Guidelines of the Forest Plan, as it is designed to represent the existing timber management plan and consequently, does not comply with all provisions of NFMA and its implementing regulations.

Standards and Guidelines Not Used in the Preferred Alternative

Several standards and guidelines were developed that were not used or were not appropriate in the Preferred Alternative. These standards and guidelines provide an opportunity for the public and the Forest Service to analyze other options for managing the Forest. The standards and guidelines described here are those which differ from, or are in addition to, those for the Preferred Alternative (Alternative J).

Below is a table of contents for the rest of this appendix. On the following page, Table D-1 shows the management prescriptions and intensities that apply in each alternative Refer to the management area acres table, Chapter II, FEIS for the acres allocated to each prescription/intensity, by alternative.

Management Area Number and Name **Page**

1 Dispersed Recreation
- 1E General Dispersed Recreation D-5
- 1F 1926 Mt. Baker Recreation Area... ..... D-5

3 Developed Recreation
- 3B Potential Recreation Sites. D-6

8 Special Areas
- 8D Other Special Area D-8

13 Watershed, Wildlife, and Fisheries Emphasis in Riparian Areas
- 13A Minimum Management Requirements.... ..... D-10
- 13C Level III Anadromous, Existing Resident Fish Habitat Capability D-14

15 Mountain Goat Habitat.. . . .. D-17
- 15B Emphasis on Habitat Improvement, Mountain Goat

20 Cedar River Municipal Watershed (City of Seattle)
- 20A Current Direction. Exchange all National Forest lands to the City of Seattle D-20
- 20B Exchange National Forest Lands, City Maintains Old Growth ... D-24
- 20C Retain National Forest Lands, Maintain Old Growth Habitat..... D-28

21 Green River Municipal Watershed (City of Tacoma)
- 21B Timber Harvest Permitted, Most Public Recreation Prohibited... D-31

22 Sultan River Municipal Watershed (City of Everett)
- 22A Closed Watershed, Except Protect Water and Hydropower Production Exchange National Forest Lands..... .... D-34
- 22C Retain National Forest Land, Full Multiple Use..... D-36

23 Other Municipal Watersheds
- 23B No Timber Harvest, Limited Recreation Opportunities..... D-37

24 Minimum Management D-39

Table D-1 Management Prescriptions and Intensities Occurring In Each Alternative	A	B	C	G Mod	H	I	J (Pref)
1 Dispersed Recreation							
1A Primitive			X	X	X		X
1B Semi-Primitive Nonmotorized		X	X	X	X		X
1C Semi-Primitive Motorized		X		X	X	X	X
1D Roaded Natural		X	X		X	X	X
1E General Dispersed Recreation	X						
1F Mt Baker Recreation Area (1926)	X						
2 Scenic Viewshed							
2A Foreground	X	X	X	X	X	X	X
2B Middleground			X		X	X	X
3 Developed Recreation							
3A Public Sector Developed Sites	X	X	X	X	X	X	X
3B Potential Recreation Sites (Not Used)							
3C Winter Sports Resorts	X	X	X	X	X	X	X
3D Private Sector Sites	X	X	X	X	X	X	X
4 Mt. Baker National Recreation Area (1984)	X	X	X	X	X	X	X
5 Wild and Scenic River - Potential							
5A Recreation	X		X	X	X		X
5B Scenic	X		X	X	X		X
5C Wild	X		X	X	X		X
6 Skagit Wild and Scenic River	X	X	X	X	X	X	X
7 American Indian Religious and Cultural Use	acres are protected, not shown to protect confidentiality						
8 Special Areas (Cultural-Historic, Geologic, Biologic, Botanic, Scenic)	X	X	X	X			X
9 Not Used							
10 Wilderness							
10A Transition	X	X	X	X	X	X	X
10B Trailed	X	X	X	X	X	X	X
10C General Trailless	X	X	X	X	X	X	X
10D Dedicated Trailless	X	X	X	X	X	X	X
10E Special Areas	X	X	X	X	X	X	X
11 Old Growth Habitat Emphasis	X	X	X	X	X	X	X
12 Mature and Old Growth Wildlife Habitat	X	X	X	X	X	X	X
13 Riparian and Fish Habitat Emphasis							
13A Minimum Management Requirements	X						
13C Enhance Anadromous Habitat		X			X	X	X
13D Enhance Anadromous and Resident				X	X		X

Appendix D

		A	B	C	G Mod	H	I	J (Pref)
14	Deer and Elk Habitat Improvement		X	X		X	X	X
15	Mountain Goat Habitat							
	15A Minimum Management Requirements	X	X	X	X	X	X	X
	15B Habitat Improvement		X	X				
16	Threatened and Endangered Species							
	16A Northern Bald Eagle	X	X	X	X	X	X	X
	16B Grizzly Bear							
	16C Peregrine Falcon							
17	Timber Management Emphasis	X	X	X	X	X	X	X
18	Research Natural Areas (RNA's)	X	X	X	X	X	X	X
19	Timber Management in Mountain Hemlock		X	X	X	X	X	X
20	Cedar River Municipal Watershed (City of Seattle)							
	20A Current Direction, Exchange NF Lands to City	X				X	X	
	20B Exchange NF Lands, City Maintain Old Growth			X	X			
	20C Retain NF Land, Maintain Old Growth Habitat		X					
	20D Negotiate a New Agreement							X
21	Green River Municipal Watershed (City of Tacoma)							
	21A Current Direction, Timber Harvest, Disp. Rec. Ok	X		X	X	X	X	X
	21B Timber Harvest OK, Most Public Recreation Prohibited		X					
22	Sultan River Municipal Watershed (City of Everett)							
	22A Closed Except Protect Water and Hydropower Production Exchange NF Lands.			X				
	22B Current Situation, Exchange NF Lands, Moderate Timber Harvest, Restricted Recreation.	X			X	X	X	X
	22C Retain NF Lands, Full Multiple Use.		X					
23	Other Municipal Watersheds							
	23A Timber Harvest, Moderate Recreation Opportunities	X	X		X	X	X	X
	23B No Timber Harvest, Limited Recreation Opportunities			X				
24	Minimum Management							
25	Special Uses - Utilities							
	25A Utility Corridors	X	X	X	X	X	X	X
	25B Electronic Sites	X	X	X	X	X	X	X
26	Administrative Sites	X	X	X	X	X	X	X
27	Alpine Lakes Area	X	X	X	X	X	X	X

1E
1F

1 DISPERSED RECREATION

INTENSITY 1E: GENERAL DISPERSED RECREATION Goal Manage the Alpine Resource Zone and some of the Upper Forest Resource Zone in accordance with Ranger District Multiple Use Plans.

Description of the Lands Where Prescription Applicable: Alpine Resource Zones and some of the Upper Resource Zone as delineated on Ranger District Multiple Use Plan maps. Acres are designated to this management prescription only in Alternative A, Current Direction "No Action"

Desired Future Condition Setting varies from primitive to roaded natural with a wide range of dispersed recreation Roadless, dispersed recreation is the dominant use, but some roaded dispersed recreation use, including ORV's, may occur.

Management Practices, Standards and Guidelines: Overall management direction for these areas *is to protect the scenic, soil, watershed, and recreation values* In the Upper Forest Resource Zone, management for resource development may require modification to protect scenic, soil, and watershed values. In most of these areas, removal of trees will be done only for recreational development, public safety to control insect or disease epidemics, or salvage catastrophic forest losses

Timber utilization will be permitted in tentatively suitable lands where overall management direction can be met; however no scheduled timber harvest is planned. Any timber volume removed will be nonchargeable

Road construction is permitted provided overall management objectives are met. The area may be traversed by a number of roads to access developed areas in other management areas. Roads should be temporary except those needed for timber harvest or to access other management areas

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INTENSITY 1F 1926 MT. BAKER RECREATION AREA Goal. Manage the Mt. Baker Recreation Area in accordance with the Secretary of Agriculture's 1926 designation order

Description of Lands Where Prescriptions Applicable: This area includes the remaining parcels of the Mt Baker Recreation Area, totaling approximately 6,005 acres. In 1926, the Secretary of Agriculture designated 74,859 acres as the Mt. Baker Recreation Area. The Washington State Wilderness Act of 1984 changed the designation of most of the Mt. Baker Recreation Area to the Mt. Baker Wilderness or the Mt Baker National Recreation Area. The Mt. Baker Ski Area is included in the Management Area 3C.

Acres are designated to this management prescription only in Alternative A (Current Direction, No Action).

Desired Future Condition: To be used and enjoyed by the general public for recreation purposes.

Management Practices, Standards and Guidelines: Overall management direction for this area emphasizes recreation for the use and enjoyment of the general public. Proper and orderly utilization of timber, forage, water power, and other economic resources is allowed; but such utilization shall not be permitted to impair the value of the area as a site for public camp grounds, municipal or health camps, sanitaria, club houses, hotels, summer homes, or public utilities requisite for the comfort and convenience of the people using the area for recreational purposes

B

Appendix D

In the sixty years since establishment, silvicultural practices have occurred on approximately 570 acres, less than 1% of the total area designated. Timber utilization is permitted, however, no scheduled timber harvest is planned Timber volume removed is nonchargeable

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3 DEVELOPED RECREATION

Goal: Provide a wide variety of year-round recreation experiences and facilities at developed sites

Description of Lands Where Prescription Applicable: Developed recreation sites are usually located close to water bodies, or other areas of scenic or special interest Developed recreation sites include existing and potential campgrounds major trailheads, boating and swimming sites, picnic areas, alpine ski areas, and associated facilities, organization camps, recreation residences, and others Facilities will be provided at mostly recreation development scale 2 (semi-primitive) with little site modification, to scale 4 (rural) with the site heavily modified The areas allocated to developed recreation include the specific site on which existing or potential development takes place and a surrounding visual and noise screen Soils and vegetation should be able to absorb heavy use Except for winter recreation areas, developed recreation sites are usually located on land with slopes of 10 percent or less.

Desired Future Condition: Common to all Intensities

Developed recreation sites may appear mostly natural to rural in setting. Physical facilities may be evident; design and construction will repeat the color, shapes, and lines of the surrounding environment. Site controls and user interaction will vary with the setting There is no scheduled timber harvest and any vegetative management is done for the purposes of maintaining a safe, functional, and attractive site Openings exist to accommodate facilities and provide scenic views. Vegetation will vary widely in type, size, and age. Access is by road

Intensities in this Management Prescription·

3B POTENTIAL RECREATION SITES

This management intensity is applied to areas of the Forest that are suitable for a variety of developed recreation facilities Under this intensity selected areas will be reserved for future study and development

The type of facilities to be developed is dependent on user demand patterns and specific site suitability Sites to be developed will complement the existing areas as developed facilities and expand the Forest's capacity to accommodate additional use

Program Element		Standards and Guidelines
A Recreation		
1. Recreation Facility Planning	a	Potential sites will be developed when needed and programmed, that are appropriate to the forest environment, and will be maintained to provide only facilities for forest-type recreation such as camping, picnicking, hiking, canoeing, etc
	b	Sites shall be designed to ensure that the People At One Time (PAOT) capacity of the site is in proper relationship to the desired ROS class and the ability of the site to withstand use.

		c	Overcrowding and loss of privacy shall be prevented by strategically locating improvements, limiting their number, or designing facilities so as to limit the number of persons who can physically use or occupy them at one time.
		d.	A comprehensive and detailed site plan including needed roads to serve the site shall be developed prior to site construction in accord with requirements specified in FSM 2330.
		e.	Constructed structures should be architecturally compatible with the established landscape
		f.	Vegetative management plans are required prior to manipulation of vegetation
		g.	The area should be administered to protect its value for future development and use as a recreation site
	2. Visual Quality	a	Visual Quality Objective will range from preservation to partial retention.
	3. American Indian Religious and Cultural Use	a	Meet Forest-wide Standards and Guidelines
	4. Trail Planning	a	Trails are permitted.
		b	Maintain existing trails to a Level III Standard, within the developed site, providing resource protection, and visitor convenience
B.	Wilderness	a.	Not applicable
C	Wildlife and Fish		
	1. Habitat Improvement	a	Improvement of wildlife and fisheries habitat may be permitted as long as it is compatible with the potential future recreation use.
D.	Range	a	Not applicable.
E.	Timber		
	1. Timber Management Planning	a.	Timber shall be managed on a non-scheduled basis.
		b.	Logging practices shall be selected that protect the area in a manner consistent with the intended recreation use.
		c	Vegetative management prescriptions should be prepared to manage desired vegetation conditions for each site.

F	Water, Soil, and Air		
	1 Planning and Improvement	a.	Improvements are appropriate as long as visitor conflicts with future recreation development and use are minimized
G	Minerals and Geology	a.	Inventory and/or validate existing mining claims and initiate title clearance on sites planned for development.
		b	Removal of common variety minerals should not be permitted.
		c.	Recommend denial for application for leasable minerals
		d.	Sites not previously withdrawn shall be recommended for withdrawal from mineral entry.
		e.	Developed sites shall be protected by standard and special stipulations in any leasing actions.
		f	No on-site occupancy
		g.	Applications will include stipulations to protect existing and/or future uses Denial may also be recommended on a case-by-case basis
H	Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines
J	Lands		
	1 Special Use Management	a	Special uses compatible with future recreation development and use should be permitted.
	2 Land Ownership Planning	a	Place all these lands in Group II Retain or acquire when possible.
L	Facilities		
	1 Transportation System Planning	a	Provide and manage roads that are compatible with intended future recreation use
P	Protection		
	1 Fire Management Planning	a	Forest-wide Fire Protection Group C applies.
	2 Forest Pest Management	a.	Meet Forest-wide Standards and Guidelines

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8 OTHER SPECIAL AREAS

Goal To protect and, to the extent possible, foster public use and enjoyment of areas with unique recreation, cultural, historic, or scientific values

Description of Lands Where Prescription Applicable: Areas that because of their unique cultural-historical, geological, botanical or biological features have been identified for special recognition and management.

Desired Future Condition The attributes which caused these areas to be recognized and classified are preserved and maintained for public study, use, or enjoyment.

Intensities in this Management Prescription: 8D Other Special Areas

Program Element	Standards and Guidelines
A. Recreation	
1. Recreation Planning	a. ORV use shall be restricted to designated route or within areas where use is compatible with Special Area purpose.
	b. Site development should generally be restricted and located outside of area to protect special features
	c Facilities may be provided for visitor use, environmental interpretation, safety of visitors, or to protect or enhance area values.
	d. ROS class may vary from semi-primitive to roaded natural
2. Visual Quality	a. Visual Quality Objectives are retention to preservation
3. American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines
	b. Visitor use and activities shall be managed to prevent degradation of Special Interest Areas
4. Trail Planning	a. Manage to prevent resource degradation and provide for public safety.
	b Minimize affects to biological community
B. Wilderness	a. Not applicable
C. Wildlife and Fish	a. Emphasis should be given to the maintenance and improvement of habitat for observable wildlife species
D. Range	a. Not appliable.
E. Timber	
1. Timber Management Planning	a. No scheduled timber harvest. Incidental timber harvest in response to implementation of vegetation management plans or to protect property and life, health and safety of area users is permitted
	b. Prepare vegetation management prescriptions to establish the short and long-term treatments necessary to maintain or enhance the unique or desired vegetation characteristics of areas.
F. Water, Soil, and Air	a. Meet Forest-wide Standards and Guidelines
G. Minerals & Geology	a Conduct mineral studies in conjunction with the mineral withdrawal process Areas should

			be withdrawn from mineral entry to ensure maintenance of area values.
		b	Common variety minerals should not be removed.
		c.	Conduct geologic mapping and studies to enhance interpretation of special geologic areas or features to the recreating public
		d.	In areas not otherwise withdrawn from entry protect or mitigate the unique or special features of areas by the development and enforcement of special lease or permit stipulations and requirements
H.	Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines
J	Lands		
	1 Special Use Management	a	Avoid locating transportation and utility corridors in these areas
		b	Special Use Permit are acceptable provided that values are protected and that permitted use support the goals and objectives established for individual areas
	2. Land Ownership Planning	a	Group II - retain or acquire when possible
L	Facilities		
	1 Transportation System Planning	a	Roads, trails, and other facilities may be developed and maintained to meet the objectives of Special Areas
P.	Protection		
	1 Fire Management Planning	a.	Forest-wide Fire Protection Group C applies
	2. Forest Pest Management	a	Only suppression work using biological, chemical or silvicultural methods consistent with management goals for the area

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13 WATERSHED, WILDLIFE, and FISHERIES EMPHASIS IN RIPARIAN AREAS

Goal: To maintain or improve water quality and to produce various levels of potential habitat capability for various species of fish within designated riparian areas Also maintain or enhance habitat for riparian associated wildlife species

Descriptions of Lands Where Prescription Applicable This prescription is applicable to those lands adjacent to perennial and intermittent streams - Class I, II, and deeply incised Class III streams - lakes, wetlands, ponds, seeps, floodplains, and it includes the aquatic and the riparian ecosystems These lands also support a diversity of plant species, being dominated by species preferring or tolerating wet or moist site conditions.

Riparian areas contain a variety of resource values (water quality, fish and wildlife habitat, and soil productivity) This strategy is designed to maintain and/or improve these resource

values, with special emphasis on water quality and fish habitat. Actual area and boundaries of these riparian areas will be determined at the project level of planning.

Desired Future Condition: Meet or exceed State/Federal water quality standards. Maintain current (existing) levels of habitat capability of all fish species. In some areas, increase habitat capability for targeted fish species (habitat restoration or enhancement). Maintain, and in some cases, improve riparian vegetation diversity. Maintain, and in some areas improve, existing levels of habitat capability of all riparian dependent wildlife species through restoration and/or enhancement. A variety of plant and animal species are present, hardwood tree species are more common here than elsewhere A variety of dead trees, standing and downed, are common. Created openings are small and widely distributed The riparian area will include mature trees that may be managed on a normal rotation, as well as larger older trees to be managed on an extended rotation (160 + years). Some trees are not planned to be harvested, as they are needed for slope stability or large wood debris

Intensities in this Management Prescription:

13A Management Requirements
13C Level III Anadromous, Existing Resident Fish Habitat Capability

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INTENSITY 13A: MANAGEMENT REQUIREMENT

Program Element		Standards and Guidelines	
A	Recreation		
	1 Recreation Planning	a	A broad range of developed recreation can be permitted, however, any planned development will be designed to minimize impact in riparian values
		b	ROS settings can range from primitive to roaded natural
	2. Recreation Use	a.	Ground or water channel disturbing activities will be minimized
	3. Visual Quality	a.	Visual Quality Objectives of retention to modification consistent with adjacent management areas
	4. American Indian Religious and Cultural Use	a.	Meet Forest-wide Standards and Guidelines.
	5 Trail Planning	a.	Trail construction and reconstruction, and maintenance are permitted
		b	Existing ORV use permitted on roads or trails designed for that use
		c	New ORV trail construction/reconstruction permitted, minimize impact to riparian values
B	Wilderness	a	Not appliable.

C. Wildlife and Fish

1. Planning

a. Habitat for primary cavity excavators will be managed to 80% of potential population levels.

b. If water temperature is an issue, created openings adjacent to a stream may be permitted, provided that 80% of the entire stream surface shading requirement is met. The length of stream is that included within the planning areas.

c. Trees of all age classes will be left adjacent to and leaning over perennial streams if they are needed for shading, slope, and bank protection, or future large organic debris recruitment.

d. Wetlands including bogs, seeps, and ponds, will be protected.

2. Habitat Improvement

a. Fish and wildlife habitat improvement and structures are permitted for mitigation. Maintain fish habitat capability (anadromous and resident) at present levels (Level I) by maintenance of existing spawning and rearing habitat. Maintain terrestrial wildlife habitat diversity.

D. Range

a. Not applicable.

E. Timber

1. Timber Management Planning

a. Silvicultural practices will be applied for the purpose of maintaining riparian habitat diversity and integrity. Timber Management Intensity (extended rotation) best meets the riparian values of Class I, II, and deeply incised Class III aquatic systems. Other timber management intensities A-G which meet the riparian values of Class I, II, and deeply incised III aquatic systems may also be considered.

2. Timber Sale Preparation

a. Yarding and skidding that maintains soil disturbance and vegetation standards are acceptable (see F1).

b. No more than 10% of the area may be compacted. A compacted area exists when there is an increase in soil bulk density of 15% or more over the undisturbed level, a macropore space reduction of 50% or more, and/or a reduction below the 15% level as measured by an air permeameter.

F. Water, Soil, and Air

1. Improvements

a. Improvement and maintenance activities are permitted. Use vegetative restoration methods to restore live root mat and reduce risk of slope failure when practical.

b. Flood damage restoration projects are permitted.

2. Soil Resource Monitoring	a.	Ground disturbing activities will result in no more than 10% mineral soil exposed within a project area after the first year
	b.	Small woody and herbaceous vegetation disturbance limited to 25% within the project area after the first year.
G. Minerals and Geology	a.	Extraction of common variety minerals may be conducted provided riparian values can be protected.
H. Rural, Community, Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J. Lands		
1. Special Use Management	a.	Activity to be analyzed through NEPA process to determine its effect on riparian habitat. Only permitted if riparian habitat diversity and integrity is maintained.
2. Rights-of-Way Grants	a.	Meet Forest-wide Standards and Guidelines.
3. FERC License and Permits	a.	See a above. Also assure consideration and establishment of minimum flows.
4. Land Ownership Planning	a.	Lands critical to riparian management should be placed in a Group III classification. Federal and non-federal lands shall contain equal amounts of riparian habitat.
L. Facilities		
1. Transportation System Planning	a.	Locating roads in a riparian area can only be done if riparian values are protected.
2. Road Construction, Reconstruction and Operation	a.	Only those construction and reconstruction practices that protect riparian values will be allowed. Water quality and/or fish habitat problems caused by construction should be given a high priority for corrective action.
	b.	Road cut and fill slopes within riparian areas shall be protected with erosion and/or sediment control. Final stabilization practices shall include vegetation as well as structural
	c.	Road construction and design should stress maintenance of slope hydrology when routing surface water
	d.	All roads not receiving annual maintenance will have measures to control road surface and ditch water.
	e.	Temporary structures installed to impound water for road maintenance will be removed upon completion of use.

P. Protection		
1. Fire Management Planning	a.	Forest-wide Fire Protection Group D applies.
2. Forest Pest Management	a.	Integrated pest management is permitted following Forest-wide Standards and Guidelines except where use of pesticides conflicts with riparian values.

INTENSITY 13C: LEVEL III ANADROMOUS, EXISTING RESIDENT FISH HABITAT CAPABILITY

Program Element		Standards and Guidelines
A. Recreation		
1. Recreation Planning	a.	When planning any new development and a conflict exists, that conflict will be resolved in favor of the dependent riparian resources and values (soil, water, fish, and wildlife.)
	b.	ROS settings can range from primitive to roaded natural.
2. Recreation Use	a.	No ground or water channel disturbance from any ORV use.
3. Visual Quality	a.	Visual Quality Objectives of retention to modification consistent with adjacent management areas.
4. American Indian Religious and Cultural Use	a.	Meet Forest-wide Standards and Guidelines.
5. Trail Planning	a.	Nonmotorized trail facilities are permitted. Existing ORV use will be permitted on roads or trails designated for that use.
	b.	New ORV trail construction/reconstruction activities will be permitted in designated riparian areas only when stated riparian objectives can be accomplished. If ORV activities are allowed, they should be restricted to timing and/or access due to anadromous fish migration and/or spawning.
B. Wilderness	a.	Not applicable.
C. Wildlife and Fish		
1. Planning	a.	Emphasize maintenance and/or improvement of water quality; e.g. reduce turbidity, and bedload movement.
	b.	Retain instream woody material plus standing (live and dead) adjacent to the stream, needed for future debris recruitment plus bank and channel stability.
	c.	Maintain streamside vegetation so that at least 80% of the fish habitat stream surface has shade

during the summer low flows Maintain or restore 75% of other small woody and herbaceous vegetation.

d. Primary excavator habitat will be managed to 80% of potential population levels. All large dead and down logs will be left except for logs to be used as instream structures

e. For T & E species, follow Forest-wide Standards and Guidelines and Management Prescription 16 Standards and Guidelines. Manage wetlands to protect all bogs, swamps, and beaver ponds.

f. Consult with local state biologists to assure fish management objectives are compatible with state management objectives.

2. Habitat Improvement

a Emphasize improving and/or enhancing existing fish habitat for anadromous fish species Enhance existing or restored spawning and/or rearing habitat. This would include enhancing off-channel or terraced tributary juvenile rearing habitat. Habitat enhancement would include structural and non-structural activities Structural activities includes log weirs, gabions, deflectors, and digger logs, rock and boulder emplacement, and groins Non-structural activities include off-channel rearing pond construction, bank or channel stabilization and spawning area improvement Maintain the resident fish habitat capability at the current or existing production level

b Emphasize measures to improve wildlife habitat diversity and integrity

c Stocking of anadromous fish (adults or juveniles) permitted to help meet production level III requirements. Must be part of the overall restoration plan Maintain resident fish stocking program

D. Range

a. Not applicable.

E. Timber

1. Timber Management Planning

a A range of silvicultural treatments will be permitted only when riparian objectives can be accomplished Timber management intensity H extended rotation best meets the riparian values of Class I, II, and deeply incised Class III aquatic systems Other timber management intensities (A-G) which meet the riparian values of Class I, II, and deeply incised III aquatic systems may also be considered.

	2. Timber Sale Preparation	a. Yarding and skidding that maintains soil disturbance and vegetation standards are acceptable (see F2).
		b. Less than 10% of the area should be damaged. A damaged area exists when there is an increase in soil bulk density of 15% or more over the undisturbed level, a macropore space reduction of 50% or more, and/or a reduction below the 15% level as measured by an air permeameter.
F.	Water, Soil, and Air	
	1. Improvements	a. Watershed improvements and maintenance are permitted. Use vegetative restoration methods to restore live root mat and reduce risk of slope failure along stream channels as well as upper slope areas outside the riparian area.
	2. Soil Resource Monitoring	a. Ground disturbing activities will result in no more than 10% mineral soil exposed within a project area. Disturbance should be widely distributed over the area.
		b. Small woody and herbaceous vegetation disturbance limited to 25% and widely distributed over the project area.
G.	Minerals and Geology	a. Extraction of common variety minerals may be conducted provided riparian values can be protected.
H.	Rural Community and Human Resources	a. Encourage use of various human resource programs to be used in accomplishing pre-selected water quality or fish habitat restoration/rehabilitation projects.
J.	Lands	
	1. Special Use Management	a. Activity to be analyzed through NEPA process to determine its effect on riparian habitat. Only permitted if riparian habitat diversity and integrity is maintained.
	2. Rights-of-Way Grants	a. Meet Forest-wide Standards and Guidelines.
	3. FERC License and Permits	a. Assure consideration and establishment of minimum flows.
	4. Land Ownership Planning	a. Lands critical to riparian management should be placed in a Group III classification. Federal and non-federal lands shall contain equal amounts of mature riparian habitat.
L.	Facilities	
	1. Transportation System Planning	a. Roads should avoid riparian areas when possible. Locating roads in a riparian area can only be done if riparian values are protected.

		b Necessary crossings should use methods that minimize adverse impacts to water and fisheries resources.
	2. Road Construction, Reconstruction and Operation	a. Road construction/reconstruction activities will be permitted in designated riparian areas only when stated riparian area objectives can be accomplished. Such activities may be restricted to timing and/or access due to anadromous fish migration and/or spawning
		b Slopes adjacent to or within riparian areas will be protected with erosion and/or sediment control. Before the first wet season, vegetation or slope protection will be completed. Prior to the end of the normal operating season, final stabilization practices should include vegetation as well as structural.
		c Water quality and/or anadromous fisheries habitat problems caused by road construction/ reconstruction will be fully mitigated in kind, on site
		d All roads not receiving annual maintenance will have measures to control road surface and ditch water.
P	Protection	
	1. Fire Management Planning	a. Forest-wide Fire Protection Group D applies
	2 Forest Pest Management	a. Integrated pest management is permitted except where use of pesticides conflicts with riparian values.

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15 *MOUNTAIN GOAT HABITAT*

Goal *Protect and manage habitat to maintain or increase mountain goat populations.*

Description of Lands Where Prescription Applicable: This prescription is applied to selected acres of current and historical mountain goat habitat. These areas characteristically contain diverse vegetation including mature and old growth stands, steep rocky cliffs, projecting pinnacles, ledges, and talus slides. Winter range is generally at lower elevations (tree-line and below) than summer habitat.

Desired Future Condition: Current and historically used mountain goat range is in the process of being identified and verified The winter range is maintained as a natural environment with little evidence of human activity

No new roads will be constructed to access winter range; existing roads and trails that would permit human encroachment and subsequent harassment to mountain goats on the winter or summer range will have use restricted No scheduled timber harvest. If timber management activities are conducted, practices shall be for purpose of maintaining mountain goat habitat

Intensities in this Management Prescription: 15B Emphasis on Habitat Improvement, Mtn Goat

INTENSITY 15B: EMPHASIS ON HABITAT IMPROVEMENT, MOUNTAIN GOAT

Program Element		Standards and Guidelines
A. Recreation		
	1. Recreation Planning	a. New trail and campsite construction shall not be located within 1,500 feet of key habitat features.
	2. Visual Quality	a. Visual Quality Objectives consistent with adjacent management areas.
	3. American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines.
	4. Use Administration	a. Roads that directly access spring, summer, and winter range shall have use restrictions where harassment to mountain goat has been identified. Consider road closures, primarily in spring transition range during the period May 15 - June 15.
		b. Existing trail and campsite use that is identified adversely effecting mountain goats shall be located 1,500 feet from the particular key habitat feature.
B. Wilderness		a. Not applicable.
C. Wildlife & Fish		
	1. Planning	a. Cooperate with the Washington Department of Wildlife in mountain goat census and refinement of winter range boundaries.
		b. Continue surveys and inventory of known and suspected mountain goat winter range to document critical habitat for protection.
		c. Monitor habitat components to insure planning objectives are being met.
		d. Reintroductions and transplant proposals will be evaluated to determine feasibility.
D. Range		a. Not applicable.
E. Timber		
	1. Timber Management Planning	a. No harvest scheduled. If timber management activities are conducted, practices applied shall be for the primary purpose of maintaining mountain goat winter habitat.
		b. A maximum of 5% of suitable lands within this prescription may be regeneration harvested per decade.

		c.	Generally, harvesting practices shall be applied for the purpose of maintaining or improving mountain goat habitat diversity.
	2. Reforestation and Timber Stand Improvement	a.	Reforestation and TSI plans should be designed for improving forage.
	3. Timber Sale Preparation and Harvest Administration	a	Small, long, and narrow units will be encouraged, maximum width shall be 400 feet but shall not increase avalanche frequency.
		b.	Harvest activities shall take place so as to avoid conflict with mountain goat.
		c.	Tree cover immediately adjacent to avalanche chutes shall be considered as very critical to optimum thermal cover needs and be maintained
F.	Water, Soil, and Air	a	Meet Forest-wide Standards and Guidelines.
G	Minerals and Geology	a	Mineral exploration and extraction, including common variety minerals will include requirements and mitigation measures needed to protect habitat and winter range objectives.
H.	Rural Community and Human Resources	a	Meet Forest-wide Standards and Guidelines.
J.	Land		
	1 FERC Licenses and Permits	a	Construction, maintenance, and operation is if mountain goat is minimally altered and any adverse effect can be mitigated.
	2 Land Ownership Planning	a	Identified critical habitat within forest boundary will be placed in Ownership Group III, available for exchange.
L.	Facilities		
	1. Transportation System Planning	a	Location of new roads shall not adversely impact mountain goat habitat
		b.	Existing open-road density in spring and summer range should average 2 miles per square mile of contiguous habitat
	2. Road Construction and Reconstruction	a.	Construction and reconstruction activities shall be timed to avoid conflict with mountain goat habitat use.
P.	Protection		
	1. Fire Management Planning	a	Forest-wide Fire Protection Group E3 applies.
	2. Forest Pest Management	a	Utilize integrated pest management techniques except where use of chemical pesticides conflicts with objectives of managing mountain goat habitat
		b	Use of pesticides that jeopardize desirable forage shall be discouraged.

20 CEDAR RIVER MUNICIPAL WATERSHED (CITY OF SEATTLE)

Goal: Provide raw water at a level of quality and quantity which, with treatment by the purveyor, will result in a satisfactory and safe water supply. Production of timber products is allowed to the extent that the water quality goal is met. There is varying emphasis on other uses.

Description of Lands Where Prescription Applicable: The Watershed is comprised of private, municipal and National Forest lands totaling 90,495 acres in King County. This strategy applies to National Forest lands within the watershed that are not allocated to other management areas. National Forest lands are intermingled with City of Seattle and private lands in a checkerboard ownership pattern in the eastern portion of the watershed.

City of Seattle and private lands within the watershed are closed to the public. National Forest lands are open to public use. However, because the Forest Service does not own public rights on roads off of National Forest lands, the public has no road access to interior National Forest parcels and is restricted to use of National Forest lands that lay along the exterior boundary of the watershed. Some private use of interior National Forest parcels takes place via helicopter.

Timber regeneration harvest, sanitation harvest (salvage), and reforestation are the only significant silvicultural practices performed in the area by the Forest Service.

The final E.I.S. for the Cedar-Tolt Watershed Management Plan of 1979 provides that wildlife populations will fluctuate with available food supplies which in turn are directly affected by timber harvest. Threatened and endangered species are protected by state and Federal laws. Except for occasional small and scattered unsuitable or non-commercial timber stands, no specialized wildlife habitat areas are left for old growth dependent species.

Desired Future Condition: Varies by Intensity.

Intensities in this Management Prescription:

20A Current Direction. Exchange all National Forest lands to the City of Seattle.
20B Exchange National Forest Lands, City of Seattle Maintains Old Growth Habitat.
20C Retain National Forest Lands, Maintain Old Growth Habitat.

Intensity 20A: CURRENT DIRECTION. EXCHANGE ALL NATIONAL FOREST LANDS TO THE CITY OF SEATTLE

Desired Future Condition:

The Forest Service's ultimate objective within the watershed is to exchange National Forest lands therein to the City of Seattle in order to consolidate National Forest holdings elsewhere.

All mature timber on available commercial forest lands, within Management Area 20A, will be sold within about 30 years. Land exchanges will periodically follow the harvest of mature timber, every 5 to 10 years as logical blocks occur. The entire watershed would be owned by the City of Seattle in about 35 years.

Program Elements		Standards and Guidelines	
A.	Recreation		
	1. Visual Quality	a	Visual Quality Objective is maximum modification except for areas seen from the Pacific Crest National Scenic Trail where the standard will be retention foreground.
	2. American Indian Religious and Cultural Use	a	Meet Forest-wide Standards and Guidelines
	3 Facility Construction, Reconstruction, and Management	a.	No existing or planned developed recreation sites.
	4. Use Administration	a.	Dispersed use is permitted unless otherwise restricted.
	5. Trails Planning	a	Use of the Pacific Crest National Scenic Trail (PCNST) in the far eastern part of the watershed will be allowed to continue. No relocation is planned.
		b.	No new trails are planned
B.	Wilderness	a	Not applicable.
C.	Wildlife and Fish		
	1. Planning	a	Wildlife and fish management practices will be provided as described in the 1979 Cedar-Tolt Watershed Management Plan Environmental Impact Statement. Wildlife populations are allowed to fluctuate as a product of available food supply and habitat.
		b	Snags are left in numbers and distribution to meet minimum viable habitat requirements.
		c.	Except for occasional small and scattered unsuitable or non-commercial timber stands, no specialized wildlife habitat areas are left for old-growth dependent species.
		d	Identified nesting sites of any osprey, spotted owl or heron will be protected according to applicable laws and recommended practices contained in the State Forest Practices Act
	2. Threatened and Endangered Species	a.	Meet Forest-wide Standards and Guidelines
D.	Range	a.	Not applicable
E.	Timber		
	1. Timber Management Planning	a.	Timber Management Prescription 17, Intensity A, C, D Program Element E is applicable.
F.	Water, Soil, and Air		

1. Soil Resource Inventory	a.	Continue to update, monitor and record S-8 classified soils. Maintain inventory of areas in the TRI/GIS system.
2. Planning	a.	Use soil information when locating roads and harvest units.
3. Improvement	a.	Emphasize maintenance and improvement of water quality over other resources.
4. Administration/Management	a.	All operations are conducted in compliance with the 1962 Coop Agreement with the City of Seattle which includes prohibition of manufacturing, use of uniform road construction standards, and compliance with sanitary regulations. No overnight camping is allowed (applies only to Industrial Operations). Industrial operations must provide chemical toilets.
	b.	Prescribed slash burning is discouraged to protect residual seedlings, soil, water, and air quality.
	c.	Roads will not be constructed across S-8 classified soils and timber harvest will not be done on S-8 or J-8 lands.
5. Soil Resource Monitoring	a.	Timber harvest activities will result in no more than 10 percent of the project area having mineral soils exposed within the riparian zone or 15 percent outside the riparian zone.
G. Minerals and Geology	a.	National Forest lands were withdrawn from locatable mineral and mineral leasing activities (which includes minerals, oil and gas, and geothermal) by Public Law 97-350, 96 Stat. 1661 dated October 18, 1982. Extraction of common variety rock for road development needs is acceptable where water quality is not degraded.
H. Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J. Lands		
1. Special Use Management	a.	Approval will be recommended for only those special use authorizations compatible with over all management goals and direction for this area.
2. Rights-of-Way Grants	a.	Rights-of-Way and easements will be given or obtained as outlined in the 1962 Cooperative Agreement.
3. Land Ownership Planning	a.	Dispose of National Forest lands and timber toward meeting the municipal ownership goal for this area, following the land adjustment

			objective provided for this area in the 1962 cooperative agreement Accomplish exchange as rapidly as funding and other factors permit National Forest lands within the watershed fall in Group IV, dispose
		b	Retain right-of-way on Pacific Crest National Scenic Trail.
L	Facilities		
	1. Transportation System Planning	a	Road locations are jointly planned and reviewed in accordance with the 1962 Coop Agreement in order to minimize the miles of road constructed.
	2. Road Construction and Reconstruction	a	Road construction standards are used as jointly agreed, in accordance with the 1962 Coop Agreement
	3. Road Operation	a	Road maintenance operations, schedules, and standards are agreed to annually through cooperative meetings between Forest Service, municipal owner, and private owners
		b	The moratorium on herbicide use would continue to be honored.
		c.	Road maintenance is financed through cooperative maintenance agreements under Forest Service timber sale contracts, cost-share agreements, and haul permit charges.
		d.	Locked gates and gate watchmen services at main entries are provided to control access by road
P	Protection		
	1 Fire Management Planning	a.	All operations are subjected to fire regulations mutually developed by the City of Seattle and the Forest Service as provided by the 1962 Coop Agreement.
		b	Suppress all fires utilizing suppression strategies and resources compatible with fire intensity conditions and values.
		c	Prescribed fire has limited application Maintenance of vegetative cover is important to meeting resource objectives Some burning of piled debris may be done.
		d	Avoid the use of ground disturbing equipment within 100 feet of water courses Avoid the use of retardant within 200 feet of water courses. Firelines should be located away from streams, maintaining at least 50 feet

		between the stream course and fire lines if possible.
		e. Natural fuels shall normally be left in place for soil stability. Activity fuels shall normally be treated by utilization.
	2. Forest Pest Management	a. Integrated pest management permitted except where use of pesticides conflicts with water quality objectives.

INTENSITY 20B: EXCHANGE NATIONAL FOREST LANDS, CITY OF SEATTLE MAINTAINS OLD GROWTH HABITAT.

Desired Future Condition: Ownership of old-growth stands to be maintained as habitat for old-growth-dependent wildlife species would be transferred to the City of Seattle through land exchange with agreement that such conditions would be maintained. Land exchanges of other National Forest lands would proceed as in Intensity A after completion of the old growth exchanges. Because of the old growth wildlife habitat areas, less National Forest lands would be harvested and more wildlife habitat would be preserved. Objectives and commitments of the 1962 Cooperative Agreement would still be in effect except for modifications of the land exchange objective due to old growth wildlife habitat areas. Public recreation opportunities on National Forest lands would be unchanged from Intensity A.

Program Elements		Standards and Guidelines
A.	Recreation	
	1. Visual Quality	a. Visual management is applied only to those areas which can be viewed from the ground from areas outside the watershed.
	2. American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines.
	3. Facility Construction, Reconstruction, and Management	a. No existing or planned developed recreation sites.
	4. Use Administration	a. Dispersed use is allowed to continue but is not encouraged.
	5. Trails Planning	a. Use of the Pacific Crest National Scenic Trail (PCNST) in the far eastern part of the watershed will be allowed to continue. No relocation is planned.
		b. No new trails are planned.
B.	Wilderness	a. Not applicable.
C.	Wildlife and Fish	
	1. Planning	a. Specialized habitat areas for old-growth-dependent species are designated and precluded from timber harvest.

		b. No structural projects to enhance fish passage are planned.
	2. Threatened and Endangered Species	a Meet Forest-wide Standards and Guidelines
D.	Range	a. Not applicable.
E.	Timber	
	1. Timber Management Planning	a. Timber management intensity A or C (where applicable Timber is applicable
		b. The maximum size of created openings will be increased by 100% over regional standard 2-1 to 120 acres in Douglas fir type and 80 acres in all other types. This standard may be exceeded in accordance with the stated descriptions if any one of the exceptions in the regional standard is met A created opening under standard 2-2 will no longer be classified as a created opening once the area has been certified as a completed reforestation project (normally following the third-year exam). These standards were developed by the U.S.F S. and the City of Seattle in 1983 study entitled - "An analysis of the effects of Various Silvicultural Standards and Guidelines on National Forest Lands Within the Cedar River Watershed."
F	Water, Soil, and Air	
	1. Soil Resource Inventory	a Continue to update, monitor and record S-8 classified soils. Maintain inventory of areas in the TRI system
	2. Planning	a. Use soil information when locating roads and harvest units.
	3 Improvement	a. Emphasize maintenance and improvement of water quality over other resources.
	4. Administration/Management	a All operations are conducted in compliance with the 1962 Coop Agreement with the City of Seattle which includes prohibition of manufacturing, use of uniform road construction standards, and compliance with sanitary regulations. No overnight camping is allowed (applies only to Industrial Operations). Industrial operations must provide chemical toilets.
		b. Prescribed slash burning is discouraged to protect residual seedlings, soil, water, and air quality.
		c Roads will not be constructed across S-8 classified soils and timber harvest will not be done on S-8 or J-8 soils.

5. Soil Resource Monitoring	a.	Timber harvest activities will result in no more than 10 percent of the project area having mineral soils exposed within the riparian zone or 15 percent outside the riparian zone.
G. Minerals and Geology	a.	National Forest lands were withdrawn from locatable mineral and mineral leasing activities (which includes minerals, oil and gas, and geothermal) by Public Law 97-350, 96 Stat. 1661 dated October 18, 1982. Extraction of common variety rock for road development needs is acceptable where water quality is not degraded.
H. Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J. *Lands*		
1. Special Use Management	a.	Approval will be recommended for only those special use authorizations compatible with over all management goals and direction for this area.
2. Rights-of-Way Grants	a.	Rights-of-Way and easements will be given or obtained as outlined in the 1962 Cooperative Agreement.
3. Land Ownership Planning	a.	Old-growth stands to be retained for wildlife would be exchanged to the City of Seattle with patents reserving the U.S. Government's right to grant approval before proceeding with any ground-disturbing activity on these lands including road construction, salvage logging, or regular timber harvest. If any of these old-growth habitat areas were destroyed by wildfire, blowdown, or other catastrophe, the land exchange program would be halted until a suitable substitute area was acquired by the City, if available. The reservation to grant approval for management activities would expire when all National Forest lands within the watershed have been acquired by the City of Seattle.
	b.	The rate of land exchange and timber harvest would proceed at a faster rate than with Intensity A, taking about 10 years less to accomplish. Because of the old-growth wildlife habitat areas, less total National Forest land would be harvested. Objectives and commitments of the 1962 Cooperative Agreement would still be in effect except for modification of the land exchange scheme due to old-growth wildlife habitat areas.
	c.	Retain right-of-way on Pacific Crest National Scenic Trail.

L. Facilities		
1. Transportation System Planning	a.	Road locations are jointly planned and reviewed in accordance with the 1962 Coop Agreement in order to minimize the miles of road constructed.
2. Road Construction and Reconstruction	a.	Road construction standards are used as jointly agreed, in accordance with the 1962 Coop Agreement.
3. Road Operation	a.	Road maintenance operations, schedules, and standards are agreed to annually through cooperative meetings between Forest Service, municipal owner, and private owners.
	b	The moratorium on herbicide use would continue to be honored.
	c	Road maintenance is financed through cooperative maintenance agreements under Forest Service timber sale contracts, cost-share agreements, and haul permit charges
	d	Locked gates and gate watchmen services at main entries are provided to control access by road.
P. Protection		
1. Fire Management Planning	a	All operations are subjected to fire regulations mutually developed by the City of Seattle and the Forest Service as provided by the 1962 Coop Agreement.
	b	Suppress all fires utilizing suppression strategies and resources compatible with fire intensity conditions and values.
	c.	Prescribed fire has limited application Maintenance of vegetative cover is important to meeting resource objectives Some burning of piled debris may be done
	d.	Avoid the use of ground disturbing equipment within 100 feet of water courses. Avoid the use of retardant within 200 feet of water courses Firelines should be located away from streams, maintaining at least 50 feet between the stream course and fire lines if possible
	e	Natural fuels shall normally be left in place for soil stability Activity fuels shall normally be treated by utilization
2. Forest Pest Management	a.	Integrated pest management permitted except where use of pesticides conflicts with water quality objectives

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INTENSITY 20C: RETAIN NATIONAL FOREST LANDS, MAINTAIN OLD GROWTH HABITAT.

Desired Future Condition: Wildlife habitat for old-growth-dependent species and others would be maintained in accordance with the National Forest Management Act. The 1962 Forest Service objective of exchanging National Forest lands in the Watershed to consolidate National Forest ownership elsewhere would be terminated. Since National Forest holdings would be retained, the full range of silvicultural practices, including fertilization, would be utilized to emphasize timber production on those lands not being retained in an old-growth status. The Forest Service would pursue acquisition of public rights on roads leading to National Forest lands within the watershed. Objectives and commitments of the 1962 cooperative agreement would still be in effect except for and the acquisition of public rights on roads leading to National Forest lands.

Program Elements	Standards and Guidelines
A. Recreation	
1. Visual Quality	a. Visual Quality Objective is maximum modification.
2. American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines.
3. Facility Construction, Reconstruction, and Management	a. No developed sites exist and none will be planned for the area.
4. Use Administration	a. Dispersed use will be emphasized over other forms.
	b. No use of vehicles permitted off of roads.
	c. Water related recreation activities will be discouraged.
	d. Sanitation facilities will be provided at areas of concentrated public use such as public firewood cutting areas.
	e. Special signing and literature will be developed to inform public recreationists that they are in a domestic water supply watershed and of special precautions necessary to prevent pollution and/or contamination.
	g. Snowmobile use will be prohibited.
B. Wilderness	a. Not applicable.
C. Wildlife and Fish	
1. Planning	a. Specialized habitat areas for old-growth-dependent species are designated and precluded from timber harvest.
	b. No structural projects to enhance fish passage are planned.

2. Threatened and Endangered Species	a	Meet Forest-wide Standards and Guidelines.
D *Range*	*a.*	*Not applicable.*
E. Timber		
1. Timber Management Planning	a.	Program Element E Timber from Timber Management Prescription 17, Intensities A through H is applicable. Silvicultural prescription and economic analysis at the time an activity is planned will determine the appropriate intensity.
F. Water, Soil, and Air		
1. Soil Resource Inventory	a.	Continue to update, monitor and record S-8 classified soils Maintain inventory of areas in the TRI system.
2. Planning	a	Use soil information when locating roads and harvest units.
3. Improvement	a.	Emphasize maintenance and improvement of water quality over other resources.
4 Administration/Management	a	All operations are conducted in compliance with the 1962 Coop Agreement with the City of Seattle which includes prohibition of manufacturing, use of uniform road construction standards, and compliance with sanitary regulations. No overnight camping is allowed . Industrial operations must provide chemical toilets
	b	Prescribed slash burning is discouraged to protect residual seedlings, soil, water, and air quality
	c.	Roads will not be constructed across S-8 classified soils and timber harvest will not be done on S-8 or J-8 soils.
5. Soil Resource Monitoring	a	Timber harvest activities will result in no more than 10 percent of the project area having mineral soils exposed within the riparian zone or 15 percent outside the riparian zone.
G. Minerals and Geology	a.	National Forest lands were withdrawn from locatable mineral and mineral leasing activities (which includes minerals, oil and gas, and geothermal) by Public Law 97-350, 96 Stat. 1661 dated October 18, 1982. Extraction of common variety rock for road development needs is acceptable where water quality is not *degraded.*
H. Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.

J. Lands		
	1. Special Use Management	a. Approval will be recommended for only those special use authorizations compatible with over all management goals and direction for this area.
	2. Rights-of-Way Grants	a. Rights-of-Way and easements will be given or obtained as outlined in the 1962 Cooperative Agreement.
	3. Land Ownership Planning	a. The 1962 Forest Service objective of exchanging out of National Forest lands to consolidate National Forest ownership elsewhere would be terminated.
		b. National Forest lands would be placed in Group III, available for land exchange.
L. Facilities		
	1. Transportation System Planning	a. Road locations are jointly planned and reviewed in accordance with the 1962 Coop Agreement in order to minimize the miles of road constructed.
	2. Road Construction and Reconstruction	a. Road construction standards are used as jointly agreed, in accordance with the 1962 Coop Agreement.
	3. Road Operation	a. Road maintenance operations, schedules, and standards are agreed to annually through *cooperative meetings between Forest Service,* municipal owner, and private owners.
		b. The moratorium on herbicide use would continue to be honored.
		c. Road maintenance is financed through cooperative maintenance agreements under Forest Service timber sale contracts, cost-share agreements, and haul permit charges.
		d. Roads on which the Forest Service owns public rights will be open to public use. Information signs will be used to inform the public of any use restrictions or precautionary measures.
P. Protection		
	1. Fire Management Planning	a. All operations are subjected to fire regulations mutually developed by the City of Seattle and the Forest Service as provided by the 1962 Coop Agreement.
		b. Suppress all fires utilizing suppression strategies and resources compatible with fire intensity conditions and values.

		c. Prescribed fire has limited application. Maintenance of vegetative cover is important to meeting resource objectives. Some burning of piled debris may be done
		d Avoid the use of ground disturbing equipment within 100 feet of water courses. Avoid the use of retardant within 200 feet of water courses Firelines should be located away from streams, maintaining at least 50 feet between the stream course and fire lines if possible.
		e. Natural fuels shall normally be left in place for soil stability. Activity fuels shall normally be treated by utilization.
2. Forest Pest Management	a	Integrated pest management permitted except where use of pesticides conflicts with water quality objectives

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21 GREEN RIVER MUNICIPAL WATERSHED (CITY OF TACOMA)

Goal: Provide for the production of water at a level of quality which, with adequate treatment by the purveyor, will result in a satisfactory and safe water supply Timber production is emphasized to the extent that the water quality goal is met. There is varying emphasis on other uses

Description of Lands Where Prescription Applicable This prescription is applied to the approximately 36,000 acres of National Forest land within the Green River Watershed Such lands are located in an intermingled pattern in the eastern part of the Green River drainage About 9,000 acres of National Forest Land are currently being considered under the existing Memorandum of Understanding for land exchange

Intensities in this Management Prescription

21B TIMBER HARVEST PERMITTED, MOST RECREATION PROHIBITED.

Desired Future Condition Public recreation will be prohibited except for those persons authorized to participate in special controlled big game hunts and for recreation use of the Pacific Crest National Scenic Trail

Program Element		Standards and Guidelines
A. Recreation		
1. Visual Quality	a	Manage to a maximum modification visual quality standard except in areas seen from the Pacific Crest National Scenic Trail.
2. American Indian Religious and Cultural Use	a	Meet Forest-wide Standards and Guidelines.
3 Facility Construction, Reconstruction Management	a.	No developed recreation sites exist Construct no new sites

	4. Use Administration	a. Recreation use prohibited except for use of the Pacific Crest National Scenic Trail (PCNST) and persons authorized to participate in special controlled big game hunts by permit.
		b. No overnight camping allowed by participants in special controlled hunts.
B.	Wilderness	a. Not applicable.
C.	Wildlife and Fish	
	1. Planning	a. Meet Forest-wide Standards and Guidelines.
		b. Cooperate with the Washington State Department of Fisheries and Department of Game in restoration and enhancement of fisheries habitat and the stocking of resident and anadromous fish within the area.
D.	Range	a. Not applicable.
E.	Timber	
	1. Timber Management Planning	a. Program Element E from Timber Management Prescription 17, intensities A through H are applicable. Silvicultural prescription and economic analysis at the time an activity is planned will determine the appropriate investment level.
F.	Water, Soil, and Air	
	1. Soil Resource Inventory	a. Continue to update, monitor, and record S-8 classified soils. Maintain inventory of areas in TRI/GIS system.
	2. Planning	a. Use soil information when locating roads and harvest units.
	3. Improvement	a. Emphasize maintenance and improvement of water quality over other resources.
	4. Administration/Management	a. Industrial operations must provide a means of disposing of human wastes and litter and restoration of the site upon removal of overnight facilities.
		b. Cooperate with the Washington State Department of Social and Health Services and the City of Tacoma in providing data that would be helpful in the study of the watershed and water quality.
		c. Prescribed slash burning is discouraged to protect residual seedlings, soil, water, and air quality.
		d. Roads will not be constructed across S-8 classified soils and timber harvest will not be done on S-8 or J-8 soils.

		e.	Timber harvest activities will result in no more than 10 percent of the project area having mineral soils exposed within the riparian zone or 15 percent outside the riparian zone.
		f.	Meet at least annually with the City of Tacoma to review work plans, anticipated contractor or permittee work within the drainage, informational or educational materials referencing activities within the drainage, and other issues of mutual interest.
G.	Minerals and Geology	a.	National Forest lands were withdrawn from locatable mineral and mineral leasing activities (which includes minerals, oil and gas, and geothermal) by Public Law 97-350, 96 Stat. 1661 dated October 18, 1982. Extraction of common variety rock for road development needs is acceptable where water quality is not degraded.
H.	Rural Community and Human Resources	a	Meet Forest-wide Standards and Guidelines
J.	Lands		
	1. Special Use Management	a	Approval will be recommended only for those special uses compatible with overall management goals and direction for this area.
	2. Land Ownership Planning	a.	Applicable details are found in the Memorandum of Understanding between the Forest Service and the City of Tacoma, dated August 29, 1984, F.S. Control #84-06-58-5.
		b.	National Forest lands are in ownership Group III and IV. (Group III - available for land exchange and Group IV - available for disposal through land exchange).
L.	Facilities		
	1. Transportation System Planning	a.	Meet Forest-wide Standards and Guidelines.
	2. Road Construction and Reconstruction	a.	Perform and administer road construction/reconstruction activities to stay within the water quality goal for this area.
	3. Road Operation	a.	Road maintenance is financed through cooperative maintenance agreements under Forest Service timber sale contracts, cost share agreements, haul permit charges and appropriated funding.
		b	Refer to Forest Service-Corps of Engineers joint Memorandum of Understanding No. DA(S) 45-108-CIVENG-60-10 which describes administration and maintenance agreements on Road 54 from the west watershed entry to the end of the Corps of Engineers' ownership.

P. Protection		
1.	Fire Management Planning	a. Forest-wide Fire Protection Group E applies.
2.	Forest Pest Management	a. Integrated pest management is permitted except where the use of pesticides conflicts with water quality objectives.

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22 SULTAN RIVER MUNICIPAL WATERSHED (CITY OF EVERETT)

Goal: Provide water at a level of quality and quantity which with treatment by the purveyor, will result in satisfactory and safe water supply. There is emphasis on providing for other uses.

Description of Lands Where Prescription Applicable: This prescription is applied to approximately 16,800 acres of National Forest land within the Sultan River watershed. It excludes the private and municipal ownership in the watershed.

Desired Future Condition: Varies by Intensity.

Intensities in this Management Prescription:

22A Closed Watershed, Except for Production of High Quality Water and Hydropower, Exchange National Forest Lands.

22C Retain National Forest Land, and Full Multiple Use.

INTENSITY 22A: CLOSED WATERSHED, EXCEPT FOR PRODUCTION OF HIGH QUALITY WATER AND HYDROPOWER, EXCHANGE NATIONAL FOREST LANDS.

Desired Future Condition: National Forest land will be owned and managed by another party, either private, state, or municipal. The Forest Service will relinquish all rights except those necessary for the Federal Power Withdrawal (FERC Project No. 2157). While lands remain in the National Forest system, they will be managed to protect the watershed, produce hydropower and provide high quality water, with an emphasis on improving water quality.

Program Elements		Standards and Guidelines
A.	Recreation	
1.	Recreation Planning	a. No recreation activities permitted.
2.	Visual Quality	a. Meet Forest-wide Standards and Guidelines.
3.	American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines.
4.	Facility Management	a. Close existing sites and facilities. No recreation activities permitted.
5.	Trail Planning	a. Abandon existing trails, no recreational activities permitted.
B.	Wilderness	a. Not applicable.

C	Wildlife and Fish		
	1 Habitat Improvement	a	No activities permitted. Natural processes will determine the habitat.
D.	Range	a	Not applicable.
E	Timber		
	1 Timber Management Planning	a.	No additional timber harvest permitted beyond completion of timber sales under contract
		b	Timber management intensities A-H should be applied if they meet the requirements of this management prescription.
		c.	Salvage harvest permitted.
	2. Timber Stand Improvement	a	No activities permitted
F.	Water, Soil and Air		
	1. Improvement	a	Meet Forest-wide Standards and Guidelines
		b	Emphasize maintenance and improvement of water quality No additional ground-disturbing activities Bank stabilization and erosion control of natural and existing bare areas is encouraged to reduce turbidity, bed load and sedimentation
G	Minerals and Geology	a	Meet Forest-wide Standards and Guidelines
H.	Rural Community and Human Resources	a	Meet Forest-wide Standards and Guidelines.
J	Lands		
	1 Special Use Management	a	Administer special use permit for FERC license
	2. Right-of-Way Grants	a	Grant right-of-way to access state, municipal, and private lands
	3 FERC License and Permits	a	Continue current FERC license, no new permits issued for hydroelectric projects
	4 Withdrawals, Modifications and Revocations	a	Withdraw all non-claimed lands from mineral entry. Revoke all power withdrawals not currently licensed.
	5 Land Ownership Planning	a	Group IV - available for disposal through land exchange.
L.	Facilities	a	No new roads, trails or facilities permitted except as needed for timber harvest administration of hydroelectric project, fire suppression, and right-of-way access.
P.	Protection		
	1. Fire Management Planning	a	Forest-wide Fire Protection Group E (2) applies

	2. Forest Pest Management	a. Integrated pest management permitted except where the use of pesticides conflict with water quality objectives.

INTENSITY 22C: RETAIN NATIONAL FOREST LAND, AND FULL MULTIPLE USE.

Desired Future Condition: The National Forest land will be retained. Lands will be managed to emphasize the output of timber products, the development of recreation potential, and to provide a range of other uses and outputs. Emphasis is on meeting Washington State minimum legal standards for water quality and producing high levels of fish/wildlife habitat, recreation, and timber outputs.

Program Elements		Standards and Guidelines
A.	Recreation	
	1. Recreation Planning	a. Recreation site development is encouraged. No restriction on activities such as swimming, motor boats, etc. Dispersed recreation is permitted.
		b. The applicable Standards and Guidelines for developed recreation are found in Management Prescription 3A, program element A, Recreation.
	2. Visual Quality	a. Meet Forest-wide Standards and Guidelines.
	3. American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines.
B.	Wilderness	a. Not applicable.
C.	Wildlife and Fish	
	1. Habitat Improvement	a. Meet Forest-wide Standards and Guidelines. Projects to improve habitat are encouraged.
D.	Range	a. Not applicable.
E.	Timber	
	1. Timber Management Planning	a. Program element E from Timber Management Prescription 17, intensities A through H are applicable. Silvicultural prescription and economic analysis at the time an activity is planned will determine the appropriate investment level.
F.	Water, Soil and Air	a. Meet Forest-wide Standards and Guidelines. Emphasis on enhancement of riparian habitats.
G.	Minerals and Geology	a. Meet Forest-wide Standards and Guidelines.
H.	Rural Community and Human Resources	a. Meet Forest-wide Standards and Guidelines.
J.	Lands	
	1. Special Use Management	a. Special use permits compatible with this intensity.

	2 Land Ownership Planning	a	Group III - available for land exchange.
L.	Facilities	a.	Meet Forest-wide Standards and Guidelines.
P.	Protection		
	1. Fire Management Planning	a	Forest-wide Fire Protection Group E (2) applies.
	2 Forest Pest Management	a	Integrated pest management permitted except where the use of pesticides conflict with water quality objectives.

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23 OTHER MUNICIPAL WATERSHEDS

Goal: Provide water at a level of quality and quantity which, with treatment by the purveyor, will result in satisfactory and safe water supply with varying emphasis on timber production, recreation, and other uses.

Description of Lands Where Prescription Applicable This prescription is applied to the small municipal watersheds of the Forest not covered in Management Prescriptions 20, 21, and 22 Watersheds are found throughout the Forest and at varying elevations. Most are forested old growth, second growth, and plantations. Access is generally by road.

Desired Future Condition Common to all Intensities

A varying mix of timber, recreation, wildlife and other resource use The primary emphasis will be to meet the above stated goal for a municipal watershed.

Intensities in this Management Prescription

23B NO TIMBER HARVEST, LIMITED RECREATION OPPORTUNITIES.

Program Element		Standards and Guidelines
A.	Recreation	
1. Recreation Planning	a	Discourage water contact recreation activities.
	b	No developed recreation facilities unless they are needed to protect water quality
	c	No overnight use
	d	Closed to ORV use.
2. Visual Quality	a	Visual Quality Objective will range from retention to modification
3. American Indian Religious and Cultural Use	a.	Meet Forest-wide Standards and Guidelines.
4. Trail Planning	a.	Maintenance and reconstruction of existing trails may continue. No new trail development

B. Wilderness		a. Not applicable.
C. Wildlife and Fish		a. Meet Forest-wide Standards and Guidelines.
D. Range		a. Not applicable.
E. Timber		
	1. Timber Management Planning	a. No scheduled harvest.
F. Water, Soil, and Air		a. Meet Forest-wide Standards and Guidelines.
G. Minerals and Geology		a. Additional mitigation and rehabilitation measures may be required to protect water quality. These measures will be determined through the NEPA process.
H. Rural Community and Human Resources		a. Meet Forest-wide Standards and Guidelines.
J. Lands		
	1. Rights-of-way Grants	a. Meet Forest-wide Standards and Guidelines.
	2. FERC License and Permits	a. Activity to be analyzed through NEPA process to determine its effect on water quality. Only permitted if water quality and minimum flows are maintained.
	3. Land Ownership Planning	a. Acquire and/or dispose of land as needed. Lands are in Group III.
L. Facilities		
	1. Transportation System Planning	a. New roads will be limited to those required to access public or private lands beyond the watershed.
		b. Roads must be located to meet water quality objectives.
	2. Road Construction, Reconstruction and Operation	a. Only those construction/ reconstruction practices that meet water quality objectives will be allowed. Water quality problems caused by construction should be given a high priority for corrective action.
		b. Road cut-and-fill slopes that may adversely effect water quality will be protected with erosion and/or sediment control. Final stabilization practices should include vegetation as well as structures.
		c. All roads not receiving annual maintenance will have measures to control road surface and ditch water.
		d. Temporary structures installed to impound water for road maintenance will be removed after use.

P	Protection		
	1. Fire Management Planning	a	Forest-wide Fire Protection Group A applies.
		b	Rehabilitation needs should be evaluated for all sizes of fires.
		c	Temporary structures installed to impound pumper chance water sources will be removed immediately after use.
	2 Forest Pest Management	a.	Integrated pest management is permitted except where use of pesticides conflicts with water quality objectives.

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24 MINIMUM MANAGEMENT — Goal: Manage National Forest lands to meet basic stewardship responsibilities at minimum costs.

Description of Lands Where Prescription Applicable: The prescription applies to identified lands throughout the Forest.

Desired Future Condition: *Provide for natural ecological processes compatible with meeting* the strategy goal.

Management is necessary to· Protect life, health, and safety of incidental users, prevent unacceptable environmental damage to National Forest lands or resources of adjoining ownerships and downstream areas administer non-Forest Service special uses leases, and permits, retain National Forest land in Federal ownership, and protect Federal property from theft and damage

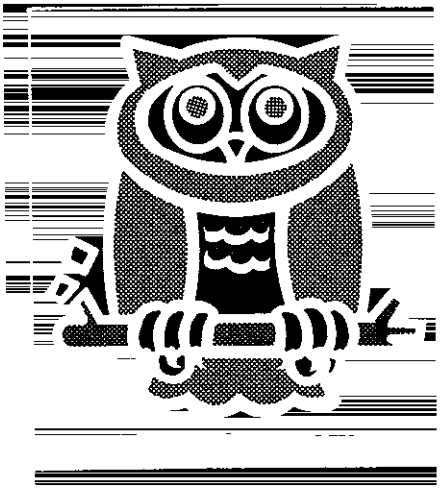
Intensities in this Management Prescription: None

Program Element		Standards and Guidelines
A.	Recreation	
	1. *American Indian Religious and* Cultural Use	a. *Meet Forest-wide Standards and Guidelines.*
	2 Trail System Planning	a Only that level of trail system management needed to protect the life health and safety of incidental users should be provided (e g signing trails).
B	Wilderness	a Not applicable.
C	Wildlife and Fish	
	1 Wildlife/Fisheries Cooperation with States and Other Agencies	a. Only the minimum level of cooperation with State and other Federal agencies and groups necessary to support regulation of incidental hunting and fishing use
	2. Threatened and Endangered Species	a Meet Forest-wide Standards and Guidelines
D	Range	a. Not applicable.

E. Timber		
1. Timber Management Planning	a.	Incidental harvest only to protect the life, health, and safety of incidental Forest users or to correct or prevent damage to Federal property or adjacent land and resources.
F. Water, Soil, and Air		
1. Soil and Water Resource Monitoring	a.	Meet Forest-wide Standards and Guidelines.
	b.	A level of soil monitoring commensurate with the need to prevent soil damage on the Forest or adjacent lands.
G. Minerals and Geology	a.	Level of activity necessary to protect surface resources and administer all privately held mineral rights for oil and gas, coal, energy and non-energy minerals.
H. Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J. Lands	a.	Administer unavoidable non-Forest Service special uses. Inventory and resolve all new encroachments and only those existing encroachments that damage or threaten to damage resources on National Forest land. Boundary line location will be done to the extent necessary to carry out resolution of encroachment.
L. Facilities		
1. Road Maintenance	a.	Only that road system management needed to protect the life, health, and safety of incidental Forest users, such as signing, gating, or otherwise closing roads, and maintenance to the extent necessary for basic custodial care and the correction or prevention of damage to adjacent land and resources.
2. FA & O Maintenance	a.	All activities normally occurring under this code for those facilities necessary to carry out National Forest functions.
P. Protection		
1. Fire Management Planning	a.	Initial attack forces provide the level of fire detection and suppression activities needed to protect adjacent lands and the health and safety of nearby residents.
2. Law Enforcement	a.	Provide the level of law enforcement necessary to enforce existing rules relating to the incidental Forest user as well as laws applying to public land; e.g., posted road and trail closures, timber theft.
	b.	Provide the level of cooperative law enforcement activities with local authorities

		to enforce State and local laws applicable to incidental Forest users.
3.	Forest Pest Management	a. Provide the level of suppression needed to protect adjacent lands from insect and disease epidemics on National Forest land

Appendix



APPENDIX E

WILD AND SCENIC RIVERS

Introduction

Congress enacted Public Law 90-542 on October 2, 1968 known as the Wild and Scenic Rivers Act, which established a National Wild and Scenic Rivers System. The intent of Congress in establishing a national system of Wild and Scenic Rivers is stated in Section 1(b) of the Act:

> "The Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes."

More specifically, Congress established a policy:

> "It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations."

The Act named eight rivers as "instant" components of the National System and named "study rivers" for potential additions to the National System. Additional rivers not mentioned may be added to the System. The Act directs the Secretaries of Agriculture and Interior to: "make specific studies and investigations to determine which additional wild, scenic, and recreational river areas within the United States shall be evaluated in planning reports by all agencies as potential alternative uses of the water and related land resources involved "

Under this direction, the Heritage Conservation and Recreation Service (HCRS) in August 1980 released an inventory of rivers that were in a relatively natural, undeveloped condition. Eight rivers or portions of rivers on the Mt. Baker-Snoqualmie National Forest were listed. A revised inventory in 1982 published by the National Park Service listed an additional eight rivers as potentially eligible for designation.

In addition to NPS inventory rivers, the Regional Forester directed that all forests examine for eligibility any river that was requested by a public interest group or a large number of individuals. Thirty-one rivers or extensions of rivers were added for study as a result of environmental or recreation user group interest.

In summary, 47 rivers were studied for eligibility, covering approximately 765 miles of river. These were presented in the Draft EIS for the Forest Plan. Five of these rivers were determined to be eligible and were recommended in the Draft preferred alternative for designation into the Wild and Scenic River System.

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Table E-1

Eligibile Rivers Studied for Designation - In Miles

Inventoried River	Total Studied	USFS Inside Wilderness	Inside National Park	Private	Found Suitable, Recommended for Designation - Alt J
Silesia Creek	10.4	6.4	4.0	0.0	0.0
North Fork Nooksack	43.3	1.3	2.2	31.8	43 3
Wells Creek	6.0	1.5	0.0	0.1	0.0
Middle Fork Nooksack	20.0	1.0	0.0	9.1	0.0
South Fork Nooksack	39.5	1.0	0.0	32.1	9.6
Bell Creek	3.0	0.0	0.0	0 0	3.0
Baker River	13.3	0.0	10.0	0.0	13.3
Noisy Creek	6.1	2.4	2.7	0.7	6.1
Diobsud Creek	10.5	6.0	0.0	1.1	10.5
Illabot Creek	15.3	4.3	0.0	4.3	15.3
Buck Creek	11.1	10.1	0.0	0.0	11.1
Downey Creek	10.8	10.0	0.0	0.0	10.8
White Chuck River	22.5	10.5	0.0	0 0	22.5
North Fork Sauk River (Extension)	9.2	9.0	0.0	0.0	9 2
South Fork Sauk River (Extension)	8.4	1.0	0.0	0.3	0.0
North Fork Stillaguamish	49.8	0.0	0.0	35.9	0.0
North Branch	5.1	0 0	0.0	0.0	0.0
Deer Creek	23.5	0.0	0.0	9.1	0.0
Boulder River	13.0	9.0	0.0	1.0	13.0
South Fork Stillaguamish	52.5	0.0	0.0	31.0	52.5
Canyon Creek (to fork)	11.9	1.3	0.0	0 5	0.0
South Fork Canyon Creek	8.4	0.0	0.0	9 7	0.0
Skykomish River including South Fork Skykomish	48.6	0.0	0.0	44.1	28 3
North Fork Skykomish	28.6	6.8	0.0	5.4	28.6
Troublesome Creek	4.5	2.3	0.0	0 0	4.5
West Cady Creek	7.5	2.5	0 0	0 2	7 5
Tye River	14.5	0 0	0 0	2.0	14.5
Miller River (to fork)	3 7	0.0	0.0	0.8	3.7
West Fork Miller River	6.3	2.1	0.0	0.2	6.3
East Fork Miller River	6 8	0.8	0.0	0 0	6 8
Foss River (to fork)	4.4	0.0	0.0	1 1	4 4
West Fork Foss River	4.6	3.1	0 0	0 8	4 6
East Fork Foss River	7.9	6.7	0 0	0 5	7.9
Beckler River	13.5	0.0	0.0	3 2	0.0
Rapid River	13.0	7.0	0.0	1.7	0.0
Deception Creek	10.3	9.8	0.0	0.0	10.3
South Fork Tolt River	5.4	0.0	0.0	2.0	0 0
North Fork Snoqualmie River	26.2	1.0	0.0	18.1	12.1
Lennox Creek	7.2	0.3	0.0	0.0	0 0
Middle Fork Snoqualmie	39.7	6.4	0.0	15 0	39.7
Taylor River	8.2	1.2	0 0	0 2	8.2
Pratt River	9.5	1 6	0.0	1.2	9 5
South Fork Snoqualmie River	30.6	0.0	0.0	19.5	0.0
Carbon River	32.4	0.0	9.0	21.7	0.0
White River	37.7	0.0	13.3	15.9	37.7
Clearwater River	9.8	3.6	0.0	5.8	0.0
Greenwater River	21.4	8.4	0.0	4.5	0.0
	795.9	138.4	41.2	330.6	451.8

Public comment on the Draft EIS indicated overwhelming support for Wild and Scenic River designation. Almost 2,000 letters, response forms and petitions were received. Every river studied except Silesia Creek was mentioned by name by at least one respondent. The Pratt River was cited by 1,405 respondents. There was strong support from the public and other agencies to reevaluate rivers using a less strict criteria for eligibility, and to assess an additional four rivers not previously reviewed.

Eligibility was re-evaluated on 51 rivers. A group of Forest Service and non-Forest Service specialists were assembled to develop new eligibility definitions and to review additional resource data. As a result, 47 rivers were determined to be eligible for consideration as additions to the Wild and Scenic River System.

This report assesses the eligibility of these rivers, including river miles that are outside the forest boundary. For each river determined eligible, a determination is made of its suitability for inclusion into the National Wild and Scenic Rivers System and its recommended classification of wild, scenic, or recreational.

The 47 rivers listed in this Appendix total 795.9 miles. Table E-1, on the previous page, lists these rivers. Note that portions of these rivers are outside the National Forest boundary, thus requiring cooperative management agreements between the federal government and landowner or other governing body, should the river be designated. Also, there are many encumbered acres showing withdrawals or other private rights.

The Skykomish River System has been designated by the State of Washington as a Scenic River under provisions of the State Scenic River System Act (RCW 79 72). This designation only applies to city, county, and state lands; it does not apply to Federal lands or private property. This river features runs of anadromous fish, bald eagle feeding and perching areas, old growth habitat, and a variety of boating opportunities.

For convenience, some of the listed rivers have been combined for analysis. For example, the east and west forks of the Miller River are described along with the main stem of the Miller

Eligibility Determination

The initial phase of the Wild and Scenic River Study process is to determine if each river or segment of river is eligible for inclusion in the National Wild and Scenic Rivers System. In order to make this determination, it is necessary to interpret Section 1(b) of the Wild and Scenic Rivers Act (Public Law 90-542), as quoted above

Generally, a river must be free-flowing and possess one or more "outstandingly remarkable" resource values. Because the Act does not specifically define "outstandingly remarkable," the Forest developed definitions that would distinguish those "outstandingly remarkable values" that are exceptional, unique, or unusual from a national or regional perspective

Following are definitions of the outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural and ecological values as used in this analysis

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Outstandingly Remarkable Value - An outstandingly remarkable value is one which is significantly above average for the state, region or nation, even though it may be fairly common within the Mt. Baker-Snoqualmie National Forest.

1. Scenic Value - The area contains a wide variety of unusual or distinctive land or water forms or vegetation patterns, or it contains an impressive example of one particular land or water form or vegetative pattern.

2. Recreation Value - The area provides a diversity of high quality recreation opportunities, or one exceptionally high quality recreation opportunity.

3. Geologic Value - The area displays an individual, unusual or unique geologic feature or a combination of several distinctive geologic features.

4. Fisheries Value - The area contains unique resident or anadromous values for "rare", "relatively rare", or "unique genetic variant" species managed by the State, or high species diversity, very high fish production, or unique fishing experiences. For this Forest, "rare" fisheries values include spring run chinook salmon. "Relatively rare" include sockeye salmon, sea-run Dolly Varden, and summer run steelhead. "Unique genetic variants" for the MBS includes early run coho salmon.

5. Wildlife Value - Habitats for species identified by federal or state agencies as threatened or endangered; or critical habitats of species of concern.

6. Historic Value - Historical events of regional or national interest have occurred within the area, or the area contains physical remains of historical events.

7. Cultural Value - The area contains scientific, paleontological, archeological or cultural resources.

8. Ecological Value - The area contains a high quality example of an unusual ecological community or a plant species of special interest listed by the state or federal government.

In applying these criteria the Forest assembled an interdisciplinary group to evaluate river eligibility. This group studied the information presented under the description for each river. In addition to the ID Teams professional judgement, information and ratings from other sources were used, including: The Nationwide Rivers Inventory, River Recreation in Washington: An Initial Inventory and Assessment, the Pacific Northwest Rivers Study - Washington, and other similar assessments. The results of this evaluation are presented below, in Table E-2.

Forty-seven rivers are judged to possess "outstandingly remarkable" resource features and, thus, eligibility for Wild and Scenic River designation.

Note that the rating criteria listed above do not mechanically or automatically indicate which rivers are eligible and suitable. The Forest has to exercise judgment not only on the specific criteria as they apply to a particular river, but on the river as a whole, and on their relative weights. For this reason, the evaluation guidelines are not absolutes.

Table E-2

"Outstanding Remarkable" Values

Inventoried River	Scenic	Recreation	Geolog.	Fish.	Wildlife	Hist/Cult.	Ecological
Silesia Creek					X		
Nooksack System							
N.F.Nooksack	X	X		X	X	X	
Wells Creek					X		
Bar Creek	. .	..None Present.....				.....	..
M F. Nooksack					X		
S.F. Nooksack				X	X		
Bell Creek					X		
Baker River	X			X	X		
Noisy Creek					X		X
Diobsud Creek		X			X		
Illabot Creek				X	X		
Skagit System							
S.F Cascade R	.....None Present.....				.....	.....	
Buck Creek				X			
Downey Creek				X	X		
Suiattle River (Ext)	... .	None Present.....			.	.....	... .
White Chuck River	X	X		X	X		
N F Sauk (exten)					X		
S F Sauk (exten.)	X				X		
Stillaguamish System							
N.F.Stillaguamish				X	X		
North Branch					X		
Deer Creek				X	X		
Boulder River				X	X		
S F. Stillaguamish	X	X		X	X	X	X
Jim Creek (to fork)	.....None Present.....						
Canyon Crk (to fork)				X			X
S.F. Canyon Creek				X	X		X
Skykomish System							
S F Skykomish	X	X		X	X		
N.F. Skykomish	X	X		X	X		
Troublesome Creek					X		
West Cady Creek					X		
Tye River	X	X		X	X	X	
Miller R (to fork)		X		X	X		
W F. Miller River		X		X	X		
E.F Miller River		X		X	X		
Foss River (to fork)		X		X	X		
W F. Foss River		X		X	X		
E.F. Foss River		X		X	X		
Beckler River		X		X	X		
Rapid River		X		X	X		
Deception Creek					X	X	
South Fork Tolt River				X			
Snoqualmie System							
N.F. Snoqualmie River		X		X			
Lennox Creek				X	X		
M F Snoqualmie River		X		X	X		
Taylor River		X		X			
Pratt River		X	X	X	X		X
S.F. Snoqualmie River					X	X	
Carbon River	X			X			
White River		X		X	X	X	
Clearwater River				X	X		
Greenwater River				X		X	

Classification of Eligible Rivers

The next step in studying potential Wild and Scenic Rivers was to evaluate eligible rivers and determine their classification. Classification was based on the relative level of development (existing land uses and access) within the river corridor. Each eligible segment qualified as one of three designation categories defined by the Wild and Scenic Rivers Act:

1. Wild river areas - These are rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

2. Scenic river areas - These are rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

3. Recreational river areas - These are rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Applying these criteria the Forest exercised its judgment in determining the most restrictive potential classification of the rivers. The results of the analysis are displayed in Table E-3, Classification of Eligible Rivers, on the following pages.

Potential classification may differ from the Forest Service Recommended classification. For these differences see narrative for each rivers in this appendix.

Table E-3
Classification of Eligible Rivers

Inventoried River	Class	Length (mi.)	Description
Silesia	Wild	10.4	Headwaters in N Cascades National Park in NW 1/4 of Sec 3, T 39N , R 10E., to Canadian border
N. F Nooksack	Wild	3 5	Headwaters in N. Cascades National Park in SW 1/4 of Sec. 30, T.39N , R 10E. to Mt Baker Wilderness boundary.
	Scenic	9.9	Mt. Baker Wilderness boundary to Nooksack Falls diversion dam
	Rec	1.6	Nooksack Falls diversion dam to Nooksack Falls power plant
	Scenic	18.8	Nooksack falls power plant to the fish hatchery near Kendall, Washington.
	Rec	9.5	Fish hatchery to the confluence with the South Fork Nooksack River
Wells	Wild	2.6	Headwaters at Galena Chain Lakes to Rd. 33 bridge, E edge Sec. 16, T.39N , R.8E
	Scenic	3.4	Road 33 bridge to confluence with N. Fork Nooksack River.
M F. Nooksack	Wild	2.7	Headwaters on Deming Glacier in NW 1/4 of Sec. 35, T.38N., R.7E to Ridley Creek.
	Scenic	10.2	Ridley Creek to diversion dam in NE 1/4 of Sec 19, T.38N., R.6E.
	Rec	7.1	Diversion dam to confluence with N. F. Nooksack River
S F Nooksack	Wild	2 3	Headwaters in SW 1/4 of Sec 9, T.37N., R 7E. to Bell Creek.
	Scenic	24 3	Bell Creek to Saxon Bridge in SE 1/4 of Sec. 21, T.37N., R.5E
	Rec.	12.9	Saxon Bridge to confluence with N. F Nooksack River.
Bell	Scenic	3 0	Headwaters on Loomis Mtn in NE 1/4 of Sec. 23, T 37N., R 7E., to confluence with S. F Nooksack River

Appendix E
Introduction

Baker	Wild	11.2	Headwaters in North Cascades National Park near Perfect Pass in NE 1/4 of Sec. 28, T.39N., R.11E. to Blum Creek.
	Scenic	2.1	Blum Creek to Baker Lake.
Noisy	Wild	6.1	Headwaters on Bacon Peak in SE 1/4 of Sec. 29, T.37N., R.10E. to Baker Lake.
Diobsud	Wild	8.3	Headwaters on Mt. Watson in SE 1/4 of Sec. 36 T.37N., R.9E. to south section line of Sec. 24, T.36N., R.10E.
	Rec.	2.2	South section line of Sec. 24 to confluence with Skagit River.
Illabot	Wild	4.3	Headwaters in NW 1/4 of Sec. 32, T 34N., R.12E. to Glacier Peak Wilderness boundary.
	Rec.	11.0	Glacier Peak Wilderness boundary to confluence with Skagit River.
Buck	Wild	10.1	Headwaters in NE 1/4 of Sec. 4, T.33N., R.12E. to Glacier Peak Wilderness boundary.
	Scenic	1.0	Glacier Peak Wilderness boundary to confluence with Suiattle River.
Downey	Wild	10.0	Headwaters on Lizard Mtn. in NW 1/4 of Sec. 13, T.33N., R.13E. to Glacier Peak Wilderness boundary.
	Scenic	0.8	Glacier Peak Wilderness boundary to confluence with Suiattle River.
White Chuck	Wild	10.5	Headwaters in NW 1/4 of Sec. 6, T.29N., R.14E. to Glacier Peak Wilderness boundary.
	Rec.	12.0	Glacier Peak Wilderness boundary to confluence with Sauk R.
N. F Sauk	Wild	9.2	Headwaters in SW 1/4 of Sec 19, T.29N., R.14E. to the boundary of the designated Wild and Scenic Skagit River in SE 1/4 of Sec. 29, T.30N., R.12E. (Glacier Peak Wilderness Boundary)
S. F Sauk	Wild	1.0	Headwaters in SE 1/4 of Sec. 28, T.29N , R.11E. to Henry M. Jackson Wilderness boundary.
	Scenic	7.4	Henry M. Jackson Wilderness boundary to confluence with Elliot Creek (to existing W & SR designation).

N. F. Stillaguamish	Rec.	49 8	Headwaters in SE 1/4 of Sec 17, T.34N., R.9E. to confluence with N. F Stillaguamish River
North Branch	Rec.	5 1	Headwaters in NE 1/4 of Sec. 12, T.33N., R.8E. to confluence with N F. Stillaguamish River
Deer	Rec.	23.5	Headwaters near Coney Pass in SW1/4 of Sec. 23, T.33N., R.8E. to confluence with N. F Stillaguamish River.
Boulder	Wild	9.0	Headwaters in SW 1/4 of Sec. 7, T.32N., R.9E to Boulder River Wilderness boundary.
	Rec.	4.0	Boulder River Wilderness boundary to confluence with N F Stillaguamish R.
S F Stillaguamish	Scenic	36 6	Headwaters between Morning Star and Lewis Peaks in NE 1/4 of Sec 14, T 29N., R.10E. to Canyon Creek
	Rec	15 9	Canyon Creek to confluence with N. F Stillaguamish River.
Canyon	Rec.	11 9	Confluence of N. and S. Forks Canyon Creek to confluence with S. F Stillaguamish River
S F. Canyon	Wild	1 3	Headwaters in NE 1/4 of Sec. 5, T.30N., R.9E., to Boulder River Wilderness boundary.
	Scenic	7 1	Boulder River Wilderness boundary to confluence with N. F. Canyon Creek.
N F. Skykomish	Wild	8 2	Headwaters in NW 1/4 of Sec 30, T 29N., R.10E. to end of F S. Road 63 in NW 1/4 of Sec. 10, T.28N , R 12E.
	Scenic	8.4	Road end to Troublesome Creek
	Rec	12 0	Troublesome Creek to confluence with S F Skykomish River.
S. F. Skykomish (& mainstem)	Rec	48 6	Confluence of Tye and Foss Rivers to confluence with Snohomish River.
Troublesome	Wild	4 4	Headwaters at Blanca Lake to FS Road 63
	Scenic	0.1	FS Road 63 to confluence with N. F. Skykomish River.

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West Cady	Wild	4.8	Headwaters in NE 1/4 of Sec. 13, T.28N., R.12E. to bridge in Sec. 21, T.28N., R.12E.
	Rec	2.7	Bridge to confluence with N. F. Skykomish River
Tye	Rec	14.5	Headwaters in SE 1/4 of Sec. 14, T.26N., R.13E. to confluence with Foss River.
Miller	Scenic	3.7	Confluence of E. and W. Forks Miller River to confluence with S. F. Skykomish River.
W. F. Miller	Wild	2 1	Headwaters in SE 1/4 of Sec. 31, T.24 1/2 N , R.11E. to Alpine Lakes Wilderness boundary.
	Scenic	4.2	Alpine Lakes Wilderness boundary to confluence with E. F Miller River.
E. F. Miller	Wild	0.8	Lake Dorothy to Alpine Lakes Wilderness boundary.
	Scenic	6.0	Alpine Lakes Wilderness boundary to confluence with W. Fk Miller River
Foss	Rec.	4 4	Confluence of E. and W. Forks Foss River to confluence with Tye River.
W. F Foss	Wild	3 1	Delta Lake to Alpine Lakes Wilderness boundary.
	Rec	1 5	Alpine Lakes Wilderness boundary to confluence with E. F. Foss River.
E. F. Foss	Wild	6 7	Headwaters at Lynch Glacier in SW 1/4 of Sec. 11, T.24N., R.13E. to Alpine Lakes Wilderness boundary.
	Rec	1.2	Alpine Lakes Wilderness boundary to confluence with W F. Foss River.
Beckler	Rec	13.5	Headwaters at Jack Pass in NW 1/4 of Sec. 31, T 28N., R 12E. to confluence with S. F Skykomish River
Rapid	Wild	7 0	Headwaters upstream from Janus Lake in SE 1/4 of Sec 13, T.27N., R.13E. to Henry M. Jackson Wilderness boundary.
	Scenic	6 0	Henry M. Jackson Wilderness boundary to confluence with Beckler River.
Deception	Wild	9.8	Headwaters at Trico Lake in SW 1/4 of Sec. 5, T 24N., R.14E., to Alpine Lakes Wilderness boundary.

	Rec	0 5	Alpine Lakes Wilderness boundary to confluence with Tye River
S. F Tolt	Rec	5.4	Headwaters in SE 1/4 of Sec 33, T.26N., R 10E. to Tolt Reservoir.
N F. Snoqualmie	Wild	1.0	Headwaters at Lake Kanim in SE 1/4 of Sec 11, T.25N., R 10E to Alpine Lakes Wilderness boundary.
	Scenic	5.1	Alpine Lakes Wilderness boundary to Lennox Creek.
	Rec	8.0	Lennox Creek to Wagner Bridge in NE 1/4 of Sec 20, T.25N , R.9E.
	Scenic	12.1	Wagner Bridge to confluence with M. F. Snoqualmie River.
Lennox	Wild	0 3	Headwaters in NW 1/4 of Sec. 36, T 25N., R.10E. to Alpine Lakes Wilderness boundary
	Scenic	6 9	Alpine Lakes Wilderness boundary to confluence with N. F Snoqualmie River
M. F. Snoqualmie	Wild	6 4	Headwaters near Dutch Miller Gap in NW 1/4 of Sec. 29, T.24N , R 13E to Alpine Lakes Wilderness boundary
	Scenic	29.1	Alpine Lakes Wilderness boundary to near community of Tanner in NW 1/4 of Sec 13, T 23N , R.8E.
	Rec	4 2	Near community of Tanner to confluence with N. F. and M F Snoqualmie River
Taylor	Wild	6.6	Snoqualmie Lake to Quartz Creek Road
	Scenic	1 6	Quartz Creek Road to confluence with M. F Snoqualmie River.
Pratt	Wild	9.5	Headwaters at Melakwa Lake in NE 1/4 of Sec. 25, T 23N., R.10E. to confluence with M. F. Snoqualmie River.
S. F Snoqualmie	Rec	30 6	Headwaters at Source Lake in NE 1/4 of Sec. 30, T 23N., R.11E., to confluence with Snoqualmie River
Carbon	Wild	4.0	Headwaters at Carbon Glacier on NW slopes of Mt. Rainier to Ipsut Creek.
	Rec	28 4	Ipsut Creek to confluence with Puyallup River.

White	Scenic	20.0	Headwaters at Emmons Glacier on northeast slopes of Mt. Rainier to Huckleberry Creek.
	Rec	17.7	Huckleberry Creek to confluence with Clearwater River.
Clearwater	Wild	3.6	Headwaters in Clearwater Wilderness on Bearhead Mtn. in NW 1/4 of Sec. 28, T.18N., R.8E. to Clearwater Wilderness boundary.
	Rec	6.2	Clearwater Wilderness boundary to confluence with White River.
Greenwater	Wild	8.4	Headwaters in Norse Peak Wilderness on Castle Mtn. is SW 1/4 of Sec. 5, T.17N., R.11E. to Norse Peak Wilderness boundary.
	Rec	13.0	Norse Peak Wilderness boundary to confluence with White River.
TOTAL 47 Rivers		795.9 miles	

Suitability Determination

The last stage in studying potential Wild and Scenic Rivers is to evaluate eligible rivers and determine if the rivers are suitable. This step provides the basis for the decision to recommend designation or non-designation of the river. Factors used to determine suitability were:

1 The characteristics which do or do not make the area a worthy addition to the National System.

2. The current status of land ownership and use in the area, including the amount of private land involved and the uses on such land.

3 The reasonably foreseeable potential uses of the land and water which would be enhanced, foreclosed, or curtailed if the area were included in the Wild and Scenic Rivers System, and the values which could be foreclosed or diminished if the area is not protected as part of the system.

4. Public, State, and local government interest in designation of the river.

5 Other issues and concerns identified during the planning process

If a river was found to be eligible, its suitability, including a recommendation for river classification (wild, scenic, and recreation), was considered in the analysis of alternatives in the environmental impact statement accompanying this forest plan

Rational for the Inclusion of Rivers in Each Alternative:

Alternative A: Consistent with the current situation, this alternative includes 15 rivers listed in the 1982 National Park Service Nationwide Rivers Inventory on natural and free-flowing rivers. The only exception is Jim Creek, which was found not to be eligible.

Alternative B: The high timber goals of this alternative preclude recommending any eligible river segments within the National Forest boundary for wild and scenic designation.

Alternative C: Consistent with the goals of emphasizing primitive and semi-primitive recreation, scenery, and fish and wildlife habitat, in this alternative, all 47 rivers found to be eligible are recommended for designation as part of the National Wild and Scenic River system.

Alternative G: In keeping with the theme of maintaining natural ecosystems, this alternative recommends that all 47 rivers found to be eligible be recommended for designation as part of the National Wild and Scenic River system.

Alternative H: This alternative carries forward the five rivers found eligible and suitable at the Draft stage of this planning effort.

Alternative I: The designation of Wild and Scenic Rivers is not consistent with the goals and objectives of this alternative.

Alternative J: The Preferred Alternative includes the 30 rivers that were determined to be suitable, and that met the goals and objectives of this alternative. This decision was based on the criteria listed on page E-13.

The next pages include the list of suitable rivers, by alternative.

Suitable Rivers, by Alternative

Alternative NC

No Rivers Recommended

Alternative B

No Rivers Recommended

Alternative A

North Fork Nooksack
Wells Creek
Middle Fork Nooksack
South Fork Nooksack
North Fork Stillaguamish
Boulder River
South Fork Stillaguamish
Canyon Creek
North Fork Skykomish
South Fork Skykomish
Tye
Beckler
Miller River (to fork)
Foss River (to fork)
Middle Fork Snoqualmie

Alternative C

Silesia Creek
North Fork Nooksack
Wells Creek
Middle Fork Nooksack
South Fork Nooksack
Bell Creek
Baker River
Noisy Creek
Diobsud Creek
Illabot Creek
Buck Creek
Downey Creek
Whitechuck River
North Fork Sauk River
(Extension)
South Fork Sauk River
(Extension)
North Fork Stillaguamish
North Branch
Deer Creek
Boulder River
South Fork Stillaguamish
Canyon Creek (to fork)
South Fork Canyon Creek
Skykomish River including
South Fork Skykomish
North Fork Skykomish
Troublesome Creek
West Cady Creek
Tye River
Miller River (to fork)
West Fork Miller River
East Fork Miller River
Foss River (to fork)
West Fork Foss River
East Fork Foss River
Beckler River
Rapid River
Deception Creek
South Fork Tolt River
North Fork Snoqualmie River
Lennox Creek
Middle Fork Snoqualmie
Taylor River
Pratt River
South Fork Snoqualmie River
Carbon River
White River
Clearwater River
Greenwater River

Alternative G

Silesia Creek	Tye River
North Fork Nooksack	Miller River (to fork)
Wells Creek	West Fork Miller River
Middle Fork Nooksack	East Fork Miller River
South Fork Nooksack	Foss River (to fork)
Bell Creek	West Fork Foss River
Bar Creek	East Fork Foss River
Baker River	Beckler River
Noisy Creek	Rapid River
Diobsud Creek	Deception Creek
Illabot Creek	South Fork Tolt River
South Fork Cascade River	North Fork Snoqualmie River
Buck Creek	Lennox Creek
Downey Creek	Middle Fork Snoqualmie
Suiattle River (Extension)	Taylor River
Whitechuck River	Pratt River
North Fork Sauk River	South Fork Snoqualmie River
(Extension)	Carbon River
South Fork Sauk River	White River
(Extension)	Clearwater River
North Fork Stillaguamish	Greenwater River
North Branch	Deer Creek
Boulder River	South Fork Stillaguamish
South Fork Canyon Creek	Canyon Creek (to Fork)
Skykomish River including	North Fork Skykomish
South Fork Skykomish	Troublesome Creek
West Cady Creek	

Alternative H

North Fork Nooksack
North Fork Skykomish
South Fork Skykomish
Tye River
Middle Fork Snoqualmie

Alternative I

No Rivers Recommended

Alternative J (Preferred)

North Fork Nooksack	Miller River (to Fork)
South Fork Nooksack	West Fork Miller River
Bell Creek	East Fork Miller River
Baker River	Foss River (to fork)
Noisy Creek	West Fork Foss River
Diobsud Creek	East Fork Foss River
Illabot Creek	Deception Creek
Buck Creek	North Fork Snoqualmie River
Downey Creek	Middle Fork Snoqualmie River
Whitechuck River	Taylor River
North Fork Sauk River (Extens.)	Pratt River
Boulder River	White River
South Fork Stillaguamish	
Skykomish River including	
South Fork Skykomish	
North Fork Skykomish	
Troublesome Creek	
West Cady Creek	
Tye River	

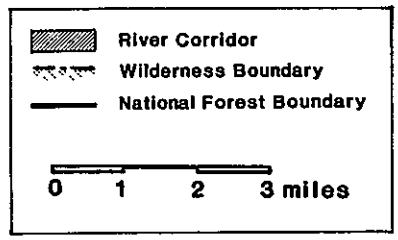
Wild and Scenic River Narratives

The remainder of this appendix includes the narrative assessment for the 47 rivers found to be eligible; a map and description including land use and resource values is included for each river. Also included, is the recommended river classification for the preferred alternative.

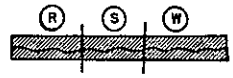
Note: For all river segments, the following list shows where more detailed information may be found:

Subject	Planning Document	Chapter/ Appendix
Affected Environment	FEIS	III
Direct Effects of Allocation	Summary	---
	FEIS	IV
	Appendix	E
Cumulative Effects on each Alternative on W&SR	FEIS	IV
Indirect Effects on Other Resources	FEIS	IV
Mitigation Measures	FEIS	IV
Management Area Descriptions	FEIS	II
	Plan	4
Recommended Classification	Plan	4
	Appendix	E
Monitoring Plan	Plan	5
Description of River and Attributes	Appendix	E
Eligibility Determination	Appendix	E
Preliminary Suitability	Appendix	E

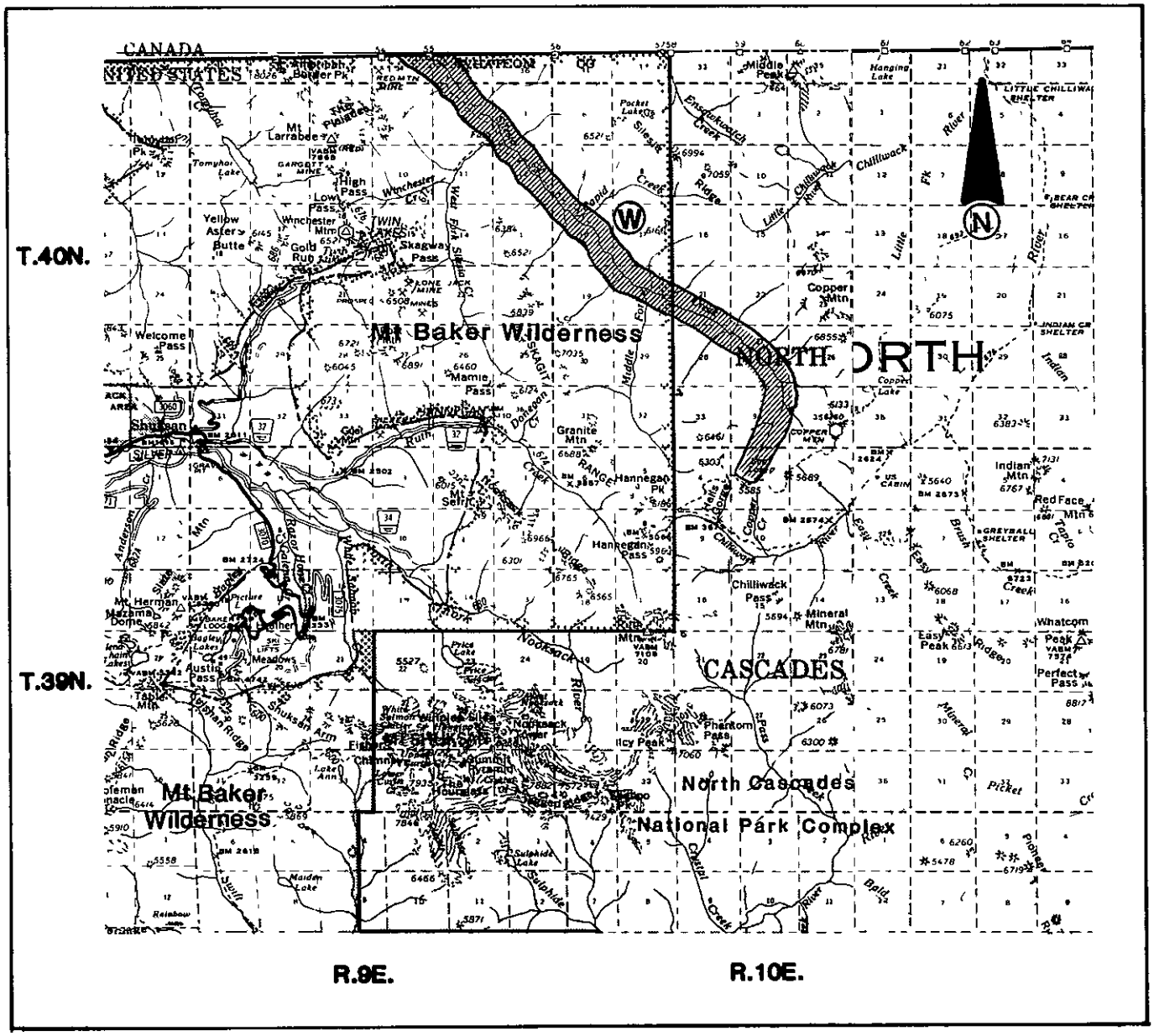
Silesia Creek



Potential River Classification



R - Recreational
S - Sconic
W - Wild



SILESIA CREEK

Whatcom County North Cascades National Park

Silesia Creek was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters at Egg Lake, located in the North Cascades National Park in the NW 1/4 of Sec. 3, T.39 N., R.10 E. northward through the Mt. Baker Wilderness to the Canadian border. The entire length of the Creek is located either in the Mt. Baker Wilderness or North Cascades National Park.

Segment 1 - Headwaters in North Cascades National Park in NW 1/4 of Sec. 3, T.39 N , R 10 E. to the Canadian border (10.4 miles).

RIVER MILEAGE:

Study:	10 4 miles
Eligible:	10.4 miles
Forest Plan·	0.0 miles recommended for designation in preferred alternative

Note: This recommendation is pending evaluation by the National Park Service.

OUTSTANDINGLY REMARKABLE VALUES: Silesia Creek was found to possess "Outstandingly Remarkable" values for the following· wildlife.

The creek contains a large summer range for deer and bear as well as habitat for cougar, bobcats and mountain goats. A SOHA is also located in the drainage, with two nesting pairs of owls

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	10.4	None recommended	0.0

SUITABILITY DETERMINATION

Silesia Creek was found to be not suitable for inclusion in the preferred alternative of the Forest Plan due to lack of public and other agency support and few outstandingly remarkable values The remarkable value present for this river was wildlife, specifically a SOHA, which is already well protected by wilderness. River designation would not improve protection.

Appendix E
Silesia Creek

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
NPS, North Cascades National Park	4.0 miles	1,280 acres
Mt. Baker-Snoqualmie National Forest (Mt. Baker Wilderness-6.4 miles)	6.4 miles	2,048 acres
Total	10.4 miles	3,328 acres 1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: A large portion of this river segment has been identified by the BLM as an "area of critical mineral potential". According to the Bureau of Mines MILS data, two past-producing gold mines are located in Sec. 34, T.41 N., R.9 E. and in Sec. 3, T.40 N., R.9 E. (the Boundary Red Mountain and Gold Basin Mines, respectively). Based upon the available information, it appears that these mines lie outside the subject river boundary. However, any extension of mineralization could lie within the river corridor.

In addition to these two reported occurrences, the literature references the Silesia Placers (Sec. 2, T.40 N., R.9 E.). However, they have no reported production or development of any significance (Garrett, Jr., C.R., 1968). According to M.H. Staatz and others (1972), some sampling has been done in the area, but the sampling did not prove to be positive. BLM mining claim recordation data (1/19/89) indicates that at least 53 mining claims have been located in the vicinity of this river segment. Of the 53 claims, only 20 are considered to have not been abandoned or have not been declared to be null and void. Those 20 claims lie within Sec. 34, T.41 N., R.9 E. It is not known which, if any, lie within the river corridor.

The northern 6 to 7 miles are classified by the BLM as being prospectively valuable for geothermal resources. None of the area is considered to be prospectively valuable for other leasable mineral commodities. None of the area is encumbered by mineral leases or pending lease applications.

Based upon the available information, it appears that the northern portion of the area does have at least a low potential for the occurrence of precious and base-metal mineral resources and a potential for the occurrence of geothermal resources. However, it also appears that the area contains no known mineral resource of more than nominal value, and no serious interest in developing mineral resources in the river corridor has been recently expressed.

WATER RESOURCE DEVELOPMENT: A small hydroelectric dam near the Canadian border was used to power a mill for Boundary Red Mountain Mine. This dam has not been in use since the early 1900's. It is barely noticeable today and does not impede the free flowing character of the river. The Northwest Power Planning Council classified the Silesia River as "Protected" from hydropower development.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: There are no existing or planned roads, bridges, homes, farms or campgrounds along Silesia Creek.

Silesia Creek Trail #672 runs up and down the stream from the confluence of the West and Main forks. The downstream trail follows Silesia Creek to the Canadian border, but is difficult to find in places due to low use. The upstream trail ends at an old fire camp near Rapid Creek.

RECREATION ACTIVITIES: Dispersed recreation use of Silesia Creek is low due to limited access.

Recreation Activities (in RVD's, for National Forest system lands only):

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	25	40
Camping	110	170
Viewing (scenery, wildlife, driving for pleasure)	15	25
Misc. (hike, picnic)	25	50
TOTAL	175	285

WILDLIFE AND FISHERIES: Silesia Creek contains habitat for various wildlife species including cougar, bobcats, black-tailed deer, mountain goat and bear. A SOHA is located in the drainage with two nesting pairs of owls.

Silesia Creek contains populations of native rainbow trout and dolly varden. The creek flows into the Chilliwack River, a tributary to Canada's Fraser River. The Chilliwack is an important anadromous fishery.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: Silesia Creek has a moderate stream gradient in its lower reaches. There are numerous small falls and rapids along its length. Small glaciers are found on Copper Mountain, located near the headwaters.

Water quality is excellent.

GEOLOGY: Silesia Creek passes through the steep and very rugged granitic mountains of the North Cascades. Continental and alpine valley glaciation has carved out a U-shaped valley and oversteepened the valley sidewalls. Lower sideslopes, dominated by stringers of conifers and brushy avalanche tracks, merge into massive, barren upper slopes where patches of snow often last through summer. Numerous side tributaries abound with waterfalls during spring runoff.

CULTURAL RESOURCES: No systematic archaeological survey has been made of Silesia Creek and no prehistoric sites have been recorded. The lack of sites may be a result of the lack of survey of the drainage. During the historic period, the area was within the territory of the Nooksack Indians. No localities used for traditional religious practices are known within the potential wild and scenic river corridor.

During the historic period, the main use of the drainage was for trail access to adjacent areas. A historic mining trail followed the drainage for a short distance before turning east at the West Fork. In the early 1950's, Forest Service crews constructed a trail shelter on the West Fork, just upstream from its confluence with the main branch of Silesia Creek. The shelter is still present, but it has been determined ineligible for the National Register of Historic Places.

TIMBER: No timber harvesting activities have occurred along the United States side of Silesia Creek. However, extensive logging has taken place on the Canadian side of the border. The entire length of this segment is in the Mt. Baker Wilderness, thus it is not available for logging.

SOCIO-ECONOMIC EFFECTS: Silesia Creek can be accessed only by trail. The nearest community is Glacier, 33 miles away. This community, traditionally supported by logging and timber products, has been economically changed by an influx of retirees and Canadian vacation homeowners, as well as an increasing number of visitors to this scenic and recreation area.

CURRENT ADMINISTRATION: From its headwaters to the boundary of the Mt. Baker Wilderness, approximately 4 miles of Silesia Creek flow through North Cascades National Park Service Complex Wilderness administered by the National Park Service. The remaining 6.4 miles flow through the Mt. Baker Wilderness area before the river crosses the border into Canada. The wilderness is administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for Silesia Creek for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 500	
Costs of Implementation		$ 200
Development of Management Plan		3,900
Development Costs	72,000	
Operation and Maintenance Costs	1,000	
TOTAL - First Five Years	**$73,500**	**$4,100**

General administration and operation and maintenance costs are estimated to continue at $300 annually.

NORTH FORK NOOKSACK RIVER

Whatcom County — North Cascades National Park

The North Fork Nooksack River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

The North Fork Nooksack River was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory (NRI) published by the National Park Service in 1982.

LOCATION: From its headwaters in the East Nooksack Glacier on Mt. Shuksan to the confluence with the South Fork of the Nooksack River.

Segment 1 - Headwaters in the North Cascades National Park in SW 1/4 of Sec. 30, T.39 N., R.10 E to the Mt. Baker Wilderness boundary in SW 1/4 of Sec 14, T.39 N , R.9 E (3.5 miles)

Segment 2 - Mt. Baker Wilderness boundary to Nooksack Falls diversion dam (9 9 miles).

Segment 3 - Nooksack Falls diversion dam to Nooksack Falls power plant (1.6 miles).

Segment 4 - Nooksack Falls power plant to the fish hatchery near Kendall, Washington (18 8 miles).

Segment 5 - Fish hatchery to the confluence with the South Fork Nooksack River (9.5 miles).

RIVER MILEAGE:

Study.	43.3 miles
Eligible:	43.3 miles
Forest Plan:	43.3 miles recommended for designation in preferred alternative

Note This recommendation is pending evaluation by the National Park Service portion of the river.

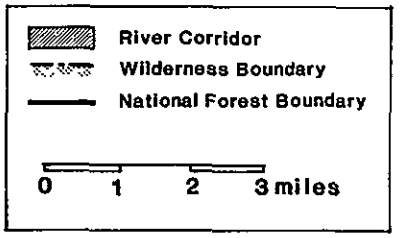
OUTSTANDINGLY REMARKABLE VALUES: The North Fork Nooksack River was found to possess "Outstandingly Remarkable" values for the following: scenic, recreation, fisheries, wildlife, and historical/cultural.

Scenic views of Mt. Shuksan and Mt. Baker can be viewed along the river. There are rapids near the confluence with Wells Creek and the 100-foot high Nooksack Falls.

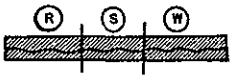
The river sustains substantial boating use with a significant potential for increased use. Glacier run-off allows boating from early spring to August.

The river provides habitat for a number of anadromous fish species, including an important spring chinook salmon run.

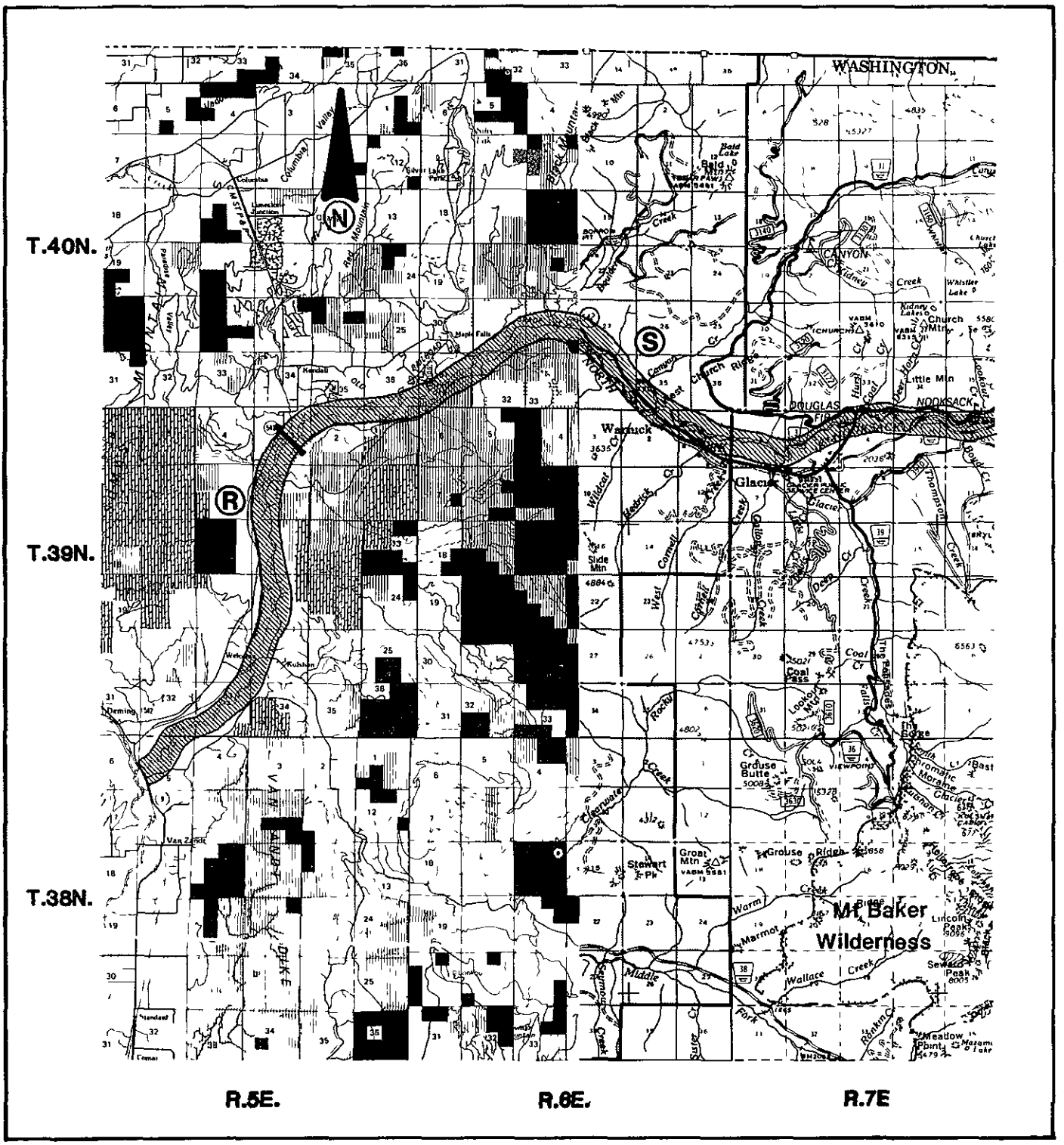
North Fork Nooksack River
(1)



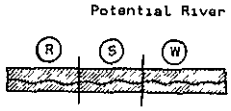
Potential River Classification



R - Recreational
S - Scenic
W - Wild



North Fork Nooksack River
(2)



Potential River Classification

R - Recreational
S - Scenic
W - Wild

River Corridor
Wilderness Boundary
National Forest Boundary

0 1 2 3 miles

T.40N.

T.39N.

T.38N.

R.8E

R.9E.

R.10E.

Mountain goats, trumpeter and tundra swans, spotted owls, black-tailed deer and the federally listed Threatened and Endangered bald eagle all inhabit the North Fork drainage.

The early logging history in the North Fork Nooksack Watershed can be interpreted at many sites. A miner's cabin is listed on the National Register of historic places. Likewise, the Nooksack Falls hydroelectric plant is listed on the Register. It is the second oldest and smallest plant in Washington.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	3.5	Wild	3.5
Segment 2	Scenic	9.9	Scenic	9.9
Segment 3	Recreation	1.6	Recreation	1.6
Segment 4	Scenic	18.8	Scenic	18.8
Segment 5	Recreation	9.5	Recreation	9.5

SUITABILITY DETERMINATION:

The North Fork of the Nooksack River was found to be suitable for inclusion in the preferred alternative of the Forest Plan due to the high number of outstandingly remarkable values, public support for designation, and interest of other public agencies. The North Fork of the Nooksack was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory published by the National Park Service in 1982. More recently, in 1988, the Washington State Scenic River Assessment included the North Fork as a river "possessing the natural, cultural, and recreational values that would make it a suitable addition to the Washington State Scenic Rivers System".

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
NPS, North Cascades National Park	2.2 miles	704 acres
Mt. Baker-Snoqualmie National Forest	1.3 miles	416 acres
(Mt. Baker Wilderness-1.3 miles)		
Segment 2		
Mt. Baker-Snoqualmie National Forest	9.9 miles	3,168 acres
Segment 3		
Nooksack Power Plant (Private)	1.6 miles	512 acres
Segment 4		
Mt. Baker-Snoqualmie National Forest	8.0 miles	2,560 acres
Private	7.4 miles	2,368 acres
State	3.4 miles	1,088 acres
Segment 5		
Private	9.5 miles	3,040 acres
Total	43.3 miles	13,856 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: Even though the subject area has no reported mineral resource production of significance, a small portion of Segment 2, near Price Lake, has been identified by the BLM as an "area of critical mineral potential". The Bureau of Mines MILS data and Moen (1969) indicate a number of reported mineral resource occurrences within or immediately adjacent to the river corridor. Of these occurrence the following appear to be of most interest:

The Great Excelsior (T.39 N., R.8 E., Sections 5 and 6): major exploration is on-going to determine if mineralization extends north and south of the presently identified ore body, which is reported to contain 5.9 million tons grading 0.033 ounces of gold and 2.047 ounces of silver per ton.

The Glacier Mine (T 39 N., R.7 E., Sections 4, 5, 8, 9): It is reported to have potential for the occurrence of copper, but to date no ore deposits worthy of development have been identified.

The First Chance Mine (T.40 N., R.8 E., Section 31): It is reported to contain mineralized rock carrying up to 0.75 ounces of gold per ton, however, an economically viable deposit has not been identified.

The Tooker Mine (T.40 N., R 8 E., Section 31): It is reported to contain disseminated pyrite and marcasite in altered Mesozoic volcanic and sedimentary rocks, which carries as much as 2.9 ounces of silver and 0.103 ounces of gold per ton.

Other prospected occurrences of copper, silver, gold, lead, zinc and stone are reported for T.40 N., R.8 E., Section 32 and 33, T.39 N., R.9 E , Section 6, T.40 N., R.8 E , Section 33. None of these are reported to be mineral deposits of significance.

BLM mining claim data indicates 292 mining claims have been located within or adjacent to the river lying between T.39 N., R.7 E. Section 5 and T.40 N., R.8 E., Section 34. Of these claims, 161 have not been abandoned or declared to be null and void. It is not known which of these, if any, actually lie within the river corridor.

The western 20 to 24 miles have been classified as being prospectively valuable for oil and gas with the eastern 33 miles classified prospectively valuable for geothermal resources. An area from one mile east of the town of Glacier westward has been classified prospectively valuable for coal resources. None of the area has reported occurrences of such commodities.

Based upon the available information, it appears that the section of the river lying near Sections 4, 5 and 6, T.39 N., R.8 E. and Sections 31, 32 and 33, T.40 N , R.8 E. has at least a moderate potential for the occurrence of locatable mineral resources. Also a portion of the river lying outside the previously described lands but between Section 5, T.39 N., R.7 E. and Section 34, T.40 N., R.8 E. has at least a low potential for the occurrence of locatable mineral resources. Numerous unpatented mining claims have been located and maintained along that portion of the river corridor, which does indicate a continuing interest in the area. Most of the interest appears to be concentrated on the Excelsior mine area. The area also has potential for the occurrence of oil and gas, coal and geothermal resources. However, the pre-existing lease applications have been withdrawn and no serious interest in the leasable minerals of the area is currently being expressed.

WATER RESOURCE DEVELOPMENT: A diversion dam exists at Nooksack Falls in conjunction with the Nooksack Falls Hydroelectric Project facility. There are plans to rebuild or enlarge this facility. All facilities of this project with the exception of existing transmission lines are located on private land. A license application has been submitted.

Hydroelectric projects have been proposed for a number of tributaries to the North Fork Nooksack. Licenses for projects on Ruth and Swamp Creek were issued by the Federal Energy Regulatory Commission in 1986. License applications have been submitted for projects on Wells Creek, Boulder Creek, and Canyon Creek. License applications have also been submitted for projects on Deadhorse Creek, Bagley Creek and Glacier Creek, and the Forest Service has recommended licensing of these projects. Fossil Creek, Gallop Creek, Cornell Creek, West Cornell Creek, Thompson Creek, Cascade Creek and Barometer Creek all have preliminary permits issued. A summary is listed below:

Tributary	**Proposed Facilities Within Corridor**	**Megawatts**
Fossil Creek	Transmission lines	1.5
Deadhorse Creek	Transmission lines	7.9
Wells Creek	Transmission lines, powerhouse	15.3
Boulder Creek	Transmission lines	4.0
Canyon Creek	Transmission lines	12.2
Gallop Creek	Transmission lines	5.4
Cornell Creek	Transmission lines	5.4
W. Cornell Creek	Transmission lines	5.4
Thompson Creek	Transmission lines	3.6
Cascade Creek	Transmission lines	1.0
Nooksack Falls 1/	Transmission lines, powerhouse, diversion structure, penstock	8.0
Barometer Creek	Transmission lines	1.0
Bagley Creek	Transmission lines, powerhouse	1.5
Swamp Creek	Transmission lines	3.5
Ruth Creek	Transmission lines	2.8
Glacier Creek	Transmission lines	5 0

1/ *Nooksack Falls project is on the main Nooksack River, not a tributary.*

Nineteen miles of river are in power site classification.

The Nooksack River is listed by the Washington State Department of Ecology as a "River of Statewide Significance" based on its water volume. The river is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Mt. Baker Highway (State 542) parallels the river on the north side from Shuksan to Douglas Fir Campground. At Douglas Fir Campground it crosses the river and continues on the south side of the river to Warnick. At Warnick, the highway crosses the river again and continues on the north side of the river to its confluence with the South Fork Nooksack.

The North Fork Road (F.S Rd. #37) parallels the south side of the river from Nooksack Falls to the point that it meets the Mt. Baker Highway (just south of Douglas Fir Campground).

Bridges cross the river at: The Mt. Baker Highway crosses at Nooksack Falls, upstream from Silver Fir Campground, and at Warnick. F.S Rd. #3070 crosses upstream of Silver Fir Campground, F.S. Rd. #33 crosses at Douglas Fir Campground, and two logging roads cross upstream of Ruth Creek.

Five developed campgrounds are located along the river within the Forest boundary: Douglas-fir (30 sites), Nooksack (18 sites), Excelsior (a reservation-only group site), Silver Fir (21 sites) and Hannegan (6 sites). There are 3 campgrounds outside the Forest.

An old railroad grade parallels the river from Glacier to Kendall. It was used by Chicago, Milwaukee, St. Paul and Pacific Railways.

The Excelsior Pass Trailhead #670 is located on Mt. Baker Highway near Nooksack Falls. Goat Mountain Trailhead #673 is on Forest Road 32, 5 miles west of Hannegan Campground Horseshoe Bend Interpretive Trail is located across from Douglas-fir Campground.

A trail is proposed to run from Maple Falls to Glacier.

There is river access at Glacier, west of Maple Falls and below Nooksack Fish Hatchery.

The towns of Glacier, Kendall and Maple Falls are situated along the river. Farms and home sites are common downstream from the Forest boundary at Glacier Increased recreation home developments are occurring along some stretches of the river.

The Nooksack Fish Hatchery is located at Kendall Creek. Kendall Cemetery is located 1/16 mile from the river corridor, 1/4 mile below the fish hatchery.

Up Deadhorse Creek, there is an off-channel rearing pond for Chinook.

Planned fishery projects along the river include an acclimation pond on Deadhorse Creek, a hatchery project in Rutsatz Slough and a rearing and spawning channel 1 mile from Rutsatz Road.

Above the confluence with Canyon Creek, there is a solid waste transfer site.

There are 500 yards of riprap near the intersection of Highway 542 and Forest Road 3070, 1000 yards along the river adjacent to the Silver Fir Campground; 2000 yards along the Mt Baker Highway near Maple Falls and Bell Creek; and 2000 yards near the Highway 9 bridge crossing.

A powerline crosses the river .7 miles upstream from the confluence with the Nooksack River.

There are 2 sand and gravel quarries located within the river basin. In Sections 9 and 10, T.39 N., R.5 E. there is an active, 1 person operation. In Section 28, T.39 N., R.5 E., there is an inactive quarry.

The Puget Power Intake is located above Nooksack Falls.

There is a limited amount of prime agricultural farmland along the river. Most farmland is used for pasturing cattle and farm animals.

RECREATION ACTIVITIES: The North Fork Nooksack is a popular river for fishing enthusiasts and has a high potential for other boating use. Downstream from Nooksack Falls, fishing use is moderate to high. Rafting use, while presently low, has significant growth potential. Glacial run-off allows rafting into August, when other area rivers are already too low. From Nooksack Falls to the *Douglas-fir Campground, canoeing and kayaking use is light. Boating use* increases downstream from the campground, mainly by Canadian visitors. The river is viewed as above average to outstanding by kayak clubs due to its challenge and hydraulics. From time to time, there are commercial guided canoe and kayak trips.

The most popular attraction in the area is Mt. Baker. In the winter, the ski area draws skiers to the mountain. In summer, the Heather Meadows area at the base of the mountain, and numerous hiking, camping and picnicking opportunities attract visitors. Mt. Baker Highway is a designated Scenic Byway. Sightseeing by car is a very popular recreation activity.

Off-road recreation vehicle use is heavy on logging roads.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Boating (power, nonpower)	500	825
Waterplay (swim, wade)	200	300
Fishing, Hunting	2,500	3,600
Camping	20,900	31,350
Viewing (scenery, wildlife, driving for pleasure)	1,500	2,280
Misc. (hike, picnic, berry picking, etc.)	3,000	5,880
TOTAL	28,600	44,235

WILDLIFE AND FISHERIES: Bald eagles, a federally listed Threatened and Endangered species, utilize the lower 3 to 5 miles of the river. A SOHA is located within the North Fork Nooksack Research Natural Area. The river corridor supports an extensive winter range for the black-tailed deer. Mountain goats can be seen from the upper reaches of the river, particularly in the Goat Mountain and Mt. Sefrit areas. Trumpeter and tundra swans are seen along the upper river during winter.

Spring chinook, coho, pink and chum salmon along with winter steelhead swim up river to the Excelsior Powerhouse, located below Nooksack Falls. The falls act as a total block to upstream migration. The spring chinook are native to the area and represent one of the better spawning runs in Puget Sound. Most *chinook spawning occurs in the North Fork, with juvenile populations rearing in* all accessible waters. Coho and some spring chinook have year round habitation. Pink and coho salmon use numerous North Fork tributaries.

Deadhorse Creek has a large population of pink salmon. The Nooksack Salmon Hatchery, located on Kendall Creek, produces coho, fall chinook, spring chinook and chum salmon. Resident cutthroat, rainbow trout and eastern brook trout are found in the upper reaches of the river.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: From its headwaters along its first six miles, the North Fork Nooksack River descends over very steep gradients with numerous cascades and falls. In the next five miles, the valley floor broadens, allowing moderate stream gradients with good pool-riffle balance. Below Nooksack Falls, the canyon narrows to form deeply incised cascades and rapids. Below Glacier Creek, the stream channel is unstable, which contributes to braiding of the stream.

From the headwaters to the confluence with the Middle Fork, the North Fork Nooksack drains a 293 square mile area with an annual runoff at more than 1,000,000 acre-feet. Streamflows reach a maximum in mid-June with up to 5000 cubic feet per second (cfs) at Deming stream. Another peak occurs in mid-December with 4400 cfs. The low flows occur in late August at a little less than 2000 cfs and in mid-winter when tributaries are frozen and precipitation falls as snow There are over 100 tributaries that contribute to the river's volume, with one-third of the total volume originating from Wells, Glacier and Canyon Creeks

A distinguishing feature of this river is the glacial runoff 6 to 8 months of the year. The glacial melt discolors the water. Four major glaciers, plus numerous smaller glaciers and perennial snow fields at the headwaters, help feed the river.

GEOLOGY: The upper Nooksack River area consists of ancient, uplifted and deeply dissected erosion surfaces cut into a complex series of granitic metamorphic rocks The surfaces are overlain by early tertiary sandstones, shales and coal The North Fork flows through a valley which was initially stream-cut and later modified by glaciation. Steep sideslopes rise to over 7,000 feet elevation. The Nooksack Falls area at the confluence of Wells Creek is a steep, narrow canyon.

Below Glacier Creek, the valley broadens then alternately narrows and widens for eight miles. The valley floors are underlain by a fill several hundred feet thick of glacial and stream sediments.

CULTURAL RESOURCES No systematic archeological survey has been made of the North Fork Nooksack River. Existing information comes from surveys made in conjunction with individual federal projects and published historical sources. No prehistoric sites have been recorded within the potential wild and scenic river corridor. The lack of sites is believed to reflect survey patterns rather than lack of use During the historic period, the area was within the territory of the Nooksack Indians. Locations used by the Nooksacks to practice their traditional religion exist within the river corridor.

During the late nineteenth and early twentieth centuries, thousands of mining claims were located in the North Fork watershed. Only the Lone Jack and Red Mountain lodes produced substantial amounts of ore, and neither is within the river corridor Further upriver, one of the early miners' cabins is still standing and is listed on the National Register of Historic Places.

Logging began in the upper Nooksack drainage during the first decade of the twentieth century, but did not make a significant impact on the valley above Glacier until about 1940. Logging and mining led to construction of a railroad to Glacier by 1910. In turn, the railroad facilitated construction of the Nooksack Falls hydroelectric project, the second oldest and smallest hydroelectric plant in Washington. The plant has been listed on the National Register of Historic Places.

Citizens of Bellingham were also promoting Mt. Baker as a recreation area during the early years of this century. Their efforts resulted in the extension of the road from Excelsior (Nooksack Falls) to Heather Meadows in 1921. Subsequent recreation developments, such as the Mt. Baker Lodge, occurred largely outside of the North Fork corridor, but the popularity of Mt. Baker did increase recreation use of the river below Excelsior.

The level of twentieth-century activity in the drainage necessitated an administrative presence on the part of the Forest Service, represented by the Glacier Ranger Station. The Station office is listed on the National Register of Historic Places as an unusually fine example of Civilian Conservation Corps construction.

TIMBER: Sideslopes away from the river have been logged extensively. To the west of the Forest boundary over 118,024 acres have been impacted by timber harvesting activities. Recent logging has concentrated in Ruth, Swamp and Razor Hone Creeks.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	----------ASQ----------	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
183.5	2.946	2.870

1/ Based on preferred alternative with management requirements.

LIVESTOCK GRAZING: None within the Forest boundary. Limited grazing on private land.

SOCIO-ECONOMIC EFFECTS: State Highway 542 runs along the North Fork of the Nooksack River, through the communities of Deming, Kendall, Maple Falls, and Glacier. These communities, historically supported by the timber industry, have been impacted by the creation of the North Cascades National Park, the Mt. Baker Wilderness, Mt. Baker ski facilities, and the recreation pursuits of the metropolitan populations of Bellingham and Vancouver, B.C. Canadians come in increasing numbers to the area acquiring vacation homes in the mountainous communities and using the recreation resources of the area. Between 1968 and 1975, over 5,000 home sites, trailer lots and condominiums were platted or constructed.

The great diversity of recreation opportunities include alpine skiing, hunting, fishing, hiking, camping, climbing and sightseeing.

Significant capital investments are planned for the Forest Service Glacier Public Service Center and Heather Meadows. River designation would add to the diversity of activities in the drainage and is expected to make it more economically viable for businesses catering to the recreation public.

The fisheries resource is considered significant on the North Fork Nooksack River The Nooksack salmon hatchery located 5 miles downstream of the town of Maple Falls helps maintain this important anadromous fishery.

CURRENT ADMINISTRATION: From the headwaters downstream 3.5 miles, the river flows within North Cascades National Park Service Complex Wilderness, administered by the National Park Service. From the park boundary downstream to the Forest boundary, the river corridor flows through the Mt. Baker Wilderness and thence through other National Forest lands administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

Under the guidelines of the Washington State Shoreline Management Act of 1971, most of the shoreline of the North Fork Nooksack River has been classified as Conservancy by Whatcom County. The exception is a 1.5 mile section below Maple Creek, which is classified Natural. These classifications are applicable only to lands outside of federal jurisdiction and within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development. A Natural designation denotes areas characterized by the presence of some unique natural features considered valuable in their undisturbed or original condition and which are relatively intolerant of intensive human use.

Lands along the North Fork Nooksack, outside of federal jurisdiction, are mostly zoned for Forestry Use by Whatcom County. There are several developed areas along the river that are zoned for Rural Use, with 1 dwelling per 5 or 10 acre tracts

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the North Fork Nooksack River for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 5,000	$ 50,000
Costs of Implementation		15,000
Development of Management Plan		78,600
Development Costs	600,000	50,000
Operation and Maintenance Costs	360,000	5,000
TOTAL - First Five Years	**$965,000**	**$198,600**

General administration and operation and maintenance costs are estimated to continue at $84,000 annually.

Appendix E
North Fork Nooksack River

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Wilderness-Trailled	296
		Wilderness-General Trailless	317
		Wilderness-Special	21
Segment 2	Scenic	Semi-Primitive, Non-Motorized Recreation	126
		Scenic Corridor (Foreground)	1,097
		Scenic Corridor (Middleground)	588
		Old Growth Habitat (spotted owl)	845
		Research Natural Area	422
		Developed Recreation	42
Segment 3	Rec	Old Growth Habitat (spotted owl)	21
		Scenic Corridor (Foreground)	357
		Scenic Corridor (Middleground)	147
Segment 4	Scenic	Scenic Corridor (Foreground)	1617
		Scenic Corridor (Middleground)	252
		Developed Recreation	84
		Goat Habitat	21
		T & E Species	105

WELLS CREEK

Whatcom County

Wells Creek was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

Wells Creek was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory (NRI) published by the National Park Service in 1982.

LOCATION: From its headwaters near Table Mountain on Ptarmigan Ridge to its confluence with the North Fork Nooksack River.

Segment 1 - Headwaters at Galena Chain Lakes to the Road 33 bridge, east edge of Sec. 16, T.39 N., R.8 E. (2.6 miles)

Segment 2 - Road 33 bridge to the confluence with North Fork Nooksack River (3.4 miles).

RIVER MILEAGE:

Study:	6.0 miles
Eligible:	6.0 miles
Forest Plan:	0.0 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: Wells Creek was found to possess "Outstandingly Remarkable" values for the following: wildlife.

Mountain goat winter range and a SOHA are located within the drainage.

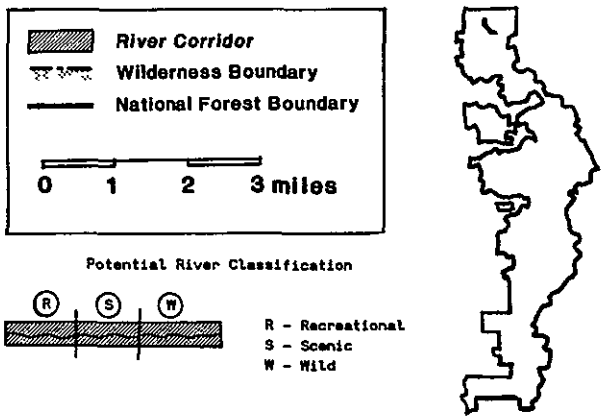
POTENTIAL AND RECOMMENDED CLASSIFICATION:

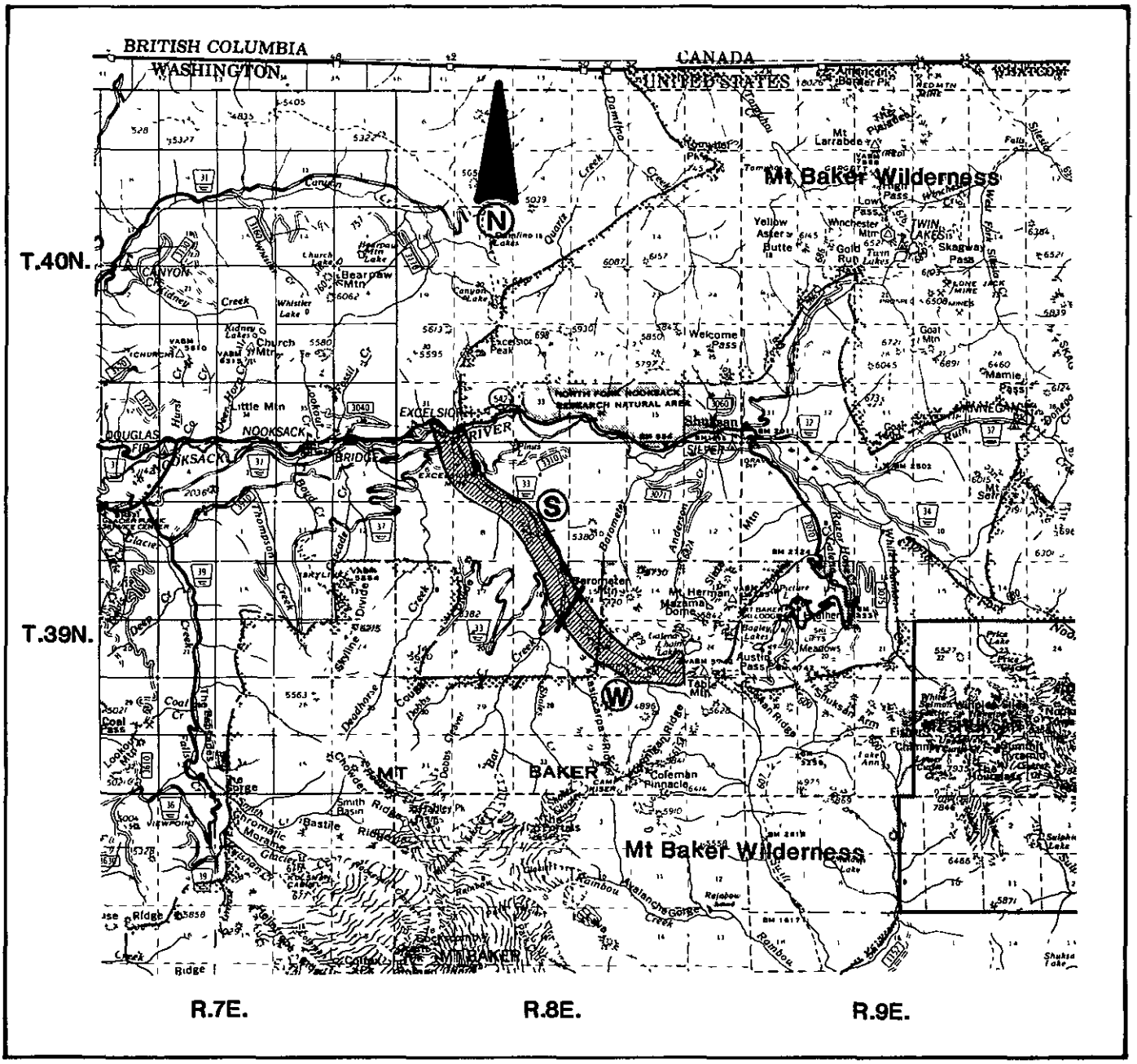
Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	2.6	Not recommended	0.0
Segment 2	Scenic	3.4	Not recommended	0.0

SUITABILITY DETERMINATION:

Wells Creek was found to be not suitable for inclusion in the preferred alternative of the Forest Plan due to low recreation use, lack of anadromous fisheries, and high competing resource values. The remarkable value for this creek was wildlife, specifically a SOHA, located off of the river and already adequately protected.

Wells Creek


River Corridor
Wilderness Boundary
National Forest Boundary
0 1 2 3 miles
Potential River Classification
R
S
W
R - Recreational
S - Scenic
W - Wild


BRITISH COLUMBIA
CANADA
WASHINGTON
UNITED STATES
Mt Baker Wilderness
Mt Baker Wilderness
T.40N.
T.39N.
R.7E.
R.8E.
R.9E.
N
S
W
MT BAKER
MT BAKER
NOOKSACK
EXCELSIOR
RIVER
BRIDGE
NORTH FORK NOOKSACK
RESEARCH NATURAL AREA
Welcome Pass
Shuksan
Church Mtn
Bearpaw Mtn
Little Min
Table Mtn
Coleman Pinnacle
Mt Herman
Mazama Dome
Austin Pass
Twin Lakes
Skagway Pass
Goat Mtn
Mamie Pass
Yellow Aster Butte
Winchester Mtn
Gold Run
Mt Larrabee
Excelsior Peak
Canyon Creek
Whistler Lake
Kidney Lakes
Lookout Mtn
Thompson Creek
Deadhorse Creek
Dobbs Draper
Skyline Divide
Chromatic Glacier
Bastile Ridge
Smith Basin
Rainbow Creek
Avalanche Gorge
Damfino Creek
Quartz Creek
Anderson Creek
Barometer Mtn
Hunegan
Ruth
Mt Seiler
Price Lake
Fisher Chimney
Sulphide Lake
Shuksan Arm
Shuksan Ridge
Coal Pass
Coal Cr
Douglas Fir
Glacier
The Gorge
Viewpoint
Ridge
Creek

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Mt. Baker Wilderness-1.5 miles)	2.6 miles	864 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	3.3 miles	1,056 acres
Private (Nooksack Power Plant)	0.1 miles	32 acres
Total	6.0 miles	1,920 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: Even though the subject area has no current reported mineral resource production of significance, a small portion of this river has been identified by the BLM as an area of "critical mineral potential". A portion of the area does have at least a moderate potential for the occurrence of gold and silver resources. Bureau of Mines MILS data and Moen (1969) indicate a number of mineral resource occurrences do occur within or immediately adjacent to the river corridor. Of these occurrences, the following are of interest:

> Great Excelsior (T.39 N , R.8 E , Section 6): Major exploration is on-going to determine if mineralization extends north and south of the presently identified ore body, which is reported to contain 5 9 million tons grading 0.33 ounce gold and 2.047 ounces silver per ton.
>
> The Wells Creek Gossan (T.39 N., R.8 E., Section 5)· Is reported to contain disseminated fine-grained pyrite in strongly sheared and altered Middle Jurassic andesite assaying up to 0.20 ounces of silver and 0 40% copper.

Other prospected occurrences of gold, silver and copper are reported for T.40 N , R.8 E., Section 31, 32 and 33.

BLM mining claim recordation data indicates that 154 claims have been located within or adjacent to the segment of the river lying in Sections 4,5 and 6, T.39 N., R.8 E., and in Sections 31 and 32, T. 40 N., R.8 E. Of these 154, 62 have been abandoned or declared to be null and void. What portion of those active claims lie within the river corridor is not presently known.

The entire river segment has been classified prospectively valuable for geothermal resources. However, none of it is classified "prospectively valuable" for other leasable mineral commodities. Sections 4, 5, 6, 8 and 9, T.39 N., R.8 E. have been encumbered by two geothermal lease applications. Both applications have been withdrawn.

Based upon the available information, it appears that the section of the river lying near Sections 4, 5 and 6, T.39 N., R.8 E. and Sections 31, 32 and 33, T.40 N., R.8 E. has at least a moderate potential for the occurrence of locatable mineral resources. Numerous unpatented mining claims have been located and maintained along that portion of the river corridor, which does indicate a continuing interest in the area with most interest being directed toward the Excelsior Mine and possible extensions of that ore body. The area also has some potential for the occurrence of geothermal resources, but the pre-existing lease applications have been withdrawn and no serious interest in the leasable minerals of the area is currently being expressed.

WATER RESOURCE DEVELOPMENT: Prior to the classification, a small hydroelectric project application was submitted to FERC. Proposed project facilities within the river corridor consist of a transmission line, a powerhouse, and a diversion structure and penstock. The project capacity will be 15.3 megawatts.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: A gravel road (#33) parallels the lower 3.3 miles of the area. However, it is not visible from the creek for the first two miles. There is no road up stream of the confluence with Bar Creek.

One bridge crosses Wells Creek just above the fork with Bar Creek.

The Chain Lakes Loop Trail #682 begins at the Artist Point Parking Lot at the end of the Mt. Baker Highway. The trail passes near the headwaters of Wells Creek.

There are 300 yards of rip-rap along the river at river mile 5.5. There are also culverts at this location.

A stream gauge is associated with the small hydro project.

No homes or farms exist along Wells Creek.

RECREATION ACTIVITIES: The majority of recreation opportunities along the creek are nonwater oriented. Among these are driving for pleasure, with excellent vistas of Mt. Baker to the south. Hunting and hiking are also enjoyed in the drainage basin.

Wells Creek is unsuitable for rafting, canoeing and kayaking, or any other type of boating due to a low volume of water. No portion of the river is appropriate for swimming, and fishing use is only incidental due to few opportunities.

No developed campgrounds are present, and there is no opportunity for any development.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	100	144
Camping	10	15
Viewing (scenery, wildlife, driving for pleasure)	75	114
Misc. (hike, picnic, berry picking, etc.)	10	20
TOTAL	195	293

WILDLIFE AND FISHERIES: There are resident populations of rainbow trout and dolly varden. No salmon can use the creek due to a series of impassable cascades and falls located at the mouth. A SOHA and a critical mountain goat winter range lie adjacent to the creek.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: A 100-foot falls lies at the mouth of Wells Creek. Cascades and rapids occur for approximately 1 mile upstream. Mazama Falls is in the upper reaches.

The stream gradient is steep, falling some 4,300 feet in 7.7 miles. The stream bottom is mostly boulders and rubble.

Glaciers are present at the headwaters, especially from Mazama and Sholes Glaciers. The creek has discoloration due to glacial runoff 6-8 months of the year, which may limit fish production.

GEOLOGY: Wells Creek originates on the flanks of Mt. Baker and flows into the North Fork Nooksack River. Geology of the headwaters is composed of pyroclastics and andesitic flows associated with Mt. Baker. Extending downstream the stream passes through andesites and metasediments A unique geologic feature of Wells Creek is that the middle portion of the stream occupies a U-shaped valley that is underlain by glacial till and hard andesitic bedrock. This has restricted downcutting and as a result the stream through this section is very wide, shallow, and braided. As it flows past the contact from andesite to softer metasedimentary rocks, it has been rapidly downcutting since the glacial period and has formed a steep V-shaped canyon extending to the North Fork

CULTURAL RESOURCES: No systematic archaeological survey has been made of the Wells Creek drainage. Available information comes primarily from published historical sources No prehistoric sites have been recorded within the potential wild and scenic river corridor. During the historic period, the area was within the territory of the Nooksack Indians. The area includes localities identified by the Lummi, Nooksack and Duwamish tribes for the practice of their traditional religion

In 1899, the Great Excelsior mine was located near the mouth of Wells Creek, which lead to further mineral discoveries up Wells Creek. Power was brought to the mine from the Nooksack Falls powerhouse in 1914. The development of these and other mines along the North Fork Nooksack facilitated the construction of a road along the Nooksack River. A wagon road provided access to Excelsior Mine. Mining interests along Wells Creek waned by 1920. Logging did not significantly impact the tributary drainages above Glacier until around 1940. None of the sites associated with these activities are listed on the National Register of Historic Places.

TIMBER: An old burn and logged-over land dominate the landscape for the first 3 miles upstream from the mouth of Wells Creek. The next 2 miles are in secon growth forest, pole size stands. The last 2 miles to the headwaters contain old growth forests.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	----------ASQ----------	
	Preferred	Preferred
Total	Alternative	Alt. with
Timber	w/o W&SR	Eligible W&SR
Volume	Designation	Designation
(MMBF)	(MMBF/yr.)1/	(MMBF/yr.)1/
44.1	.484	442

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: State Highway 542 is located at the confluence of Wells Creek and the North Fork Nooksack. The communities in the area were historically supported by the timber industry. However, the great diversity of recreation opportunities in the area have created a large tourist industry with Mt. Baker being the major draw.

CURRENT ADMINISTRATION: The upper 2 miles of Wells Creek are within the Mt. Baker Wilderness. The entire river is on the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for Wells Creek for the next five years:

	Expenses Expected Independent of Designation	**Addit. Expenses with Designation**
General Administration	$1,000	$2,000
Costs of Implementation		2,000
Development of Management Plan		4,800
TOTAL - First Five Years	**$1,000**	**$8,800**

General administration and operation and maintenance costs are estimated to continue at $600 annually.

MIDDLE FORK NOOKSACK RIVER

Whatcom County

The Middle Fork Nooksack River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

The Middle Fork Nooksack River was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory (NRI) published by the National Park Service in 1982.

LOCATION: From its headwaters on the slopes of Mt. Baker to its confluence with the North Fork Nooksack River.

Segment 1 - Headwaters on Deming Glacier in the NW 1/4 of Section 35, T.38 N , R.7 E.to Ridley Creek (2.7 miles).

Segment 2 - Ridley Creek to the diversion dam in the NE 1/4 of Section 19, T.38 N., R 6 E. (10.2 miles).

Segment 3 - Diversion dam to the confluence with the North Fork Nooksack River (7.1 miles).

RIVER MILEAGE:

Study:	20.0 miles
Eligible:	20.0 miles
Forest Plan:	0.0 miles recommended for designation in preferred alternative

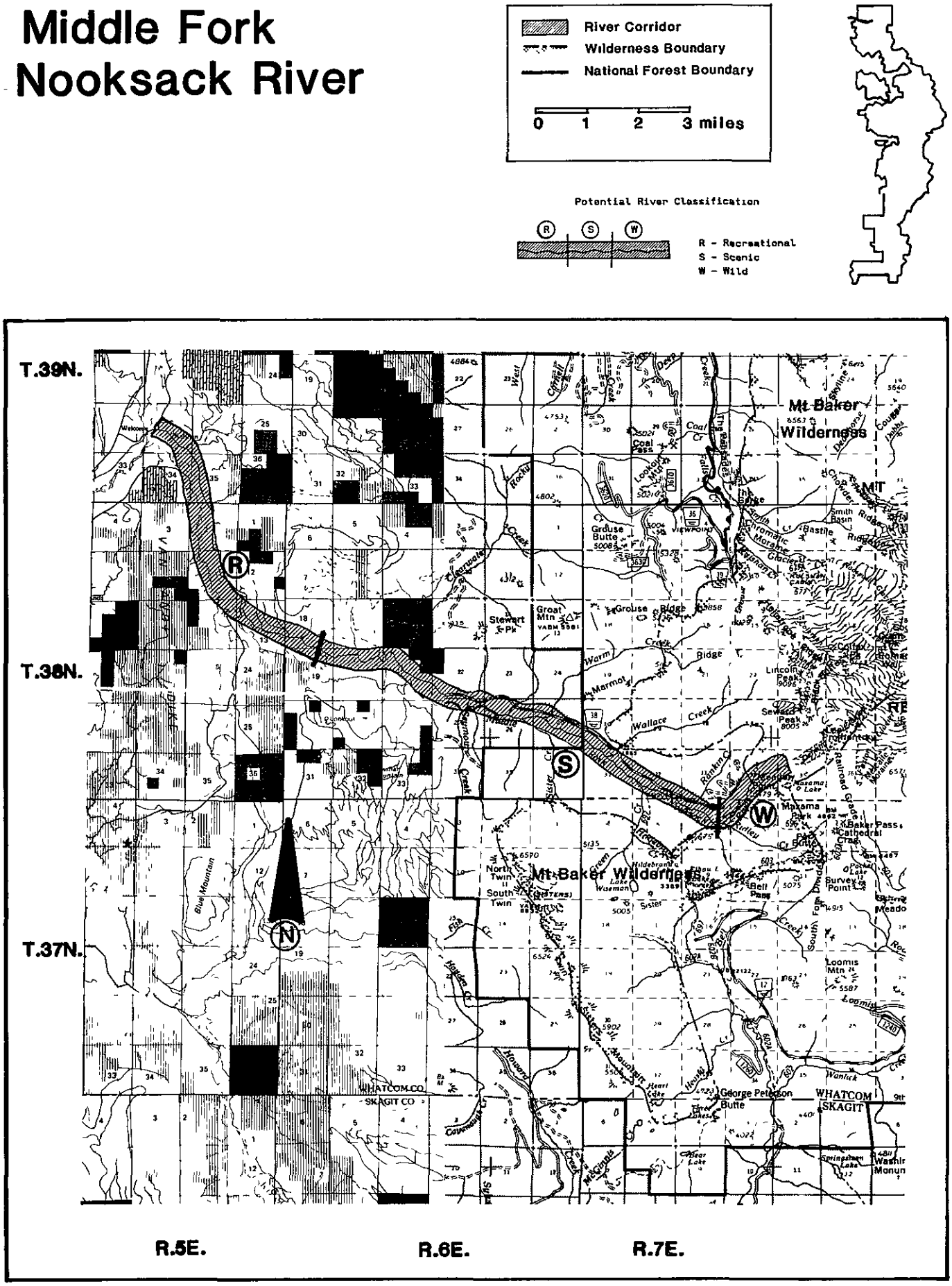
OUTSTANDINGLY REMARKABLE VALUES: The Middle Fork Nooksack River was found to possess "Outstandingly Remarkable" values for the following: wildlife.

Excellent black-tailed deer, Roosevelt elk and mountain goat winter range are found along the river corridor. A SOHA has been designated in the Middle Fork Nooksack drainage.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	2.7	Not recommended	0 0
Segment 2	Scenic	10.2	Not recommended	0.0
Segment 3	Recreation	7.1	Not recommended	0.0

Middle Fork Nooksack River



SUITABILITY DETERMINATION:

The Middle Fork of the Nooksack River was found to be not suitable for inclusion in the preferred alternative of the Forest Plan due to a majority (70%) of the river being off of the Forest, in state or private ownership. The river received only moderate public support for designation and has high competing resource values within the National Forest. Low water flow and discoloration due to glacial runoff are limiting to fish production on the Middle Fork.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt Baker-Snoqualmie National Forest (Mt. Baker Wilderness-1.0 miles)	2.7 miles	864 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	3.4 miles	1,088 acres
Private	5.5 miles	1,760 acres
State	1.3 miles	416 acres
Segment 3		
Private	3.6 miles	1,152 acres
State	3.5 miles	1,120 acres
Total	20.0 miles	6,400 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of the river segments are classified as areas of critical mineral potential. A review of available literature including Bureau of Mines MILS data indicates there are no reported occurrences of locatable mineral resources. BLM mining claim recordation data indicates that the area is not encumbered by any unpatented mining claims. The Bureau of Mines MILS data does indicate two occurrences of stone deposits in T 39 N., R.5 E., Section 28, one of which has provided for production in the past. However, it appears that they lie outside the river corridor.

The Bureau of Land Management has classified the western 14 miles as being prospectively valuable (PV) for oil and gas, the eastern 14 miles as being "PV" for geothermal resources, and the eastern 9 miles as being "PV" for coal resources. None of the area, however, has known occurrences of such resources. While the area or immediately adjacent areas have been encumbered by at least eight leases and 4 lease applications, all eight leases have terminated and the four applications have been withdrawn.

Based upon the available information, it appears the area has little if any potential for the occurrence of locatable minerals. It does have at least a low potential for the occurrence of geothermal, coal and oil and gas resources. However, it also appears that the area contains no known mineral resources of more than nominal value, and no serious interest in developing either leasable or locatable mineral resources in the river corridor is currently being expressed.

Appendix E
Middle Fork Nooksack River

WATER RESOURCE DEVELOPMENT: The Middle Fork Nooksack River is part of the Bellingham Municipal Watershed. A diversion dam exists at the 7.2 mile point, which feeds water to Lake Whatcom.

The Middle Fork Nooksack River is designated a power site. The river is listed by the State Department of Ecology as a "River of Statewide Significance" based on water volume.

The river is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

A preliminary permit for a hydroelectric project has been issued by FERC on Clearwater Creek, a tributary of the Middle Fork Nooksack. Proposed facilities within the river corridor consist of the transmission line. Project capacity will be 1.2 megawatts.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: The Mosquito Lake Road takes off from the Mt. Baker Highway near the confluence of the Middle and North Forks of the Nooksack River. The road parallels the river to mile 5, crossing the Middle Fork Nooksack and proceeding south past Spring Lake, Mosquito Lake and Jorgenson Lake. Mine traffic occurs 3 months a year.

At Porter Creek a Forest Road forks south-east from Mosquito Lake Road and follows the Middle Fork Nooksack nearly to the Forest boundary.

Three bridges cross the river at: Mosquito Lake Road crossing (5 mile point), the diversion dam (7.2 mile point) and the section 21 mining road (9.5 mile point). A trail bridge crosses at mile post 11 on Forest Road 38. A road bridge is also planned at this location.

The Ridley Creek Trail #696 begins near the end of Forest Road 38. The trail parallels the Middle Fork for 1-1/2 miles to the junction with Ridley Creek. The trail crosses the Middle Fork near the creek mouth and continues up Ridley Creek. There is no bridge at the crossing.

The Elbow Lake Trailhead #697 is located on Forest Road 38. The trail crosses the Middle Fork and heads up Green Creek to Elbow and Dorene Lakes.

Farms, residences and the town of Kulshan are all located along the lower six miles of the river.

There is 6500 yards of rip-rap along the Mosquito Lake Road swamp, and 1000 yards on the mining road bridge.

An old railroad track and camp are located 12 miles upstream.

An old trail and ranger station site from the 1930's are located near the river between Warm and Wallace Creeks.

A fish passage is planned at the Middle Fork Dam, 7 miles upstream from the mouth of the river.

An aqueduct runs southwest from the diversion dam below Falls Creek. There is also river access at this point.

RECREATION ACTIVITIES: Public access to the river is limited by private ownership and geographical isolation. No developed trails or campgrounds are located along the river outside of the forest boundary. Hikers gain access to the Mt. Baker Wilderness from trails taking off from the end of Forest Road 38.

Hunters generally stay a distance from the river.

Boating and fishing occur along the lower three miles of the river where challenge and hydraulics are considered above average for canoeing and kayaking. There is currently little use of the river by rafters or swimmers.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Boating (power, nonpower)	400	660
Waterplay (swim, wade)	200	300
Fishing, Hunting	2,000	2,880
Camping	3,000	4,500
Viewing (scenery, wildlife, driving for pleasure)	1,000	1,520
Misc. (hike, picnic, berry picking, etc.) berry picking, etc.)	1,500	2,940
TOTAL	8,100	12,800

WILDLIFE AND FISHERIES: Extensive winter range for black-tailed deer, Roosevelt elk and mountain goats are found along the river corridor. The upper reaches of the river contain an important spring calving habitat for elk. A SOHA has been designated in the Middle Fork Nooksack drainage.

Low water flows and discoloration due to glacial runoff are limiting to fish production on the Middle Fork. Anadromous fish spawn and rear upstream to the Bellingham diversion dam. Some of the better fish habitat is found near the mouth of the river. Species include Chinook, coho, pink, chum salmon and steelhead trout. Juvenile salmon rear throughout this section of the river and its accessible tributaries. Coho have year round habitation. Above the diversion dam, resident cutthroat, dolly varden and rainbow trout are found.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The Middle Fork Nooksack drains an area of 100 square miles. The river gradient averages 279 feet per mile. Precipitation is quite heavy. Snow and ice fields act as natural surface storage in the upper river basin.

The headwaters, consisting of the upper 10 miles, are characterized by mountainous terrain with a narrow, ravine-like valley. Stream gradient is very steep with numerous cascades and small falls. The bottom is mostly boulders and rubble. Stream width varies from 4 to 27 feet. The water is highly discolored most of the year due to glacial flour and high water scouring.

The lower half of the river starts out in fairly steep mountainous terrain. The river flows in a narrow, ravine-type valley. The course contains numerous rapids, cascades and small falls. The stream width is 18 to 45 feet. In the lower 5 miles of this section, the river breaks out of its narrow confined terrain into a broad valley floor. Stream gradient is moderate and characterized by meandering, riffle-type waters. Channel splitting and braiding is evident with stream widths of 30 to 75 feet.

GEOLOGY: Geology of the headwaters is composed of pyroclastic and lava flow associated with Mt. Baker. Extending downstream, the river passes through metasediments, metavolcanics, and extensive deposits of glacial till. While the valley has the characteristic U-shape of a glaciated valley. The stream has been actively downcutting and has produced a V-shaped channel within the broader valley. Steep forested side-slopes occur along most of the river's length.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the Middle Fork Nooksack drainage. Available information comes primarily from published historical sources. No prehistoric sites have been recorded within the Middle Fork drainage; however, it is believed that this reflects the lack of survey rather than lack of use. During the historic period, the Middle Fork was within the territory of the Nooksack Indians. Several villages and fishing sites were reported to have been along the main river and at the mouths of creeks. The area includes localities identified by the Duwamish and Samish tribes for the practice of their traditional religion.

Historic sites are associated primarily with Forest Service Administration and are relatively recent. Some early logging took place, but it did not result in significant developments along the river. None of the sites have been identified as eligible for the National Register of Historic Places.

TIMBER: Outside of the Forest boundary, private clearcuts are located on both sides of the river. Large areas of blowdown occurred as a result of a high wind storm. These trees were salvaged logged in 1968.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest systems lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
40.2	1.629	1.462

1/ Based on preferred alternative with management requirements.

LIVESTOCK GRAZING: Along the lower five miles of the river, cattle and horses graze along the river bank.

SOCIO-ECONOMIC EFFECTS: Although its headwaters are in the Mt. Baker Wilderness, the Middle Fork of the Nooksack River is accessible by road for much of its length. The communities of Deming and Van Zandt are near its confluence with the North Fork Nooksack. These communities, traditionally supported by the timber industry and agriculture, have been impacted by the creation of North Cascades National Park, the Mt. Baker Wilderness and the increasing population of nearby cities. Bellingham is 15 miles away and Vancouver, British Columbia is 60 miles away. Canadians are visiting the area in increasing numbers, acquiring vacation homes in the mountain communities and utilizing the recreation resources of the area. There are a great diversity of outdoor recreation opportunities in the area, which include kayaking, hunting, fishing, hiking, camping, climbing and sightseeing.

CURRENT ADMINISTRATION: The river flows through the Mt. Baker Wilderness and National Forest lands to the forest boundary administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

Under the guidelines of the Washington State Shoreline Management Act of 1971, most of the shoreline of the Middle Fork Nooksack River has been classified as Conservancy by Whatcom County. The exception is a 1 1/2 mile section of shoreline just upstream from the Mosquito Lake Bridge. This section is classified as Natural. These classifications are applicable only to lands outside of federal jurisdiction and within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development. A Natural designation denotes areas characterized by the presence of some unique natural features considered valuable in their undisturbed or original condition and which are relatively intolerant of intensive human use.

The land along the Middle Fork from the forest boundary to Porter Creek, outside of federal jurisdiction, is zoned by Whatcom County for Forestry Use. From Porter Creek to the confluence with the Nooksack River, the corridor is zoned for Rural Use, with developments restricted to 5 or 10 acre tracts.

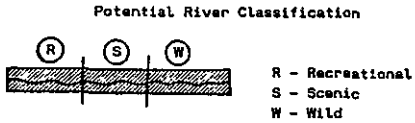
FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

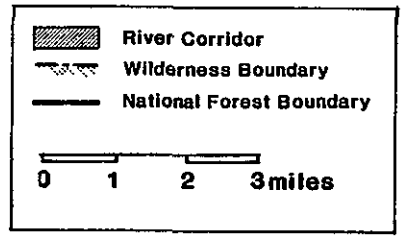
The following are expected funding requirements for the Middle Fork Nooksack River for the next five years:

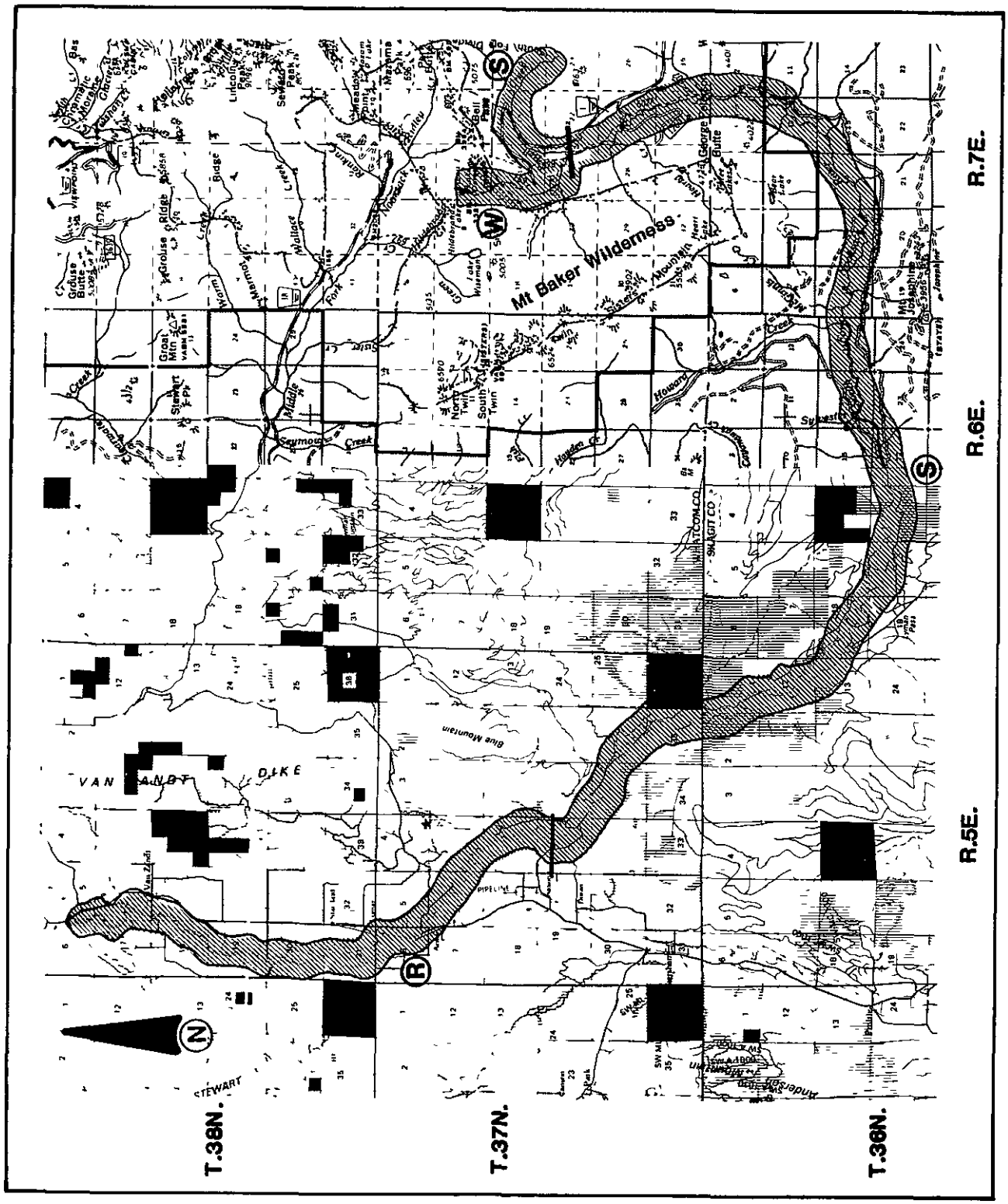
	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 1,000	$ 20,000
Costs of Implementation		10,000
Development of Management Plan		35,500
Development Costs	0	50,000
Operation and Maintenance Costs		5,000
TOTAL - First Five Years	**$ 1,000**	**$120,500**

General administration and operation and maintenance costs are estimated to continue at $5,200 annually.

South Fork Nooksack River
Bell Creek







SOUTH FORK NOOKSACK RIVER
BELL CREEK

Whatcom and Skagit Counties

The South Fork Nooksack River and Bell Creek were studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

The South Fork Nooksack River was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory (NRI) published by the National Park Service in 1982.

LOCATION: The South Fork Nooksack flows from its headwaters at Lake Doreen and Elbow Lake and from tributaries flowing from the Twin Sisters mountain range to its confluence with the North Fork Nooksack River.

Bell Creek, a tributary, originates on the South Fork Divide and flows into the South Fork Nooksack River

Segment 1 - Bell Creek headwaters on Loomis Mtn. in NE 1/4 of Sec. 23, T.37N., R.7 E. to confluence with S. Fork Nooksack River (3.0 miles).

Segment 2 - Headwaters of the South Fork Nooksack in the SW 1/4 of Sec. 9, T.37N., R.7 E. to Bell Creek (2.3 miles).

Segment 3 - Bell Creek to Mt. Baker-Snoqualmie N.F. boundary (4.3 miles).

Segment 4 - Mt. Baker-Snoqualmie N.F. boundary to Saxon Bridge in SE 1/4 of Sec. 21, T.37N , R 5 E. (20.0 miles).

Segment 5 - Saxon Bridge to confluence with N. Fork Nooksack River (12.9 miles).

RIVER MILEAGE:

Study:	42.5 miles
Eligible:	42.5 miles
Forest Plan:	9 6 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The South Fork Nooksack River was found to possess "Outstandingly Remarkable" values for the following Fisheries and Wildlife

Bell Creek possesses values for Wildlife only.

Both river areas provide forage and cover for deer and elk. There is also spring elk calving in the drainage.

The South Fork Nooksack provides spawning and rearing habitat for chinook, coho, pink and chum salmon as well for resident rainbow and cutthroat trout, dolly varden and summer-run steelhead.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Scenic	3.0	Scenic	3.0
Segment 2	Wild	2.3	Wild	2.3
Segment 3	Scenic	4.3	Scenic	4.3
Segment 4	Scenic	20.0	None recommended	0
Segment 5	Recreation	12.9	None recommended	0

SUITABILITY DETERMINATION:

The upper 6.8 miles of the South Fork of the Nooksack was found to be suitable for inclusion in the preferred alternative of the Forest Plan. The Forest recommends that the State designate the lower sections of the river due to high private competing use outside of the Forest boundary. The South Fork had outstandingly remarkable values for fish and wildlife, and was one of the rivers listed in the Nationwide Rivers Inventory of the National Park Service in 1982. There is public support for designation of this river, as well as a recommendation for designation in the 1988 Washington State Scenic River Assessment.

Bell Creek was also found to be suitable as a logical extension of the South Fork of the Nooksack.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest	3.0 miles	960 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest (Mt. Baker Wilderness-1.0 mile)	2.3 miles	736 acres
Segment 3		
Mt. Baker-Snoqualmie National Forest	4.0 miles	1,376 acres
Private	0.3 mile	160 acres
Segment 4		
Private	18.9 miles	6,048 acres
State	1.1 miles	352 acres
Segment 5		
Private	12.9 miles	4,128 acres
Total	42.5 miles	13,600 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of the river segment is classified as an area of critical mineral potential. However, a review of available literature including Bureau of Mines MILS data does indicate some reported magnesium, olivine and chromium occurrences. Those occurrences appear to be concentrated in Sections 3,4,9 and Section 16, T.37N., R.7 E., and Section 34, T.37N., R.7 E. BLM mining claim recordation data also indicates that Sections 16, 27, 28, 33 and 34, T.37N., R.7 E. and Sections 3,4 and 9, T.36N., R.7 E. are or have been encumbered by 144 unpatented mining claims. Of those 144 claims, 73 have either been abandoned or declared to be null and void. How many claims actually encumber the river corridor is not known.

The BLM has classified the northwest 7 miles as being prospectively valuable (PV) for oil and gas, has classified the eastern 12 miles "PV" for geothermal resources, and classified the northwest 7 miles "PV" for coal resources. However, only one occurrence of coal (Section 5, T.38 N., R.5 E.) and no known occurences of oil, gas or geothermal resources has been reported for the area. None of the area is encumbered by mineral leases or pending lease applications.

Based upon the available information, it appears that the segment of the river lying within Sections 27, 28, 34 and 35, T 37N., R.7 E. and in Sections 2,3 and 9, T. 36N., R.7 E. does have at least a low potential for the occurrence of magnesium, chromite and olivine. It is encumbered by numerous unpatented mining claims indicating a continuing interest in the area's locatable mineral resources. The area also has potential for the occurrence of coal, oil and gas and geothermal resources. However, none of the area is encumbered by mineral leases or lease applications, indicating that no serious interest in the leasable minerals of the area is currently being expressed.

WATER RESOURCE DEVELOPMENT: Two miles of the South Fork Nooksack are in power site classification. Some lands along the lower river reaches are under Nooksack Indian tribal jurisdiction. The South Fork of the Nooksack is classified as "Protected" from hydropower development by the NW Power Planning Council. Bell Creek is not classified for protection status.

A preliminary permit for a hydroelectric project has been issued by FERC on Howard Creek, a tributary to the South Fork. Proposed facilities located within the river corridor consist of the transmission line. The capacity of the project will be 4.2 megawatts.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: State Highway 9 roughly parallels the river to Mosquito Lake Road. At Acme it crosses and continues south as the river veers to the east.

There are forest roads in the river corridor for most of its length, appearing just before the southern boundary of the national forest.

There is one bridge crossing over Bell Creek and one over the South Fork that occur inside the Forest boundary. Seven bridges cross downstream from the Forest boundary, including both State Highway 9 and the Burlington Northern railroad.

Potter Road crosses the river in SW 1/4 Sec. 8, T.38 N., R.5 E., Staud/Hillside Road crosses on the section line between 30 and 19, T.38 N., R.5 E., and Saxon Road crosses the river in SE 1/4 Sec. 21, T.37N., R.5 E.

Appendix E
South Fork Nooksack River and Bell Creek

The south end of the Elbow Lake Trail #697 takes off from the end of Forest Road 12, and parallels the South Fork Nooksack to its headwaters at Elbow and Dorene Lakes.

No developed campgrounds exist on the South Fork Nooksack or Bell Creek. A private recreation vehicle park is in Acme.

The City of Bellingham water pipeline crosses the river in SW 1/4 Sec. 9, T.37N., R.5 E. The Middle Fork pipeline dike lies at the mouth of Hutchinson Creek.

A reclaimed olivine quarry exists at the forest boundary.

2,000 yards of rip-rap was developed on the bridge of F.S. Road #1260, 500 yards of rip-rap at the Olivene Mire bridge, and extensive rip-rap outside of National Forest land.

The South Fork valley floor has been cleared and developed primarily in agriculture with scattered rural residences and the small communities of Saxon, Acme, Clipper and VanZandt.

A Lummi Tribal Residential Development is located in Sec. 19, T.38 N., R.5 E.

Fourteen log weirs were placed in the river to create pools for fish between the forest boundary and Saxon Bridge.

Near the mouth of Sylvester Creek there is a fisheries improvement project that allows salmon passage through a steep cascade - falls. Work consisted of blasting large boulders to allow passage. The river still appears natural and has no artificial structures.

RECREATION ACTIVITIES: The South Fork Nooksack River receives use by rafters, canoers, kayakers and swimmers. The majority of use is from Skookum Creek downstream. In summer, there is not enough water for canoes, but water levels are adequate for kayakers and rafters. There are scenic views, abundant wildlife and good gravel bars for resting. Swimmers enjoy the summer water temperature of 65 to 70 degrees. However, limited public access to the lower half of the river limits use.

The South Fork receives moderate use from fisherman for the resident Cutthroat and Rainbow Trout and low use for anadromous fish consisting of Coho Salmon and Winter Steelhead.

Sightseers enjoy the prominent view of the Twin Sisters Range and Mt. Baker from Forest Road 12. Along the lower portion of the South Fork, there are views of rock cliffs, distant waterfalls and a pastoral landscape.

Near the town of Acme, visitors enjoy views of Blue Mountain, beaches, wetlands and a high degree of vegetation and wildlife diversity. Sunny areas are ideal for picnicking, swimming, sunbathing, canoeing and boating.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Boating (power, nonpower)	600	990
Waterplay (swim, wade)	200	300
Fishing, Hunting	3,000	4,320
Camping	4,200	6,300
Viewing (scenery, wildlife, driving for pleasure)	1,500	2,280
Misc. (hike, picnic, berry picking, etc.)	1,800	3,528
TOTAL	11,300	17,718

WILDLIFE AND FISHERIES: The entire South Fork Nooksack has important elk habitat. The upper reaches of the South Fork and Bell Creek contain important winter and summer habitat for elk and deer. The adjacent slopes of Sisters Mountain and Loomis Mountain contain mountain goat habitat. The lower reaches of the South Fork contain a high degree of vegetation and wildlife diversity. Marshes and a wetland habitats are found throughout this stretch.

The South Fork Nooksack provides spawning and rearing habitat for chinook, coho, pink and chum salmon. Spring chinook spawn in the 10 mile river stretch above the Saxon Bridge. Resident rainbow and cutthroat trout and dolly varden are found in the upper reaches of the South Fork and Bell Creek. The Lummi Indian Tribe operates a salmon production facility at Skookum Creek. The hatchery has produced good coho returns to the lower river tributaries Pink and chum production is limited. A remnant population of summer run steelhead remains on the South Fork.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The South Fork Nooksack River has excellent water quality and is listed by the State Department of Ecology as a "River of Statewide Significance" based on water volume.

The headwaters area of both rivers fall over steep mountain terrain through a shallow valley floor. Two miles down the South Fork, the valley deepens and remains narrow. The river contains numerous cascades and rapids. Fourteen miles downstream from the headwaters of the South Fork, there are large cascades which drop 20 to 25 feet in a very short distance.

The middle section of the South Fork flows through a very narrow canyon with sharply rising sideslopes. A large 20 to 50 foot waterfall occurs in the upper stretches of this section of the river. All tributaries along this stretch exhibit steep mountain characteristics with many cascades and falls.

The lower section of the South Fork starts as a narrow valley. Below Saxon Bridge, the valley opens abruptly into a broad, flat bottomland with sidehills rising steeply from the valley floor.

The river basins receive approximately 100 inches of precipitation annually. Low flows occur in late summer/early Fall. The low flows are extreme on the rivers because of the lack of augmentation from melting ice packs. Neither river has a glacial origin. In mid-winter, the low flow on the South Fork is less pronounced, due to the lower elevation of the South Fork and because most of the precipitation that falls in the basin is not stored as snow.

Appendix E
South Fork Nooksack River and Bell Creek

The South Fork Nooksack River gradient is 131 feet per mile. Below Skookum Creek, the river channel is braided. The stream bottoms are composed of large rock, boulders and rubble.

The South Fork Nooksack River has sixty small tributaries.

GEOLOGY: The bedrock geology is composed primarily of metasediments and metavolcanics. Extensive deep surficial deposits of glacial till and lacustrine materials occur within the valley bottom and toe slopes. Much of the valley has the typical U-shape resulting from past continental and alpine glaciation. As the South Fork reenters Whatcom County from Skagit County, a small gorge has been cut through phyllite and contains a unique kame moraine. It is an extremely fragile environment and is currently over-used.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the South Fork Nooksack River, and no prehistoric sites are recorded. The absence of sites probably reflects the lack of survey rather than lack of use. During the historic period the South Fork was within the territory of the Nooksack Indians. The South Fork was known as a good fishing river for eight miles above the forks. Several fishing villages were located at the mouths of tributaries. The potential wild and scenic river corridor includes areas identified by the Lummi, Nooksack and Samish tribes for the practice of their traditional religion.

The South Fork of the Nooksack does not appear to have played a significant role in regional development. There are no sites within the potential wild and scenic river corridor recognized on either State or National Historic Registers.

TIMBER: Logging presents a high to moderate influence along the entire length of the rivers.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
78.1	1.948	1.906

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The communities located along the lower South Fork Nooksack are traditionally supported by agriculture and timber. The regional plan supports a growing agriculture base, with any further commercial or residential development discouraged. The area has recently been impacted by the creation of the North Cascades National Park and the Mt. Baker Wilderness Area. The recreation needs of Bellingham (15 miles) and the metropolitan Vancouver B.C. area have brought economic change to the mountain towns. Canadians come in increasing numbers to the area, acquiring vacation homes and utilizing the recreation resources of the area. The resources include Alpine skiing, hunting, fishing, hiking, camping, climbing and sightseeing.

CURRENT ADMINISTRATION: National Forest lands are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. The lower reaches of the river pass along Lummi Tribal land.

Under the guidelines of the Washington State Shoreline Management Act of 1971, the shoreline of the South Fork Nooksack River has been classified by Whatcom County as:

> Conservancy from the forest boundary to the Mosquito Lake Road, except for a narrow area in Sec. 35, T.37N , R.5 E., which is designated Natural.
>
> Rural from the Mosquito Lake Road to approximately 1 mile south of the confluence with the Nooksack River.

These classifications are applicable only to lands outside of federal jurisdiction and within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development. A Natural designation denotes areas characterized by the presence of some unique natural features considered valuable in their undisturbed or original condition and which are relatively intolerant of intensive human use. A Rural designation denotes shoreline areas characterized by agricultural uses, low density residential where most urban services are not available, and areas which provide buffer zones and open space between predominantly urban areas.

The Skagit County Comprehensive Plan has zoned the land along the South Fork Nooksack, outside of federal jurisdiction, for Forestry Use Whatcom County has currently designated land along the river as "GP" for General Provisions. This area will soon be rezoned

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the South Fork Nooksack River and Bell Creek for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 1,000	$ 20,000
Costs of Implementation		20,000
Development of Management Plan		78,300
Development Costs	160,000	50,000
Operation and Maintenance Costs		5,000
TOTAL - First Five Years	**$161,000**	**$163,300**

General administration and operation and maintenance costs are estimated to continue at $5,200 annually.

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

A portion of this river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Scenic	Semi-Primitive, Non-Motorized Recreation	316
		Old Growth Habitat (spotted owl)	380
		Deer and Elk Habitat Enhancement	21
		Timber Management	274
Segment 2	Wild	Old Growth Habitat (spotted owl)	21
		Semi-Primitive, Non-Motorized Recreation	275
		Wilderness-Transition	148
		Wilderness-General Trailless	127
		Wilderness-Trailled	42
		Deer and Elk Habitat Enhancement	168
		Timber Management	63
		Pine Marten/pileated woodpecker habitat	21
Segment 3	Scenic	Semi-Primitive, Non-Motorized Recreation	274
		Wilderness-Transition	168
		Wilderness-Trailed	21
		Wilderness-General Trailless	126
		Old Growth Habitat (spotted owl)	63
		Pine martin/pileated woodpecker habitat	21
		Deer and Elk Habitat Enhancement	1,308
		Timber Management	63

BAKER RIVER

Whatcom County North Cascades National Park

The Baker River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters in Mineral and Picket Creeks to Baker Lake.

Segment 1 - Headwaters in North Cascades National Park near Perfect Pass in NE 1/4 of Sec. 28, T.39 N., R.11 E. to Blum Creek (11.2 miles).

Segment 2 - Blum Creek to Baker Lake (2.1 miles).

RIVER MILEAGE:

Study:	13 3 miles
Eligible:	13.3 miles
Forest Plan:	13.3 miles recommended for designation in preferred alternative

Note: This recommendation is pending evaluation by the National Park Service.

OUTSTANDINGLY REMARKABLE VALUES: The Baker River was found to possess "Outstandingly Remarkable" values for the following: Scenic, Fisheries, and Wildlife.

The lower half of the river has occasional views of logging and roads, but Mt. Challenger dominates the view looking upstream. Mt. Blum can be viewed to the east. The upper third of the river has excellent views of Mt. Pugh, White Chuck Mountain and Glacier Peak.

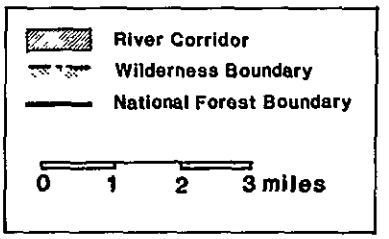
Excellent winter range for deer and elk, along with wintering and nesting habitat for bald and golden eagles are found along Baker River. The lower river flows through a SOHA and beaver habitat.

Sockeye, coho and summer and fall chinook are released into Baker Lake and swim up Baker River to seek their natural spawning grounds. Summer run steelhead are also transported.

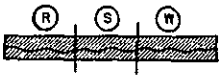
POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	11 2	Wild	11.2
Segment 2	Scenic	2.1	Scenic	2.1

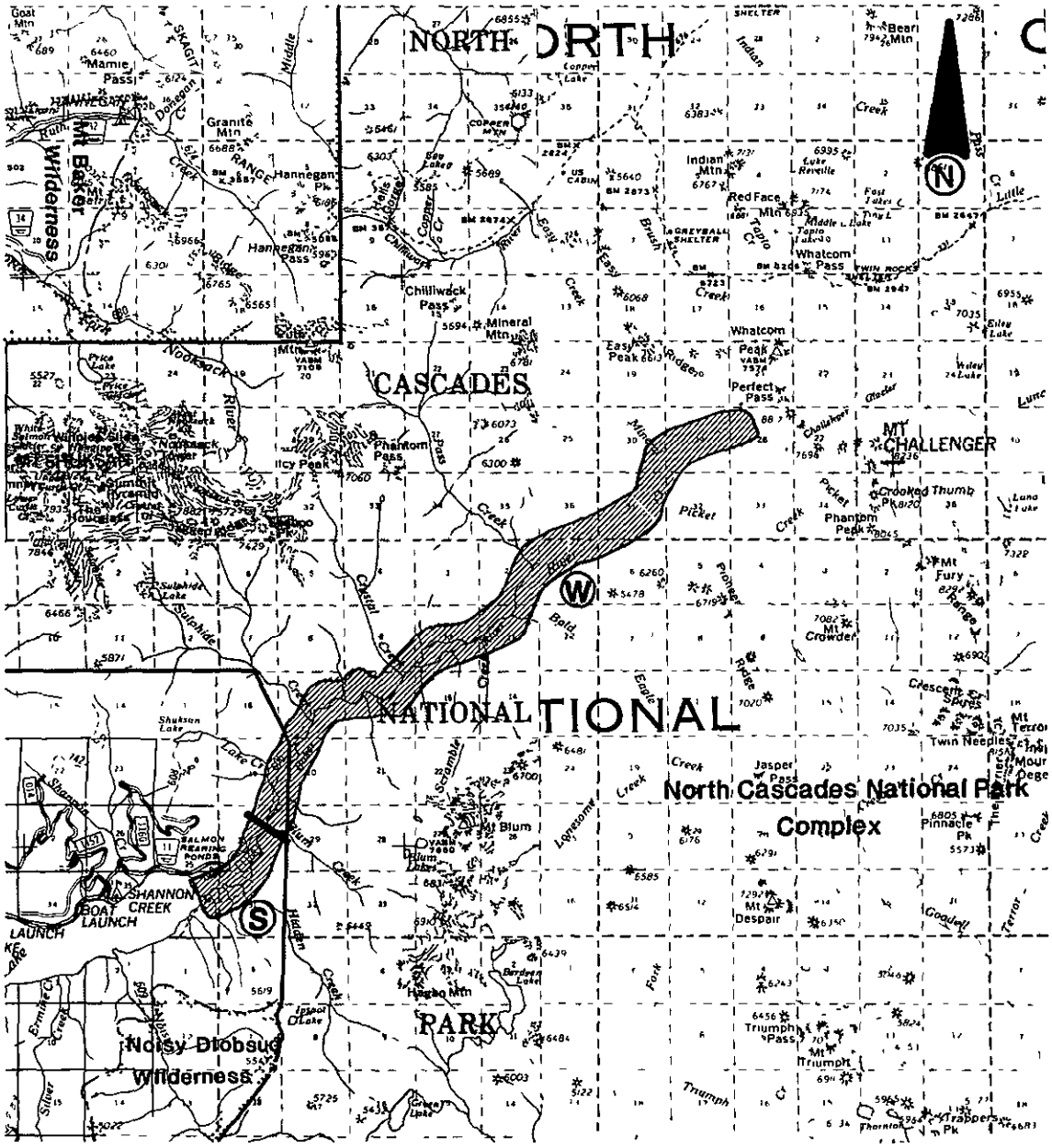
Baker River



Potential River Classification



R - Recreational
S - Scenic
W - Wild



SUITABILITY DETERMINATION:

Baker River was found to be suitable for inclusion in the preferred alternative of the Forest Plan. The entire river is in federal ownership, and there would be few resource conflicts on Forest Service land. Baker River was found to possess outstandingly remarkable values for scenery, fisheries, and wildlife, and there was public support for designation.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
NPS North Cascades National Park	10.0 miles	3,200 acres
Mt. Baker-Snoqualmie National Forest	1.2 miles	384 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	2.1 miles	672 acres
Total	13.3 miles	4,256 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of this river segment is classified as an area of critical mineral potential. A review of available literature, including the Bureau of Mines MILS data, indicates the area has no reported occurrences of locatable mineral resources. None of the area is encumbered by unpatented mining claims, mineral leases or lease applications, and no part of the area has been classified by the BLM as being prospectively valuable for leaseable mineral resources.

Therefore, based upon the available information, it appears that the area has a relatively low potential for the occurrence of locatable and leasable mineral resources, and no serious interest in either the locatables or leasables has been expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments along the river. The lower 9.7 miles of the Baker River are classified as "Protected" from hydropower development by the Northwest Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: There are no forest roads, homesites or farms bordering the river.

The Baker River Trailhead #606 is located on Forest Road 1168 near the end of the Baker Lake Highway. The maintained trail runs upstream to Sulphide Creek on the west side of the river. The trail continues unmaintained up to Bald Eagle Creek

There is a Park Service backcountry camp near Sulphide Creek.

Currently, no bridges span the river. An old abandoned road bridge 1 mile upstream washed out in the late 1960's. A proposed trail bridge would cross the river just above Blum Creek to access the east side of Baker Lake.

There is 1,000 yards of rip-rap 1/2 mile above the abandoned bridge, and 500 yard of rip-rap at the bridge.

The meandering nature of the river has caused unsuccessful attempts at channelization which was aimed at protecting sockeye spawning beaches.

A Washington Department of Fisheries artificial spawning beach lies at the head of Baker Lake and mouth of upper Baker River for chinook, coho and sockeye.

RECREATION ACTIVITIES: Dispersed recreation occurs along the drainage. The Baker River Trail provides access to a Park Service backcountry camp near Sulphide Creek.

Good dolly varden fishing is available as far as Bald Eagle Creek. There is some potential for kayaking from Sulphide Creek downstream, but boats must be portaged to the river. The river is not used for rafting or swimming.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only.

	1988 RVD'S	Projected 2000 RVD'S
Boating (power, nonpower)	10	15
Waterplay (swim, wade)	20	30
Fishing, Hunting	500	720
Camping	1,500	2,250
Viewing (scenery, wildlife, driving for pleasure)	1,000	1,520
Misc. (hike, picnic, berry picking, etc.)	2,000	2,920
TOTAL	5,030	7,455

WILDLIFE AND FISHERIES: The drainage contains extensive winter range for the black-tailed deer and Roosevelt elk and wintering and nesting habitat for bald and golden eagles. Beaver activity is prevalent along the lower 2 miles of the river. The lower river also flows through a SOHA.

Salmon returning to the Baker River are trapped in lower Baker River below the dam. They are transported by truck to Baker Lake for release. An artificial spawning beach complex was built at the head of Baker Lake to handle beach-spawning sockeye salmon, whose natural lakeshore habitat was inundated. Coho and summer and fall chinook are released into the lake to seek their natural spawning grounds, which include Baker River. Summer-run steelhead are also transported. The Baker River provides salmon habitat upstream to Pass Creek.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: From the river's headwaters for 4 to 5 miles, the gradient is steep with numerous cascades and rapids. They are narrowly confined with few splits. The valley alternately broadens and narrows before opening onto a fairly wide, flat floodplain. Sheer rock outcroppings, large rocks and boulders with some rubble gravel are found. Below Eagle Creek, fast riffles and pool-riffles predominate with moderate gradient and increased braiding. From Sulphide Creek to Blum Creek, the river has a moderate gradient. The channel shifts and meanders with numerous channels. Fourteen tributaries drain into the Baker River above Blum Creek.

Water quality is excellent within the Wilderness. The entire river is colored by suspended glacial sediments during the snowmelt season.

GEOLOGY: The bedrock geology along the Baker River Valley is dominated by metasediments and metavolcanics with some lesser bodies of phyllite. Extensive glaciation during the last glacial period carved out the valley and left thick deposits of glacial till and lacustrine materials. The river is wide, braided, and carries a heavy bedload.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the proposed Baker River Wild and Scenic River corridor. Few project surveys have been conducted and historic research is limited. The lack of known sites is believed to reflect the lack of survey of the drainage. During the historic period, the area was within the territory of the Skagit Indians. No localities used for traditional religious practices are known within the corridor.

The Forest Service was present in the area in the 1930's. A shelter was built along the river, probably for use by fire suppression and detection crews. The shelter is still present, but has been determined ineligible for the National Register of Historic Places.

TIMBER: Along the lower half of the drainage, there are occasional views of logging activity on private land. No logging activity has occurred along the river corridor. Roads and logging activity have been a minor influence outside the Wilderness boundary.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	----------ASQ----------	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
25.5	.096	.089

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: Baker River is approximately 25 miles from Concrete (pop. 570) on SR 20. Concrete, once largely economically dependent on the cement plant (now closed) derives its major support from the timber industry and a shake mill. To an increasing degree, tourism and recreation contribute to the economy of the community. Baker Lake attracts many visitors for camping, boating and fishing. The Ross Lake recreation area is not far away and the Skagit River is renowned for its steelhead fishing.

CURRENT ADMINISTRATION: The first 10 miles of the river flow downstream through North Cascades National Park Service Complex Wilderness administered by the National Park Service. The remaining 3.3 miles flow through the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the Baker River for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 1,000	$ 3,000
Costs of Implementation		3,000
Development of Management Plan		6,500
Development Costs	125,000	3,000
Operation and Maintenance Costs		1,000
TOTAL - First Five Years	**$126,000**	**$ 16,500**

General administration and operation and maintenance costs are estimated to continue at $1,000 annually.

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Semi-Primitive Non-Motorized Recreation	316
		Old Growth Habitat (spotted owl)	21
Segment 2	Scenic	Semi-Primitive Non-Motorized Recreation	337
		Scenic Corridor (Foreground)	21
		Scenic Corridor (Middleground)	63
		T&E Species (bald eagle)	105
		Goat Habitat	21

NOISY CREEK

Whatcom County — North Cascades National Park

Noisy Creek was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters on Bacon Peak downstream to Baker Lake.

Segment 1 - Headwaters on Bacon Peak in SE 1/4 of Sec. 29, T.37 N., R.10 E. to Baker Lake (6.1 miles).

RIVER MILEAGE:

Study:	6.1 miles
Eligible:	6.1 miles
Forest Plan:	6.1 miles recommended for designation in preferred alternative

Note: This recommendation is pending evaluation by the National Park Service

OUTSTANDINGLY REMARKABLE VALUES: Noisy Creek was found to possess "Outstandingly Remarkable" values for the following: wildlife and ecological.

Species found in the drainage include deer, bear, mountain goats, bald eagles, osprey and cougar. A SOHA extends for most of the length of Noisy Creek through the Noisy-Diobsud Wilderness.

The drainage supports stands of low elevation old-growth.

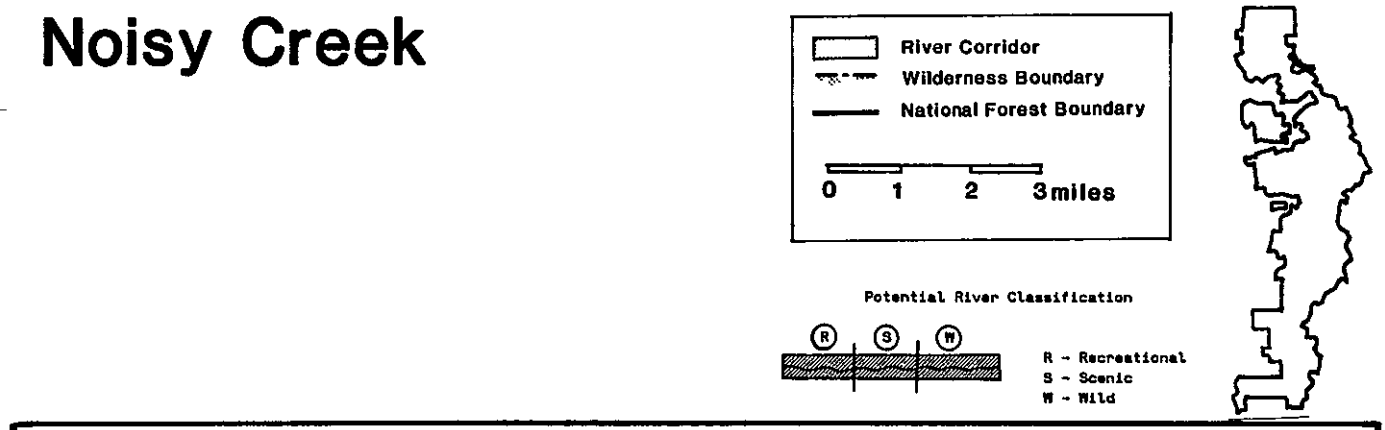
POTENTIAL AND RECOMMENDED CLASSIFICATION:

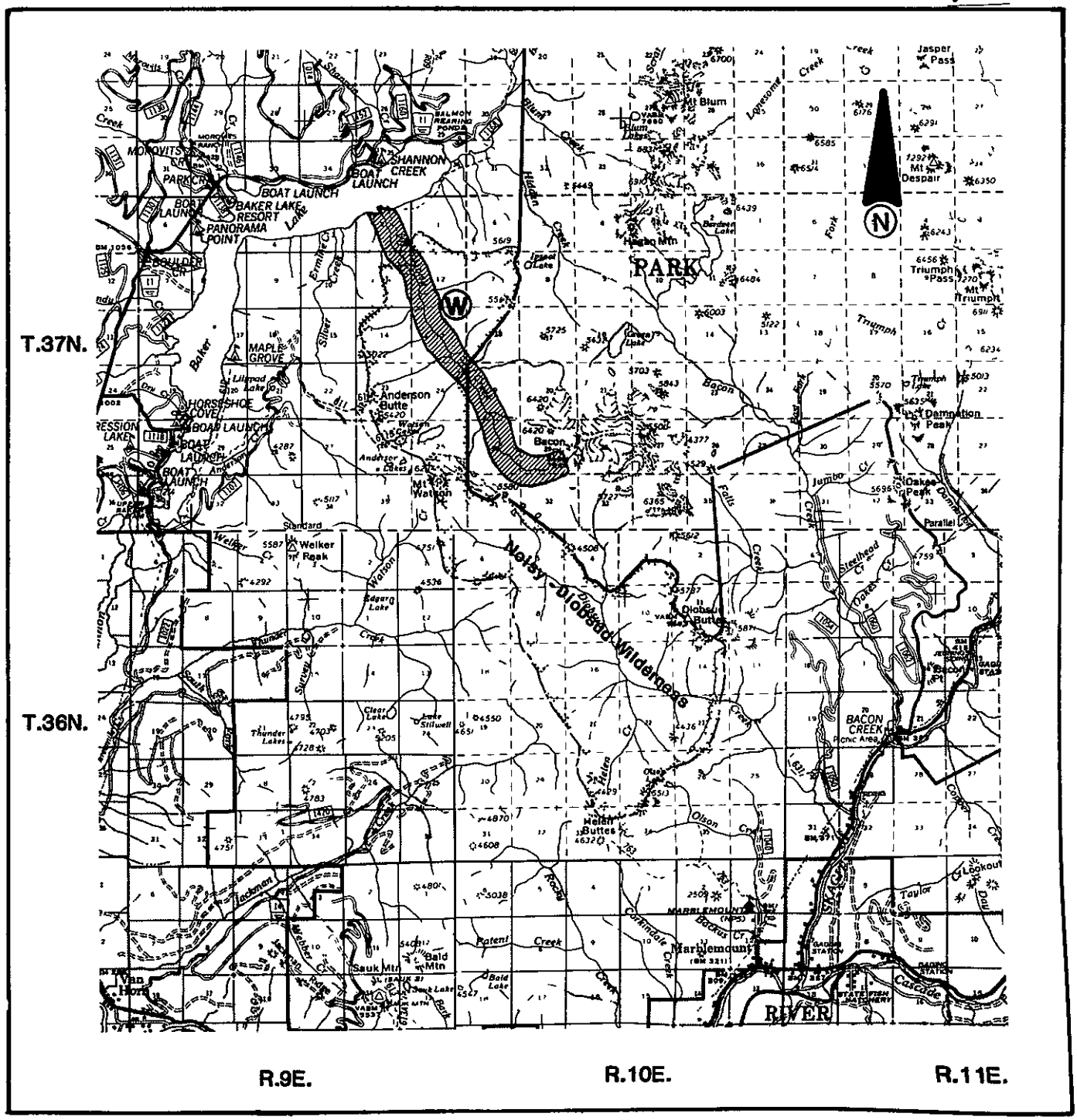
Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	6.1	Wild	6.1

SUITABILITY DETERMINATION:

Noisy Creek was found to be suitable for inclusion in the preferred alternative of the Forest Plan due to the lack of competing resource values. All but the lower one mile of the river is in forest service or national park service wilderness. There is public support for designation as well as outstandingly remarkable values for wildlife and ecology. It was felt that these values outweighed potential future use for hydropower.

Noisy Creek


River Corridor
Wilderness Boundary
National Forest Boundary
0 1 2 3miles
Potential River Classification
R
S
W
R - Recreational
S - Scenic
W - Wild


T.37N.
T.36N.
R.9E.
R.10E.
R.11E.
Noisy-Diobsud Wilderness
PARK
RIVER
Mt Blum
Jasper Pass
Mt Despair
Triumph Pass
Mt Triumph
Damnation Peak
Oakes Peak
Anderson Butte
Bacon
Diobsud Butte
Welker Peak
Helen Buttes
Marblemount
BACON CREEK
Picnic Area
SHANNON CREEK BOAT LAUNCH
BAKER LAKE RESORT
PANORAMA POINT
BOULDER
MAPLE GROVE
HORSESHOE COVE
BOAT LAUNCH
Sauk Mtn
Bald Mtn
Van Horn
Lookout
Concrete

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
NPS, North Cascades National Park	2.7 miles	864 acres
Mt. Baker-Snoqualmie National Forest (Noisy-Diobsud Wilderness - 2.4 miles)	2.7 miles	864 acres
Private	0 7 mile	224 acres
Total	6.1 miles	1,952 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of this river segment is classified as an area of critical mineral potential. A review of available literature, including the Bureau of Mines MILS data, indicates the area has no known occurrences of locatable mineral resources of significance. However, it is reported that placer gold does occur in the area. None of the area is encumbered by unpatented mining claims, mineral leases or mineral lease applications. BLM has classified the northern three miles as being prospectively valuable for geothermal resources. It is not considered to be prospectively valuable for any other leasable mineral commodities Based upon the available information, it appears that the area does have at least a low potential for the occurrence of gold deposits and geothermal resources. The potential for other locatable and leasable mineral resources appears to be relatively low and no serious interest in either the locatables or leasables is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments along Noisy Creek. The creek is classified as "Protected" from hydropower development by the Northwest Power Planning Council. A hydroelectric project license application was submitted to FERC. Proposed facilities within the river corridor consist of a transmission line, power house, diversion structure and penstock. The capacity of the project will be 10.7 megawatts.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: There are no logging roads or bridges along the Noisy Creek drainage. A trail bridge once crossed Noisy Creek just as it entered Baker Lake, but has since been washed away. There are plans to replace the bridge when the East Bank Trail is completed

There are no developed campgrounds along the creek. The only camping occurs on Baker Lake, on a point north of the mouth of Noisy Creek.

A trail provides access to the upper reaches of the creek. The trail is located on the north side of Noisy Creek and crosses the creek at 1 mile. There is no bridge crossing.

There are no homesites or farms bordering the creek.

A cedar salvage sale is planned to be logged within 3 years.

RECREATION ACTIVITIES: Fishermen catch native trout along the lower 3 miles of the creek. There are no rafting or canoeing opportunities.
Dispersed recreation users hike a trail to the upper part of the creek.

Appendix E
Noisy Creek

Recreation Activities (in estimated Recreation Visitor Days (RVD's), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	250	360
Misc. (hike, picnic, berry picking, etc.)	150	210
TOTAL	400	570

WILDLIFE AND FISHERIES: The Noisy Creek area contains quality winter range for black-tailed deer. Other species found in the drainage include bear, mountain goats, bald eagles, osprey and cougar. A SOHA extends for most of the length of Noisy Creek through the Noisy-Diobsud Wilderness.

Native trout are found in Noisy Creek.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: *Water quality is excellent. Unnamed* glaciers are found above Noisy Creek on Bacon Peak and Mt. Watson. In the last miles, the creek falls rapidly through a series of short cascades.

GEOLOGY: The bedrock geology along Noisy Creek is comprised of phyllite schist, greenschist, and include some schistose metaconglomerate. Thick deposits of glacial till occur on this U-shaped glacial valley. Forested lower sideslopes merge into rock outcrops, brushy zones, and perennial snow patches on the higher slopes.

CULTURAL RESOURCES: No systematic archaeological survey has been made of Noisy Creek and no prehistoric or historic sites are recorded. The lack of sites may represent the lack of surveys of the area.

Noisy Creek was within the territory of the Upper Skagit tribe during the historic period. Localities used in traditional religious practices exist within the proposed Wild and Scenic River corridor.

TIMBER: There is one old clearcut near the creek where it enters Baker Lake.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
3.8	0	0

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: Accessible only by trail from the north end of Baker Lake, Noisy Creek has its headwaters in North Cascades National Park and tumbles into Baker Lake on its less developed east side. The community of Concrete (pop. 570) is approximately 25 miles from the trailhead.

Concrete, once largely economically dependent on the cement plant (now closed) derives its major support from the timber industry via logging and a shake mill. To an increasing degree, tourism and recreation contribute to the economy of the community. Baker Lake attracts many visitors for camping, boating, and fishing. The nearby Skagit River is renowned for its steelhead fishing, and the Ross Lake Recreation Area is nearby.

CURRENT ADMINISTRATION: The creek flows through the North Cascades National Park Service Complex Wilderness administered by the National Park Service from its headwaters downstream 2.7 miles. The next 2.5 miles flow through the Noisy-Diobsud Wilderness. The wilderness and other National Forest lands are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for Noisy Creek for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 1,000	$1,000
Costs of Implementation		1,000
Development of Management Plan		2,300
Development Costs	60,000	
Operation and Maintenance Costs	0	
TOTAL - First Five Years	**$61,000**	**$4,300**

Development costs are for completion of East Bank trail.

General administration and operation and maintenance costs are estimated to continue at $400 annually.

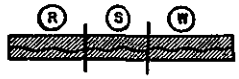
LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Wilderness-Dedicated Trailless	823

Diobsud Creek

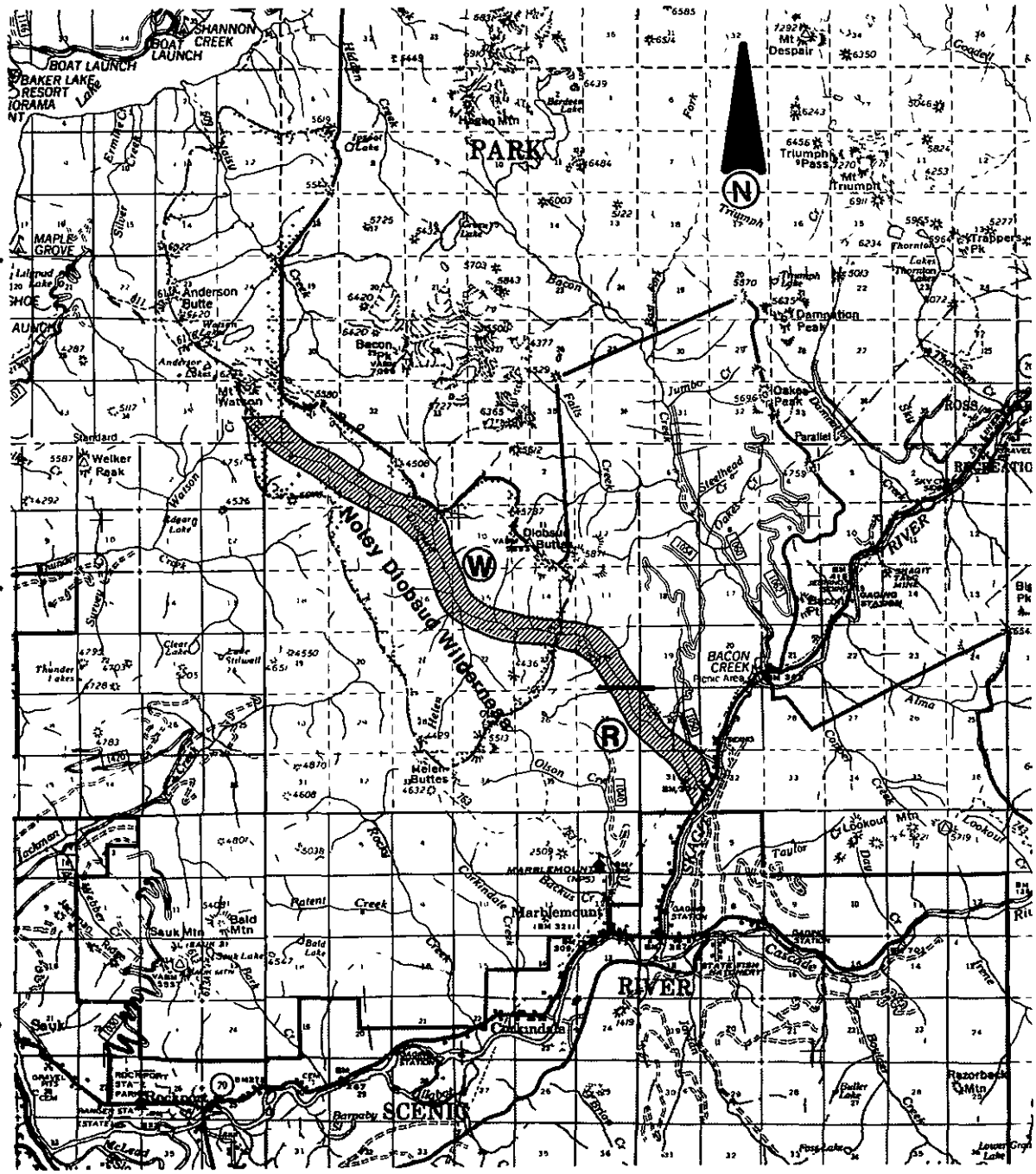
Potential River Classification



R - Recreational
S - Scenic
W - Wild

River Corridor
Wilderness Boundary
National Forest Boundary

0 1 2 3 miles



DIOBSUD CREEK

Whatcom and Skagit Counties

Diobsud Creek was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters on Mt. Watson to its confluence with the Skagit River.

Segment 1 - The headwaters on Mt. Watson in the SE 1/4 of Section 36, T.37 N., R.9E. to the south section line of Section 24, T.36 N., R.10 E. (8.3 miles).

Segment 2 - The south section line of Section 24 to the confluence with the Skagit River (2.2 miles).

RIVER MILEAGE:

Study:	10.5 miles
Eligible:	10.5 miles
Forest Plan:	10.5 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: Diobsud Creek was found to possess "Outstandingly Remarkable" values for the following: recreation and wildlife.

Fishing is the most popular recreation activity along the creek, especially on the lower 2 to 4 miles. Though the amount of use is presently low, the quality of the experience is high and there is potential for additional use.

Black-tailed deer, bears, and mountain goats inhabit the upper reaches of the creek below Mt. Watson. The creek corridor contains a moderate amount of deer winter range. A SOHA is located in the middle reaches of this creek.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	8.3	Wild	8.3
Segment 2	Recreation	2.2	Recreation	2.2

SUITABILITY DETERMINATION:

Diobsud Creek was found to be suitable for inclusion in the preferred alternative of the Forest Plan due to the lack of resource conflicts, public support, and ease of management as most of the river is within wilderness. The Forest Plan allocation of this area to nonmotorized recreation is incompatible with potential hydro-electric values. The outstandingly remarkable values present on Diobsud Creek are recreation and wildlife.

Appendix E
Diobsud Creek

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Noisy-Diobsud Wilderness - 6.0 miles)	8.3 miles	2,656 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	1.1 miles	352 acres
Private	1.1 miles	312 acres
State	0.0 miles	40 acres
Total	10.5 miles	3,360 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of this river segment is classified as an area of critical mineral potential. A review of available literature including the Bureau of Mines MILS data, indicates the area has no known occurrences of locatable mineral resources. None of the area is encumbered by unpatented mining claims, mineral leases or mineral lease applications, and only a small portion of the area (northern one mile) is classified by the BLM as being prospectively valuable for geothermal resources. Based upon the available information, it appears that the area has a relatively low potential for the occurrence of locatable and leasable mineral resources, and no serious interest in either type of mineral resource is currently being expressed.

WATER RESOURCE DEVELOPMENT: This river was classified as "Protected" from hydropower development by the Northwest Power Planning Council. Prior to the classification, a hydroelectric project application was submitted to FERC. Proposed facilities within the river corridor consist of a transmission line, powerhouse, diversion structure and penstock. The capacity of the project will be 4 megawatts.

There are no water impoundments.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: There is one bridge where Highway 20 crosses the creek near the confluence with the Skagit.

A road parallels the creek for approximately 1 mile upstream from the Skagit. There are several primitive roads in the vicinity.

Trail #631 follows the north side of the creek for 1.5 miles.

There are no developed campgrounds.

Three homesites and two farms are found along the lower mile of the creek.

There is some agricultural development in the lower reaches.

The creek has been channelized upstream from the Highway 20 bridge on private land (Section 31, T.36 N., R.11E.)

2,000 yards of rip-rap are located along the creek at the Highway 20 bridge crossing.

A powerline crosses the creek in Section 31, T.36 N., R 11E.

An old railroad track is located in Sections 31 and 32, T.36 N , R11E.

RECREATION ACTIVITIES: The greatest recreation opportunity on Diobsud Creek is fishing, especially on the lower 2 to 4 miles. There is no rafting, canoeing, kayaking or swimming.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	300	430
Camping	10	15
Viewing (scenery, wildlife, driving for pleasure)	10	15
Misc. (hike, picnic, berry picking, etc.)	20	39
TOTAL	340	499

WILDLIFE AND FISHERIES: Black-tailed deer, bears, and mountain goats inhabit the upper reaches of the creek below Mt. Watson. The creek corridor contains a moderate amount of deer winter range. A SOHA is located adjacent to the wilderness boundary in the middle reaches of this creek.

Salmon are able to migrate upstream for only 1.5 miles, where their passage is blocked by a series of cascades. The river is heavily utilized by pink salmon and steelhead trout and has good runs of coho, summer and fall chinook.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: Diobsud Creek displays excellent water quality. The creek contains several waterfalls and glaciers on the south side of Bacon Peak. Sixteen tributaries drain into Diobsud Creek.

GEOLOGY: Phyllite schist and metasediments are the most prevalent rock types in the Diobsud area. Glacial till occurs along the last mile or so prior to the confluence with the Skagit. This stream is full of boulders and has very high energy. It is rapidly downcutting and has a deep V gorge throughout most of its length. The sideslopes along the majority of the stream are very steep, rugged, and rocky with numerous deeply dissected side channels.

CULTURAL RESOURCES: No systematic archaeological survey has been made of Diobsud Creek, although some information is available from surveys made in conjunction with Federal projects, and from published historical sources. During the historic period, the creek was within the territory of the Upper Skagit tribe. Historical research indicates that the Diobsud Creek drainage was used by the Upper Skagit during seasonal food gathering activities and there was a camp at the mouth of the creek. Although no evidence of these sites has been found, this probably reflects the lack of survey, rather than lack of use. Both the Upper Skagit and the Samish Indian tribes have identified localities withing this drainage that are used in the practice of their traditional religion.

Appendix E
Diobsud Creek

TIMBER: Logging activity is limited along the creek to the last mile downstream.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	----------ASQ----------	
	Preferred	Preferred
Total	Alternative	Alt. with
Timber	w/o W&SR	Eligible W&SR
Volume	Designation	Designation
(MMBF)	(MMBF/yr.)1/	(MMBF/yr.)1/
17.0	.056	.052

1/ Based on preferred alternative with management requirements.

LIVESTOCK GRAZING: Two small farms occur along the lower reaches of the creek.

SOCIO-ECONOMIC EFFECTS: Diobsud Creek enters the Skagit River about 3 miles east of Marblemount. Marblemount is located on the North Cascades Highway and is in close proximity to North Cascades National Park. Traditionally, the economy of the area has been closely tied to the timber industry. In recent years, tourism and recreation supplement the economic base of this small community. Ross Lake, a major recreation area, is only 25 miles to the east of Marblemount, offering visitors the opportunity to fish, boat and camp.

CURRENT ADMINISTRATION: The upper 6.0 miles of Diobsud Creek are within the Noisy-Diobsud Wilderness. The wilderness and other National Forest lands are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. This river, if designated, would become an extension of the existing designated Skagit Wild and Scenic River System.

The Skagit County Comprehensive Plan has zoned the land along Diobsud Creek, outside of federal jurisdiction, for Forestry Use.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for Diobsud Creek for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 2,000	$ 1,000
Costs of Implementation		2,000
Development of Management Plan		4,500
Development Costs	0	2,000
Operation and Maintenance Costs		1,000
TOTAL - First Five Years	**$ 2,000**	**$10,500**

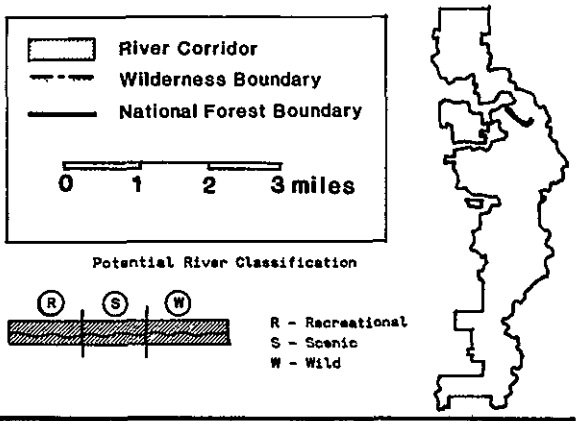
General administration and operation and maintenance costs are estimated to continue at $800 annually.

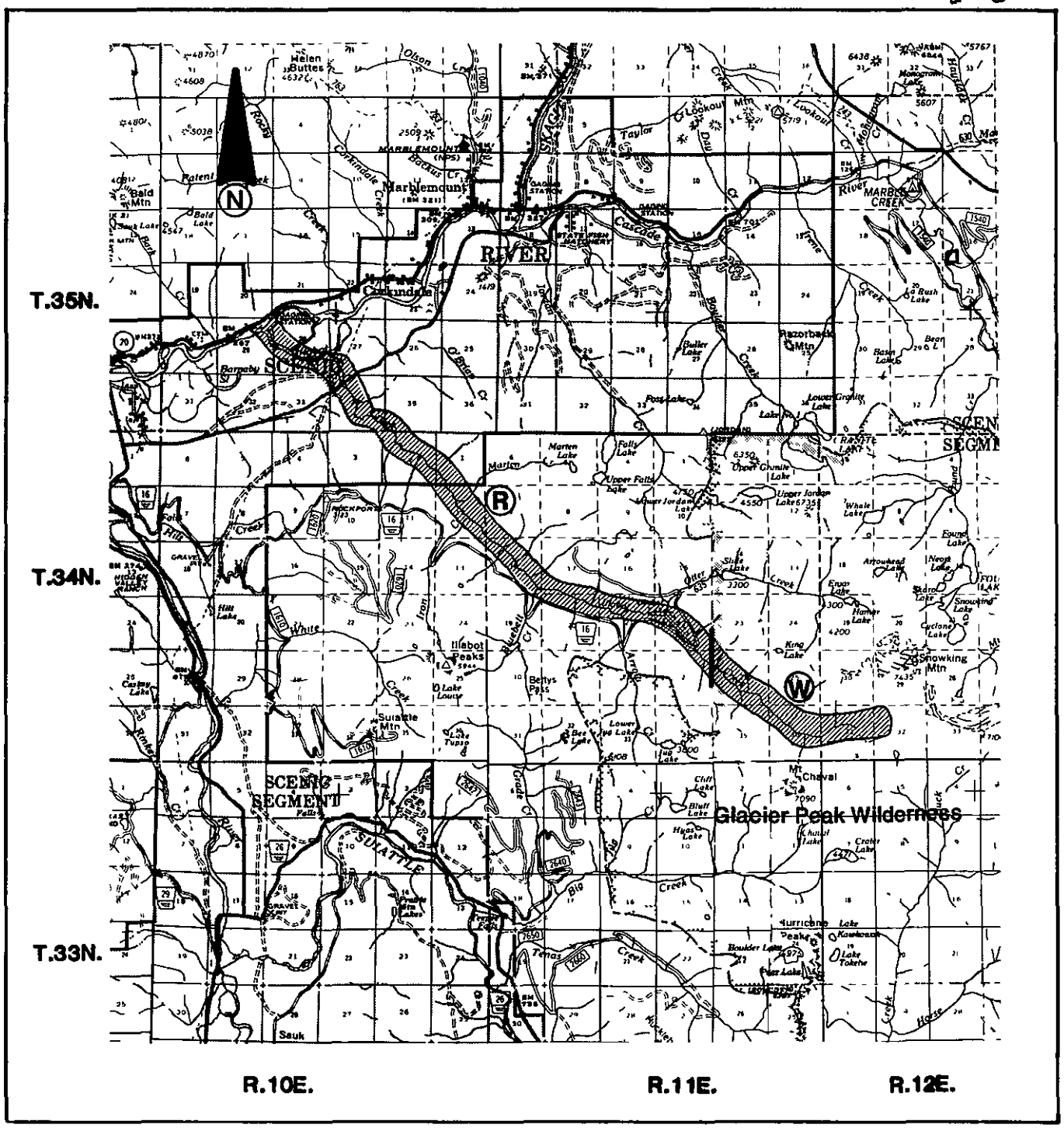
LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service).

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Primitive Recreation	527
		Wilderness-Dedicated Trailless	2,217
		Semi-Primitive, Non-Motorized Recreation	126
Segment 2	Recreation	Semi-Primitive, Non-Motorized Recreation	253
		Scenic Corridor (Middleground)	42
		Old Growth Habitat (spotted owl)	84

Illabot Creek





ILLABOT CREEK

Skagit County

Illabot Creek was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters on Mt. Chaval to its confluence with the Skagit River.

Segment 1 - Headwaters in NW 1/4 of Sec. 32, T.34 N., R.12 E. to Glacier Peak Wilderness boundary (4.3 miles).

Segment 2 - Glacier Peak Wilderness boundary to confluence with Skagit River (11.0 miles)

RIVER MILEAGE:

Study:	15.3 miles
Eligible:	15.3 miles
Forest Plan:	15.3 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: Illabot Creek was found to possess "Outstandingly Remarkable" values for the following: Fisheries and Wildlife

Illabot Creek is outstanding due to the overall production and species diversity of anadromous fish.

Illabot Creek provides very important habitat for bald eagles, bear, beaver, otter, black-tailed deer, Roosevelt elk, spotted owls and mountain goats There is a bald eagle communal night roost in the river corridor.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	4 3	Wild	4.3
Segment 2	Recreation	11 0	Recreation	11.0

SUITABILITY DETERMINATION:

Illabot Creek was found to be suitable for inclusion in the preferred alternative of the Forest Plan due to the high degree of public support for designation, Washington State Department of Fisheries interest, and outstandingly remarkable values for fisheries and wildlife. Illabot Creek is outstanding due to overall production and species diversity of anadromous fish

Appendix E
Illabot Creek

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Glacier Peak Wilderness - 4.3 miles)	4.3 miles	1,376 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	6.2 miles	1,984 acres
Private	4.3 miles	1,096 acres
State	0.5 miles	440 acres
Total	15.3 miles	4,896 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of this river segment is classified as an area of critical mineral potential. A review of available literature, including the Bureau of Mines MILS data, indicates the area has only one reported occurrence of possibly a locatable mineral resource (graphite in Section 2, T.34 N., R.10 E.). The mineral resources of a portion of the area have been studied by the U.S.G.S. and U.S.B.M. (Church and Others, 1984), and based upon the geology of the area and their sampling, they have concluded that a large portion of this river segment has at least a low potential for the occurrence of gold-bearing quartz-vein deposits in metamorphic host rocks. BLM mining claim recordation data does indicate numerous mining claims have been located in Sections 16 and 21, T. 34 N., R.11E. However, all of those claims have either been abandoned or declared to be null and void.

None of the area is classified by the BLM as being prospectively valuable for leasable mineral resources, and none of the area has been encumbered by leases or lease applications.

Based upon the available information, it appears that this river does have at least a low potential for the occurrence of lode gold deposits. It has little, if any, potential for the occurrence of other locatable and leasable mineral resources and no serious interest in either the locatables or leasables is currently being expressed.

WATER RESOURCE DEVELOPMENT: The lower two miles of Illabot Creek contain beaver ponds.

Illabot Creek is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: The road from the town of Rockport to Illabot Lake is 1/4 to 1 mile from the creek. The road crosses the creek above the lake and then loops back down the other side of Illabot Creek for 4 miles.

The Rockport-Cascade Road crosses Illabot Creek about 2 miles from its confluence with the Skagit River. A Forest Service road crosses above Illabot Lake. A private bridge crosses about 1 mile above the mouth of the river.

The land below the Rockport-Cascade Road is used for agricultural purposes. There is one farm, but no other residences, within the drainage.

There are no developed campgrounds along the creek.

There is 200 yards of rip-rap at mile post 19.9 on Rd. #16, and 500 yards on the South Skagit Highway.

Powerlines cross the creek at 1.5 miles from the confluence of Illabot Creek and the Skagit.

There is an existing timber sale at the end of Forest Road 16, downstream from Illabot Lake in T.34 N., R.11E., Section 17.

RECREATION ACTIVITIES: There is fishing from the mouth of the creek upstream 2 1/2 miles and in lakes tributary to the Illabot: Marten Lake, Jug Lake, Slide Lake and Enjar Lake.

There is mountaineering on Snowking and Mt. Chaval. The upper reaches provide opportunities for hunting, berry picking and mushroom gathering.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Waterplay (swim, wade)	10	15
Fishing, Hunting	300	432
Camping	100	150
Viewing (scenery, wildlife, driving for pleasure)	50	76
Misc. (hike, picnic, berry picking, etc.)	50	98
TOTAL	510	771

WILDLIFE AND FISHERIES: Illabot Creek provides feeding and daytime perching habitat for bald eagles and is adjacent to a known bald eagle communal night roost. This is thought to be the largest concentration of eagles in the continental U.S. In addition, there are bear, beaver, and otters. Moderate quality black-tailed deer and Roosevelt elk forage and cover extend throughout the river corridor. Mountain goat winter range is located along the upper reaches of the creek. The creek flows through the middle of a SOHA for 3 miles, three-fourths of which is in the Glacier Peak Wilderness.

Coho salmon, summer steelhead and dolly varden have been reported to swim upstream as far as Illabot Lakes. However, the best spawning habitat for chinook, coho, chum and pink salmon and steelhead is found from the mouth of the Illabot upstream for 1 1/4 miles. Chum salmon spawn mostly in Illabot Slough, at the mouth of the creek.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: Glaciers are found near the headwaters on Snowking and Mt. Chavel, which feed the creek, causing discoloration of the water. From Illabot Lake, the creek descends through a narrow canyon with numerous cascades and falls.

The gradient in the upper end of Illabot Creek drops at the rate of 200 feet per mile and contains large boulders and rubble. The last mile is a wide channel with good gravel. The channel then splits into two with a sand bottom and little gravel. Illabot Creek contains 31 tributaries and two side channels.

Appendix E
Illabot Creek

GEOLOGY: The bedrock geology consists of granitic and gneissic rocks associated with large bodies of phyllite schist. Previous glaciation has carved out this U-shaped valley and left deep deposits of glacial till and lacustrine materials. Most of the valley consists of long, relatively smooth forested sideslopes blending into ridgetops dominated by rock outcrops and perennial snow patches.

CULTURAL RESOURCES: No systematic archaeological survey has been made of Illabot Creek, and no prehistoric or historic sites are recorded. The lack of known sites is believed to reflect the lack of survey rather than use. During the historic period, Illabot Creek was within the territory of the Upper Skagit Tribe, and an important fishery was located on the creek. Both the Upper Skagit and the Samish Indian Tribes have identified localities within this this drainage that are used in the practice of their traditional religion.

TIMBER: The land between the Rockport-Cascade Road and the wilderness boundary has been used extensively for logging. The deciduous forest bordering Illabot Creek and the steep slopes of its tributaries have been heavily logged and are currently in various stages of reforestation.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	----------ASQ----------	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
71.2	1.729	1.624

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The Skagit County Comprehensive Plan (May, 1982) recommends that the Barnaby Slough area near the mouth of Illabot Creek be designated as prime agricultural land. This area is located within the creeks'floodplain. Industrial and residential development would be discouraged.

The remainder of the river's length is dominated by logging. The timber industry has been the economic mainstay of the communities in the area. However, outdoor recreation pursuits are diversifying the economies of the area. Increasing numbers of visitors are travelling to the North Cascades to take advantage of hiking, camping, boating, fishing and sightseeing opportunities.

CURRENT ADMINISTRATION: The upper five miles of the creek are within Glacier Peak Wilderness. The wilderness and other National Forest lands are administered by Mt. Baker-Snoqualmie National Forest, USDA Forest Service. This river, if designated, would become an extension of the existing designated Skagit Wild and Scenic River System.

Most of the land along Illabot Creek, outside of federal jurisdiction, has been zoned by Skagit Country for Forestry Use. At the confluence of Illabot Creek and the Skagit River, the land is zoned Rural Use, Public Use District and Agricultural Reserve District.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for Illabot Creek for the next five years:

	Expenses Expected Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 3,000	$ 2,000
Costs of Implementation		2,000
Development of Management Plan		13,800
TOTAL - First Five Years	**$ 3,000**	**$17,800**

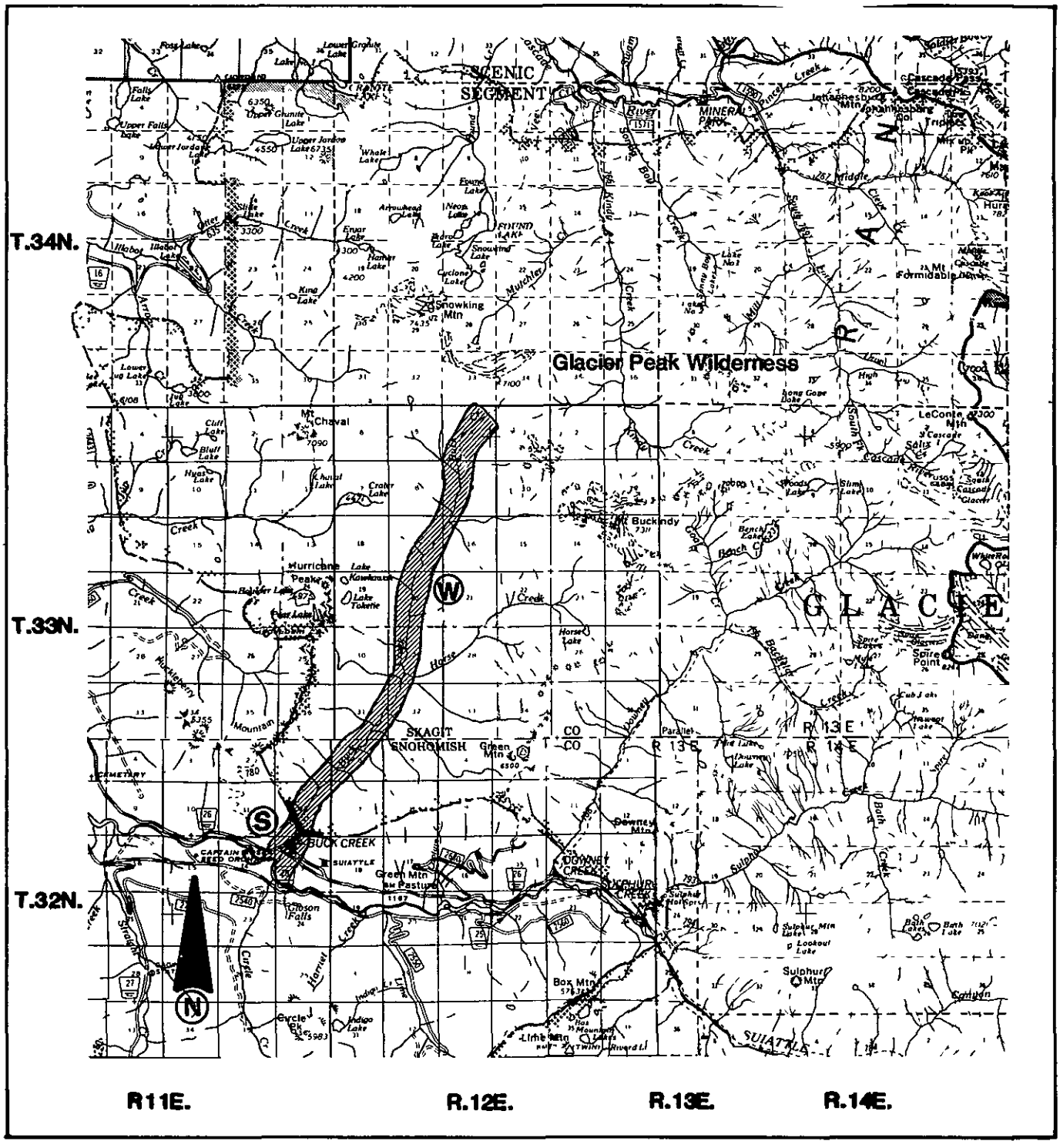
General administration and operation and maintenance costs are estimated to continue at $1,000 annually.

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	**Management Emphasis**	**Acres**
Segment 1	Wild	Wilderness-General Trailless	1,351
		Wilderness-Dedicated Trailless	84
Segment 2	Recreation	Semi-Primitive, Non-Motorized Recreation	126
		Deer and Elk Habitat Enhancement	1,436
		Old Growth Habitat (spotted owl)	105
		Goat Habitat	63
		Timber Management	274

Buck Creek


River Corridor
Wilderness Boundary
National Forest Boundary
0 1 2 3 miles
Potential River Classification
R
S
W
R - Recreational
S - Scenic
W - Wild
SCENIC SEGMENT
Glacier Peak Wilderness
T.34N.
T.33N.
T.32N.
R11E.
R.12E.
R.13E.
R.14E.
SKAGIT
SNOHOMISH
BUCK CREEK
SUIATTLE

BUCK CREEK

Skagit and Snohomish Counties

Buck Creek was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: *From its headwaters on Mt. Chaval to the confluence with the* Suiattle River.

Segment 1 - Headwaters in NE 1/4 of Sec. 4, T.33 N., R.12 E. to Glacier Peak Wilderness boundary (10.1 miles).

Segment 2 - Glacier Peak Wilderness boundary to the confluence with the Suiattle River (1.0 mile).

RIVER MILEAGE:

Study:	11.1 miles
Eligible:	11.1 miles
Forest Plan:	11.1 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: Buck Creek was found to possess "Outstandingly Remarkable" values for the following: Fisheries.

Spring chinook and coho salmon spawn in the lower reaches of the creek. There is also a population of dolly varden.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	10.1	Wild	10.1
Segment 2	Scenic	1.0	Scenic	1.0

SUITABILITY DETERMINATION:

Buck Creek was found to be suitable for inclusion in the preferred alternative of the Forest Plan due to lack of resource conflicts, outstanding fisheries resources, and ease of management. Ninety-one percent of this river is within wilderness.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Glacier Peak Wilderness - 10.1 miles)	10.1 miles	3,232 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	1.0 miles	320 acres
TOTAL	11.1 miles	3,552 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of the river segments are classified by the BLM as an area of critical mineral potential or encumbered by unpatented mining claims. A review of available literature, including the Bureau of Mines MILS data, indicates the river has no reported locatable mineral resource occurrences. However, the area's mineral resources have been studied by the U.S.G.S. and U.S.B.M. (Church and Others, 1984). Based upon the geology of the area and their sampling, they have concluded the area does have at least a moderate potential for the occurrence of copper and molybdenum resources.

None of the area has been classified as being prospectively valuable for leasable mineral resources. However, Section 13, T.32 N., R.11 E. has been encumbered by two geothermal lease applications. Both applications have been withdrawn.

Based upon the available information, it appears that the area does have potential for the occurrence of copper and molybdenum resources. The potential for the occurrence of other locatable mineral resources and leasable mineral resources is relatively low and no serious interest in the mineral resources is currently being expressed.

WATER RESOURCE DEVELOPMENT: The lower 1.5 miles of this river are classified as "Protected" from hydropower development by the NW Power Planning Council.

There are no water impoundments.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Campground access and dispersed recreation access roads are situated on both sides of the creek for the first 0.6 mile.

Buck Creek Campground (51 sites) is situated on both sides of the creek near the confluence with the Suiattle River.

A single lane concrete bridge spans the creek 0.3 miles upstream.

The bridge is protected by rip-rap. Also 50 feet of rip-rap protects unit #3 in the Buck Creek Campground (1988).

There are no communities or farms located on this creek.

Near the mouth, there are 4 log deflectors on the west bank (each is 2' x 55') and 32 log deflectors on the west bank side channel.

Bridge approach guard rails are planned for installation. Planned improvements in the campground include a new shelter and toilet facilities.

RECREATION ACTIVITIES: The river is not suitable for rafting, canoeing, or kayaking. It is also not suitable for swimming due to very cold water.

The lower reaches of the creek support low to moderate amounts of fishing for resident trout.

Dispersed camping is available between Road #26 and the Suiattle River.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	800	1,152
Camping	9,000	13,500
Viewing (scenery, wildlife, driving for pleasure)	50	76
Misc. (hike, picnic, berry picking, etc.)	200	392
TOTAL	10,200	15,120

WILDLIFE AND FISHERIES: Species typical of the westside of the Cascades, and associated with old-growth fauna, are found within the creek drainage.

Spring chinook and coho salmon spawn from the creeks mouth upstream for 1 1/2 miles. Steep cascades block further upstream access. The best spawning occurs in the lower 1/2 mile where excellent gravel riffles are found. Dolly varden is also found throughout the creek.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: Buck Creek has excellent water quality. It contains steep gradients with extremely steep cascades, and the stream bottom is made up of boulders, rubble and scattered patch gravel. Glaciers are common at the headwaters of Buck Creek and its twenty-eight tributaries.

GEOLOGY: Deeply weathered, incompetent, phyllite schist and greenschist comprise the lower slopes whereas the upper slopes contain more competent schist. Past glaciation has carved out the valley and left deposits of glacial till and lacustrine materials The once predominant U-shaped valley characteristic is disappearing as the creek rapidly downcuts through the soft bedrock and forms a V-shaped valley. Landflows and other mass movements are common due to high instability. Areas adjacent to the creek are very brushy. Most of the valley consists of long, relatively smooth forested sideslopes blending into ridgetops dominated by rock outcrops and perennial snow patches.

CULTURAL RESOURCES: No systematic archaeological survey has been made of Buck Creek. Few project surveys have been conducted and historic research is limited. The lack of known sites is believed to reflect the lack of survey of the drainage. During the historic period, the area was within the territory of the Sauk-Suiattle Indians. The mouth of Buck Creek has been reported as a historic fishing and long house site by the Sauk-Suiattle tribe. The area currently has values for traditional Indian religious practices.

TIMBER: Salvage logging occurs from the confluence for 1 mile upstream to the wilderness boundary.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest systems lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
5.4	.109	.108

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: Buck Creek lies almost entirely within the Glacier Peak Wilderness. It enters the Suiattle River near a forest road system approximately 25 miles from Darrington. Darrington, approximately 50 miles from Everett, is a community traditionally and presently dependent on the logging and forest products industry. Located on the Mountain Loop Highway in an area noted for its scenery and recreation opportunities, Darrington also benefits economically from the many visitors to the area.

CURRENT ADMINISTRATION: The mouth of this creek is within the corridor of the Skagit Wild and Scenic River for the first 0.7 miles and thus would become an extension of the Skagit System if it were designated. The rest of the river is within the Glacier Peak Wilderness which is administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for Buck Creek for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 1,000	$ 1,000
Costs of Implementation		1,000
Development of Management Plan		4,900
Development Costs		
Operation and Maintenance Costs	60,000	0
TOTAL - First Five Years	**$61,000**	**$ 6,900**

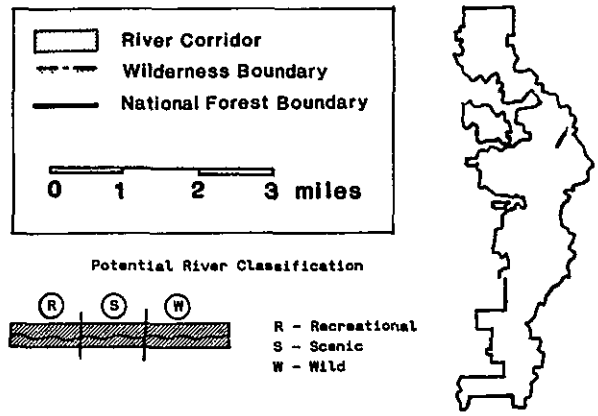
General administration and operation and maintenance costs are estimated to continue at $12,400 annually.

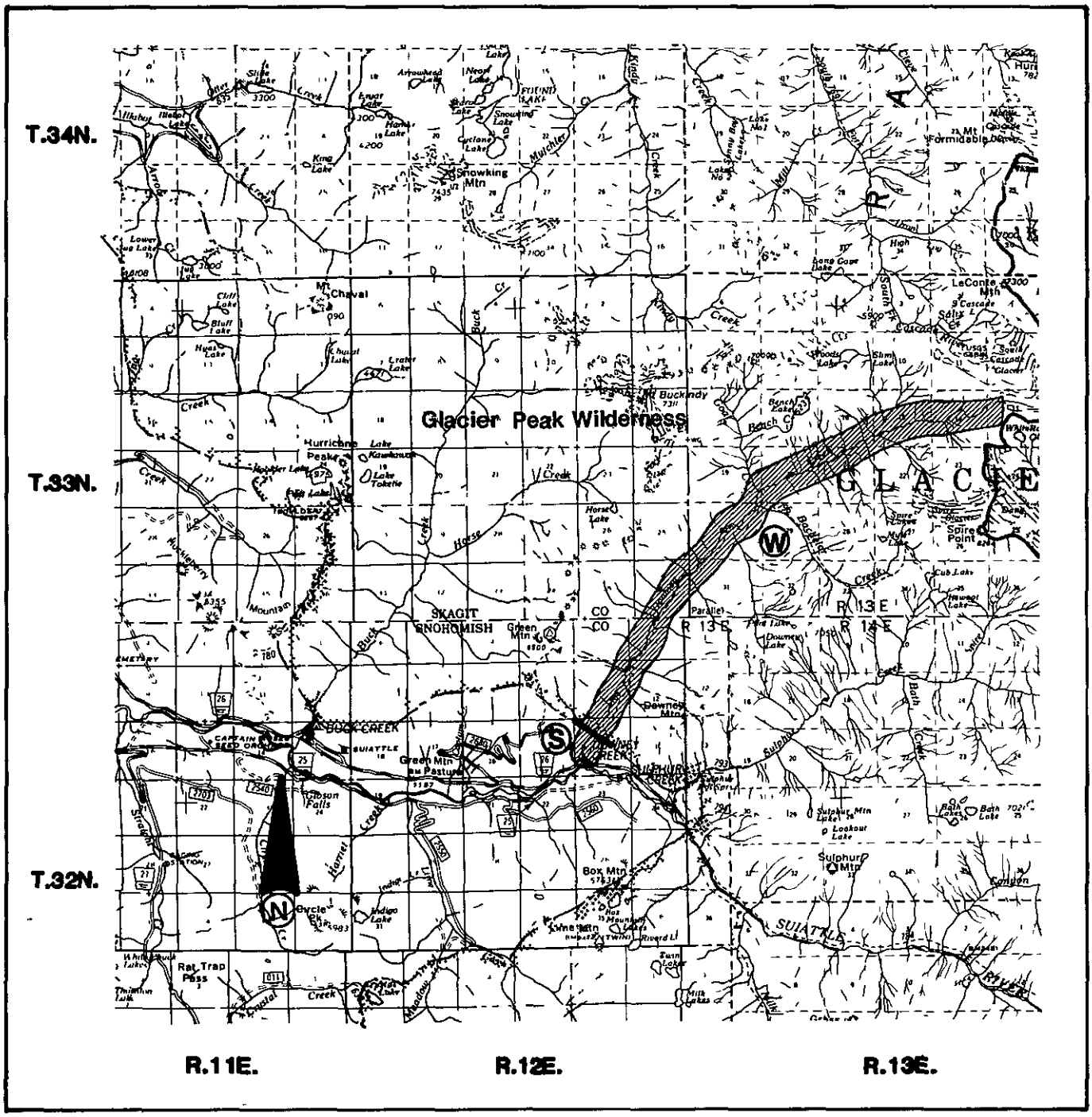
LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Wilderness-Transition	105
		Wilderness-Dedicated Trailless	3,231
Segment 2	Scenic	Semi-Primitive, Non-Motorized Recreation	21
		Skagit Wild and Scenic River	168
		Deer and Elk Habitat Enhancement	21

Downey Creek





DOWNEY CREEK

Skagit and Snohomish Counties

Downey Creek was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters on Lizard Mountain to the confluence with the Suiattle River.

Segment 1 - Headwaters on Lizard Mtn. in NW 1/4 of Sec. 13, T.33 N., R.13 E. to Glacier Peak Wilderness boundary (10.0 miles)

Segment 2 - Glacier Peak Wilderness boundary to confluence with Suiattle River (0 8 mile)

RIVER MILEAGE:

Study:	10.8 miles
Eligible·	10.8 miles
Forest Plan:	10.8 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: Downey Creek was found to possess "Outstandingly Remarkable" values for the following: Fisheries and Wildlife

Downey Creek provides habitat for a diverse population of fish. The creek supports runs of spring chinook, coho salmon, summer steelhead and dolly varden.

A SOHA extends along the river inside the Glacier Peak Wilderness. Three pairs of spotted owls have been observed.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	10.0	Wild	10.0
Segment 2	Scenic	0.8	Scenic	0 8

SUITABILITY DETERMINATION:

Downey Creek was found to be suitable for inclusion in the preferred alternative of the Forest Plan due to lack of resource conflicts, outstanding fish and wildlife values and ease of management. Almost all of this river is within wilderness.

Appendix E
Downey Creek

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Glacier Peak Wilderness - 10.0 miles)	10.0 miles	3,200 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	0.8 miles	256 acres
TOTAL	10.8 miles	3,456 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of the river segments are classified by the BLM as areas of critical mineral potential or encumbered by unpatented mining claims. A review of available literature including the Bureau of Mines MILS data indicates the river has no reported locatable mineral resource occurrences. However, the area's mineral resources have been studied by the U.S.G.S. and U.S.B.M. (Church and Others, 1984). Based upon the geology of the area and their sampling, they have concluded the area does have at least a low potential for the occurrence of nickel, cobalt, chromium and platinum-group metal resources in magmatic segregations of mafic layered complexes.

The BLM has classified the southern two miles as being prospectively valuable (PV) for geothermal resources. However, none of the area is considered "PV" for other leasable mineral resources and none of the area has been encumbered by mineral leases or lease applications.

Based upon the available information, it appears the area does have at least a low potential for the occurrence of nickel, cobalt, chromium and platinum-group metal resources. A small portion of the area has at least a low potential for the occurrence of geothermal resources. No serious interest in either type of mineral resource is currently being expressed.

WATER RESOURCE DEVELOPMENT: This river is classified as "Protected" from hydropower development by the NW Power Planning Council.

There are no water impoundments.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: The only bridge is located where Forest Road No. 29 crosses Downey Creek at the confluence with the Suiattle River.

There is approximately 100 feet of rip-rap under the bridge on both banks.

The Downey Creek Trailhead #768 is located at the junction of the Suiattle River Road #26 and the old Downey Creek Campground now used as a dispersed site. The trail parallels the creek for 6.6 miles to Bachelor Creek.

There are no homes, farms or agricultural developments along the creek.

Guard rails are planned for installation on the bridge approaches. Also, trailhead parking and toilet facilities are proposed.

RECREATION ACTIVITIES: Fishing dominates the recreation opportunities on Downey Creek, mostly for trout. The lower reaches have a low to moderate amount of fishing use.

This creek is not suitable for rafting, canoeing, kayaking, or swimming.

Several dispersed recreation opportunities are available including hiking, camping, and big game hunting, all of which are associated with the Downey Creek trail.

Recreation Activities (in estimated Recreation Visitor Days (RVD's), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	800	1,152
Camping	1,600	2,400
Misc. (hike, picnic, berry picking, etc.)	500	980
TOTAL	2,900	4,532

WILDLIFE AND FISHERIES: A SOHA with three sighted pairs extends along the river inside the Glacier Peak Wilderness.

Downey Creek provides habitat for a diverse population of fish, particularly in the lower 0.5 miles The creek contains good spawning and rearing habitat for spring chinook. There are also runs of coho salmon, summer steelhead and dolly varden.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The water quality of Downey Creek is excellent. Its eighteen tributaries are pristine at higher elevations. They have glaciers at their headwaters and contain numerous falls and cascades. Downey Creek has a steep gradient.

GEOLOGY: Deeply weathered, incompetent, phyllite schist and greenschist are common on lower slopes whereas the upper slopes contain more competent schist in association with granitic and gneissic rocks. Past glaciation has carved out the valley and left deposits of glacial till and lacustrine materials. The once predominant U-shaped valley characteristic is disappearing as the creek rapidly downcuts through the soft bedrock and forms a V-shaped valley. Landflows and other mass movements are common due to the high instability. Long, mostly forested sideslopes, contain numerous deep avalanche tracks. Upper slopes and ridgetops are dominated by rock outcrops, meadows, and perennial snow fields

CULTURAL RESOURCES: No systematic archaeological survey has been made of Downy Creek. Few project surveys have been done and historic research is limited. The lack of sites is believed to reflect lack of survey in the drainage. During historic times, the area was within the territory of the Sauk-Suiattle Indians. The mouth of Downy Creek was reportedly a historic fishing site for the Sauk-Suiattle tribe. The area currently has value to local Indians for gathering materials used in their traditional religious practices.

TIMBER: Salvage logging occurs in and adjacent to the Downey Creek Campground.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
9.2	.302	.286

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: Downey Creek lies almost entirely within the Glacier Peak Wilderness. The creek enters the Suiattle River near a forest road system approximately 25 miles from Darrington. Darrington is a community traditionally and presently dependent on logging and the forest products industry. Located on the Mountain Loop Highway in an area noted for its scenery and recreation opportunities, Darrington also benefits economically from the many visitors to the area.

CURRENT ADMINISTRATION: The mouth of this creek flows into the Suiattle River which is a part of the Skagit Wild and Scenic River System. The remainder of the creek is within the Glacier Peak Wilderness. The whole creek is administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for Downey Creek for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 1,000	$ 1,000
Costs of Implementation		1,000
Development of Management Plan		4,600
Development Costs	51,000	
Operation and Maintenance Costs	15,000	0
Total - First Five Years	**$67,000**	**$ 6,600**

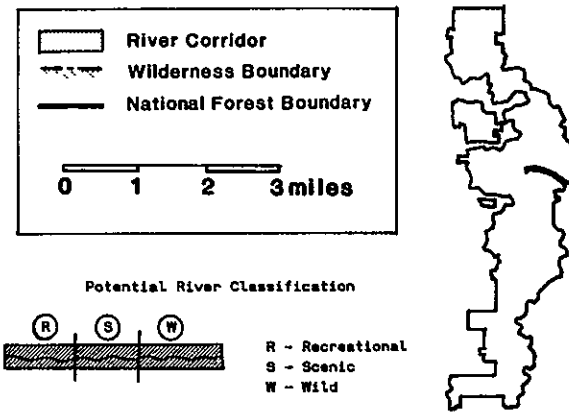
General administration and operation and maintenance costs are estimated to continue at $3,400 annually.

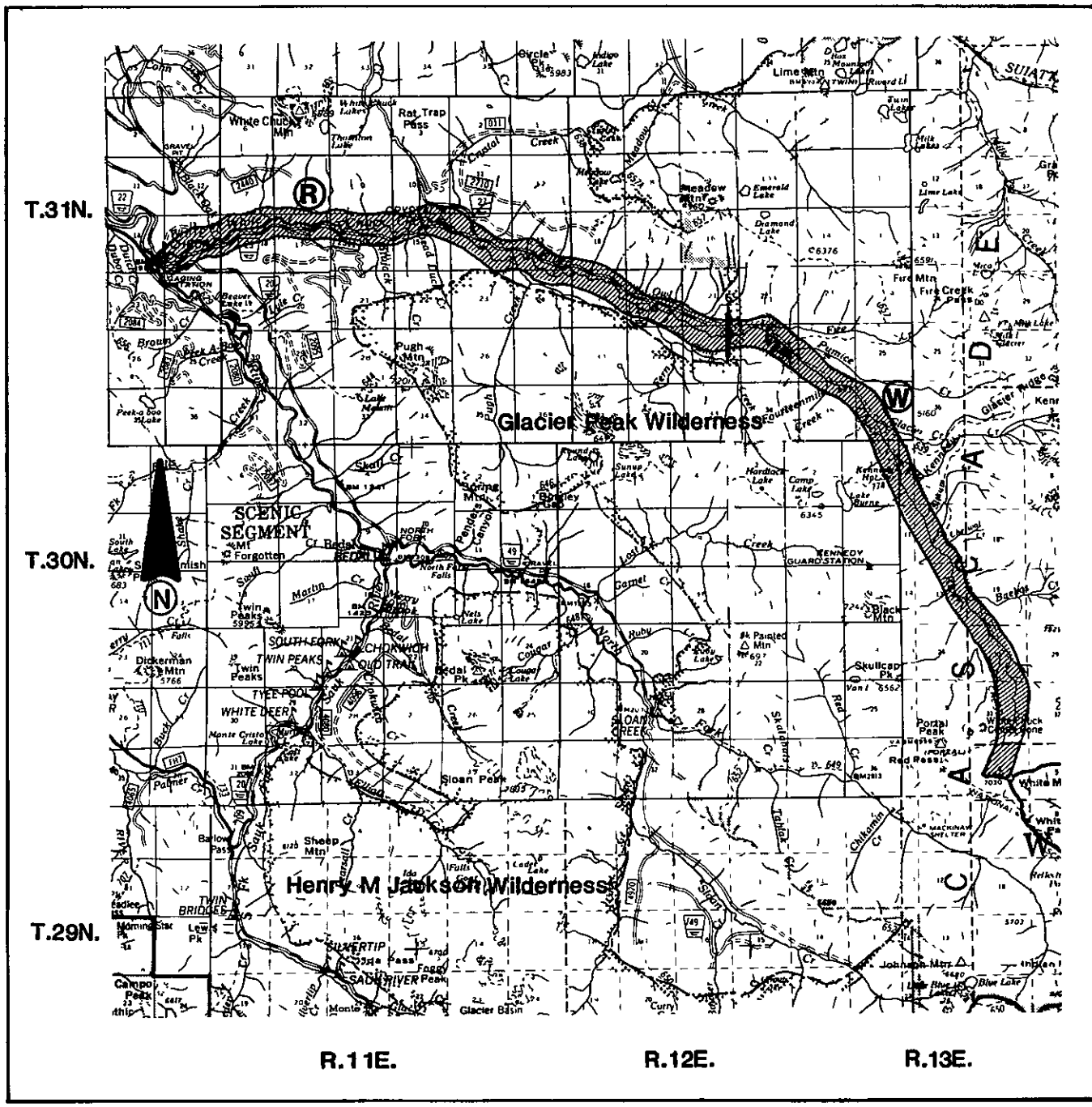
LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Wilderness-Trailled	908
		Wilderness-General Trailless	2,238
		Wilderness-Dedicated Trailless	844
Segment 2	Scenic	Old Growth Habitat (spotted owl)	21
		Timber Management	42

White Chuck River





WHITE CHUCK RIVER

Snohomish County

The White Chuck River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters in rugged mountainous country between White Chuck Mountain and Meadow Mountain to its confluence with the Sauk River.

Segment 1 - Headwaters in NW 1/4 of Sec. 6., T.29 N., R.14 E. to Glacier Peak Wilderness boundary (10.5 miles).

Segment 2 - Glacier Peak Wilderness boundary to confluence with Sauk River (12.0 miles).

RIVER MILEAGE:

Study:	22.5 miles
Eligible:	22.5 miles
Forest Plan:	22.5 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The White Chuck River was found to possess "Outstandingly Remarkable" values for the following: Scenic, Recreation, Fisheries and Wildlife.

The White Chuck River and its tributaries flow through rugged mountainous terrain and contain numerous cascades and falls.

There are abundant camping and hiking opportunities throughout the river corridor. Trails parallel the river for its entire length. Kennedy Hot Springs is a very popular hiking destination. Canoeing and kayaking potential exists from 6 miles upstream to the mouth of the river for experienced boaters looking for challenging hydraulics.

A SOHA exists within the river corridor.

The river provides habitat for spring chinook and coho salmon, dolly varden and resident rainbow trout.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	10.5	Wild	10.5
Segment 2	Recreation	12.0	Recreation	12.0

SUITABILITY DETERMINATION:

The White Chuck River was found to be suitable for inclusion in the preferred alternative of the Forest Plan due to high public interest and high number of outstandingly remarkable features. The White Chuck possessed remarkable values for scenery, recreation, fisheries and wildlife. The travel corridor up this drainage is allocated for scenic protection in the preferred alternative, and contains an abundance of recreational opportunities.

LANDOWNERSHIP:

Segment 1	**River Miles**	**Corridor Acres**
Mt. Baker-Snoqualmie National Forest (Glacier Peak Wilderness - 10.5 miles)	10.5 miles	3,360 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	12.0 miles	3,840 acres
Total	22.5 miles	7,200 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: Neither of the river segments are classified by the BLM as areas of critical mineral potential or are encumbered by unpatented mining claims. A review of available literature, including Bureau of Mines MILS data, indicates the river has no reported locatable mineral resource occurrences of significance. However, the area's mineral resources have been studied by the U.S.G.S. and U.S.B.M. (Church and Others, 1984). Based upon the geology of the area and their sampling, they have concluded that the area does have at least a low potential for the occurrence of hot springs precious metal deposits.

The BLM has classified the entire river as being prospectively valuable for geothermal resources. Kennedy Hot Springs is found in Section 1, T.30 N., R.12 E. However, none of the area appears to have potential for the occurrence of other leasable mineral resources and none of the area has been encumbered by mineral leases or lease applications.

Based upon the available information, it appears that the area does have at least a low potential for the occurrence of precious metal resources and geothermal resources. No serious interest in either type of mineral resource is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments on the river.

The White Chuck River is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Forest Road 23 crosses the White Chuck River near the confluence with the Sauk River. A Forest Service road parallels the river for 11.5 miles upstream, crossing the river 6 miles upstream.

On the north side, forest trail No. 731 parallels the river from the junction of the Sauk River upstream for 6 miles.

In addition to the Forest Service road crossings, an abandoned structure spans the river at river mile 4.0.

There are no homes or farms located within the drainage.

White Chuck Campground is located at the confluence of the White Chuck and Sauk Rivers.

The White Chuck Trailhead #643 is located at the end of the White Chuck Road #23. The trail parallels the river to Kennedy Hot Springs, a popular hot springs. Hikers can gain access to the Pacific Crest Trail near Kennedy Creek. The Pacific Crest Trail follows the White Chuck River drainage upstream for approximately 5 miles, where it crosses the river's headwaters.

RECREATION ACTIVITIES: There is camping and hiking associated with the area trails. Trails parallel the river for its entire length. Kennedy Hot Springs is a popular hiking destination.

Fishing is generally poor due to suspended glacial sediment during the summer. Fall fishing season results in higher use.

Rafting is considered to be unsuitable on the river.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Boating (power, nonpower)	400	660
Waterplay (swim, wade)	100	150
Fishing, Hunting	300	432
Camping	13,000	19,500
Viewing (scenery, wildlife, driving for pleasure)	100	152
Misc. (hike, picnic, berry picking, etc.) berry picking, etc.)	26,000	50,960
TOTAL	39,900	71,854

WILDLIFE AND FISHERIES: Mineral seeps near Kennedy Hot Springs attract big game animals to the surrounding vegetation. A SOHA with 3 sighted pair extends along the river corridor within the Wilderness boundary.

The White Chuck River contains spawning habitat for spring chinook and coho salmon. Dolly varden and resident rainbow trout are also found. There are major limiting factors to increased fish production The fast runoff of snow melt creates flooding conditions. The small gravel substrate is washed away, leaving behind only boulders and coarse material. Cold water conditions in the upper watershed tend to retard fish growth and reduce the abundance of food organisms.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: Beginning 2 miles above the confluence with the Sauk River, the river valley is confined and becomes progressively narrower upstream. It creates steep gradients, dropping over 100 feet per mile. The bottom of the river is composed of rubble and boulders with only scattered fish spawning areas. There are extensive glacier systems on nearby Glacier Peak. The tributaries, which are precipitous and pristine in nature, contain many cascades and falls. Thirty-five tributaries flow into the White Chuck River.

Appendix E
White Chuck River

GEOLOGY: Originating within the pumice deposits and volcanic flows on the flanks of Glacier Peak, this river passes through bedrock dominated by gneiss and granite and then through metasediments and schist. Although the valley has had a strong glacial influence, the traditional glacial U-shape is only dominate in the lower part of the valley. This is because post glacial volcanic activity from Glacier Peak has filled in the upper part of the valley and subsequent river downcutting has formed a steep aided V drainage. Landslides are common on the unstable volcanic material on these inner gorge sidewalls.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the White Chuck River, however, information is available from some project surveys. There is scant evidence of prehistoric use; the lack of sites is believed to represent survey patterns rather than lack of use. Historically, the river was within the territory of the Sauk-Suiattle Tribe. Localities used by the Sauk-Suiattle in the practice of their traditional religion exist within the proposed corridor.

Historic sites represent logging and Forest Service administration. The Sauk River Logging Company operated in the area from the 1920's to the 1950's. Railroad tracks extended a couple of miles up the White Chuck. None of the sites known on the White Chuck is listed on the National Register of Historic Places. Kennedy Hot Springs cabin, a Forest Service administrative structure built in 1924, may be determined eligible for the historic register after an evaluation is completed.

TIMBER: Approximately 50 years ago, the lower 5 miles of the river were extensively logged using railroads. Logging is still common on both sides of the river to Dead Duck Creek and on the north side of the river to the Wilderness boundary.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
105.3	2.787	2.674

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The White Chuck River enters the Sauk River about 10 miles southeast of Darrington (pop. 1020). Darrington is a community traditionally and presently dependent on logging and the forest products industry for its support. Located on the Mountain Loop Highway and in an area noted for its scenery and recreation opportunities, Darrington also benefits economically from the many visitors to the area.

CURRENT ADMINISTRATION: From its headwaters downstream 10.5 miles, the White Chuck River flows through the Glacier Peak Wilderness. The wilderness and other National Forest lands are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. This river if designated would become an extension of the existing designated Skagit Wild and Scenic River System.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the White Chuck River for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 7,500	$ 1,000
Costs of Implementation		3,000
Development of Management Plan		17,200
Development Costs	40,000	
Operation and Maintenance Costs	34,000	1,000
Total - First Five Years	**$81,500**	**$22,200**

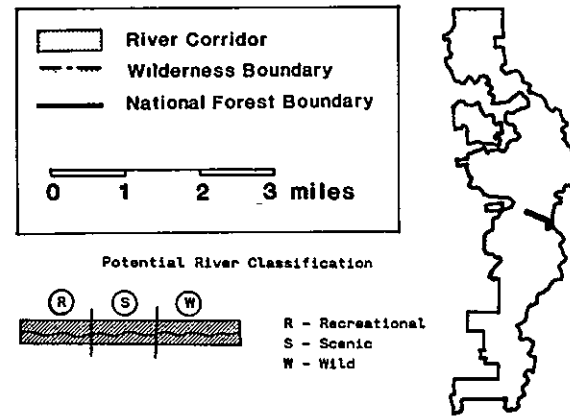
General administration and operation and maintenance costs are estimated to continue at $22,200 annually.

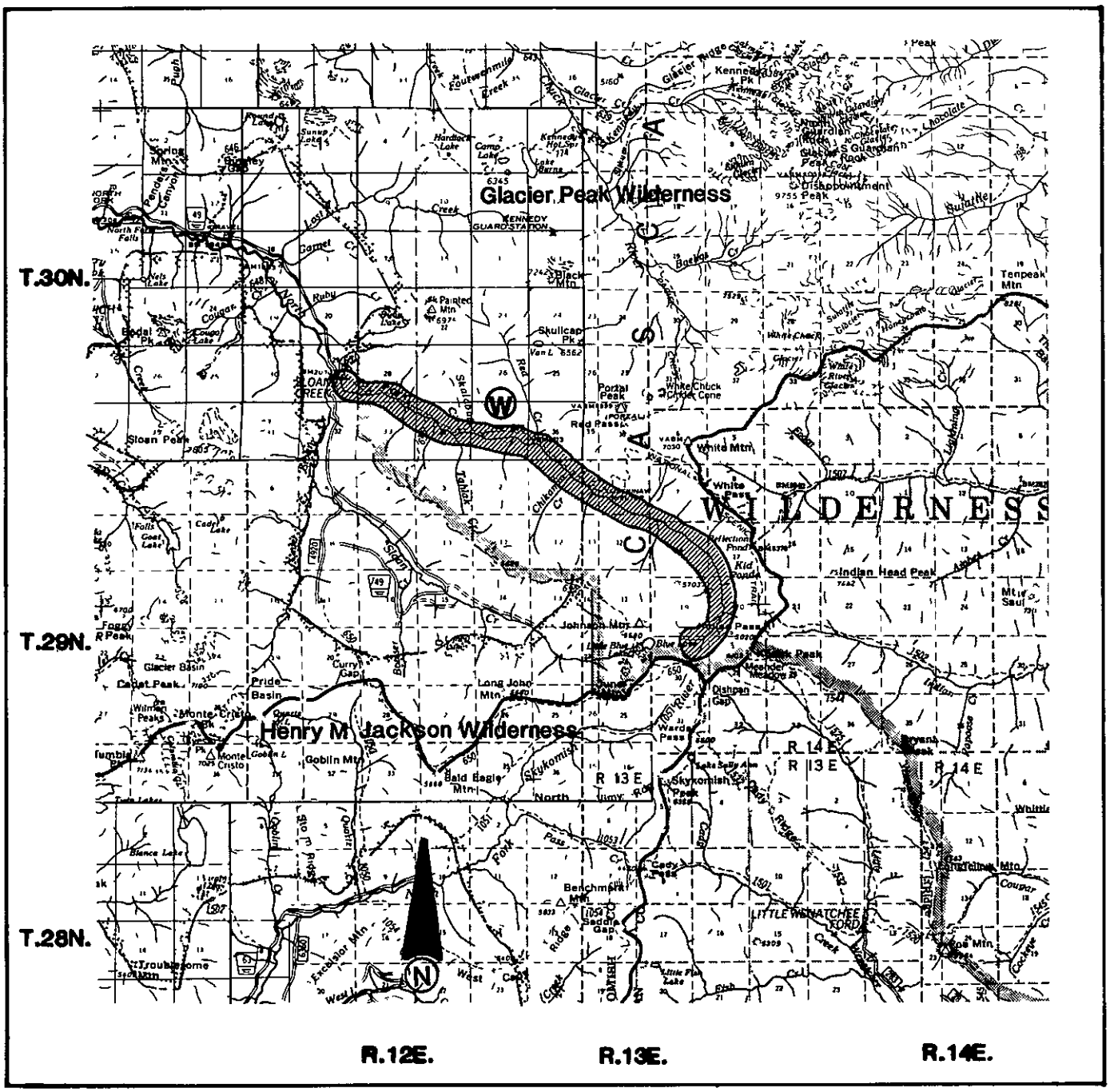
LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Wilderness-Transition	549
		Wilderness-Trailed	739
		Wilderness-General Trailless	591
		Wilderness-Dedicated Trailless	1,964
Segment 2	Recreation	Semi-Primitive, Non-Motorized Recreation	295
		Scenic Corridor (Foreground)	2,534
		Scenic Corridor (Middleground)	612
		Old Growth Habitat (spotted owl)	21
		Martin/pileated woodpecker habitat	21
		Goat Habitat	63
		Timber Management	147

North Fork Sauk River Extension





NORTH FORK SAUK RIVER

Snohomish County

The North Fork Sauk River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: The North Fork Sauk River Extension originates on Kodak Peak and flows westward ending at the Glacier Peak Wilderness boundary where it flows into the congressionally designated Wild and Scenic River.

Segment 1 - Headwaters in SW 1/4 of Sec. 19, T.29 N., R 14 E. to the boundary of the designated Wild and Scenic Skagit River in SE 1/4 of Sec 29, T.30 N., R.12 E. (Glacier Peak Wilderness boundary) (9.2 miles).

RIVER MILEAGE:

Study:	9.2 miles
Eligible:	9.2 miles
Forest Plan:	9.2 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The North Fork Sauk River was found to possess "Outstandingly Remarkable" values for the following: Wildlife.

The North Fork Sauk River area provides an extensive winter range for black-tailed deer and mountain goat. A SOHA exists within Glacier Peak Wilderness.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	9.2	Wild	9.2

SUITABILITY DETERMINATION:

The North Fork Sauk River extension was found to be suitable for inclusion in the preferred alternative of the Forest Plan. The river is located entirely within the Glacier Peak Wilderness and is a logical extension of the existing Wild and Scenic River.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Glacier Peak Wilderness - 9.2 miles)	9.2 miles	2,944 acres
TOTAL	9 2 miles	2,944 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of this river segment is classified by the BLM as an area of critical mineral potential. A review of available literature, including the Bureau of Mines MILS data, indicates the river has no reported locatable mineral resource occurrences of significance. However, Section 30, T.29 N., R.13 E. is encumbered by 4 unpatented mining claims. Based upon a U.S.G.S and U.S.B.M.'s mineral resource evaluation (Church and Others, 1984), it has been concluded that portions of the area does have a low potential for the occurrence of precious metal resources in hot spring type deposits, a low to moderate potential for the occurrence of base metal resources in several areas, and a moderate potential for disseminated porphyry base metal deposits.

The BLM has classified the entire river segment as being prospectively valuable for geothermal resources. However, it is not considered to have potential for the occurrence of other leasable mineral resources. None of the area has been encumbered by mineral leases or lease applications.

Based upon the available information, it appears that the area does have potential for the occurrence of base metal resources, precious metal resources and geothermal resources. Except for the four unpatented mining claims, no serious interest in either the locatable or leasable mineral resource potential of the area is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Forest Service Road No. 49 crosses the North Fork Sauk near the Sloan Creek confluence. A concrete bridge with approach guardrails is planned for this crossing.

The old Sloan Creek Campground road parallels the river for 0.25 miles.

The old site of Sloan Creek Campground now serves as a trailhead facility for horse and other Wilderness user's entry.

The North Fork Sauk Trail #649 begins at Sloan Creek. The trail parallels the North Fork for several miles before heading uphill to White Mountain and the junction with the Pacific Crest Trail.

The Sloan Peak Trailhead #648 is also located in the old Sloan Creek Campground. The trail crosses the North Fork Sauk. There is no footbridge; the river must be forded during periods of low water.

The Pilot Ridge Trail #652 is accessed 2 miles up the North Fork Sauk Trail. The Pilot Ridge Trail crosses the North Fork via a footlog before ascending Pilot Ridge.

Trail reconstruction, trailhead parking and a shelter reconstruction are proposed for development.

There are no homes, farms, or agricultural development.

RECREATION ACTIVITIES: There is little opportunity for rafting, canoeing, kayaking or swimming on the North Fork Sauk River Extension. There is high native trout fishing use on the lower reaches.

Dispersed recreation opportunities include hiking, horseback riding, hunting and camping.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	20	30
Camping	11,800	17,700
Viewing (scenery, wildlife driving for pleasure)	9,000	13,680
Misc. (hike, picnic, berry picking, etc.)	11,900	23,325
TOTAL	32,720	54,735

WILDLIFE AND FISHERIES: The North Fork Sauk River area provides an extensive winter range for black-tailed deer and mountain goat. A SOHA exists within Glacier Peak Wilderness.

There are no anadromous fish found on the North Fork Sauk Extension. The North Fork Falls, below the beginning of the river extension, acts as a total barrier to fish migration upstream. Native rainbow and cutthroat trout are found in the river's waters.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The water quality of the river is excellent. Small glaciers are found on the headwaters of the tributary streams. The river and its tributaries are filled with many cascades and falls.

The upper watershed contains steep gradients, dropping 100 feet per mile and lies in a valley which becomes narrower downstream. The bottom composition is rubble and boulders with only scattered fish spawning areas.

Fifteen tributaries drain into the North Fork Sauk River Extension.

GEOLOGY: Granite, granodiorite, hornblende gneiss, and associated rock types comprise the bedrock of the rugged topography in this area. Past glaciation has carved out the valley and left deposits of glacial till and lacustrine materials in this mostly U-shaped valley. Lower sideslopes, dominated by stringers of conifers and brushy avalanche tracks, merge into long steep and barren upper sideslopes where patches of snow often last through summer.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the North Fork Sauk River proposed Wild and Scenic River corridor. No prehistoric sites are known, however, the lack of sites is thought to reflect lack of survey of the drainage rather than lack of use. During the historic period, the North Fork Sauk was within the territory of the Sauk-Suiattle Tribe. An Indian trail that followed the North Fork to the upland meadows was documented in 1870. Localities used by the Sauk-Suiattle for traditional religious practices exist within the proposed corridor.

Known sites represent logging history and Forest Service administration. Logging railroads were built up the North Fork Sauk during the 1920's to 1950's. In the 1920's, Forest Service trail and telephone maintenance crews built two trail shelters along the river as part of the fire detection and suppression system. Both of these are still standing. Of the known historic sites, the Mackinaw trail shelter has been determined eligible for listing on the National Register of Historic Places.

TIMBER: The entire segment is within the Glacier Peak Wilderness, thus it is not available for logging.

LIVESTOCK GRAZING: There is occasional sheep grazing along the headwater divide, and recreation livestock grazing adjacent to the North Fork Sauk and Pacific Crest Trail.

SOCIO-ECONOMIC EFFECTS: The North Fork Sauk River enters the Sauk River about 10 miles SE of Darrington (pop. 1020). Timber has long been a vital component of Darrington's economy. The community is dependent on the periodic fluctuations of the timber industry. However, Darrington also serves as a primary gateway into the North Cascades. Located on the Mountain Loop Highway and in an area noted for its scenery and recreation opportunities, Darrington also benefits economically from the many visitors to the area.

CURRENT ADMINISTRATION: The river flows entirely within the Glacier Peak Wilderness. The wilderness is administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. This portion of the North Fork, if designated, would become an extension of the existing designated Skagit Wild and Scenic River System.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the North Fork Sauk River for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 500	
Costs of Implementation		200
Development of Management Plan		3,400
Development Costs	80,000	
Operation and Maintenance Costs	1,000	
TOTAL - First Five Years	**$81,500**	**$3,600**

General administration and operation and maintenance costs are estimated to continue at $300 annually.

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Wilderness-Transition	654
		Wilderness-Trailled	84
		Wilderness-General Trailless	42
		Wilderness-Dedicated Trailless	2,365

SOUTH FORK SAUK RIVER

Snohomish County

The South Fork Sauk River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters on Monte Cristo Peak to its confluence with Elliot Creek. Downstream from Elliot Creek, the river is already designated under the Skagit Wild and Scenic River System.

Segment 1 - Headwaters in SE 1/4 of Sec. 28, T.29 N., R.11 E. to Henry M. Jackson Wilderness boundary (1.0 mile).

Segment 2 - Henry M. Jackson Wilderness boundary to confluence with Elliot Creek (to existing W & SR designation) (7.4 miles).

RIVER MILEAGE:

Study	8.4	miles
Eligible:	8.4	miles
Forest Plan:	0.0	miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The South Fork Sauk River was found to possess "Outstandingly Remarkable" values for the following: Scenic and Wildlife.

The South Fork Sauk River lies between Bedal Peak and Sheep Mountain on the east shore and between Twin Peaks and Lewis Peak on the west shore. Views of these rugged mountain peaks are dramatic.

The area serves as a high quality winter range for black-tailed deer as well as a good riparian habitat area.

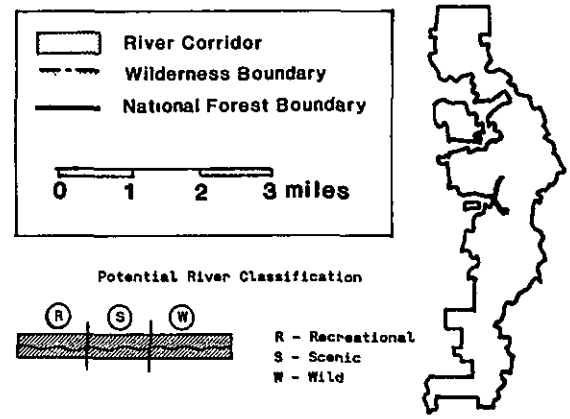
POTENTIAL AND RECOMMENDED CLASSIFICATION:

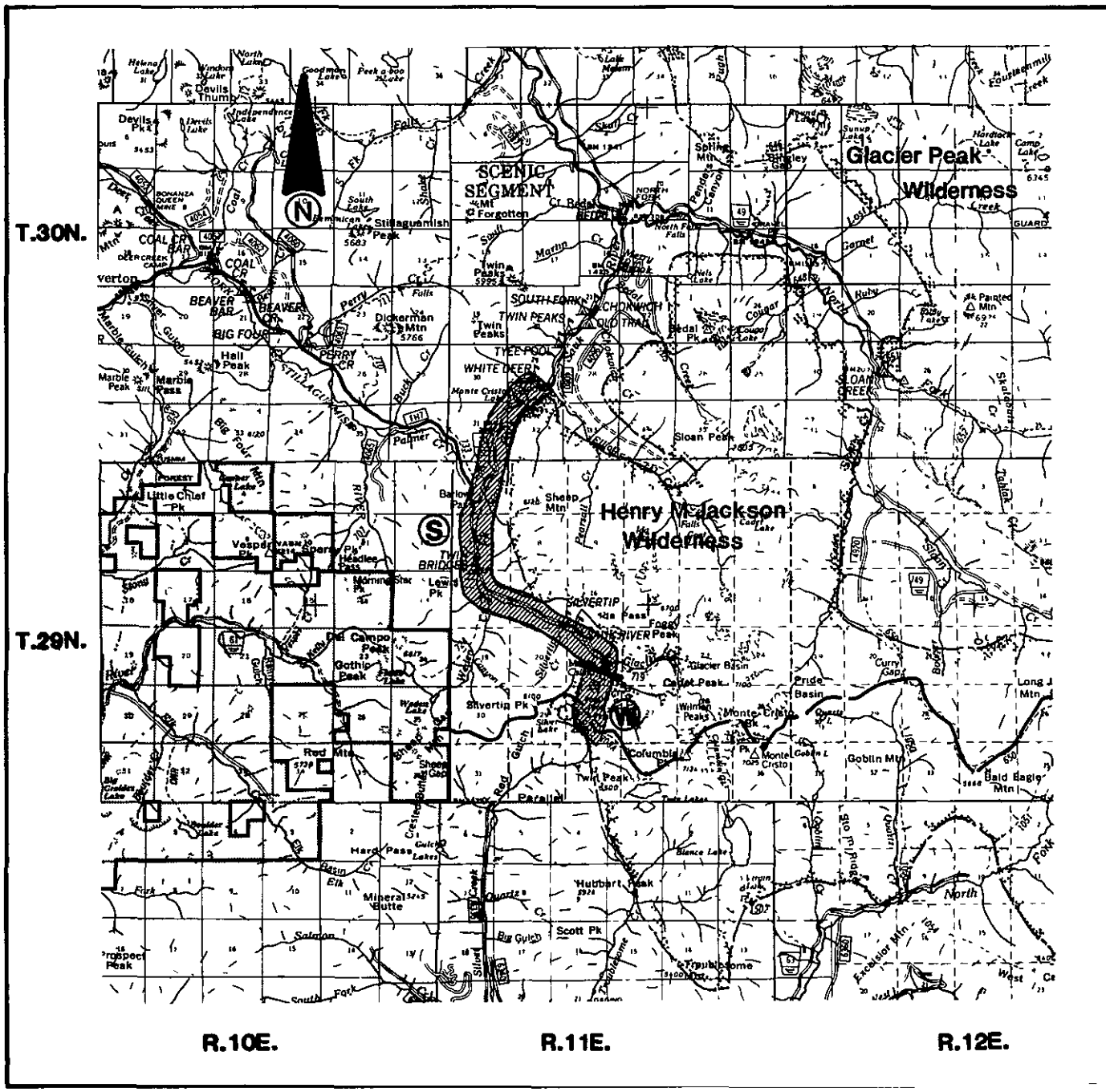
Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	1.0	None recommended	0
Segment 2	Scenic	7.4	None recommended	0

SUITABILITY DETERMINATION:

The South Fork of the Sauk extension was found to be not suitable for inclusion in the preferred alternative of the Forest Plan due to low public interest, high competing resource values in timber and mining, and the lack of anadromous fisheries.

South Fork Sauk River Extension




T.30N.
T.29N.
R.10E.
R.11E.
R.12E.
SCENIC SEGMENT
Glacier Peak Wilderness
Henry M. Jackson Wilderness
Mt Forgotten
Stillaguamish Peak
Twin Peaks
Dickerman Mtn
Hall Peak
Marble Pass
Sloan Peak
Sheep Mtn
Silvertip Pk
Del Campo Peak
Gothic Peak
Red Mtn
Mineral Butte
Hubbart Peak
Scott Pk
Prospect Peak
Columbia Pk
Monte Cristo
Glacier Basin
Pride Basin
Goblin Mtn
Bald Eagle Mtn
Excelsior Mtn
Long Mtn
Devils Thumb
Spire Mtn
Painted Mtn
Sperry Pk
Lewis Pk
Twin Peaks
Twin Peaks
Red Parallel
Twin Peak
Tripod Tsoma
Monte Cristo
Monte Cristo
Gobbin L
Curry Gap
Bedal Pk
Cougar
Lower Cougar Lake
Ruby Lake
Ruby Creek
Loam Creek
Pandora Lake
Pandora Canyon
Hardtack Lake
Camp Lake
Swamp Lake
Spire Lake
Goodman Lake
Independence Lake
Devils Lake
Meadow Lake
Monte Cristo Lake
Blanca Lake
Twin Lakes
Lake Metan
Lake Evelyn
Lake Cadet
Lake Sloan
Lake Celeste
Lake Roosevelt
Lake Chaval
Lake Chaval
Lake Chaval

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Henry M. Jackson Wilderness - 1.0 mile)	0.9 miles	288 acres
Private	0.1 miles	32 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	7.2 miles	2,304 acres
Private	0.2 miles	64 acres
TOTAL	8.4 miles	2,688 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: Neither of the river segments are classified by the BLM as areas of critical mineral potential. However, a review of available literature, including the Bureau of Mines MILS data, indicates numerous reported prospects for gold resources occur along the river and 168 unpatented mining claims have been located on or adjacent to the river. Of these claims, 41 have either been abandoned or declared to be null and void. The majority of the remaining 127 claims lie in Sections 20, 21, 22, 23, 26, and 27, T.29 N., R.11 E. The U.S.G.S. and U.S.B.M. (S.E. Church and Others, 1983) have evaluated the mineral resources of at least part of the area. Based upon the available information, the geology of the area and the results of their sampling they have concluded that:

> The upper end of the segment (Silver Creek and above) lies within an area that has "proven" reserves of base and precious metal resources, and it lies within a geologic terrain which has a high potential for additional precious and base metal mineral resources.

The BLM has classified the entire river as being prospectively valuable for geothermal resources, and one mile of the river is classified prospectively valuable for coal resources. However, the area is not considered to have potential for the occurrence of other leasable mineral resources, and none of the area has been encumbered by mineral leases or lease applications.

Based upon the available information, it does appear a large portion of the river has a moderate to high potential for the occurrence of both precious metal and base metal mineral resources. A serious interest in these resources is currently being expressed. The river also has at least a low potential for the occurrence of geothermal resources. However, no serious interest in these resources is currently being expressed.

WATER RESOURCE DEVELOPMENT: The river is classified as "Protected" from hydropower development by the NW Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: The Mountain Loop Highway follows the South Fork Sauk upstream from Elliott Creek and continues 3 miles to Barlow Pass. From the pass, a county road parallels the river to the Monte Cristo townsite. The road is closed to public vehicle traffic, but is well used by hikers. The road encroaches on the channel and immediate river banks at several points along the river.

There are plans to pave and widen the Mountain Loop Highway from Barlow Pass to the White Chuck River junction.

Appendix E
South Fork Sauk River

A concrete bridge spans the river at Mowich on the Mountain Loop Highway, a severely damaged wooden structure spans the river at Twin Bridges, and a substandard wooden structure spans the river near Monte Cristo on the county road.

There is 100 feet of rip-rap on both banks of the bridge in Section 6, T.29 N., R.11 E.

On private land, on and adjacent to the Monte Cristo townsite, there are several summer homes and restored mining structures.

The Poodledog Pass Trail #708 begins at the Monte Cristo townsite. The trail follows the river to the divide between the South Fork Sauk and Silver Creek drainages, before ending at Silver and Twin Lakes.

The Weden Creek Trailhead #724 is located along the Monte Cristo Road past Twin Bridges Camp. The trail crosses the South Fork Sauk before heading uphill to Foggy Lake.

The only developed campground is found at Monte Cristo, with a 40-person capacity.

Additional developed view points, trailhead parking and trails are planned.

RECREATION ACTIVITIES: Resident rainbow trout, steelhead and dolly varden are caught on the South Fork Sauk.

The Monte Cristo area is a popular destination hike as well as a gateway to the Henry M. Jackson Wilderness.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	100	144
Camping	8,300	12,450
Viewing (scenery, wildlife, driving for pleasure)	3,400	5,168
Misc. (hike, picnic, berry picking, etc.)	2,800	5,488
TOTAL	14,600	23,250

WILDLIFE AND FISHERIES: The area serves as a high quality winter range for black-tailed deer and mountain goat. The area around Monte Cristo Lake is an important wetland habitat.

Due to the river's extreme flows, cold water conditions and boulder-filled bottom, only scattered fish spawning areas are found. Spring chinook have been reported as far upstream as Barlow Pass. However, most spawning is in the lower 1/2 mile of the river. Pink salmon also spawn in the lower reaches. Resident trout, dolly varden and mountain whitefish are found along the length of the river.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The South Fork Sauk River contains steep gradients, dropping over 100 feet per mile. The bottom of the riverbed is composed of rubble and boulders. Thirteen tributaries flow into the South Fork Sauk River above Elliot Creek.

GEOLOGY: The bedrock geology consists of granitic and gneissic rocks associated with local extrusive igneous rocks of andesite and diabase flows. This high energy stream is relatively wide, braided and flows through a U-shaped glacial valley. Surrounding mountains rise thousands of feet above the valley floor. Sparsely forested lower slopes merge into massive barren rock capped by perennial snow and ice. Snow and debris tracks are numerous on these long steep sideslopes.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the South Fork Sauk River. However, some information is available from project surveys and historical research. No prehistoric sites have been documented, but literature research indicates that Indians used this area during the historic period. A known prehistoric site near the headwaters of the North Fork indicates use of the drainage as a travel corridor.

The drainage was within the territory of the Sauk-Suiattle tribe during the historic period. Today, localities important in the practice of their traditional religion exist within the proposed corridor.

Most of the documented history of the South Fork Sauk relates to the development of the Monte Cristo Mining District. Minerals, principally silver, were discovered at Monte Cristo in 1889, and within a couple of years, several claims had been made. A tote road was built, and in 1893, the Everett to Monte Cristo Railroad was completed. This was the only railroad in the state to be constructed solely for the purposes of mining. The railroad and the town of Monte Cristo were abandoned in 1898. Interest in the mines and railroad was intermittent through the next 30 years. At the onset of the Depression era, a flood closed the railroad for the last time, but small scale mining interests continue today. Historic sites and features associated with the mining history of the drainage may be determined eligible for the National Register of Historic Places after an evaluation is completed, however, no sites are currently listed on the register.

TIMBER: In the past, private lands have been logged. The Forest Service has performed patch cutting and salvage logging adjacent to the area roads.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only.

	----------ASQ----------	
	Preferred	Preferred
Total	Alternative	Alt. with
Timber	w/o W&SR	Eligible W&SR
Volume	Designation	Designation
(MMBF)	(MMBF/yr.)1/	(MMBF/yr.)1/
30.9	.762	.760

1/ Based on preferred alternative with management requirements.

Appendix E
South Fork Sauk River

SOCIO-ECONOMIC EFFECTS: The South Fork of the Sauk River enters the Sauk River about 15 miles southeast of Darrington (pop. 1020). Darrington is a community traditionally and presently dependent on logging and the forest products industry for its economic survival. Located on the Mountain Loop Highway and in an area noted for its scenery and recreation opportunities, Darrington also benefits economically from the many visitors to the area.

CURRENT ADMINISTRATION: With the exception of small parcels of private land, the South Fork Sauk is entirely administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. The river if designated would become an extension of the existing designated Skagit Wild and Scenic River System.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the South Fork Sauk River for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 10,000	$ 2,000
Costs of Implementation		3,000
Development of Management Plan		8,600
Development Costs	56,000	10,000
Operation and Maintenance Costs	16,800	4,000
TOTAL - First Five Years	**$ 82,800**	**$ 27,600**

General administration and operation and maintenance costs are estimated to continue at $6,560 annually.

NORTH FORK STILLAGUAMISH RIVER

Skagit and Snohomish Counties

The North Fork Stillaguamish River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

The North Fork Stillaguamish River was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory (NRI) published by the National Park Service in 1982.

LOCATION: From its headwaters on Rinker Ridge downstream to its confluence with the South Fork Stillaguamish River, near the town of Arlington.

Segment 1 - Headwaters in SE 1/4 of Sec. 17, T.34 N., R.9 E. to the confluence with the South Fork Stillaguamish

RIVER MILEAGE:

Study:	49.8 miles
Eligible:	49.8 miles
Forest Plan:	0.0 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The North Fork Stillaguamish River was found to possess "Outstandingly Remarkable" values for the following: Fisheries and Wildlife.

Nearly all gravel areas above Rollins Creek, located near community of Hazel, are suitable for the spawning and rearing of chinook, pink, chum and some coho salmon The lower six miles of the river contains excellent spawning, holding and rearing habitat for adult salmon.

The North Fork Stillaguamish River corridor has an excellent winter range for black-tailed deer. It also provides excellent riparian, furbearer, and elk habitat.

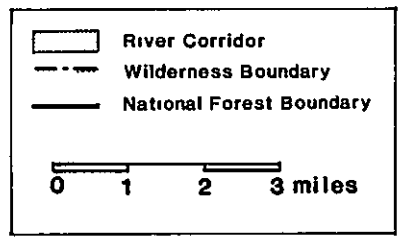
POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Recreation	49.8	None recommended	0

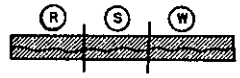
SUITABILITY DETERMINATION:

The North Fork of the Stillaguamish River was found to be not suitable for inclusion in the preferred alternative of the Forest Plan because the majority of the outstandingly remarkable values are found off of the National Forest. A large portion of the river is in private ownership leading to potential management problems. There are high competing resource values on that portion of the river within the National Forest.

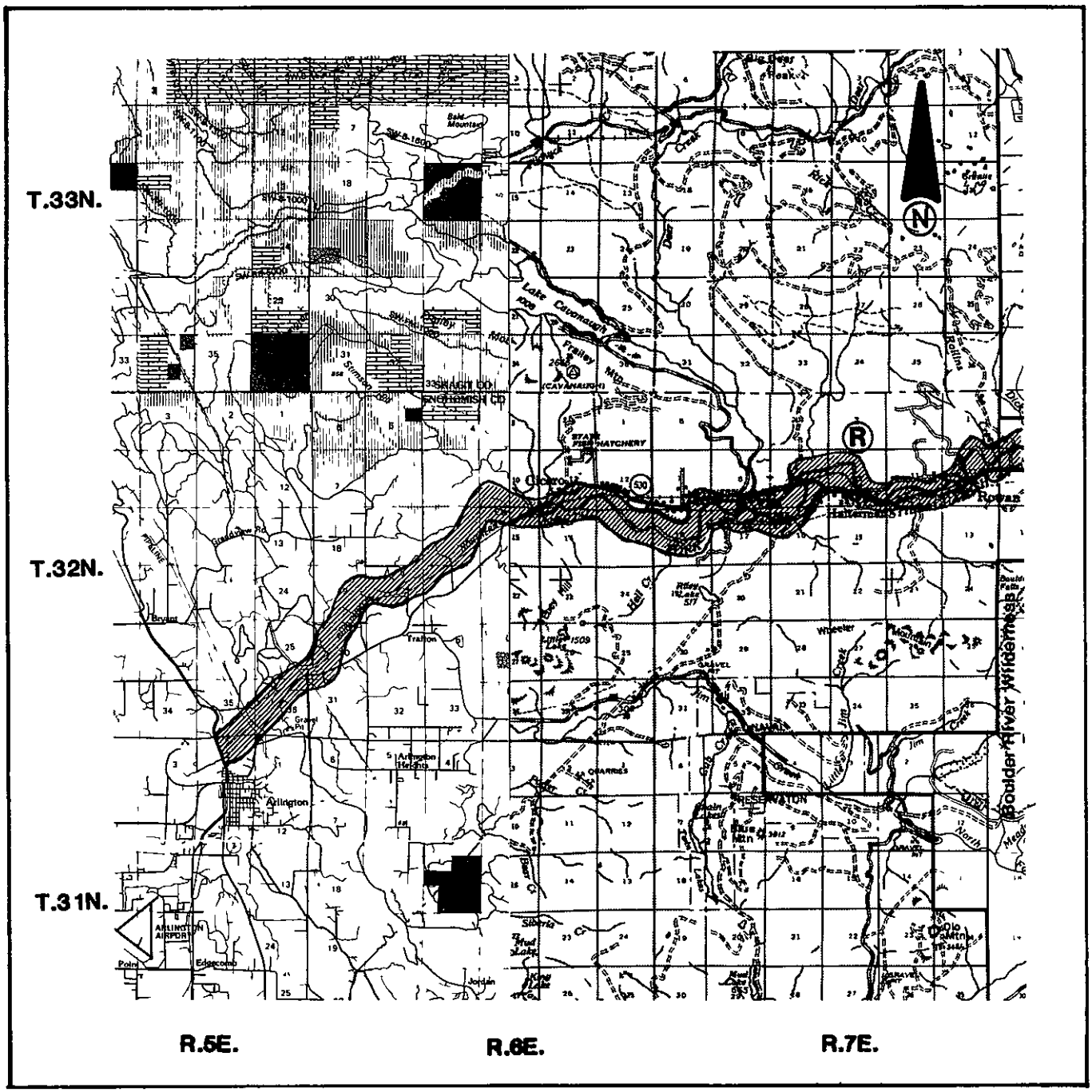
North Fork Stillaguamish River North Branch (1)



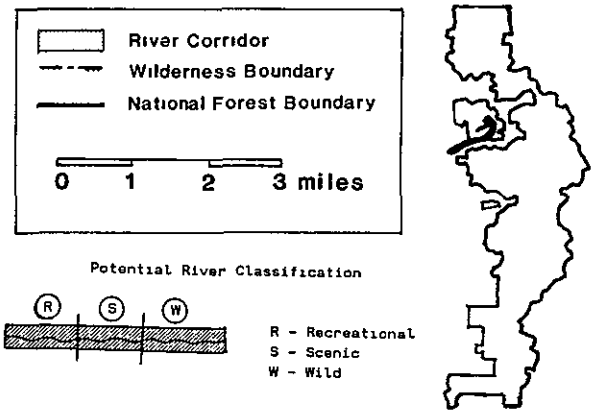
Potential River Classification

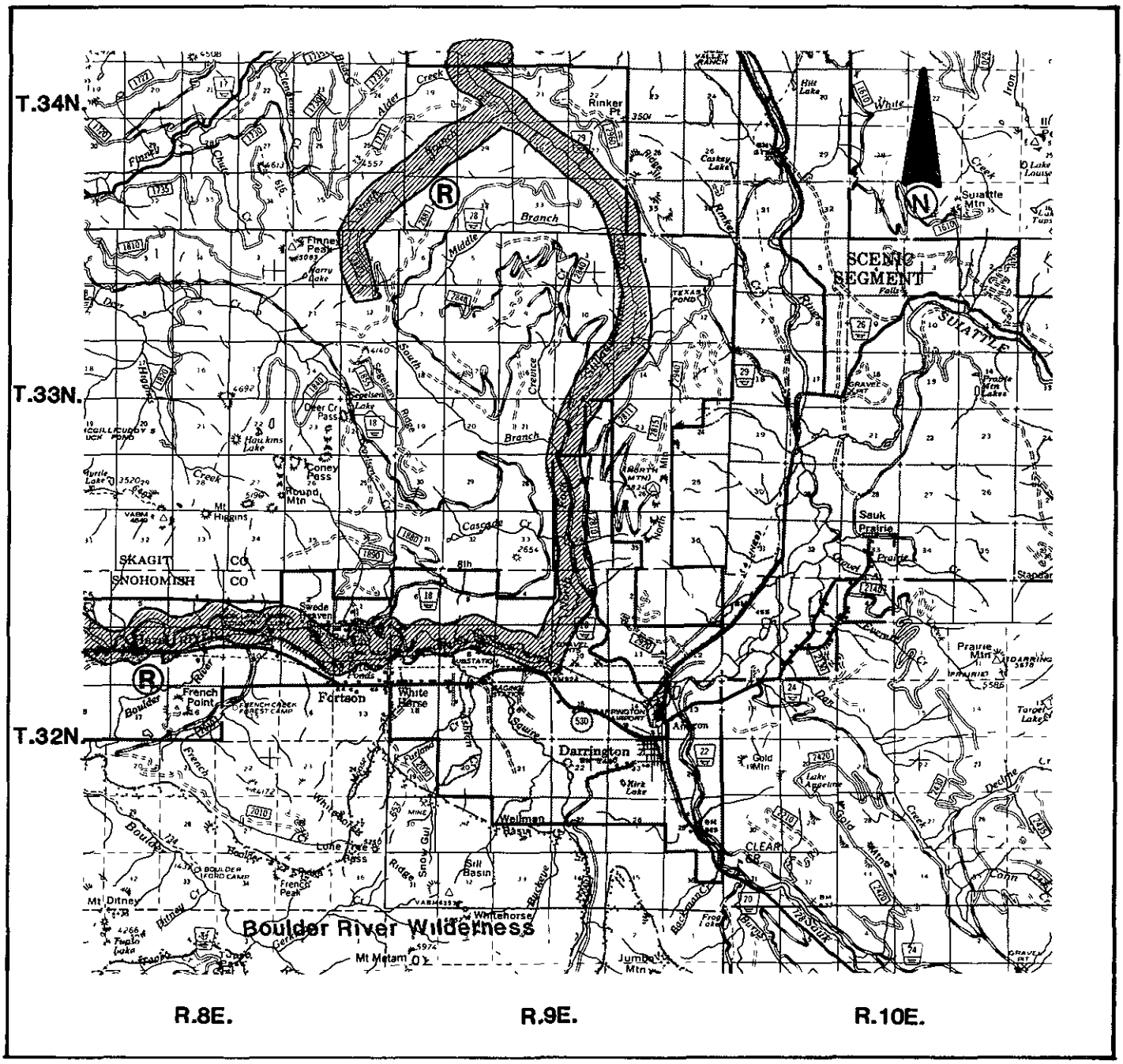


R - Recreational
S - Scenic
W - Wild



North Fork Stillaguamish River North Branch (2)





Appendix E
North Fork Stillaguamish River

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest	10.8 miles	3,456 acres
Private	35.9 miles	11,040 acres
State	3.1 miles	1,440 acres
TOTAL	49.8 miles	15,936 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of this river segment is classified by the BLM as an area of critical mineral potential. Neither is it encumbered by unpatented mining claims, and a review of available literature, including the Bureau of Mines MILS data, indicates the river has no reported locatable mineral resource occurrences of interest although one gold prospect was reported for T.32 N., R.8 E., Section 14. There are, however, numerous reported occurrences of both rock and sand and gravel resources which have been produced in the past.

The BLM has classified the west two miles as being prospectively valuable for oil and gas, and has classified the west 8 miles and a 9 mile section in the middle part of the river as "PV" for coal. However, none of the area has been encumbered by mineral leases or lease applications.

Based upon the available information, it appears the area has a relatively low potential for the occurrence of locatable mineral resources. Portions of the river have at least a low potential for the occurrence of coal, oil and gas resources. No serious interest in either type of mineral resource is currently being expressed. The area does have mineral material resources which are being or have been produced in the past, and there appears to be a continuing interest in those resources.

WATER RESOURCE DEVELOPMENT: There are no water impoundments located on the river.

The Stillaguamish River is listed by the State Department of Ecology as a "River of Statewide Significance" based on water volume.

The North Fork Stillaguamish is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Highway 530 and other roads link the communities and residences in this area. Highway 530 parallels the river for its entire length in Snohomish County. Numerous logging roads also parallel the river and tributaries in the National Forest.

The river flows under a number of bridges. Highway 530 crosses the river east of Oso in Sec. 9, T.32 N, R.7 E. and again at NE 1/4 Sec. 15, T.32 N., R.6 E. Local roads cross the river at Sections 10 and 17, T.32 N., R.7 E.

The Northern Pacific Railroad parallels the river for all of its length in Snohomish county. It crosses the river east of Oso near Deer Creek, and again in NE 1/4 Sec. 15, T.32 N., R.6 E. and SW 1/4 Sec. 30, T.32 N., R.6 E.

Outside the forest boundary, the predominant land use is agricultural.

In the lower valley, there are farms and rural residences. The small communities of Whitehorse, Trafton and Arlington are all located in the valley Some summer and recreation developments are located along river-front lands.

At the confluence of the North Fork and the South Fork Stillaguamish Rivers Twin Rivers County Park is a 50-acre site with soccer fields, fishing, etc. The facilities are planned specifically to tolerate the regular flooding that takes place there.

A small picnic area is located at the Fortson Fish Hatchery.

Steelhead Haven Park with fishing access is approximately 5 miles west of Darrington near Swede Heaven Road in NE 1/4 Sec. 12, T.32 N., R.8 E.

River access is available off SR530 17.3 miles northeast of Arlington and 8.6 miles and 2.5 miles west of Darrington. A primitive boat launch is located 7.5 miles northeast of Arlington off SR530.

Seattle City Light Transmission Lines parallel much of the river. There are three powerlines in the river corridor. One is south of the river at RM 15-34, one crosses the river at 2.2 miles from the confluence of the North Fork and the Stillaguamish Rivers, and the other crosses the river .7 mile from the confluence of the North Fork and the Stillaguamish Rivers.

RECREATION ACTIVITIES: Big game hunting and camping occurs in association with the Forest Service road system. Heavy fishing use occurs from Oso to the confluence with the South Fork.

Canoeing and kayaking are above average from Oso to South Branch. The North Fork Stillaguamish is considered a good training river. There is no rafting use inside the forest boundary and low use outside. Swimming use is moderate.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	1,000	1,440
Camping	3,500	5,250
Viewing (scenery, wildlife, driving for pleasure)	400	608
Misc. (hike, picnic, berry picking, etc.)	100	196
TOTAL	5,000	7,494

WILDLIFE AND FISHERIES: The North Fork Stillaguamish River corridor provides excellent winter range for black-tailed deer. It also provides excellent riparian, furbearer, and elk habitat

The North Fork Stillaguamish is accessible to anadromous fish upstream to an impassable falls, located 3/4 mile below the mouth of the South Branch. However, the prime spawning and rearing habitat is located between Squire Creek and the community of Hazel. Large numbers of pink, chum and summer and fall

chinook use the North Fork and its accessible tributaries. Above Squire Creek, high summer water temperatures and low flows limit fish production. Below Hazel, near Rollins Creek, a major mud and clay slide on the river's right bank is depositing large amounts of silt into the river. The silt covers the gravel riffles, making them unsuitable for successful spawning and egg incubation. Deep pools located in the lower 6 miles of the river offer excellent holding and resting areas for adult salmon and provide exceptional rearing habitat. Sea-run cutthroat trout, mountain whitefish and resident rainbow and cutthroat trout also inhabit the river.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The area from the headwaters to the community of Fortson contains two different stream characteristics. The upper 14 miles has many boulders. The river is swift flowing over a steep gradient through a relatively deep-cut channel. The stream width varies from 2 to 5 yards. The banks are generally stable with sharp earth or rock cuts and only a few gently sloping rock beaches. The lower 6 miles are floodway in nature and present a moderate gradient and winding stream course There are numerous, relatively broad riffles separated by deeper pool and glide stretches. There are low banks with naturally stable, earth-cut or gently sloping gravel-rubble beaches.

From Fortson to Oso, the valley floor is relatively broad and gently sloping. Stream gradient is moderate with considerable meandering and numerous channel splits. Pool-riffle balance is good to excellent with a mix of broad riffles and lengthy gravel beaches with some patch gravel sections. Pools are large and deep.

From Oso to Arlington, the river meanders a great deal, offering moderate gradient with good to excellent pool-riffle conditions. Just north of Trafton, the gradient decreases considerably and the stream channel contains numerous long, deep pools and relatively shallow, slow-moving glides. The channel width ranges from 45 feet to 100 feet. Numerous riffles are composed of gravel and mixed rubble with layers of silt deposit in slower waters.

In the upper headwaters, the stream bottom is mainly boulders and rubble with only occasional patch gravel. Further downstream, the channel is well-defined with only a few channel splitting sections, and the bottom is stable with clean rubble and gravel.

The sixty-three tributaries are predominantly steep-gradient, mountain-type streams with numerous cascades and small falls. Water quality is medium.

GEOLOGY: This river passes through two distinctly different geologic and topographic areas. From the headwater area to the Forest boundary, the bedrock is dominated by relatively soft and incompetent phyllite and greenschist. The river is rapidly downcutting through this soft rock producing a steep, unstable, V-shaped canyon Upon leaving the Forest boundary the river enters a very wide, previously glaciated, U-shaped valley. Surrounding bedrock is primarily metasediments However, very deep glacial till is the controlling geologic feature on the valley bottom and toeslopes.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the North Fork Stillaguamish River. However, information is available from a number of surveys made in conjunction with Federal projects and from published historical research. That no prehistoric sites have been recorded to date is believed to reflect the lack of survey of the drainage. During the historic period, the area was within the territory of the Stillaguamish tribe. Historic

sources indicate that there were several Indian villages and campsites along the North Fork during the historic period. Localities, used by the Samish, Sauk-Suiattle and Tulalip tribes in the practice of their traditional religion, exist in the upper segments of the river.

Historic period sites represent logging and railroading. In 1901, the Seattle International Railroad was extended to Darrington, primarily to serve mining developments of the Whitehorse Mining District. With the trains, came equipment for the first sawmills; and railroad logging spurs were extended up several of the tributaries of the drainage. None of the sites known from the North Fork are listed on the National Register of Historic Places.

TIMBER: There is extensive patch logging in the upper watershed. Some patch logging and clearcutting now takes place on the valley floor and on the adjacent hillsides. However, most of the lower slopes were clearcut during the early days of railroad logging.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest System lands only

	----------ASQ----------	
	Preferred	Preferred
Total	Alternative	Alt with
Timber	w/o W&SR	Eligible W&SR
Volume	Designation	Designation
(MMBF)	(MMBF/yr.)1/	(MMBF/yr)1/
78.2	6.621	6.031

1/ Based on preferred alternative with management requirements

LIVESTOCK GRAZING: Extensive grazing of dairy and beef cattle occurs adjacent to Highway 530.

SOCIO-ECONOMIC EFFECTS: The North Fork of the Stillaguamish River meets SR 530 three miles west of Darrington (pop 1020). Its confluence with the Stillaguamish River lies near Arlington (pop 2990). Darrington is traditionally and presently a community which is supported by logging and the forest products industry Arlington and nearby communities depend more on agriculture for their economic livelihood. A number of Arlington residents are employed in Everett. There is pressure to convert farmland to residences and businesses. Located on the Mountain Loop Highway, communities along the North Fork also benefit from tourism and outdoor recreation enthusiasts.

CURRENT ADMINISTRATION: Of the headwaters, 10.8 miles are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

Under the guidelines of the Washington State Shoreline Management Act of 1971, the shoreline of the North Fork Stillaguamish has been classified by Skagit and Whatcom counties as Conservancy or Rural. There are flood hazard zones all along the river. These classifications are applicable only to lands outside of federal jurisdiction and within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development. A Rural designation denotes areas characterized by

agricultural uses, low density residential where most urban services are not available, and areas which provide buffer zones and open space between predominantly urban areas.

Almost all of the river corridor is classified as "Environmentally Sensitive" by Snohomish County. Lands along the river corridor, outside of federal jurisdiction, are zoned by Snohomish and Skagit Counties for Forestry or Rural Uses.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the North Fork Stillaguamish River for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 1,000	$ 50,000
Costs of Implementation		15,000
Development of Management Plan		98,100
Development Costs		150,000
Operation and Maintenance Costs		25,000
TOTAL - First Five Years	**$ 1,000**	**$338,100**

General administration and operation and maintenance costs are estimated to continue at $15,200 annually.

NORTH BRANCH OF THE NORTH FORK STILLAGUAMISH RIVER

Skagit County

The North Branch Stillaguamish River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters on Finney Peak downstream to its confluence with the North Fork Stillaguamish River.

Segment 1 - Headwaters in NE 1/4 of Sec. 12, T.33 N., R.8 E. to the confluence with the North Fork Stillaguamish River (5.1 miles).

RIVER MILEAGE:

Study:	5.1	miles
Eligible:	5.1	miles
Forest Plan:	0.0	miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The North Branch Stillaguamish River was found to possess "Outstandingly Remarkable" values for the following: Wildlife.

The North Branch area supplies winter range for black-tailed deer. It also supports excellent furbearer and riparian habitat.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Recreation	5.1	None recommended	0

SUITABILITY DETERMINATION:

The North Branch of the Stillaguamish was found to be not suitable for inclusion in the preferred alternative of the Forest Plan due to high competing resource values and low public interest. The North Branch is a logical addition only if the North Fork of the Stillaguamish is also suitable.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt Baker-Snoqualmie National Forest	5.1 miles	1,632 acres
TOTAL	5.1 miles	1,632 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of this river segment is classified by the BLM as lying within an area of critical mineral potential. Neither is it encumbered by unpatented mining claims. A review of available literature, including the Bureau of Mines MILS data, indicates the river has no reported occurrences of locatable mineral resources. The BLM has not classified any part of this river as being prospectively valuable for leasable mineral resources, and no part of the river has been encumbered by mineral leases or lease applications.

Based upon the available information, it appears that the river has a relatively low, if any, potential for the occurrence of both locatable and leasable mineral resources, and no serious interest in either type of mineral resources is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments on the river.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: There are no developments on the river at this time. Logging roads are proposed for the future.

RECREATION ACTIVITIES: Trout fishing and big game hunting are the major recreation activities in this area.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Misc. (hike, picnic, berry picking, etc.)	100	196

WILDLIFE AND FISHERIES: The North Branch area contains winter range for black-tailed deer. It also supports excellent furbearer and riparian habitat.

Anadromous fish cannot access the river due to an impassable falls located on the North Fork Stillaguamish River. The river is inhabited by cutthroat and rainbow trout.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The North Branch contains many boulders. The river is swift, flowing over steep gradient through a relatively deep-cut channel. Stream width varies from 2 to 5 yards and the banks are generally stable.

The North Branch has 10 tributaries.

GEOLOGY: The bedrock geology is dominated by relatively soft and incompetent phyllite and greenschist. The river is rapidly downcutting through this soft rock producing steep and unstable V-shaped canyons. Adjacent sideslopes and ridges are forested or cutover.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the North Branch, and no prehistoric or historic resources are known. No localities used for traditional religious practices are known to exist within the potential wild and scenic river corridor.

TIMBER: The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
48.7	2.999	2.729

1/ Based on preferred alternative with revised requirements.

SOCIO-ECONOMIC EFFECTS: The North Branch, like the North Fork Stillaguamish which it joins, is near forest roads. Its confluence with the North Fork Stillaguamish is approximately 14 miles from Darrington (pop. 1020) Darrington is a community traditionally and presently dependent on logging and the forest products for its economic survival. It is located on the Mountain Loop Highway in an area noted for its scenery and recreation opportunities and benefits economically from the many visitors to the area.

CURRENT ADMINISTRATION: The river corridor is administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service

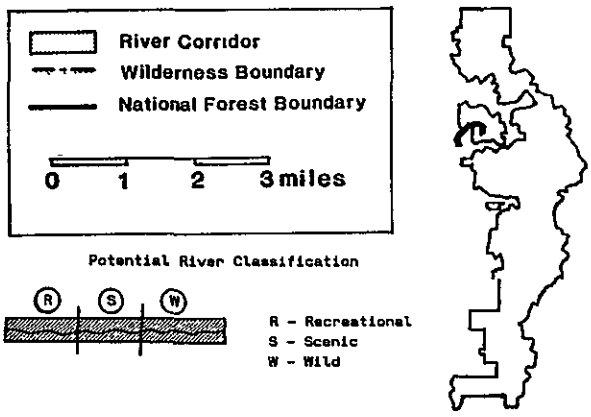
FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

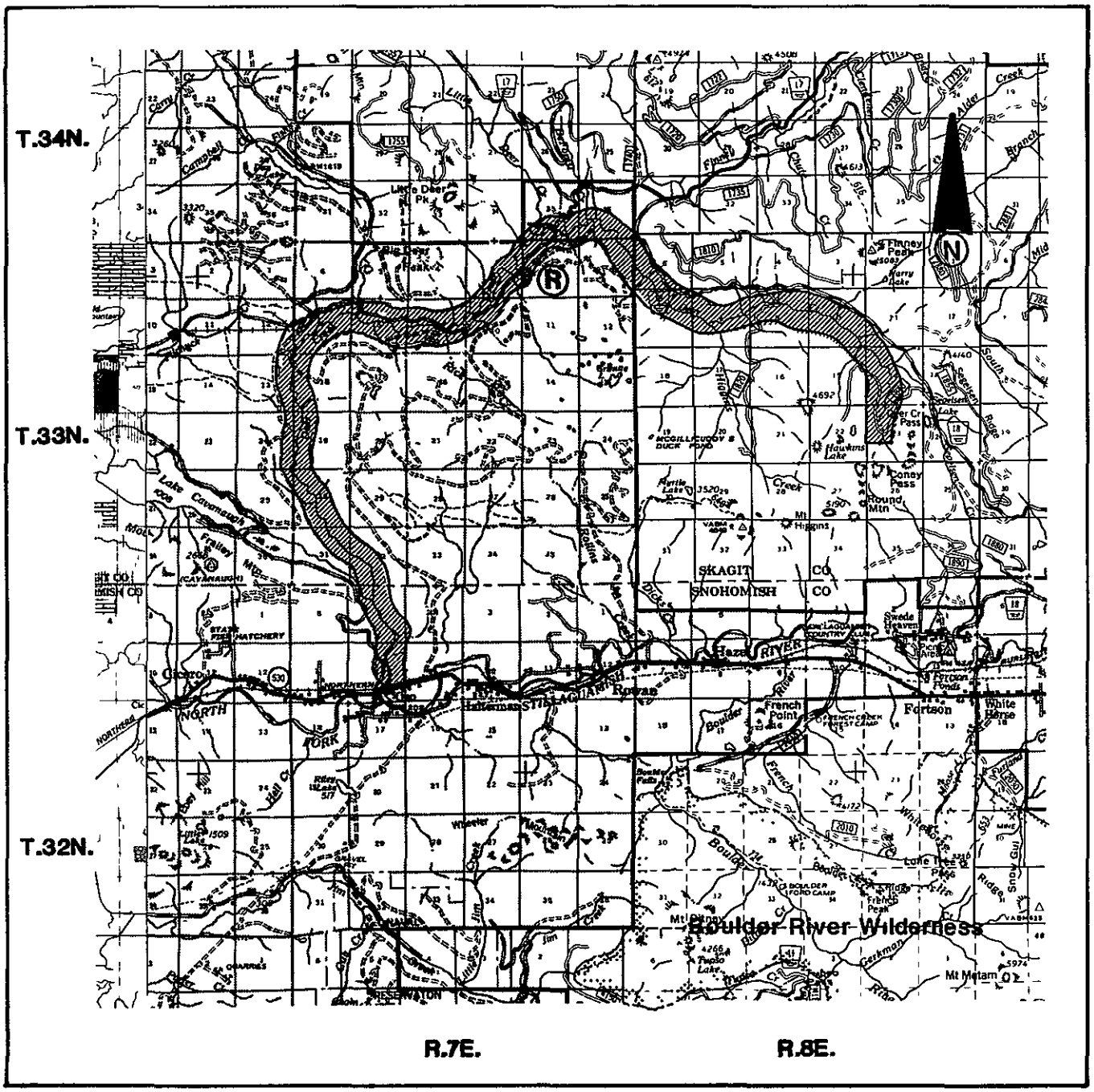
The following are expected funding requirements for the North Branch of the North Fork Stillaguamish River for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$500	$ 0
Costs of Implementation		1,000
Development of Management Plan		5,700
Development Costs		2,000
Operation and Maintenance Costs		500
TOTAL - First Five Years	**$500**	**$9,200**

General administration and operation and maintenance costs are estimated to continue at $200 annually.

Deer Creek


River Corridor
Wilderness Boundary
National Forest Boundary
0 1 2 3 miles
Potential River Classification
R S W
R - Recreational
S - Scenic
W - Wild


T.34N.
T.33N.
T.32N.
R.7E.
R.8E.
Boulder River Wilderness
SKAGIT CO
SNOHOMISH CO
Granite Falls
Fortson
Mt Higgins
Round Mtn
Coney Pass
Finney Peak
Mt Pilchuck
Lake Cavanaugh
Stillaguamish River
North Fork
Hazel River
Boulder Creek
French Creek
Mt Dickerman
Mt Metam

DEER CREEK

Skagit and Snohomish Counties

Deer Creek was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters near Coney Pass to its confluence with the North Fork Stillaguamish River at Oso.

Segment 1 - The headwaters near Coney Pass in the SW 1/4 of Section 23, T.33 N., R.8 E. to the confluence with the North Fork Stillaguamish River (23.5 miles).

RIVER MILEAGE:

Study:	23.5 miles
Eligible:	23.5 miles
Forest Plan:	0.0 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: Deer Creek was found to possess "Outstandingly Remarkable" values for the following: Fisheries and Wildlife.

The Deer Creek drainage supports an excellent, extensive black-tailed deer winter range. Two SOHA's are located in the upper reaches of the creek.

Deer Creek is accessible to anadromous fish runs nearly to its headwaters. The creek is known for its famous summer steelhead run. Fall and spring chinook, coho, pink and chum salmon and resident trout also inhabit the creek.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Recreation	23.5	Not recommended	0.0

SUITABILITY DETERMINATION:

Deer Creek was found to be not suitable for inclusion in the preferred alternative of the Forest Plan since only a small portion of the river is within the National Forest.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest	7.4 miles	2,368 acres
Private	9.1 miles	2,912 acres
State	7.0 miles	2,240 acres
TOTAL	23.5 miles	7,520 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of the river segment is classified by the BLM as an area of critical mineral potential. A review of available literature, including the Bureau of Mines MILS data, indicates the area has had only one reported prospect for a locatable mineral resource. That prospect was for nickel, and it was located in T.33 N., R.7 E., Section 31. The BLM mining claim recordation data does indicate that 48 unpatented mining claims were located in Sections 22, 23, 26 and 27, T.33 N., R.8 E. However, of those 48 claims, 36 have either been abandoned or declared to be null and void, and the remaining 12 may or may not lie within the river corridor.

BLM has classified a 14 mile segment in the middle part of the river as being prospectively valuable for coal resources. The river is not considered to be prospectively valuable for any other leasable mineral resources, and none of the area has been encumbered by mineral leases or lease applications.

Based upon the available information, it appears that the river has a relatively low potential for the occurrence of locatable mineral resources. A portion of it does have at least a low potential for the occurrence of coal resources. However, no serious interest in the coal resources has been expressed, and only a minor interest in locatable mineral resources has been expressed for the eastern-most two miles of the river.

WATER RESOURCE DEVELOPMENT: This river is classified as "Protected" from hydropower development by the NW Power Planning Council.

There are no water impoundments.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Logging roads provide the principal access throughout most of the area. A single lane gravel road parallels the creek.

Highway 530 crosses Deer Creek at the town of Oso. In addition, the creek flows under 2 other road bridges and the Burlington Northern Railroad bridge just north of Oso.

Rip-rap has been placed along the creek in the following locations: 3,000 yards under the Highway 530 and Burlington Northern bridges, 1,000 yards at the mouth of Rick Creek, 2,000 yards under the Forest Road 1820 bridge crossing, and 200 yards near mile post 1.5 of Forest Road 1840.

The mouth of tributary Deforest Creek has been channelized and stabilized.

Fish habitat improvement and stream stabilization projects are planned for several locations along the creek.

There are a few rural residences along the lower reaches of the creek and in the community of Oso.

There are no developed campgrounds.

RECREATION ACTIVITIES: The river is seldom used for rafting, due to poor access. The lower 11 miles offer a moderate amount of kayaking. The river gets only incidental use for swimming at Oso. There is minimal use of the creek corridor for dispersed recreation.

Deer Creek has been closed to fishing since 1941 in order to protect and rebuild stocks of summer steelhead.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Waterplay (swim, wade)	50	75
Camping	200	300
Viewing (scenery, wildlife, driving for pleasure)	150	230
Misc. (hike, picnic, berry picking, etc.)	50	100
TOTAL	450	705

WILDLIFE AND FISHERIES: The Deer Creek drainage supports an excellent, extensive black-tailed deer winter range. Two SOHA's are located in the upper reaches of the creek.

Deer Creek is accessible to anadromous fish runs nearly to its headwaters. Fall and spring chinook, coho, some pink and an occasional chum salmon and steelhead utilize the creek for spawning and rearing. Deer Creek is known for its famous summer steelhead run. Resident trout are found in the headwaters area. Additional fish production is limited by heavy silt loading and a tendency toward flash flooding. This condition has been aggravated by areas of extensive clearcut logging in the upper watershed.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The stream gradient is moderately steep. Very narrow, ravine- and canyon-like conditions are predominant in the lower five miles with very steep gradients. The creek bottom is boulder-strewn, interspersed with rubble and a few riffle and patch gravel sections. There are 23 tributaries flowing into Deer Creek. The tributaries exhibit steep gradients common to mountain streams. They contain numerous cascades and waterfalls. The main channel of Deer Creek contains several passable cascades. There is a heavy sediment load in the water below DeForest Creek due to land slides.

GEOLOGY: Within the confines of the Forest boundary and extending downstream several miles, the bedrock geology is dominated by nonmarine sedimentary rocks formed from sediments of silt and sand deposited on the floors of ancient fresh water lakes. These rocks consists of graywacke or arkose sandstone interbedded with mudstone, siltstone and shale Extensive glaciation occurred during the last glacial period depositing till and lacustrine materials hundreds of feet thick. Subsequent rapid downcutting through these often unstable materials has caused oversteepening of the sidewalls resulting in numerous old and recent landslides.

CULTURAL RESOURCES: No systematic archaeological survey has been made of Deer Creek and no prehistoric or historic sites have been recorded. The lack of known sites is believed to reflect the lack of survey of the drainage. During the historic period the area was within the territory of the Stillaguamish tribe. The mouth of the river was known as a large campground for Indians during forays to the high country for berry picking and hunting. The Deer Creek drainage currently has some value for local Indians in the practice of their traditional religion.

The town of Oso developed as a logging town. The Oso Elementary School is recognized on the State Register of Historic Place.

TIMBER: There has been extensive clear-cut logging in the upper watershed. Views are of logged lands and second growth tree stands.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
54.9	3.284	3.005

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: Deer Creek is in close proximity to forest roads. It flows into the North Fork Stillaguamish near the community of Oso. Oso (pop. 75) is located on the Mountain Loop Highway. The economy of the area in the vicinity of Deer Creek is traditionally dependent on the forest products industry and small farming. However, an increasing number of visitors are seeking out the recreation opportunities available along the Stillaguamish River system and surrounding mountains. Camping, fishing, hiking, hunting, cross-country skiing and sightseeing all attract visitors into the area.

CURRENT ADMINISTRATION: The river corridor inside the Forest boundary is administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

Under the guidelines of the Washington State Shoreline Management Act of 1971, the shoreline of Deer Creek has been classified by Snohomish County as Conservancy. This classification is applicable only to lands outside of federal jurisdiction and within 200 feet of the ordinary high water mark. A conservancy designation denotes shoreline areas which are primarily free from intensive development. Flood hazard zones have also been designated in the shoreline area.

Within Snohomish County, much of the land along Deer Creek, that is outside of federal jurisdiction, is zoned for Agricultural Use with 10-acre tracts and Rural Use with 5-acre tracts. There are also some parcels of land zoned for Forestry Use. All of the Deer Creek corridor that lies within Skagit County is zoned for Forestry Use.

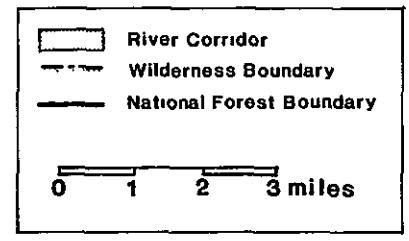
FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

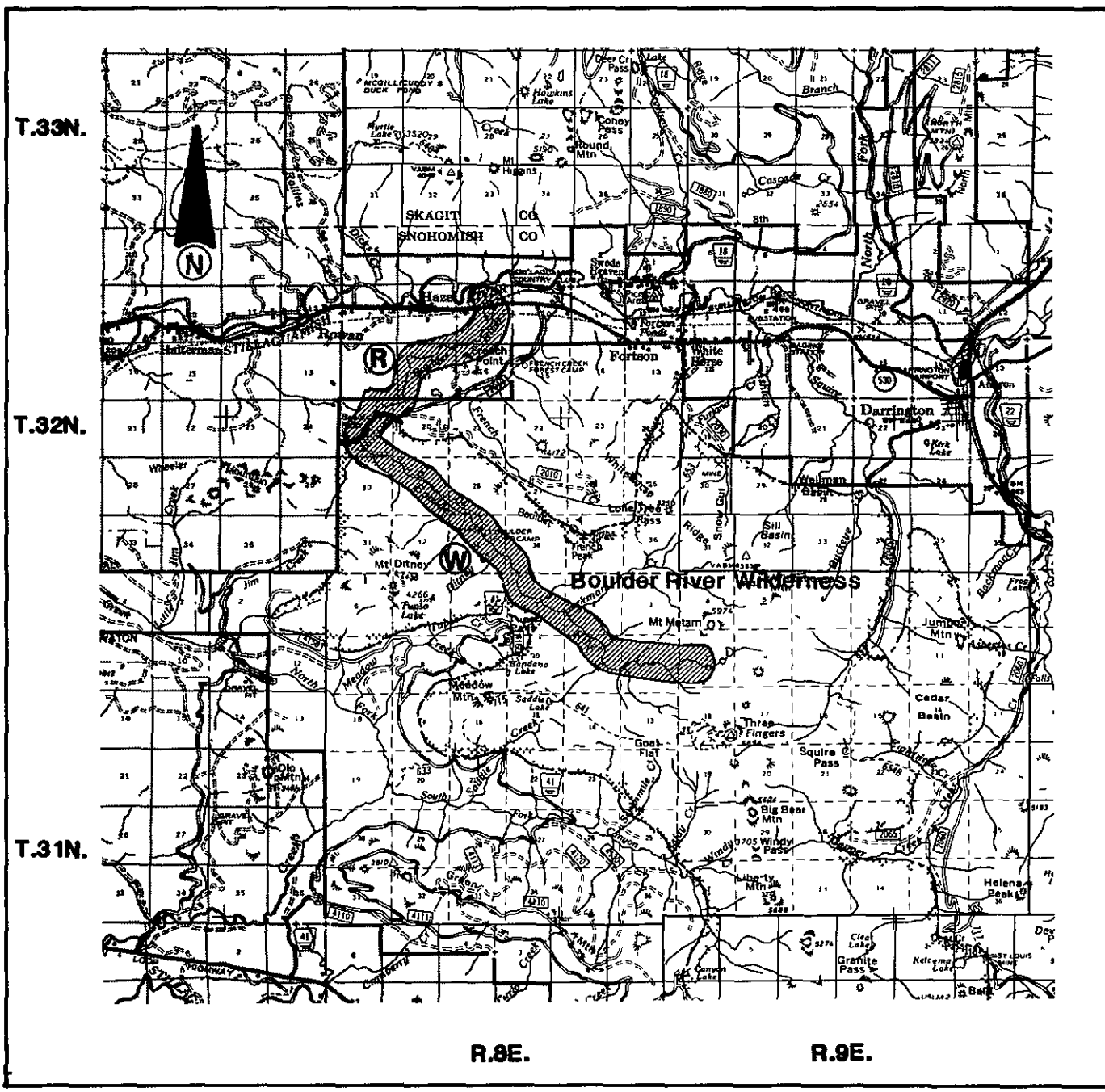
The following are expected funding requirements for Deer Creek for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 1,000	$ 1,000
Costs of Implementation		2,000
Development of Management Plan		43,800
Development Costs	0	5,000
Operation and Maintenance Costs		1,000
TOTAL - First Five Years	**$ 1,000**	**$52,800**

General administration and operation and maintenance costs are estimated to continue at $600 annually.

Boulder River




T.33N.
T.32N.
T.31N.
R.8E.
R.9E.
SKAGIT CO
SNOHOMISH CO
Boulder River Wilderness
Darrington
Fortson
Mt Higgins
Mt Ortney
Mt Metam
Three Fingers
Big Bear Mtn
Liberty Mtn
Helena Peak
Granite Pass
Squire Cr Pass
Cedar Basin
Jumbo Mtn
Goat Flat
Meadow Mtn
Lone Tree Pass
Sill Basin
Windy Pass
Round Mtn
Coney Pass
Haze
Rollins
Boulder
Meadow
Squire
Windy
Liberty
Granite
Clear Lake
Canyon Lake
Kelcema Lake
Pugh Lake
Pablo Lake
Lone Tree Lake
Deer Cr Pass
Hawkins Lake
Myrtle Lake
Swede Heaven
Wolman Creek
Big Four Ice Caves
Halfway Flat
Lone Tree Pass
Granite Pass
Squire Cr Pass
Windy Pass
Cedar Basin
Goat Flat
Jumbo Mtn
Big Bear Mtn
Three Fingers
Helena Peak
Liberty Mtn
Sill Basin
Mt Ortney
Mt Metam
Round Mtn
Mt Higgins
Meadow Mtn
Darrington
Fortson
Haze
Rollins
Boulder
Meadow
Squire
Windy
Liberty
Granite

BOULDER RIVER

Snohomish County

The Boulder River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

The Boulder River was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory (NRI) published by the National Park Service in 1982.

LOCATION: From its headwaters on Three Fingers Mountain to its confluence with the North Fork Stillaguamish River.

Segment 1 - Headwaters in SW 1/4 of Sec. 7, T.31 N., R.9 E. to Boulder River Wilderness boundary (9.0 miles)

Segment 2 - Boulder River Wilderness boundary to confluence with North Fork Stillaguamish River (4.0 miles).

RIVER MILEAGE:

Study	13.0 miles
Eligible:	13.0 miles
Forest Plan.	13.0 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The Boulder River was found to possess "Outstandingly Remarkable" values for the following: Fisheries and Wildlife.

The Boulder River provides habitat for a diverse number of fish species. The river provides spawning and rearing habitat for fall chinook, coho, pink and chum salmon and also supports a population of summer steelhead and dolly varden.

An extensive winter range for black-tailed deer and habitat for bald eagles are contained within the river corridor. There is mountain goat habitat at the headwaters and two SOHA's are located within the wilderness.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	9.0	Wild	9.0
Segment 2	Recreation	4.0	Recreation	4.0

Appendix E
Boulder River

SUITABILITY DETERMINATION:

Boulder River was found to be suitable for inclusion in the preferred alternative of the Forest Plan due to a lack of resource conflicts and the support of other public agencies. This river was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory published by the National Park Service in 1982. Ease of management would be facilitated by a majority of the river being located in wilderness.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Boulder River Wilderness - 9.0 miles)	9.0 miles	2,880 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	0.9 miles	288 acres
Private	1.0 miles	222 acres
State	2.1 miles	770 acres
TOTAL	13.0 miles	4,160 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: Neither of the river segments are classified by the BLM as areas of critical mineral potential or are encumbered by unpatented mining claims. A review of available literature, including the Bureau of Mines MILS data, indicates the river has only one reported occurrence of a locatable mineral resource, which was a prospect for manganese located in Section 16, T.32 N., R.8 E. No part of the river has been classified by the BLM as being prospectively valuable for leasable mineral resources, and none of it has been encumbered by mineral leases or lease applications.

Based upon the available information, it appears that the river has a relatively low potential for the occurrence of both locatable and leasable mineral resources, and no serious interest in the mineral resources of this river is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments on the river.

This river is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Highway 530, the Northern Pacific Railroad, and powerlines cross the Boulder River 0.5 mile from its confluence with the North Fork Stillaguamish.

There are a few homes located near the mouth of the river.

Some hay farming occurs near the mouth of the river.

The Boulder River Trailhead #734 is located at the end of Forest Road 2010. The trail follows the river past Boulder Falls to Boulder Ford Camp.

There are no developed campgrounds along the river.

RECREATION ACTIVITIES: Recreation use in the National Forest is low. Some camping occurs along the river in undeveloped sites. A trail parallels the river inside the Wilderness boundary.

The lower 3 miles of the Boulder River receives moderate use for steelhead fishing. The upper reaches have moderate use for rainbow and cutthroat trout fishing.

There is Class V whitewater kayaking below Boulder Falls to the confluence with the North Fork Stillaguamish River. The river is not suitable for rafting or swimming.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	400	576
Camping	3,000	4,500
Viewing (scenery, wildlife, driving for pleasure)	20	30
Misc. (hike, picnic, berry picking, etc.)	1,900	3,724
TOTAL	5,320	8,830

WILDLIFE AND FISHERIES: The Boulder River provides winter range habitat for the black-tailed deer. The corridor also provides a wintering area for the federally listed Threatened and Endangered species, the bald eagle. Habitat for mountain goats occurs near the headwaters and two SOHA's are located within the wilderness.

The Boulder River is accessible to anadromous fish runs for nearly 3 miles upstream from the mouth. This section provides spawning and rearing area for fall chinook, coho, pink, and some chum. The river also supports a population of summer steelhead and dolly varden.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The upper river drops sharply through a deep narrow cut. The Boulder River Canyon section, lying 3 to 5 miles downstream from the headwaters is very narrow and almost entirely composed of cascades. There are many falls with vertical drops of greater than 20 feet. At Boulder Falls, 8 miles downstream from the headwaters, the valley walls narrow and steepen into a deep ravine for 2 miles. At Boulder Falls the river drops 50 feet. Below the falls, the valley floor widens, the stream gradient is moderate and the stream width averages 24 feet. Ten tributaries drain into the Boulder River.

The water is discolored due to glacial runoff from Three Finger Mountain, but the water quality is good.

Appendix E
Boulder River

GEOLOGY: Beginning in granitics and gneissic rocks, the river flows mostly through weathered and incompetent phyllite schist and greenschist. Very deep deposits of unstable lacustrine materials and glacial till occur throughout much of the middle portion of the valley. Rapid downcutting since glaciation has removed side support and has caused frequent areas where the inner gorge sidewalls have collapsed. Some very deep V notches are present where the river has downcut through local inclusions of relatively competent bedrock that has resisted failing.

CULTURAL RESOURCES: No systematic cultural resource survey has been done on the Boulder River, and research is limited. During the historic period, the drainage was within the territory of the Stillaguamish tribe. Localities used by the Samish and Sauk-Suiattle tribes to practice their traditional religion have been identified within the proposed Wild and Scenic River corridor.

Some historic sites are recorded, primarily associated with logging and Forest Service administration; however, no sites are listed or known to be eligible for the National Register of Historic Places.

TIMBER: The lower 3 miles along the river have been clearcut in the past. Stands of second growth poles now occupy the site.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
5.4	.614	.558

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: Boulder River has its headwaters in the Boulder River Wilderness. It joins the North Fork of the Stillaguamish River approximately 7 miles east of Oso. Oso is on the Mountain Loop Highway and in close proximity to the Everett metropolitan area. Economies traditionally dependent on forest products and small farming are supplemented by benefits from an increasing number of visitors seeking the recreation opportunities available in the area. Camping, hiking, hunting, fishing, cross-country skiing and sightseeing all attract people into the area.

CURRENT ADMINISTRATION: From its headwaters downstream 9 miles, the Boulder River flows within the Boulder River Wilderness. The wilderness and other National Forest lands are administered by the Mt. Baker-Snoqualmie National Forest, USDA, Forest Service.

Under the guidelines of the Washington State Shoreline Management Act of 1971, the shoreline of the Boulder River has been classified as Conservancy by Snohomish County. This classification is applicable only to lands outside of federal jurisdiction and within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development.

The Snohomish County Comprehensive Plan has zoned all land along the river corridor, outside of federal jurisdiction, for Forestry Use, except for a small rural diversification zone near the confluence with the North Fork Stillaguamish.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the Boulder River for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 2,000	$ 1,000
Costs of Implementation		3,000
Development of Management Plan		11,200
Development Costs		10,000
Operation and Maintenance Costs		2,000
TOTAL - First Five Years	**$ 2,000**	**$27,200**

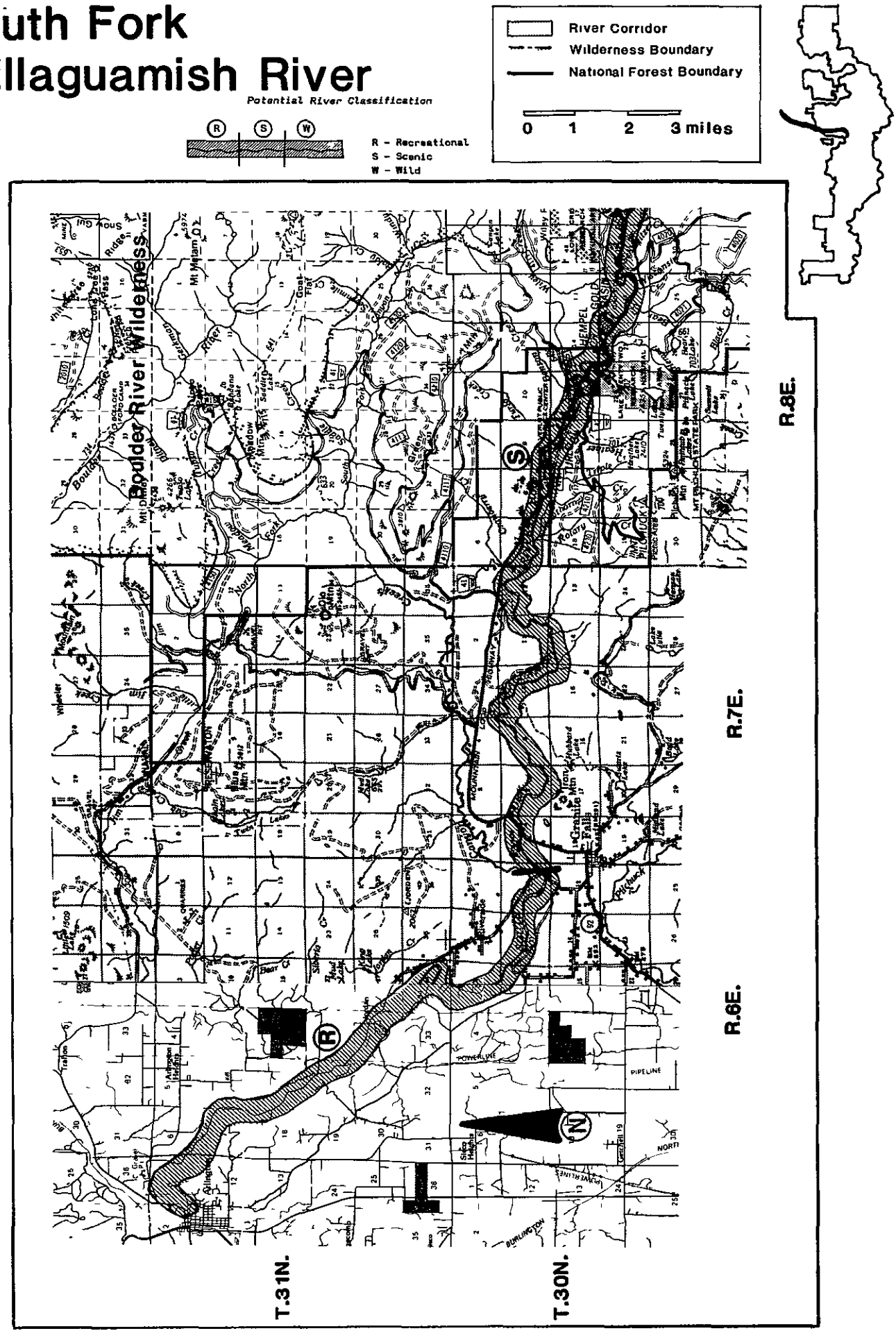
General administration and operation and maintenance costs are estimated to continue at $1,000 annually.

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

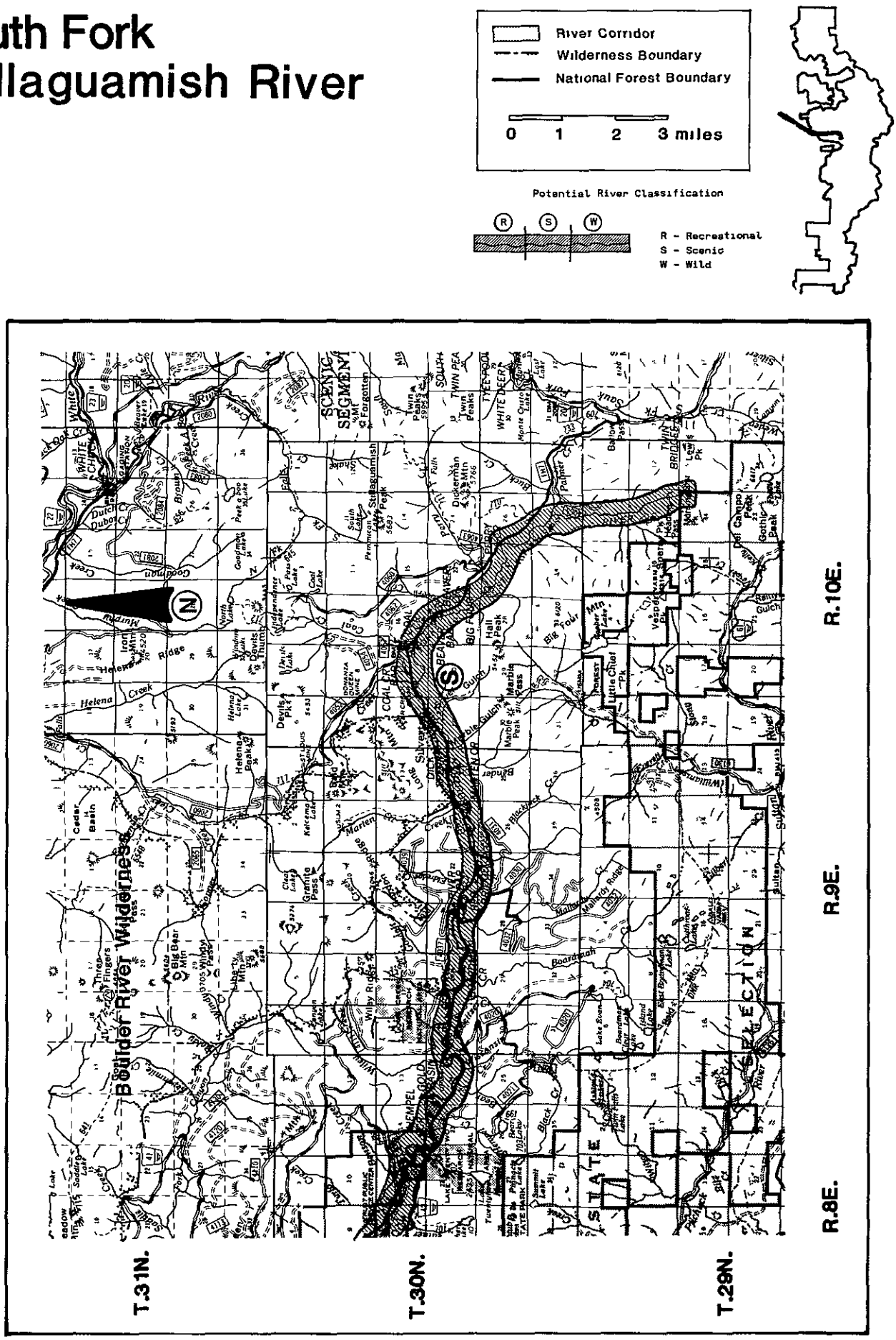
This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Wilderness-Transition	422
		Wilderness-General Trailless	1,499
		Wilderness-Dedicated Trailless	1,055
Segment 2	Recreation	Wilderness-Transition	21
		Wilderness-General Trailless	21
		Timber Management	147

South Fork Stillaguamish River (1)



South Fork Stillaguamish River
(2)



SOUTH FORK STILLAGUAMISH RIVER

Snohomish County

The South Fork Stillaguamish River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

The South Fork Stillaguamish River was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory (NRI) published by the National Park Service in 1982.

LOCATION: From its headwaters on Morning Star Mountain downstream to its confluence with the North Fork Stillaguamish, near the town of Arlington.

Segment 1 - Headwaters between Morning Star and Lewis Peaks in NE 1/4 of Sec. 14, T.29 N., R.10 E. to Canyon Creek (36.6 miles).

Segment 2 - Canyon Creek to the confluence with the North Fork Stillaguamish River (15.9 miles).

RIVER MILEAGE:

Study:	52.5 miles
Eligible:	52.5 miles
Forest Plan:	52.5 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The South Fork Stillaguamish River was found to possess "Outstandingly Remarkable" values for the following: Scenic, Recreation, Fisheries, Wildlife, Historical/Cultural, and Ecological.

There is a wide range of landscapes from pastoral scenes in the lower valley to extraordinary mountain scenes of Big Four, Vesper Peak and Del Compo.

The South Fork Stillaguamish receives heavy use by kayakers, canoeists and campers. Many visitors to the area drive the Mountain Loop Highway.

The river corridor contains an extensive winter range for black-tailed deer and bald eagles. Several SOHA's are located in the Big Four area.

There is good spawning and rearing habitat for chinook, chum, coho, and some pink salmon. A fish ladder was constructed in 1954 at Granite Falls.

Historic sources indicate that the South Fork Stillaguamish was used extensively by the Stillaguamish tribe. The river served as a travelway, with portages to the Sauk and Pilchuck Rivers. Historic period sites represent mining, logging, homestead settlements, recreation development and Forest Service administration.

Dense stands of conifers are found from the headwaters to Verlot and dense stands of mixed deciduous trees and conifers grow further downstream to Arlington. Along the upper reaches, there is a well-developed riparian zone with isolated fresh water wetlands containing sphagnum bogs and cedar stands.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Scenic	36.6	Scenic	36.6
Segment 2	Recreation	15.9	Recreation	15.9

SUITABILITY DETERMINATION:

The South Fork of the Stillaguamish River was found to be suitable for inclusion in the preferred alternative of the Forest Plan due to the high number of outstandingly remarkable values, public support, and other agency support. The South Fork of the Stillaguamish was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory published by the National Park Service in 1982. More recently, in 1988, the Washington State Scenic River Assessment included the South Fork as a river "possessing the natural, cultural, and recreational values that would make it a suitable addition to the Washington State Scenic Rivers System".

LANDOWNERSHIP:

	River Miles	Corridor Acres
Segment 1		
Mt. Baker-Snoqualmie National Forest	19.7 miles	6,304 acres
Private	15.1 miles	4,632 acres
County	0.8 mile	256 acres
State	1.0 mile	520 acres
Segment 2		
Private	15.9 miles	5,048 acres
State	0.0 miles	40 acres
TOTAL	52.5 miles	16,800 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: Approximately six miles of this river have been identified by the BLM as an area of critical mineral potential (Sections 22,23 and 24, T. 30 N., R.9 E. and Sections 22,26 and 32, T.30 N., R.10 E.). A review of available literature, including the Bureau of Mines MILS data, indicates numerous reported locatable and salable mineral resource occurrences consisting of gold, silver, copper, lead, zinc, limestone, rock and sand and gravel. Most of these occurrences appear to have only experienced some prospecting activity, although, some have actually produced. Of most interest for the locatable mineral resources are the limestone deposits in Section 9 and 14, T. 30 N., R.7 E., and the precious and base metal occurrences reported along the river in T. 29 and 30 N., R.9 and 10 E. and in T.30 N., R.7 E., Sections 8,9 and 18. The limestone deposits, however, do appear to have been exhausted and abandoned. According the BLM mining claim recordation data, numerous unpatented mining claims (258) have been located along the river or adjacent to the corridor from Section 20, T. 30 N., R.9 E. eastward to the end of the river. Of these 258 or so claims, 117 have either been abandoned or declared to be null and void, and the majority of the remaining active claims are located in Sections 2,11 and 12, T.29 N., R.10 E.

The BLM has classified the eastern 5 miles of the river as being prospectively valuable ("PV") for geothermal resources, and the western 11 miles and a 3 mile section near Silverton have been classified "PV" for coal resources. However, none of the river corridor has been encumbered by mineral leases or lease applications.

Based upon the available information, it appears that from Section 20, T.30 N., R.9 E. eastward the area has a low to moderate potential for the occurrence of both precious and base metal mineral resources. This area is encumbered by numerous unpatented mining claims which indicate a continuing interest in the locatable mineral resources of that part of the river. The remaining part of the river appears to have a relatively low potential for the occurrence of locatable mineral resources. No serious interest in these resources has recently been expressed. As indicated above, portions of the river do have at least a low potential for the occurrence of both coal and geothermal resources, however, no serious interest in those resources has been recently expressed.

WATER RESOURCE DEVELOPMENT: The river is classified as "Protected" from hydropower development by the NW Power Planning Council.

The Stillaguamish River is listed by State Department of Ecology as a "River of Statewide Significance" based on water volume.

Two preliminary permits for hydroelectric projects have been issued by FERC for a project on the Marten Creek and Boardman Creek tributaries. Proposed facilities within the river corridor consist of a transmission line and a powerhouse on each tributary. The Marten Creek project capacity will be 1.5 megawatts; the Boardman Creek project 1.4 megawatts.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: County highways, private land access and timber access roads parallel all but a few miles of the river. The Mountain Loop Highway parallels the river west to Granite Falls and, from Granite Falls to Arlington it is paralleled by the Jordan road.

The Mountain Loop Highway crosses the river near the fish ladder at Sec. 15, T.30 N., R.8 E. and at Red Bridge in Sec. 7, T.30 N., R.7 E. The Jordan Road crosses near Granite Falls at Sec. 12, T.30 N., R.6 E. At Arlington, Highway 530 also crosses the river at Sec. 2, T.31 N., R.5 E.

There is also a private bridge at Silverton and a suspension bridge over the river near Jordan Road in NE 1/4 Sec. 28, T.31 N., R.6 E.

There is limited agricultural development. The amount of cleared farmland increases toward Arlington.

Along the river, there are numerous rural residences and summer homes, the small communities of Silverton, Robe, and Verlot as well as the larger towns of Arlington and Granite Falls.

Following are developed campgrounds and day use areas located along the river.

Beaver Creek Campground (4 sites)
Coal Creek Bar Campground (5 sites)
Martin Creek Campground (5 sites)
Esswine Campground (5 sites)
Boardman Campground (5 sites)
Red Bridge Campground (16 sites)
Turlo Campground (19 sites)
Verlot Campground (26 sites)
Gold Basin Campground (93 sites)
Silverton School Organization Camp
Wiley Creek Youth Organization Camp
Tulalip Millsite Organization Camp
Big Four Picnic Area
Hemple Creek Picnic Area
Dick Sperry Picnic Area

The Big Four Ice Caves Trailhead #723 is located at the Big Four Picnic Area, 14.5 miles east of Verlot. This is the most popular trail on the Darrington Ranger District. A trail bridge crosses the South Fork.

The Sunrise Mountain Trail #707 begins at the end of Forest Road 4065. The trail crosses the South Fork via a footlog before ascending Sunrise Mountain.

At the confluence of the North Fork and South Fork Stillaguamish Rivers, Twin Rivers County Park has soccer fields, fishing, etc. Facilities are planned specifically to tolerate the regular flooding.

River Meadows Country Park east of Arlington has a river access area with parking lot, walk-in fishing, and boat launch. A proposed boat launch a short distance down river at Jordan Road would utilize a more protected site with a slower current.

There is fishing access at Riverscene, about 8 miles upriver from Arlington at the confluence of Canyon Creek and South Fork Stillaguamish.

There are sections of rip-rap on National Forest land along the Mountain Loop Highway and many such sites off-Forest.

A salmon rearing pond has been constructed at Heather Creek. There is a fish ladder north of Granite Falls just below the highway crossing in Sec. 7, T.30 N., R.7 E.

There are plans to construct salmon rearing ponds at Gold Basin Mill Pond and Beaver Creek.

A powerline runs to Gold Basin Campground.

RECREATION ACTIVITIES: The South Fork Stillaguamish receives heavy use by kayakers and canoeists. From Riverbar (Mallardy Creek confluence) to Verlot, the river requires experienced (Class III) boaters. From Granite Falls to Arlington the river is suitable for beginners. Likewise, the river receives high use for swimming and tubing. The river receives relatively low use from rafters.

Use for fishing is moderate to high inside the forest boundary and high outside the boundary to Arlington.

The river corridor is a gateway to the North Cascades. There is heavy camping use along the river. Many visitors to the area drive the Mountain Loop Highway. There is a wide range of landscapes from pastoral scenes in the lower valley to mountain scenes of Big Four, Vesper Peak and Del Compo.

Hiking takes place year around. Cross-country skiing is on the increase from Silverton to Barlow Pass.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Boating (power, nonpower)	100	165
Waterplay (swim, wade)	300	450
Fishing, Hunting	1,000	1,440
Camping	110,400	165,600
Viewing (scenery, wildlife, for pleasure)	42,100	63,992
Misc. (hike, picnic, berry picking,etc.)	69,400	136,024
TOTAL	223,300	367,671

WILDLIFE AND FISHERIES: The river area contains extensive winter range for black-tailed deer and bald eagles. It also has Western pond turtle habitat and excellent riparian habitat for other animals.

Good coho salmons runs are found throughout the length of the river. A fish ladder was constructed at Granite Falls in 1954. Below the fishway, the spawning area has improved in recent years. However, it is greatly under-utilized by summer and fall chinook. Pink salmon use this section in moderate but increasing numbers. Above the falls, the river has a steeper gradient. Only coho use this section in large numbers. A few pink and chinook salmon spawn here. Chum are almost non-existent. A massive earth slide located near Verlot causes heavy silt loading on spawning beds during periods of heavy runoff. Many gravel riffles downstream have been rendered unsuitable for successful spawning or egg incubation. Resident rainbow and cutthroat trout inhabit the entire length of the river.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The South Fork Stillaguamish has medium water quality, due to heavy silt loading from the earth slides above Verlot. The river contains numerous rapids, cascades and falls. It is a stable, fast flowing, riffle-type river with numerous boulder strewn areas. In general, the bottom is boulder-rubble with some bed-rock. The gradient is fairly steep, and increases sharply below Boardman Creek. Fifty-one tributaries drain into the South Fork.

GEOLOGY: The bedrock geology consists primarily of metasedimentary and metavolcanic rocks. The most dominant geological process is very deep deposition of till and unstable lacustrine materials during the previous ice age. Most of the valley contains the characteristic glaciated U-shape. However, a deep gorge occurs within the lower 7 miles.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the South Fork Stillaguamish River. Existing information comes primarily from published historical research. No prehistoric sites have been recorded, however, it is believed that this reflects the lack of survey of the drainage. Historic sources indicate that the South Fork Stillaguamish was used extensively by the Stillaguamish Tribe, and that the river was used as a travelway, with portages to the Sauk and Pilchuck Rivers. No locations used for traditional religious practices are known within the potential Wild and Scenic River corridor.

Historic period sites represent mining, logging, homestead settlements, recreation development and Forest Service administration. During the 1890's, hundreds of mining claims were located in the Silverton Mining District. During the same period, a railroad was built up the South Fork Stillaguamish to provide access to the Monte Cristo Mining District. Mining interests peaked and declined before the turn of the century, but the railroad, under new ownership, continued to operate for some time. Many settlements, such as Granite Falls, Robe, Verlot and Silverton were established in the valley. In 1920, a recreation resort was built on the river. The only access to this was by way of the railroad, then operating under the name Hartford and Eastern. The resort did very well until the onset of the Depression. In the 1930's, the railroad tracks were removed and sold for scrap. The highway up the South Fork follows the railroad in part, and portions of the old grade are visible from the highway. The Hartford and Eastern Railroad is listed on the State Registry of Historic Places.

In the early 1900's, logging interests were developed in the South Fork Stillaguamish drainage. The major operation within the drainage was the Gold Basin Timber and Shingle Company. Remains of this operation have not been fully inventoried.

Forest Service administration is represented by the Verlot Public Service Center. This administrative site was built by the Civilian Conservation Corps as a ranger station and living quarters for the Monte Cristo Ranger District. The buildings that remain of the original 1930's compound are listed on the National Register of Historic Places.

TIMBER: Considerable timber harvesting has occurred with numerous and large-scale clear-cut areas.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
121.6	3.155	2.865

1/ Based on proposed preferred alternative with revised minimum management requirements.

SOCIO-ECONOMIC EFFECTS: The South Fork of the Stillaguamish river is accessible by forest roads and local roads over its entire length. The small communities of Silverton, Verlot and Robe are all within or near the Mt. Baker Forest boundaries. Granite Falls and Arlington are larger communities located on the South Fork. The historic gold mining community of Monte Cristo is accessible from Silverton. Campsites are dispersed all along the South Fork. The availability of recreation and scenic resources contributes to the economy of the more remote communities which still derive their major support from the forest products industry.

CURRENT ADMINISTRATION: The river corridor inside the forest boundary is administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

Under the guidelines of the Washington State Shoreline Management Act of 1971, the shoreline of the South Fork Stillaguamish has been classified by Snohomish County as Conservancy from the forest boundary to Granite Falls and Rural from Granite Falls to Arlington. These classifications are applicable only to lands outside of federal jurisdiction and within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development. A Rural designation denotes shoreline areas characterized by agricultural uses, low density residential where most urban services are not available, and areas which provide buffer zones and open space between predominantly urban areas.

The Snohomish County Comprehensive Plan has zoned land along the South Fork Stillaguamish, outside of federal jurisdiction, for Forest Use or Residential Use, with 5 or 10 acre lots. Many flood hazard zones are identified along the river.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the South Fork Stillaguamish River for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 51,000	$ 50,000
Costs of Implementation		30,000
Development of Management Plan		94,200
Development Costs	124,800	100,000
Operation and Maintenance Costs	204,500	30,000
TOTAL - First Five Years	**$380,300**	**$304,200**

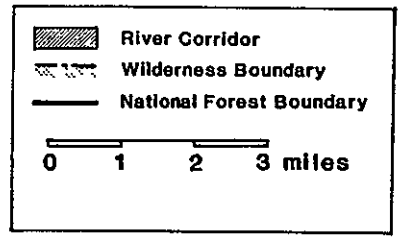
General administration and operation and maintenance costs are estimated to continue at $67,100 annually.

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

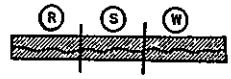
This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Scenic	Semi-Primitive, Non-Motorized Recreation	1,140
		Scenic Corridor (Foreground)	4,202
		Scenic Corridor (Middleground)	422
		Wilderness-General Trailless	126
		Old Growth Habitat (spotted owl)	168
		Pine martin/pileated woodpecker habitat	380
		Timber Management	84

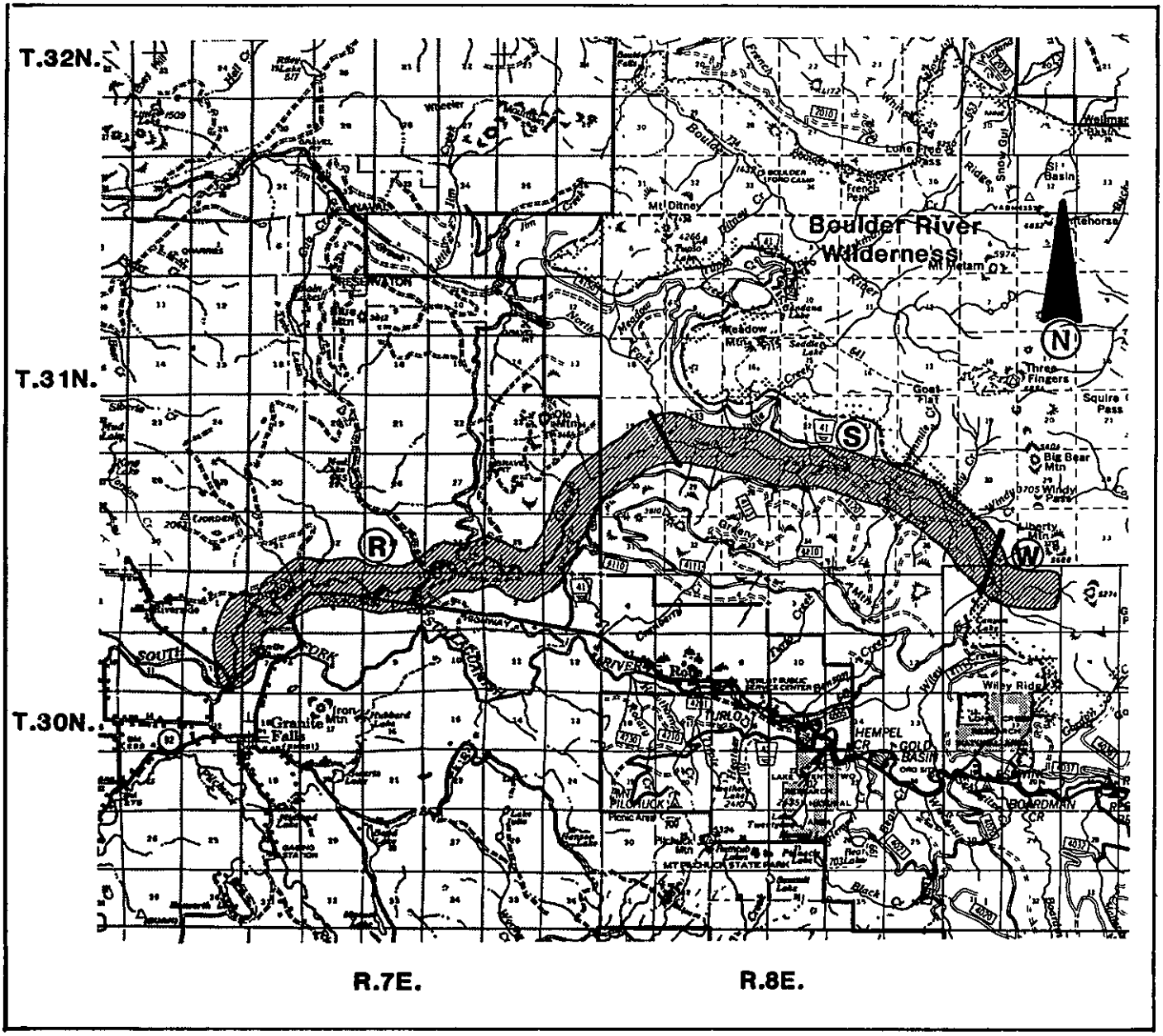
Canyon Creek and South Fork Canyon Creek



Potential River Classification



R - Recreational
S - Scenic
W - Wild



CANYON CREEK (TO FORK)
SOUTH FORK CANYON CREEK

Snohomish County

Canyon Creek and South Fork Canyon Creek were studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

The Canyon and South Fork Canyon Creeks were identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory (NRI) published by the National Park Service in 1982.

LOCATION: From the headwaters of the South Fork of Canyon Creek to the confluence of Canyon Creek with the South Fork Stillaguamish River.

Segment 1 - Headwaters of S. Fork Canyon Creek in NE 1/4 of Sec. 5, T.30 N., R.9 E. to the Boulder River Wilderness boundary (1.3 miles).

Segment 2 - Boulder River Wilderness boundary to the confluence with the North Fork of Canyon Creek (7.1 miles).

Segment 3 - Confluence of North and South Forks of Canyon Creek to the confluence with the South Fork Stillaguamish River (11.9 miles).

RIVER MILEAGE:

Study:	20.3 miles
Eligible:	20.3 miles
Forest Plan:	0 0 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: Canyon Creek and South Fork Canyon Creek were found to possess "Outstandingly Remarkable" values for the following: Fisheries and Ecological. South Fork Canyon Creek also has values for Wildlife.

Chinook, coho, pink and chum salmon spawn and rear in Canyon Creek. Summer and winter steelhead are also present.

Areas within the Canyon Creek drainage contain dense conifer stands of large timber, including old-growth.

Both rivers have an extensive black-tailed deer winter range, as well as other excellent riparian habitat. There is wintering bald eagle habitat, raptor nesting of osprey, excellent furbearer habitat, and a SOHA.

Appendix E
Canyon Creek/
South Fork Canyon Creek

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	1.3	Not recommended	0
Segment 2	Scenic	7.1	Not recommended	0
Segment 3	Recreation	11.9	Not recommended	0

SUITABILITY DETERMINATION:

Canyon Creek and the South Fork of Canyon Creek were found to be not suitable for inclusion in the preferred alternative of the Forest Plan.

Canyon Creek to the fork is almost entirely in private ownership. Designation of the South Fork would conflict with other resource values, principally high timber values. Existing old-growth in this area is already protected by other land allocations.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest	1.3 miles	416 acres
(Boulder River Wilderness - 1.3 miles)		
Segment 2		
Mt. Baker-Snoqualmie National Forest	6.6 miles	2,112 acres
Private	.5 miles	160 acres
Segment 3		
Mt. Baker-Snoqualmie National Forest	1.5 miles	480 acres
Private	9.7 miles	2,908 acres
State	0.7 mile	420 acres
Total	20.3 miles	6,496 acres

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: No part of these rivers is classified by the BLM as areas of critical mineral potential, nor does the BLM Mining Claim Recordation Data indicate any part is encumbered by unpatented mining claims. A review of available literature, including the Bureau of Mines MILS data, indicates the rivers have only one reported mineral resource occurrence which may be of a locatable nature. That occurrence is reported as a limestone deposit which has produced in the past. Little information is available concerning the deposits specific location or characteristics.

The BLM has not classified any part of these river segments as being prospectively valuable for leasable mineral resources, and none of the subject lands have been encumbered by mineral leases or lease applications.

Based upon the available information, it appears that, except for the limestone deposit upon which there is little information, these rivers have a relatively low potential for the occurrence of either locatable or leasable mineral resources. No serious interest in these resources is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments on either creek, but some water is used for irrigation.

These creeks are classified as "Protected" from hydropower development by the Northwest Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Roads are visible from Canyon Creek and the South Fork of Canyon Creek from the mouth for 11 miles Roads cross the creeks at Sections 4 and 6, T.30 N., R.7 E., and on the line of Sec. 4 & 5, T.30 N., R.7 E

Along the lower reaches of Canyon Creek, there is some cattle ranching and corn and hay farming.

In the lower 4 miles of Canyon Creek, there are approximately 25 home sites situated along the creek.

The Forks of Canyon Creek Trail #633 begin on the Tupso Pass Road #41. The trail leads to the confluence of the North and South Forks of Canyon Creek. A dispersed camping site is located near the confluence.

There are no developed campgrounds nor potential opportunity for development along either creek.

There is fishing access at Riverscene, about 8 miles upriver from Arlington, at the confluence of Canyon Creek and South Fork Stillaguamish.

RECREATION ACTIVITIES: There is low recreation use along both creeks due to restricted access on private land and little access provided on public land. Near the mouth of Canyon Creek, there is a moderate amount of fishing. The lower 10 miles of Canyon Creek is classified at Class IV whitewater kayaking. The creeks are not suitable for rafting or swimming.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only.

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	100	144
Misc. (hike, picnic, berry picking, etc)	100	196
TOTAL	200	340

WILDLIFE AND FISHERIES: There is extensive black-tailed deer winter range along both rivers, as well as other excellent riparian habitat. There is wintering bald eagle habitat, raptor nesting of osprey and excellent furbearer habitat. A SOHA is located on the South Fork Canyon Creek.

Chinook and steelhead spawn and rear in the mainstem and the South Fork up to the barrier falls. Given adequate water conditions, coho and some chinook can ascend the falls and swim upstream as far as Tiger Creek.

Appendix E
Canyon Creek/
South Fork Canyon Creek

STREAMFLOW, GRADIENT AND VALLEY PROFILE: Canyon Creek, below the North and South Forks, is characterized by moderately steep gradients with steep side valley slopes. At 1.5 miles above the mouth, the creek narrows into a canyon with a steep gradient, narrow channels and numerous rapids. The creek bottom is littered with boulders and gravel. Eighteen tributaries drain into Canyon Creek.

Sediment loading into the creek is significant due to 2 earth slides, heavy logging and road building in the upper watershed.

GEOLOGY: The bedrock geology consists primarily of metasedimentary and metavolcanic rocks. During the previous ice age, glaciers carved out a U-shaped valley and left very thick lacustrine and till deposits. Rapid downcutting is returning the valley to its pre-glacial V-shape. This is also causing destabilization of the lacustrine materials resulting in numerous mass failures.

CULTURAL RESOURCES: No systematic archaeological survey has been made of Canyon Creek, and no prehistoric or historic sites are recorded. The lack of known sites is believed to reflect the lack of survey of the drainage. During the historic period the area was within the territory of the Stillaguamish tribe. Localities used for traditional religious practices by the Samish tribe have been identified within the South Fork drainage.

No sites associated with logging or Forest Service administration have been listed or identified as eligible for the National Register of Historic Places.

TIMBER: Private lands have been clearcut down to the river. National Forest lands have been patch clearcut.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system land only:

	ASQ	
Total Timber *Volume* (MMBF)	Preferred Alternative w/o W&SR *Designation* (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR *Designation* (MMBF/yr.)1/
54.1	7.931	7.805

1/ Based on preferred alternative with management requirements.

LIVESTOCK GRAZING: Some cattle grazing occurs along the lower reaches of Canyon Creek on private land.

SOCIO-ECONOMIC EFFECTS: Canyon Creek joins the South Fork of the Stillaguamish about 1 mile north of Granite Falls, a community strongly dependent on forest resources for employment.

CURRENT ADMINISTRATION: From its headwaters downstream 1.3 miles, the South Fork of Canyon Creek flows through the Boulder River Wilderness. The wilderness and other National Forest lands are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

Under the guidelines of the Washington State Shoreline Management Act of 1971, the shoreline of Canyon Creek has been classified by Snohomish County as Conservancy. This classification is applicable only to lands outside of federal jurisdiction and within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development.

Land along the Canyon Creek corridor, outside of federal jurisdiction, is zoned by Snohomish County for:

Forestry Use from the forest boundary downstream for 5 miles.

Rural Use with 1 home per 5 acre lots from the Canyon Creek Lodge area to the confluence with the South Fork Stillaguamish. Flood hazard zones exist throughout this area, possibly affecting future development.

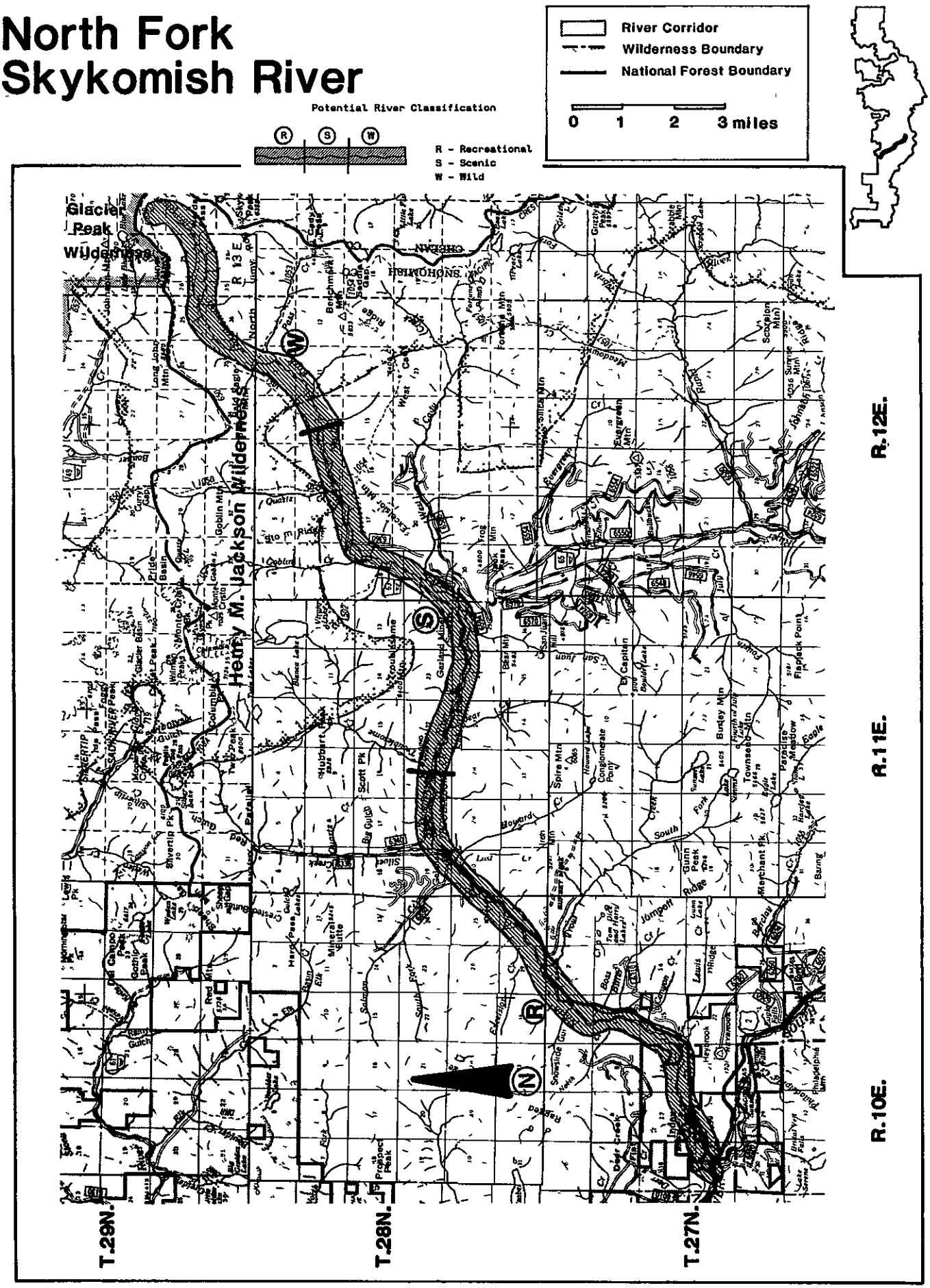
FUNDING NEEDS IF CLASSIFIED AS A WILD AND A SCENIC RIVER:

The following are expected funding requirements for the Canyon and South Fork Canyon Rivers for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 1,000	$ 1,000
Costs of Implementation		2,000
Development of Management Plan		33,500
TOTAL - First Five Years	**$ 1,000**	**$ 36,500**

General administration and operation and maintenance costs are estimated to continue at $400 annually.

North Fork Skykomish River



NORTH FORK SKYKOMISH RIVER

Snohomish County

The North Fork Skykomish River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability

The North Fork Skykomish River was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory (NRI) published by the National Park Service in 1982.

The North Fork Skykomish River to the Bear Creek tributary is designated by the State of Washington as a Scenic River under the State's Scenic Rivers Act.

LOCATION: From its headwaters north of Skykomish Peak to the confluence with the South Fork Skykomish River

Segment 1 - Headwaters in NW 1/4 of Sec. 30, T.29 N., R.14 E. to end of F.S. Road #63 in NW 1/4 of Sec. 10, T.28 N., R.12 E (8.2 miles).

Segment 2 - Road end to Troublesome Creek (8.4 miles).

Segment 3 - Troublesome Creek to confluence with South Fork Skykomish River (12.0 miles).

RIVER MILEAGE:

Study:	28.6 miles
Eligible:	28.6 miles
Forest Plan:	28.6 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The North Fork Skykomish River was found to possess "Outstandingly Remarkable" values for the following: Scenic, Recreation, Fisheries and Wildlife.

Prominent features along the North Fork Skykomish River include Deer Falls, Bear Falls, Troublesome Mountain, Bear Mountain and Keyes Peak.

The North Fork is one of Washington State's most continuously challenging whitewater rafting runs. Eleven miles of the river is Class III or Class IV. The river is also a favorite of expert kayakers. Fishing is popular for steelhead, salmon and resident trout. Backpacking and horseback riding are popular along the upper reaches of the river Cross-country skiing and snow play along the river are popular during the winter.

The river corridor is significant for its population of bald and golden eagles and spotted owl habitat area. A key winter range for black-tailed deer lies on both sides of the lower section of the river. There is also has excellent furbearer and riparian habitats for black bear, cougar, coyote, bobcat, and marten.

The North Fork supports a population of chinook, coho and pink salmon as well as steelhead trout.

Appendix E
North Fork Skykomish River

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	8.2	Wild	8.2
Segment 2	Scenic	8.4	Scenic	8.4
Segment 3	Recreation	12.0	Recreation	12.0

SUITABILITY DETERMINATION:

The North Fork of the Skykomish River was found to be suitable for inclusion in the preferred alternative of the Forest Plan. The river has a high number of outstandingly remarkable values. It is one of Washington State's most continuously challenging whitewater rafting and kayaking runs, with 11 miles of class III or IV river. The corridor is significant for its population of bald and golden eagles, as well as spotted owls. There is public and other agency support for designation. The North Fork was identified as a potential wild and scenic river in the Nationwide Rivers Inventory published by the National Park Service in 1982.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Henry M. Jackson Wilderness - 6.8 miles)	8.2 miles	2,624 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	8.0 miles	2,638 acres
Private	0.4 mile	50 acres
Segment 3		
Mt. Baker-Snoqualmie National Forest	6.0 miles	1,920 acres
Private	5.0 miles	1,320 acres
State	1.0 mile	600 acres
Total	28.6 miles	9,152 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: The BLM has classified about 10 miles of this river (T.28 N., R.11 E.) as an area of critical mineral potential. A review of available literature, including the Bureau of Mines MILS data, indicates numerous reported occurrences of both precious and base metals resources. Of most importance, appear to be those located in Section 35, T.28 N., R.10 E., Section 19, T.28 N., R.11 E. The BLM mining claim recordation data indicates that 140 unpatented mining claims have been located along or adjacent to the river from Section 36, T. 28 N., R.10 E. eastward. Of these 140 claims, however, 37 have either been abandoned or declared to be null and void. Of the remaining 103 claims most are located in Sections 19, 20, 21, 22, 28 and 29, T.28 N., R.11 E. The mineral resources of a part of the area have been evaluated by the U.S.G.S. and U.S.B.M. (Church and Others, 1983 and 1984), and based upon the geology of the area and the results of their sampling they have concluded the following:

The vicinity of Section 35, T 28 N., R.10 E. and Sections 2 and 3, T.27 N., R.10 E. has a moderate potential for the occurrence of copper and silver resources, and Sections 25,26,35 and 36, T.29 N., R.13 E., Section 31, T. 29 N., R14 E. and Sections 25 and 36, T.29 N., R12 E. have a low potential for the occurrence of precious metal resources in hot spring type deposits, a low potential for the occurrence of base and precious metal resources in hydrothermal veins and a moderate potential for the occurrence of base metal resources in disseminated porphyry deposits.

The BLM has classified the entire river as being prospectively valuable ("PV") for geothermal resources, and three miles of the river near Galena is classified "PV" for coal resources. However, none of the area has been encumbered by mineral leases or lease applications.

Based upon available information, it appears that a large portion of the area does have potential for the occurrence of both precious and base metal mineral resources and a potential for the occurrence of coal and geothermal resources. The mining claims located along the river indicate that there is at least some serious interest in the locatable mineral resources. However, no serious interest in the leasable mineral resources has recently been expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments on the North Fork Skykomish. This river is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

Nine preliminary permits for hydroelectric projects have been issued by FERC and two license applications have been submitted on tributary rivers to the North Fork. The following is a list of the tributaries, proposed facilities and the capacity of the project in megawatts:

Tributary	Proposed Facilities within Corridor	Megawatts
West Cady	Transmission line	4.0
Goblin Creek	Transmission line	1.0
San Juan Creek	Transmission line	2.2
Bear Creek	Transmission line	2 7
Troublesome Creek	Transmission line	3.7
Howard Creek	Transmission line	3.5
Trout Creek	Transmission line	4.9
Excelsior Creek	Transmission line	1.7
Salmon Creek	Transmission line	2.9
Silver Creek	Transmission line	3.4
Storm Ridge1/	Transmission line, powerhouse, diversion structure and penstock	15.0

1/ Storm Ridge project is on the main North Fork Skykomish, not a tributary.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENT: Segments 2 and 3 of the North Fork is paralleled by a road. U.S. 2 passes the river corridor near the confluence of the North and South Forks of the Skykomish River. From the junction with U.S. 2, the paved North Fork Road #6300 passes the community of Index and follows the North Fork River to a fork about a mile beyond the San Juan Campground. It continues, unpaved over Jack Pass and back to U.S. 2 via the Beckler River Road. This is a popular scenic loop and has long been under consideration for paving as a scenic drive. At the fork by San Juan Campground, F.S. Road 63 takes off and runs unpaved along the river. It ends

at the North Fork Skykomish Trailhead about 3/4 mile from the Henry M. Jackson Wilderness boundary.

F.S. Road 6360 crosses the North Fork above Goblin Creek. F.S. Road 65 crosses above San Juan Creek. County Road 63 crosses near Troublesome Creek. County Road 6335 crosses below Silver Creek. The Index road bridge and railroad bridge cross at Index. A powerline crosses just above the confluence with the South Fork.

The North Fork Skykomish/Dishpan Gap Trail #1051 begins at the end of F.S. Road 63. The trail follows the North Fork Skykomish valley to the northeast to the headwaters of the river.

The Quartz Creek/Curry Gap Trailhead #1050 is located 1 mile west of the end of F.S. Road 63. The trail heads uphill along Quartz Creek.

The West Cady Ridge Trailhead #1054 is also located 1 mile west of the end of F.S. Road 63. The trail heads up West Cady Ridge to Saddle Gap.

The Blanca Lake Trail #1052 begins on F.S. Road 63, 2 miles northeast of Garland Mineral Springs.

The communities of Index, Galena, and Garland are located on the west bank of the river. Downstream from Silver Creek, there are 4 private subdivisions which support recreation residences. There are also a few scattered summer cabins. Along the lower 2 to 3 miles of the river, rural and suburban residences are found along the river.

There is a cable tram crossing at Trout Creek and several old bridge crossings from early railroad logging. A log stringer bridge is located near Excelsior Mountain.

The Burlington Northern Railroad is in the river corridor near the confluence of the North and South Forks of the Skykomish River.

There are two campgrounds located along the river: Troublesome Creek Campground and San Juan Campground. Both are widely used for overnight camping.

Many fish habitat structures were put in the river in 1986-87 near Goblin Creek.

There are sections of dikes from Garland to Jack's Pass and also at the town of Index.

Rip-rap is found at Index, Garland, F.S. Road 65 and Troublesome Creek Campground.

RECREATION ACTIVITIES: The lower portion of the North Fork Skykomish receives high recreation use, much of which is oriented toward river activity. The North Fork is one of Washington States most continuously challenging whitewater rafting runs. Eleven miles of the river is Class III or Class IV. The river is also a favorite of expert kayakers. Use of the river is low by swimmers. Fishing is popular for steelhead and salmon up to Bear Falls. Resident trout fishing is also popular in the upper reach. Some planting takes place.

Hunting occurs in the surrounding areas. Backpacking and horseback riding are popular in the upper reaches of the river. Cross-country skiing and snow play along the river are popular during the winter.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Boating (power, nonpower)	265	437
Waterplay (swim, wade)	15	22
Fishing, Hunting	1,470	2,117
Camping	69,670	104,505
Viewing (scenery, wildlife, driving for pleasure)	15,635	23,765
Misc. (hike, picnic, berry picking, etc.)	2,880	5,645
TOTAL	89,935	136,491

WILDLIFE AND FISHERIES: The entire area is within the big game management unit 448 and goat management units 11 and 37. The river corridor is significant for its population of bald and golden eagles and spotted owl habitat area. A key winter range for black-tailed deer lies on both sides of the lower section of the river. There is also excellent furbearer and riparian habitats for black bear, cougar, coyote, bob cat, and marten.

Birds include band-tailed pigeons, dipper, harlequin duck, spotted sand piper, warbling vireos, red-tailed hawk, bald eagle, white tailed ptarmigan, Audubon's warber, downy woodpecker, evening gosbeak, red crossbill, western tanager, spotted owl, and great grey owl.

The North Fork supports a population of chinook, coho and pink salmon as well as steelhead trout. Chinook salmon is the principal species and is common up to Bear Falls. The anadromous steelhead are numerous below Bear Falls and sparse above Bear Falls to Deer Falls. Resident trout inhabit the entire length of the river. Angler use is heavy for steelhead and light for all other species. Holding ponds and fish planting has been in operation for several years through mutual agreements with the Index Sportsman, Washington State Department of Wildlife and Department of Fisheries, and U.S. Forest Service.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: Small falls and cascades are found in the upper 10 miles of the river, separated by short rapids or occasional pool-riffle stretches. Bear Falls and Deer Falls are two of the larger falls along the river.

There are 64 tributaries to the North Fork Skykomish. All exhibit steep mountain characteristics over their entire length. They contain narrow channels with numerous cascades, small falls and a few riffles or pools with bottoms generally consisting of boulder rubble material.

GEOLOGY: The upper 10 miles of the river covers steep mountainous terrain, with the river flowing though a narrow, occasionally canyon-like valley. The valley broadens slightly between Goblin and San Juan Creeks. Downstream below San Juan Creek, the valley again narrows with rugged side slopes. Down river from Silver Creek, the river courses through a relatively narrow, very steep sloped valley. The valley broadens slightly over the lower two to three

miles. Most of the river flows through glacial material deposited from glaciers along the canyon bottom.

There are 2 distinctive geologic features along the river: the Index Town Wall (cliffs) and Troublesome Mountain formations which provide a striking addition to the forested slopes.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the North Fork Skykomish. Information is available primarily from published historic sources.

No prehistoric sites have been recorded to date. The absence of sites probably reflects the lack of survey of the area. Historically, the drainage was within the territory of the Skykomish Indians. The Skykomish and Wenatchee Indians used a trail that followed the North Fork as a main travel and track route across the Cascades. No localities used for traditional religious practices are known within the proposed Wild and Scenic River corridor.

Historic period sites represent mining, logging and Forest Service administration. The Silver Creek Mining District was established in 1871, but mining began in earnest in 1882, when several discoveries were made in rapid succession. As a result, the townsites of Mineral City and Galena were established on the North Fork. Between 1890 and 1894, a trail was built between Mineral City and Galena.

A small lumber mill was established in 1904 at the town of Index. From this, the Index-Galena Logging Company was formed in 1907. By 1922, the company operated approximately 14 miles of logging railroad along both sides of the North Fork. It operated until 1928.

There are two sites within the proposed Wild and Scenic River corridor that are listed on the National Register of Historic Places. Both are buildings located within the town of Index and associated with the development of the town.

TIMBER: *Extensive logging occurs from Deer Falls downstream*

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	----------ASQ----------	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
188.2	3.441	3.378

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The North Fork of the Skykomish River has its headwaters at Dishpan Gap near the Cascade Crest in the Henry M. Jackson Wilderness. A traditional horse use area, the river is bordered by pack trail, then by forest road. This area offers developed campgrounds, ample dispersed camping, and several trailheads. Many visitors are drawn to the area by its scenic and recreation attractions.

The community of Index (pop. 147) lies on the river one mile north of its confluence with the Skykomish River. Traditionally a mining and logging community, Index has also become a magnet for retirees and vacation home-owners. The "Index Town Wall" (cliffs) attract many skilled rock climbers who have established numerous routes on the "wall".

CURRENT ADMINISTRATION: From its headwaters downstream 6.8 miles, the North Fork Snoqualmie flows through the Henry M. Jackson Wilderness. The wilderness and other National Forest lands are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

Under the guidelines of the Washington State Shoreline Management Act of 1971, most of the shoreline of the North Fork Skykomish River has been classified as Conservancy by Snohomish County. Several areas that have been subdivided near the town of Index have been classified Rural. These classifications are applicable only to lands not under federal jurisdiction and within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development. A Rural designation denotes shoreline areas characterized by agricultural uses, low density residential where most urban services are not available, and areas which provide buffer zones and open space between predominantly urban areas.

The land along the North Fork Skykomish River corridor, outside of federal jurisdiction, is zoned by Snohomish County for Forestry Use. Subdivisions near the town of Index, are in a flood hazard zone, which may inhibit further development.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the North Fork Skykomish River for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 570,000	$ 50,000
Costs of Implementation		10,000
Development of Management Plan		82,000
Development Costs	883,000	60,000
Operation and Maintenance Costs	61,500	15,000
Total - First Five Years	**$1,514,500**	**$217,200**

General administration and operation and maintenance costs are estimated to continue at $139,300 annually.

Appendix E
North Fork Skykomish River

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Semi-Primitive, Non-Motorized Recreation	211
		Wilderness-Trailed	1,055
		Wilderness-General Trailless	922
Segment 2	Scenic	Semi-Primitive, Non-Motorized Recreation	2,977
		Old Growth Habitat (spotted owl)	21
		Timber Management	168
Segment 3	Recreation	Semi-Primitive, Non-Motorized Recreation	549
		Deer and Elk Habitat Enhancement	1,098
		Timber Management	549

TROUBLESOME CREEK

Snohomish County

Troublesome Creek was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters in the Henry M Jackson Wilderness at Blanca Lake to the confluence with the North Fork Skykomish River.

Segment 1 - Headwaters at Blanca Lake to Forest Road 63 (4.4 miles).

Segment 2 - Forest Road 63 to the confluence with the North Fork Skykomish River (0.1 mile).

RIVER MILEAGE:

Study:	4.5 miles
Eligible:	4.5 miles
Forest Plan:	4.5 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: Troublesome Creek was found to possess "Outstandingly Remarkable" values for the following: Wildlife.

Mountain goats and spotted owls are predominant wildlife in the drainage.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	4.4	Wild	4.4
Segment 2	Scenic	0.1	Scenic	0.1

SUITABILITY DETERMINATION:

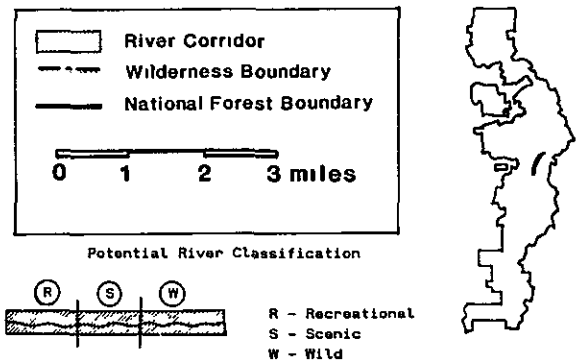
Troublesome Creek was found to be suitable for inclusion in the preferred alternative of the Forest Plan due to the lack of competing resource values. Designation would have no impact on timber resources and the potential hydro-electric value is incompatible with Forest Plan land allocations.

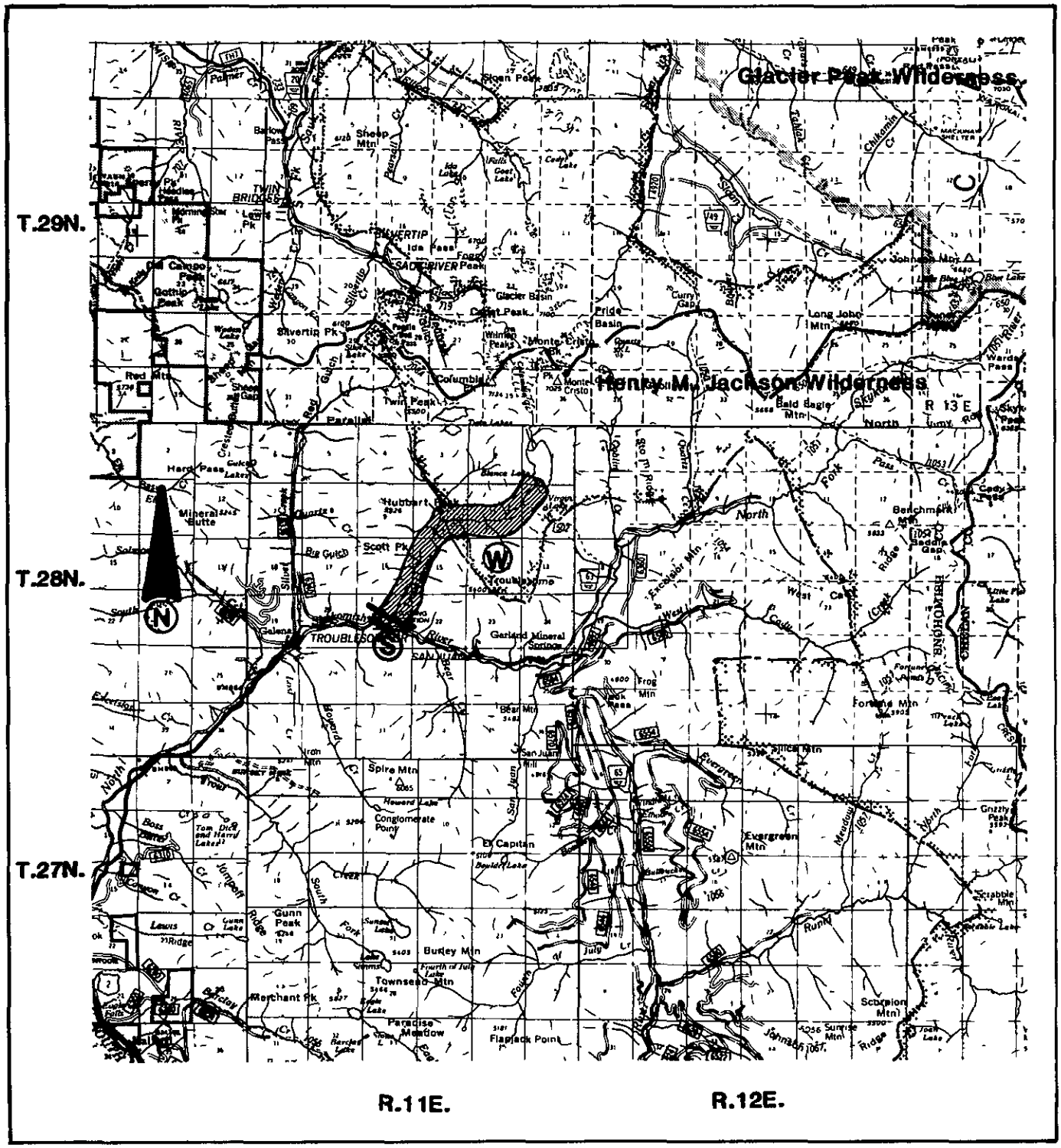
LANDOWNERSHIP:

	River Miles	Corridor Acres
Segment 1		
Mt. Baker-Snoqualmie National Forest (Henry M. Jackson Wilderness - 2.3 miles)	4.4 miles	1,408 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	0.1 miles	32 acres
Total	4.5 miles	1,440 acres1/

1/Acres based on a 1/4-mile corridor on each side of the river.

Troublesome Creek





MINERAL AND ENERGY RESOURCE ACTIVITIES: The entire creek lies within an area classified by the BLM as having critical mineral potential. Even though the area has no reported mineral resource production history, a review of available literature, including the Bureau of Mines MILS data, does indicate the area has precious and base metal resource occurrences. These occurrences appear to be concentrated in Sections 10, 15 and 21, T.28 N., R.11 E. The BLM mining claim recordation data also indicates that 144 mining claims have been located along or adjacent to the river corridor in Sections 9, 10, 15, 16, 21 and 22, T.28 N., R.11 E. Of these 144 claims, only 8 have been abandoned or declared to be null and void

The BLM has classified the entire river as being prospectively valuable ("PV") for geothermal resources. None of the area is considered to be "PV" for other leasable mineral resources and none of the area has been encumbered by mineral leases or lease applications

Based upon the available information it appears that the area does have at least a low and possibly a moderate potential for the occurrence of precious and base metal resources. The number of unpatented mining claims being maintained in the area indicates a serious and continuing interest in these resources. Even though the area does have potential for the occurrence of geothermal resources, no serious interest in that resource is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments along the creek. Troublesome Creek is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

A preliminary permit for a hydroelectric project has been issued by FERC. Proposed facilities within the river corridor consist of a transmission line, a powerhouse, and a diversion structure and penstock. The project capacity will be 3.7 megawatts.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: County Road 63 crosses above the mouth of the river.

Troublesome Creek Campground (35 sites) is located near the mouth of the river. There is some rip-rap at the campground.

Troublesome Creek Nature Trail (#1079) is adjacent to the campground. It is a 1/2-mile loop trail. Two trail bridges cross Troublesome Creek at its confluence with the North Fork Skykomish.

There are no homes or farms bordering the creek.

Several fish habitat structures were put in during 1985-86: 25 log deflectors, 1 digger log, 1 area of bank seeding/planting, and 2 rock deflectors

RECREATION ACTIVITIES: The predominant activities are camping, hiking and fishing Camping receives the heaviest use Some swimming use is associated with the campground, but cold water acts to limit this activity.

Appendix E
Troublesome Creek

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Boating (power, nonpower)	10	15
Waterplay (swim, wade)	25	35
Fishing, Hunting	245	353
Camping	45,000	67,500
Viewing (hiking, wildlife, driving for pleasure)	2,525	3,840
Misc. (hike, picnic, berry picking, etc.)	390	765
TOTAL	48,195	72,508

WILDLIFE AND FISHERIES: Mountain goats and spotted owls are predominant wildlife in the drainage. Coho and some chinook and pink salmon spawn near the mouth of Troublesome Creek. Further access upstream is blocked by a series of cascades-falls. The creek does support a population of resident rainbow trout.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The Columbia Glacier feeds into Blanca Lake, which in turn drains into Troublesome Creek. The creek exhibits the steep mountain character typical of this area over its entire length. There are numerous cascades, falls and rapids. Eleven tributaries drain into Troublesome Creek. The creek bottom is mainly boulder and rubble.

Water quality is excellent.

GEOLOGY: This creek originates and passes through rugged granitic mountains. Previous glaciation has carved out the valley and oversteepened the sideslopes. Lower sideslopes dominated by stringers of conifers interspersed with deeply dissected and extremely steep side drainages and avalanche tracks merge into upper slopes of barren rock and perennial snow. The numerous side tributaries abound with waterfalls during spring runoff.

CULTURAL RESOURCES: No systematic archaeological survey has been made of Troublesome Creek, and no prehistoric sites are recorded within the proposed Wild and Scenic River corridor. The lack of sites may be a result of the lack of a survey. Historically, the Troublesome Creek drainage was within the territory of the Skykomish Indian tribe. No localities used for traditional religious purposes are known.

The discovery of silver on Lost Creek in 1871 resulted in the filing of additional mining claims up Troublesome Creek. No historic sites are listed on the National Register of Historic Places.

TIMBER: There is some logging in the drainage in conjunction with mining claims. The logging occurs below the Wilderness boundary.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

Total Timber Volume (MMBF)	ASQ: Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	ASQ: Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
23.5	0	0

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: Troublesome Creek has its confluence with the North Fork of the Skykomish River at Troublesome Creek Campground. Rapids near the mouth of the river have been made accessible by construction of the high standard Troublesome Creek Nature Trail. Many visitors are attracted to the North Fork area by its scenic and recreation attractions, and the community of Index (pop. 147). Index is located on the North Fork Skykomish, and benefits economically from the visitors Traditionally a mining and logging community, Index has also become a magnet for retirees and vacation home owners. The "Index Town Wall" (cliffs) attract many skilled rock climbers who have established numerous routes on the "wall".

CURRENT ADMINISTRATION: The upper 2.3 miles of the creek are inside the Henry M. Jackson Wilderness. The wilderness and other National Forest lands are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for Troublesome Creek for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 1,000	
Costs of Implementation		500
Development of Management Plan		1,800
Development Costs	15,000	
Operation and Maintenance Costs	1,000	
TOTAL - First Five Years	**$17,000**	**$2,300**

General administration and operation and maintenance costs are estimated to continue at $400 annually

Appendix E
Troublesome Creek

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Semi-Primitive, Non-Motorized Recreation	654
		Wilderness-Transition	42
		Wilderness-General Trailless	696
Segment 2	Scenic	Semi-Primitive, Non-Motorized Recreation	63

WEST CADY CREEK

Snohomish County

West Cady Creek was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters in the Henry M. Jackson Wilderness to the confluence with the North Fork Skykomish River.

Segment 1 - Headwaters in NE 1/4 of Sec. 13, T.28 N., R.12 E. to bridge in Sec. 21, T.28 N., R.12 E. (4.8 miles).

Segment 2 - Bridge to confluence with North Fork Skykomish River (2.7 miles).

RIVER MILEAGE:

Study:	7.5 miles
Eligible:	7.5 miles
Forest Plan:	7.5 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: West Cady Creek was found to possess "Outstandingly Remarkable" values for the following: Wildlife.

There is a golden eagle nest site in the drainage.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	4.8	Wild	4.8
Segment 2	Recreation	2.7	Recreation	2.7

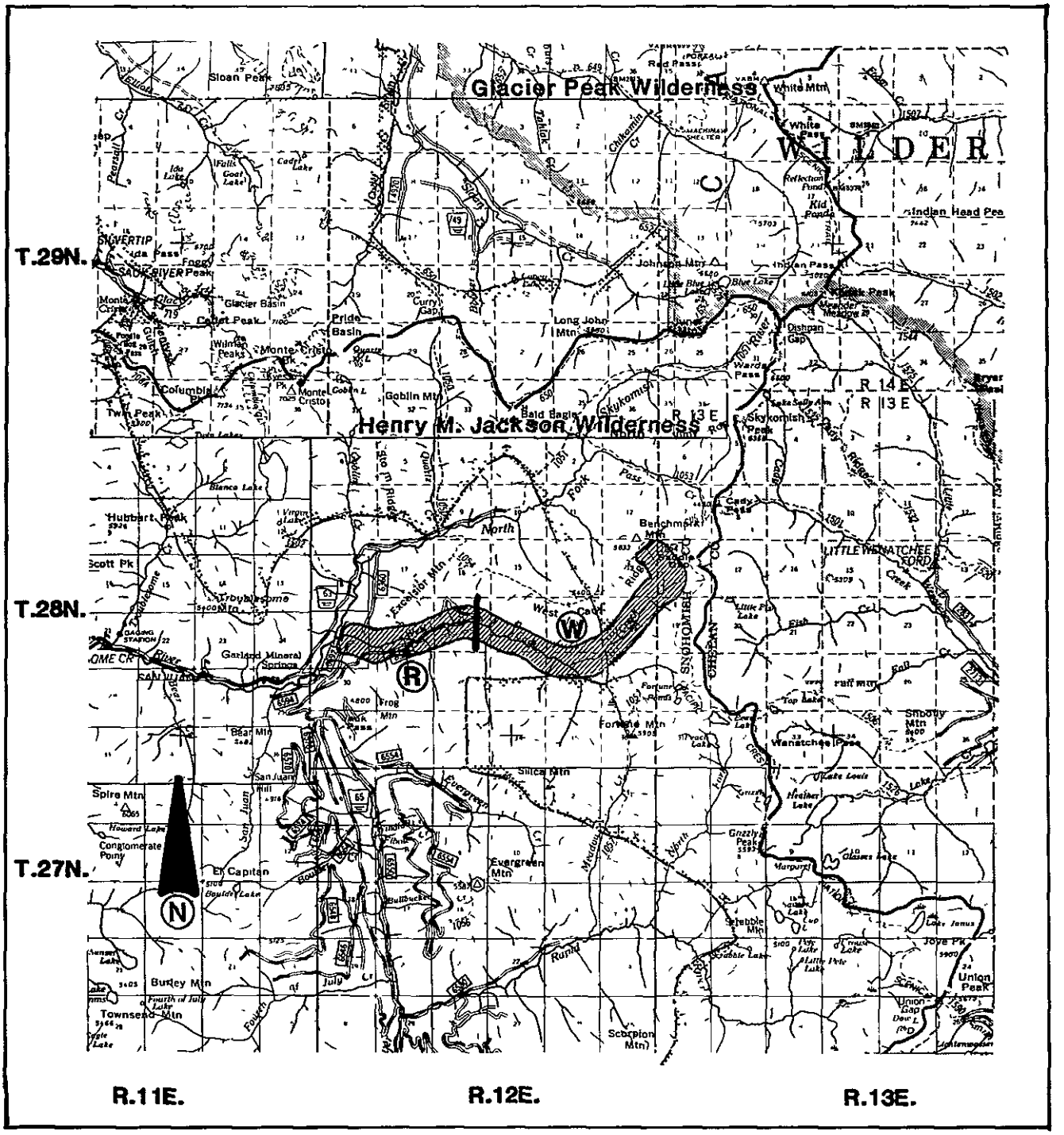
SUITABILITY DETERMINATION:

West Cady Creek was found to be suitable for inclusion in the preferred alternative of the Forest Plan due to little to no resource conflict, and compatibility with the existing Forest Plan land allocation. West Cady Creek has outstandingly remarkable values for wildlife.

West Cady Creek

River Corridor
Wilderness Boundary
National Forest Boundary
0 1 2 3 miles

Potential River Classification
R - Recreational
S - Scenic
W - Wild



LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Henry M. Jackson Wilderness - 2.5 miles)	4.8 miles	1,536 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	2.5 miles	800 acres
Private	0.2 miles	64 acres
TOTAL	7.5 miles	2,400 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: Neither of the river segments are classified by the BLM as areas of critical mineral potential or are encumbered by unpatented mining claims. A review of available literature including the Bureau of Mines MILS data, indicates the river has no reported locatable mineral resource occurrences.

The BLM has classified the entire river as being prospectively valuable for geothermal resources. None of the area is considered to have potential for other leasable mineral resources and none of the area has been encumbered by mineral leases or lease applications.

Based upon the available information, it appears the area has a relatively low potential for the occurrence of locatable mineral resources. No serious interest in the locatable minerals is currently being expressed. The area does have at least a low potential for the occurrence of geothermal resources. However, as with the locatables, no serious interest in the geothermal potential is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments along West Cady Creek. This creek is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

A license application has been completed for a small hydroelectric project on West Cady Creek. Proposed facilities within the river corridor consist of a transmission line, powerhouse, and a diversion structure and penstock. The project capacity would be 4 megawatts.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: F.S. Road 6580 parallels the river for 2 miles along its lower reaches. Two miles upstream from the mouth, the road crosses to the north side of the creek. The bridge was developed to provide logging access to the area.

There are no homes, farms or developed campgrounds bordering the creek.

RECREATION ACTIVITIES: The West Cady Creek drainage has low recreation use. Limited amounts of camping, hunting and fishing for resident species occurs along its banks. Rafting and kayaking are not suitable and the water is too cold for swimming.

Appendix E
West Cady Creek

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	25	40
Camping	865	1,300
Viewing (scenery, wildlife, driving for pleasure)	4,100	6,230
Misc. (hike, picnic, berry picking, etc.)	160	315
TOTAL	5,150	7,885

WILDLIFE AND FISHERIES: There is a golden eagle nest site in the drainage.

Chinook and coho salmon spawn and rear in the lower mile of the creek. An impassable series of cascades-falls prohibits further migration upstream. *Rainbow and cutthroat trout inhabit the entire creek.*

STREAMFLOW, GRADIENT AND VALLEY PROFILE: West Cady Creek exhibits the steep mountain character typical of this region over its entire length. There are numerous cascades, falls and rapids. Sixteen tributaries drain into the creek. The bottom of the creek is mainly boulders and rubble.

GEOLOGY: West Cady Creek flows through a steep V-shaped valley dominated by granitic and gneissic bedrock. Lower slope conifers blend into old burn meadow areas on the adjacent ridgetops.

CULTURAL RESOURCES: No systematic archaeological survey has been made of West Cady Creek, and no prehistoric or historic sites are recorded. The lack of sites may be a result of the lack of survey of the drainage. Historically, West Cady Creek was within the territory of the Skykomish Indian tribe. No localities used for traditional religious purposes are recorded.

There are no sites within the proposed Wild and Scenic River corridor listed on *the National Register of Historic Places.*

TIMBER: The lower three miles of the creek have been extensively clearcut logged.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
51.8	2.810	2.572

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The North Fork Skykomish drainage, providing access to West Cady Creek, has developed campgrounds, dispersed camping opportunities, and several trailheads. Many visitors are drawn to the area by its scenic and recreation attractions.

Index, traditionally a mining and logging community, also has become a magnet for retirees and vacation home owners The "Index Town Wall" (cliffs) attract many skilled rock climbers who have established numerous routes on the "wall".

CURRENT ADMINISTRATION: The upper 2.2 miles of the creek flow within the Henry M. Jackson Wilderness. The Wilderness and other National Forest lands, are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for West Cady Creek for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 2,000	$ 3,000
Costs of Implementation		3,000
Development of Management Plan		5,000
Development Costs	15,000	80,000
Operation and Maintenance Costs		20,000
Total - First Five Years	**$17,000**	**$111,000**

General administration and operation and maintenance costs are estimated to continue at $5,000 annually.

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Semi-Primitive, Non-Motorized Recreation	781
		Wilderness-Trailled	147
		Wilderness-General Trailless	782
		Timber Management	42
Segment 2	Recreation	Semi-Primitive, Non-Motorized Recreation	168
		Timber Management	633

Skykomish River South Fork

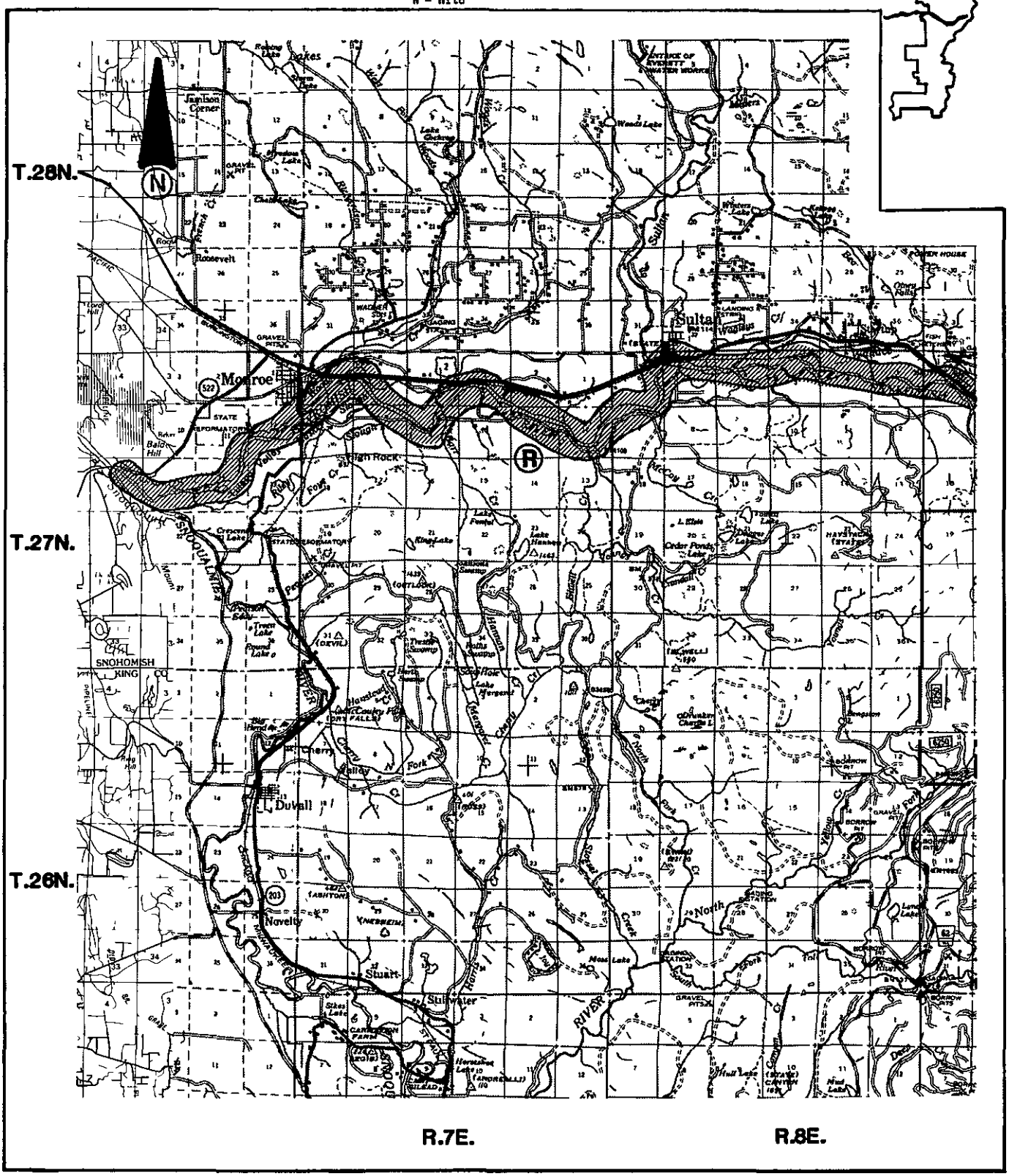
(1)

Potential River Classification

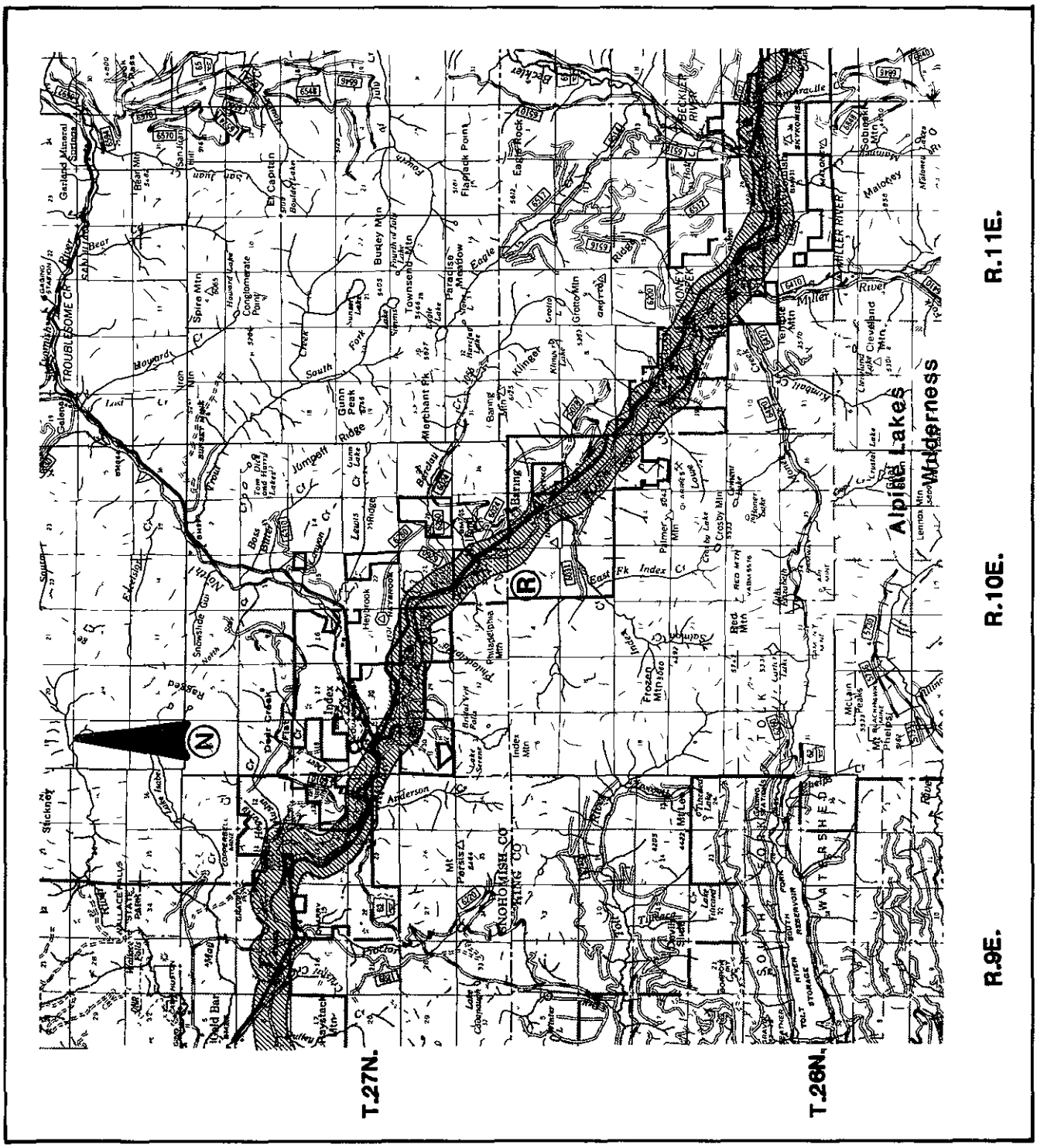
R - Recreational
S - Scenic
W - Wild

River Corridor
Wilderness Boundary
National Forest Boundary

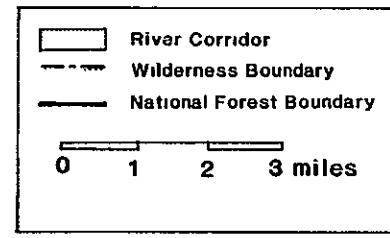
0 1 2 3 miles



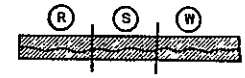
Skykomish River
South Fork
(2)



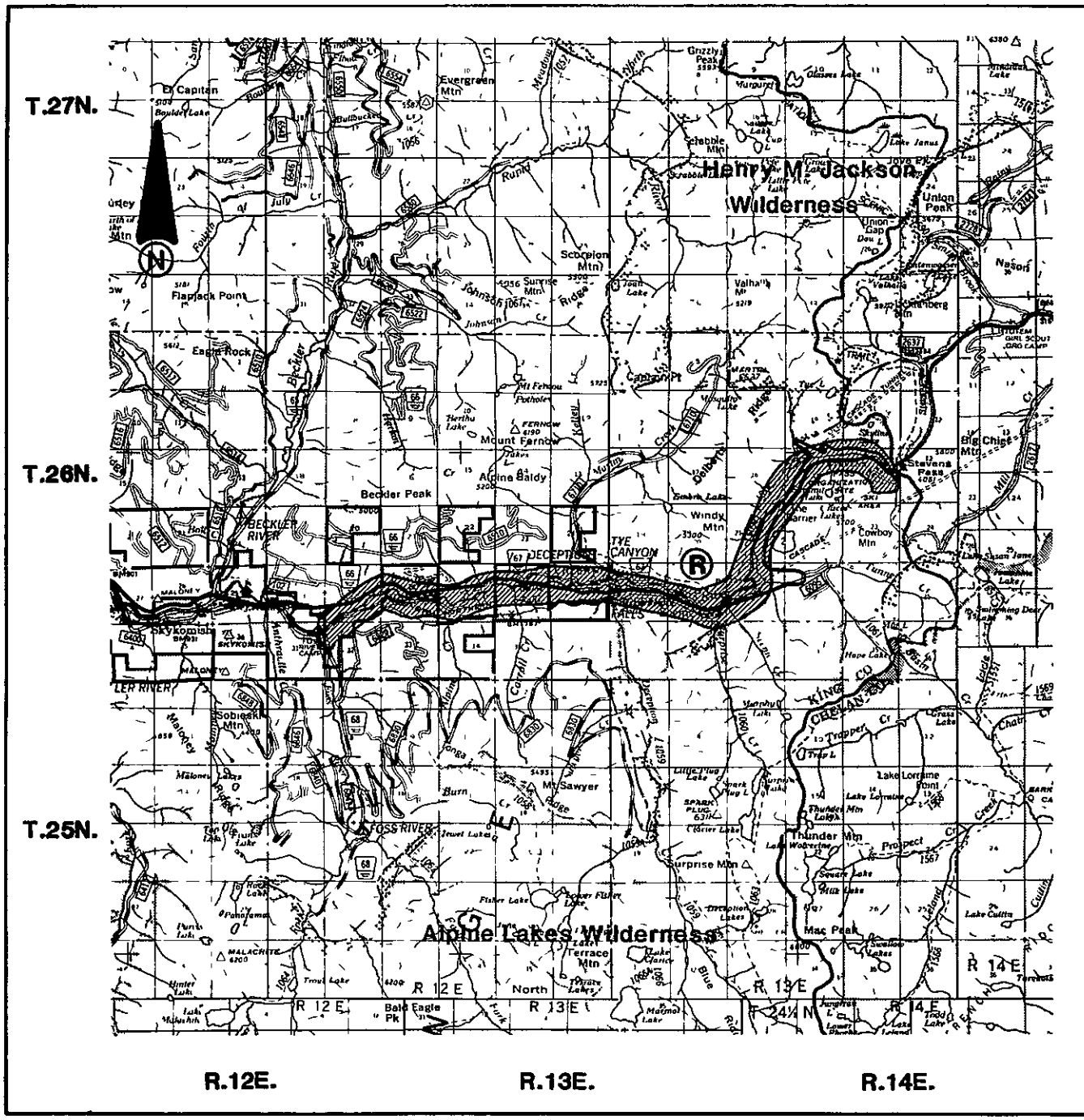
Tye River



Potential River Classification



R - Recreational
S - Scenic
W - Wild



SKYKOMISH RIVER
SOUTH FORK SKYKOMISH RIVER
TYE RIVER

Snohomish and King Counties

The Skykomish, South Fork Skykomish, and Tye Rivers were studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

The Skykomish, South Fork Skykomish, and the Tye Rivers were identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory (NRI) published by the National Park Service in 1982.

The Skykomish upstream from Sultan, South Fork Skykomish, and the Tye Rivers are designated by the State of Washington as a Scenic River under the State's Scenic Rivers Act.

LOCATION: The Tye River is under evaluation from its headwaters near Stevens Pass on U.S. Highway 2 downstream to the confluence with the South Fork Skykomish and Foss Rivers. The South Fork becomes the main Skykomish River at the confluence with the North Fork Skykomish River.

Segment 1 - Headwaters of the Tye River in SE 1/4 of Sec. 14 , T.26 N., R 13 E. to the confluence with the South Fork Skykomish and Foss Rivers (14 5 miles).

Segment 2 - Confluence of Tye and Foss Rivers to the confluence with the Snohomish River (48.6 miles)

OUTSTANDINGLY REMARKABLE VALUES: The Skykomish, South Fork Skykomish, and Tye Rivers were found to possess "Outstandingly Remarkable" values for the following. Scenic, Recreation, Fisheries, and Wildlife. The Tye River also has values for Historical/Cultural

The river system has many falls that have become popular viewing sites. One of the most dramatic is Eagle Falls, located 12 miles west of the Ranger Station off of Highway 2. The water cascades to a large emerald green pool. Other falls include Sunset, Bridal Veil, Alpine and Deception Falls. Bridal Veil Falls is located on Bridal Veil Creek, a tributary of the Skykomish. The falls cascade down steep rock cliffs forming 2 "veils" in summer and a solid sheet of blue ice in winter. The falls can be viewed from Highway 2 near Index.

All river segments provide boating opportunities. The Tye provides above average opportunity for kayaking. The main Skykomish River is considered to be one of the most outstanding boating rivers in the state due to its rafting and kayaking runs. Overnight camping opportunities are scattered throughout the area with low to moderate use. Hikers can access the Pacific Crest Trail from Stevens Pass. Many people drive for pleasure along U.S. Highway 2 which gains more than 3000 feet elevation from Skykomish to Stevens Pass, winding its way around steep mountainsides.

Winter range is provided for black-tailed deer and mountain goats. Below Alpine Falls, bald eagles, a federally listed Threatened and Endangered species, forage in winter.

Good spawning and rearing habitat exist for chinook, coho and pink salmon. Winter steelhead, resident rainbow and cutthroat trout also inhabit the waters.

The most significant historic resource in the Skykomish system is the Stevens Pass Historic District. Listed on the National Register of Historic Places, the district is nationally significant. It represents 35 years of effort by the Great Northern Railroad to construct and improve a transcontinental line.

RIVER MILEAGE:

Study:	63.1 miles
Eligible:	63.1 miles
Forest Plan:	42.8 miles recommended for designation in preferred alternative

Note: Recommendation includes the Tye and portion of Skykomish system to Gold Bar.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Recreation	14.5	Recreation	14.5
Segment 2	Recreation	48.6	Recreation	28.3

SUITABILITY DETERMINATION:

The Skykomish, South Fork of the Skykomish, and Tye Rivers were found to be suitable for inclusion in the preferred alternative of the Forest Plan due to a very high number of outstandingly remarkable values. The main Skykomish is considered to be one of the most outstanding boating rivers in the state due to its rafting and kayaking runs. A scenic corridor parallels much of the river and provides habitat for bald eagle wintering and foraging. The Skykomish system flows through the Stevens Pass Historic District, a National Register of Historic Places site. The Skykomish is currently the only designated Washington State Scenic River. The Skykomish System was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory published by the National Park Service in 1982.

Designation is recommended downstream on the main branch of the Skykomish only as far as the town of Gold Bar due to private ownership concerns.

The Tye River is recommended as a logical extension of the main Skykomish.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest	10.5 miles	3,360 acres
Private	2.0 miles	120 acres
State	2.0 miles	1,160 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	2.3 miles	736 acres
State	2.2 miles	784 acres
Private	44.1 miles	14,032 acres
TOTAL	48.6 miles	15,552 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of this river segment is classified by the BLM as lying within an area of critical mineral potential. However, a review of available literature including the Bureau of Mines MILS data does indicate numerous sand and gravel resource occurrences and a few base and precious metal resource occurrences along the river. Of most importance, appears to be limestone deposits in Section 12 and 13, T.26 N., R.10 E. and Sections 15 and 16, T.27 N., R.9 E., gold occurrences in Section 31, T. 28 N., R.8 E., Section 5 and 6, T.27 N., R.8 E and in Section 7, T.27 N., R.9 E. The BLM mining claim recordation data indicates a few unpatented mining claims (43) have been located in Sections 17, 18, 19, 20 and 21, T.26 N., R.11 E. Of these 43 claims, however, 21 have been abandoned or declared to be null and void, and it is not known what part of the remaining 22 claims lie within the river corridor.

The BLM has classified the western 10 miles as being prospectively valuable ("PV") for oil and gas, the eastern 17 miles as being "PV" for geothermal resources, and the western 16 miles as "PV" for coal resources. However, none of the area has been encumbered by mineral leases or lease applications

Based upon the available information, it appears that only a small part of the river has at least a low potential for the occurrence of precious metal resources, and only in Sections 17,18,19, and 20, T.26 N., R.11 E. has any serious interest in locatable minerals been recently expressed. Even though a large part of the area is considered to have at least a low potential for the occurrence of leasable minerals (coal, oil and gas, and geothermal), no serious interest in those resources has been recently expressed.

WATER RESOURCE DEVELOPMENT: The Skykomish River and the lower 8.3 miles of the Tye River are classified as "Protected" from hydropower development by the NW Power Planning Council.

Preliminary permits for hydroelectric projects have been issued by FERC on seven tributary streams to the South Fork of the Skykomish River. Also one license application has been submitted. Following is a list of the tributaries, proposed facilities and the capacity of each project in megawatts:

Tributary	Proposed Facilities within Corridor	Megawatts
Proctor Creek	Transmission line	2.3
Anderson Creek	Transmission line	1.4
Inder Creek	Transmission line	3.4
Lowe Creek	Transmission line	1.7
Money Creek	Transmission line	3.0
Duffy Creek	Transmission line	13.4
Lake Isabel	Transmission line	5.0
Barclay Creek	Transmission line	6.3

No major water diversions are known, but perhaps there are pump stations for agricultural irrigation.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Tye River: Highway 2 parallels the river for the entire segment, crossing the river 3 times. The Stevens Pass Ski Area and associated development occurs within the Tye River near the headwaters. The upper portion includes Highway 2, and F.S. Roads 6099 (Old Cascade Hwy), 050, and 910. The middle section is paralleled by Highway 2 and F.S. Road 6099. The Old Cascade Highway crosses twice via earth covered culverts. The lower section continues to be closely paralleled by Highway 2 and F.S. Road 6810.

The Burlington Northern Railroad parallels the river for the entire segment. The railroad crosses the Tye and enters an underground tunnel (Cascade Tunnel) which goes under the Tye. The Cascade Tunnel is the longest railroad tunnel in the western hemisphere. An abandoned railroad grade parallels the right bank of the upper Tye.

The Pacific Crest Trail passes near the headwaters of the Tye.

Bonneville transmission lines parallel the entire length of the Tye from Stevens Pass to Sultan. They cross the river repeatedly between the confluence with the Foss River and Deception Falls. A buried pipeline crosses the river at Sec. 19, T.27 N., R.10 E. It is no longer in use.

There are a few scattered residences and the small communities of Timberland Village and Scenic. Historically significant townsites on the Tye River are Martin City, Alpine, Corea, and Alpine Camps 1 & 2.

Deception Falls Picnic Area is located off Highway 2 at Deception Creek. A 1/2-mile nature trail leads from the falls to the Tye.

There is rip-rap and a couple of private homes at Profitts Ponds.

South Fork and main Skykomish River: The entire length of the mainstem Skykomish River has developments along its banks. U.S. Highway 2 parallels most of Skykomish, as does the Burlington Northern Railroad. Highway 2 crosses at confluence of the North and South Forks and east of Gold Bar. Highway 522 crosses just below the confluence of Skykomish and Snoqualmie Rivers.

U.S. Highway 2 crosses the South Fork Skykomish 3 times. County roads 12 and 6030 and F.S. Roads 210 and 6020 each cross the river. The railroad crosses 3 times.

There are many powerline crossings over the Skykomish River. The following is a list of the locations

1. approximately 3 miles west of Sultan in Sec. 11.
2. at confluence of South Fork Skykomish River, North Fork Skykomish and Skykomish
3 0.1 mile upstream from the confluence of South Fork and Skykomish
4. 1 mile below Baring
5. 0.5 mile below the confluence with the Tye River
6. just above the confluence of the North Fork and Skykomish Rivers

The powerline also runs along the corridor between Baring and Grotto.

There are scattered rural residences and summer vacation residences along the lower stretch of the river. Major communities along the Skykomish include: Gold Bar, Startup, Sultan, and Monroe Most of the South Fork is bordered by communities (Skykomish, Grotto, Baring), roads (especially U.S. Highway 2), and other developments. There are old bridge crossings at Grotto and Baring.

There is agricultural development on the lower 2/3 of the river.

Money Creek Campground (24 sites) and Picnic Area (4 sites) is the only developed National Forest campground. There is a privately owned and operated campground along the river approximately seven miles southeast of Goldbar.

The High Bridge Site just east of Reiter Road under the Highway 2 bridge is an existing recreation site with proposed improvements. At present it receives high use from illegal ORV users. Plans are to accommodate ORV users elsewhere and improve High Bridge for fishing use

A high use dispersed camping area is under the bridge in Sultan. This recreation site and High Bridge are susceptible to flooding.

At the confluence of the Skykomish and Snohomish Rivers is the planned Lord Hill Regional Park site. A coalition of government agencies is planning the development of the park for area recreation.

There is a fish hatchery on Wallace River 4 miles above its confluence with Skykomish River.

Rip-rap is found on the South Fork at Money Creek Campground and at Eagle Falls. Eagle Falls has been modified by blasting in 1926. Additional stabilizing materials undoubtedly occur on private land.

There is diking at the town of Skykomish. Remains of old wood diking exist at Milltown (old town site).

RECREATION ACTIVITIES: **Tye River:** There is canoeing and above average kayaking use from Carrol Creek to confluence with Foss River. Fishing for anadromous fish species occurs below Alpine Falls; resident species only above Alpine Falls. There is low use of the river for swimming, due to cold water and lack of opportunities.

Dispersed camping opportunities are scattered throughout the area with low to moderate use. Hikers can access the Pacific Crest Trail from Stevens Pass. A short 1/2 mile loop nature trail starts at Deception Falls Picnic Area and winds along the Tye River and Deception Creek. A wheelchair view point along the trail has been proposed.

Many people drive for pleasure along U.S. Highway 2 which gains more than 3000 feet elevation from Skykomish to Stevens Pass, winding its way around steep mountainsides.

South Fork and main Skykomish Rivers: The river reach between Sunset Falls and Goldbar is heavily used by a number of commercial river rafting companies. From Skykomish to Monroe the river offers a range of canoeing and kayaking from beginner (Class I) to experienced (Class V) with a number of put-in and take-out locations. The river is considered to be one of the most outstanding boating rivers in the state. Use is heavy and increasing yearly. The Ben Howard Public Fishing Area is located between Sultan and Monroe.

Eagle Falls, located 12 miles west of the Ranger Station off of Highway 2, is a favorite spot for swimmers and skindivers. It falls to a large emerald green pool below and is enjoyed by many.

The highest dispersed recreation use is driving for pleasure along U.S. Highway 2, which parallels most of the river. Sunset Falls may be viewed from Highway 2, east of Index. Also known for its beauty is Bridal Veil Falls, located 1/4 mile east of Index on Highway 2. The falls are on Bridal Veil Creek, a tributary of the Skykomish. The falls cascade down steep rock cliffs forming 2 "veils" in summer and a solid sheet of blue ice in winter.

The only developed campground on the river is Money Creek Campground, located 4.2 miles from the Skykomish Ranger District on Highway 2.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Boating (power, nonpower)	125	210
Waterplay (swim, wade)	675	1,015
Fishing, Hunting	1,545	2,225
Camping	52,120	78,180
Viewing (scenery, wildlife, driving for pleasure)	203,160	308,800
Misc. (hike, picnic, berry picking, etc.)	261,120	511,795
TOTAL	518,745	902,225

Note: The miscellaneous category includes the Stevens Pass Ski Area use.

WILDLIFE AND FISHERIES: Tye River: There is bald eagle wintering and foraging habitat below Alpine Falls, as well as an anadromous fish run of chinook and coho salmon. Some winter steelhead and resident rainbow and cutthroat trout also inhabit the waters.

The river area offers an extensive black-tailed deer winter range, and excellent riparian and furbearer habitats

South Fork and main Skykomish Rivers: Notable species or habitats include bald eagle (a federally listed Threatened and Endangered species), spotted owl, and winter range for mountain goat and deer.

There is good spawning and rearing habitat for chinook, coho, and some pink salmon. The main stem of the Skykomish is heavily utilized. In the upper area, Cass Pond was created in the lower 1/4 mile of Anthracite Creek for trout rearing and production of juvenile fish. Adult salmon are captured at Sunset Falls fishing trap, hauled four miles and released above Eagle Creek by the State. There is also a state salmon hatchery between Startup and Goldbar. In the lower area, the bottom has ideal spawning gravel with superb salmon production in the main channels. There is a large rearing pond on Wagleys Creek for rearing coho and a state salmon hatchery on Wallace River. In this area there are large deep pools and long glides used as resting areas and holding waters for the maturation of adult salmon.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: Tye River: For the first three miles, the Tye River falls through a narrow, steep-sloped, densely forested valley. Then for seven miles, the valley alternately widens and narrows The river exhibits a steep gradient in a confined channel. About 3 1/2 miles from its confluence with the Foss, the river gradient becomes moderate and the channel winds across a relatively flat valley floor. There are numerous channel splits with good to excellent pool-riffle conditions. The banks are low earth cuts, and there are many logs and related debris in the streambed. In the lower mile, the gradient again becomes moderately steep with a number of cascades and rapids, a few fast riffles, and large deep pools. The nineteen tributaries exhibit steep mountain features throughout, and many fall directly off steep side slopes into the river. Alpine Falls, 5.1 miles east of the Ranger Station, has a 50 foot drop

South Fork and main Skykomish River: The river is situated in a confined valley with high mountain ranges of moderate to moderately steep slopes. A large channel split near Grotto forms a rock island about .5 mile in length covered with deciduous growth. On the south side of the rock island, a large island of sand and gravel is formed in the main river at the mouth of Money Creek. The river gradients descend gradually at the rate of under twenty feet a mile. Five and a half miles beyond Grotto, just below Barclay Creek, the river falls rapidly for three miles. Eagle Falls (28 feet), Canyon Falls (48 feet), and Sunset Falls (88 feet) form a series of cascades and falls. Below Sunset Falls, the river returns to a moderate gradient with mostly pool riffles. At the confluence of the North Fork and the South Fork, the main stem enlarges and slows down as it enters a more gradual gradient in the lower valley. The valley goes from 1/4 mile to 3 miles wide. In the Sultan area, the valley floor is flat, cleared land with side valley terrain that rises gradually and is densely forested with mixed coniferous and deciduous trees. There are extensive channel splits winding through large islands of gravel.

Excellent pool-riffle and long glide areas prevail with moderate gradient throughout. The river retains this character to its confluence with the Snohomish River at Monroe. Forty tributaries drain into the Skykomish River. Stream flows reach a maximum in late May and early June with over 7000 cubic feet per second (cfs) at the Goldbar stream gauge. The low flows occur in late August at about 1000 cfs.

GEOLOGY: The bedrock geology is dominated by granitic and metasedimentary rocks. Upper river basins are predominantly V-shaped but become U-shaped downslope where previous glaciation has been a dominant influence. Glacial till and lacustrine materials are common surficial deposits. The Skykomish River basin becomes very wide in the downstream reaches.

CULTURAL RESOURCES: No systematic archeological survey has been made of the Skykomish. However, information is available from a number of surveys made in conjunction with Federal projects, and from published historical sources.

Few prehistoric sites have been recorded to date. Known sites are believed to represent the period shortly before white exploration and settlement, but contain relatively little distinctive material. During the historic period, the area was occupied by the Skykomish and Snohomish Indians. Localities used in traditional religious practices exist along the Skykomish.

Historic period sites represent logging, mining and railroading. Logging of the Skykomish began in 1860 and produced numerous mills and some miles of logging railroad. By the 1930's, much of the private timber had been removed. Limited production of gold and copper ores occurred in the Index, Silver Creek and Miller River districts. The Silver Creek district was one of the earliest established in the Cascades (1871). Production was at a peak between 1880 and 1900, but was never very great. Sporadic activity continued until World War II.

The most significant historic resource in the Skykomish system is the Stevens Pass Historic District. Listed on the National Register of Historic Places, the district is Nationally significant. It represents 35 years of effort by the Great Northern Railroad to construct and improve a transcontinental line. The line contributed substantially to the economic development of Washington State. The district includes a segment of railroad's Cascade crossing, with numerous engineering features such as switchbacks, snowsheds and tunnels that were unusual or unique engineering achievements in their day. The historic district runs from Martin Creek drainage easterly up over Stevens Pass to Berne Camp on the eastside.

TIMBER: Extensive logging has taken place on both rivers, on private, state and federal lands, especially below the town of Scenic.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

Total Timber Volume (MMBF)	ASQ: Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	ASQ: Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
143.2	3.411	3.311

1/ Based on preferred alternative with management requirements.

LIVESTOCK GRAZING: The Tye River has no livestock grazing. There is some localized grazing below Sultan on private property along the Skykomish River.

SOCIO-ECONOMIC EFFECTS: The Skykomish River, the South Fork of the Skykomish and the Tye River are paralleled by U.S. Highway 2, a major link between western and eastern Washington, crossing the North Cascades at Stevens Pass. Communities along the rivers and highway are Monroe, Sultan, Startup, Gold Bar, Index, Grotto, Baring and Skykomish

These communities derive their support increasingly from tourism and recreation. The ski area at Stevens Pass draws many visitors, in addition to those who utilize the area for hiking, camping, climbing, fishing, hunting, river rafting, cross-country skiing and ORV use. The scenic qualities of the rivers, mountains and forest also attract many sightseers.

Local businesses serve these visitors with restaurants, hotels, rafting and guide outfits, ski rental and camping supply stores, and grocery/gas stations.

Timber harvesting and the wood products industry have traditionally and continue to be important to the economic health of the area. Some mining activity can still be found.

Monroe, with its close proximity to Seattle and Everett, serves increasingly as a bedroom community to both, and houses a state prison facility and Valley General Hospital.

CURRENT ADMINISTRATION: National Forest lands along the Skykomish River System are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. The area from east of Grotto to the headwaters of the Tye are within the Alpine Lakes Management Unit. Management direction is found in the Alpine Lakes Management Plan.

Under the guidelines of the Washington State Shoreline Management Act of 1971, most of the shorelines of the Skykomish, South Fork and Tye Rivers are classified by King and Snohomish Counties as Conservancy. This classification is applicable only to lands outside of federal jurisdiction and within 200 feet of the ordinary high water mark A Conservancy designation denotes shoreline areas which are primarily free from intensive development. A small suburban development lies inside the loop of the river near Sunset Falls and Canyon Falls. This area is classified as a Flood Hazard Zone and may not be developed. For approximately 2 1/2 miles between the forks of the rivers, the area has been classified as Natural. A Natural designation denotes areas

characterized by the presence of some unique natural features considered valuable in their undisturbed or original condition and which are relatively intolerant of intensive human use.

The King and Snohomish County Comprehensive Plans have zoned the land along the Skykomish River System, outside of federal jurisdiction, as:

Rural Use or Forestry Use along the Tye and South Fork Skykomish. There are a few residential developments and the town of Skykomish, where a greater dwelling density is permitted.

Forestry Use from the King/Snohomish County line to Gold Bar, with Flood Hazard Zones designated near the communities situated along the river.

Rural Use, with 1 dwelling per 10 acres, from Gold Bar to Sultan.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the Skykomish, South Fork Skykomish and Tye Rivers for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 15,000	$100,000
Costs of Implementation		80,000
Development of Management Plan		125,000
Development Costs	291,000	75,000
Operation and Maintenance Costs	115,000	25,000
TOTAL - First Five Years	**$421,500**	**$405,000**

General administration and operation and maintenance costs are estimated to continue at $51,100 annually.

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Recreation	Scenic Corridor (Foreground)	42
		Winter Developed Recreation	295
		Timber Management	84
		Alpine Lakes Dispersed Recreation	21
		Alpine Lakes Scenic	2,576
Segment 2	Recreation	Scenic Corridor (Foreground)	147
		Scenic Corridor (Middleground)	337
		Timber Management	147
		Alpine Lakes Scenic	1,245

FOSS RIVER (TO FORK)
EAST FORK FOSS RIVER
WEST FORK FOSS RIVER

King County

The Foss, East Fork Foss, and the West Fork Foss Rivers were studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

The Foss River was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory (NRI) published by the National Park Service in 1982.

LOCATION: The East Fork Foss River flows from its headwaters on Mt. Daniels' Lynch Glacier to its confluence with the Foss River. The West Fork Foss River flows from its headwaters in Delta Lake to its confluence with the Foss River. The Foss River flows from the confluence of the East and West Forks of the Foss River to its confluence with the Tye River.

Segment 1 - Headwaters of the East Fork Foss River at Lynch Glacier in SW 1/4 of Sec. 11, T.24 N., R.13 E. to the Alpine Lakes Wilderness boundary (6.7 miles).

Segment 2 - Alpine Lakes Wilderness boundary to the confluence with the West Fork Foss River (1.2 miles).

Segment 3 - Headwaters of the West Fork Foss River at Delta Lake to the Alpine Lakes Wilderness boundary (3.1 miles).

Segment 4 - Alpine Lakes Wilderness boundary to the confluence with the East Fork Foss River (1.5 miles).

Segment 5 - Confluence of East and West forks of the Foss River to confluence with Tye River (4.4 miles).

RIVER MILEAGE:

Study:	16.9 miles
Eligible:	16.9 miles
Forest Plan:	16.9 miles recommended for designation in preferred alternative

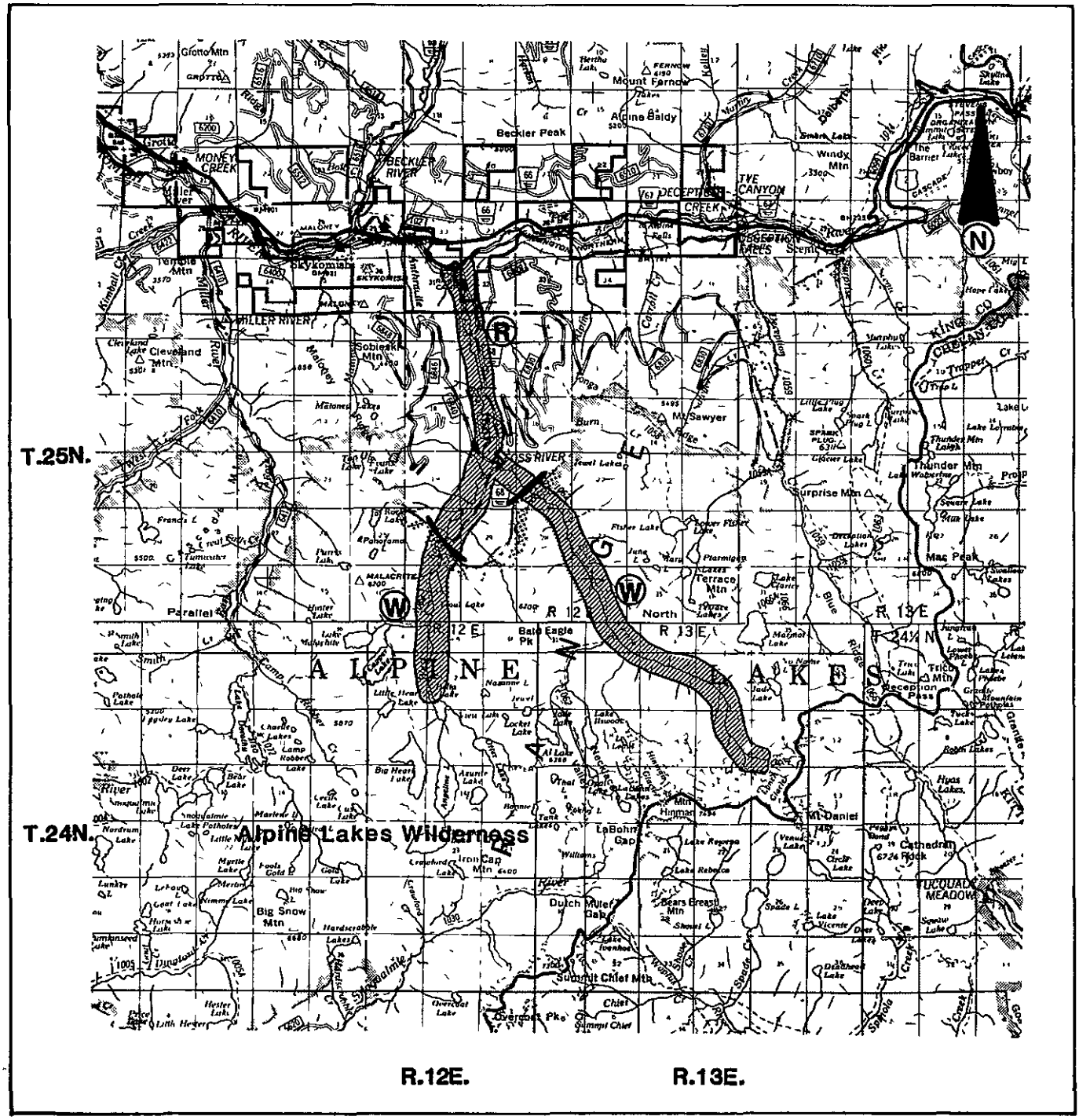
OUTSTANDINGLY REMARKABLE VALUES: The Foss, East Fork and West Fork Rivers were found to possess "Outstandingly Remarkable" values for the following: Recreation, Fisheries and Wildlife.

Many forest visitors drive the forest road for pleasure or to gain access for hunting, fishing and hiking opportunities. Two very popular hiking trails lead into the Alpine Lakes Wilderness. The Foss River system provides excellent whitewater kayaking opportunities.

Foss River
East Fork Foss River
West Fork Foss River

River Corridor
Wilderness Boundary
National Forest Boundary
0 1 2 3 miles

Potential River Classification
R S W
R - Recreational
S - Scenic
W - Wild



Bald eagles forage near the mouth of the Foss River and black-tailed deer winter range occurs throughout the drainage. The river also provides excellent furbearer and riparian habitat.

Chinook and coho salmon, rainbow and cutthroat trout inhabit the river system.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	6.7	Wild	6.7
Segment 2	Recreation	1.2	Recreation	1.2
Segment 3	Wild	3.1	Wild	3.1
Segment 4	Recreation	1.5	Recreation	1.5
Segment 5	Recreation	4.4	Recreation	4.4

SUITABILITY DETERMINATION:

The Foss, West Fork Foss, and East Fork Foss Rivers were found to be suitable for inclusion in the preferred alternative of the Forest Plan due to a lack of competing resource values or uses, high public support, and other public agency support. The potential hydro-electric projects on tributaries of the Foss system would not be ruled out due to designation. The Foss system was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory published by the National Park Service in 1982.

LANDOWNERSHIP:

	River Miles	Corridor Acres
Segment 1		
Mt. Baker-Snoqualmie National Forest (Alpine Lakes Wilderness - 6.7 miles)	6.7 miles	2,144 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	0.7 mile	224 acres
Private	0.5 mile	160 acres
Segment 3		
Mt. Baker-Snoqualmie National Forest (Alpine Lakes Wilderness - 3.1 miles)	2.5 miles	800 acres
Private	.6 mile	192 acres
Segment 4		
Mt. Baker-Snoqualmie National Forest	1.3 miles	416 acres
Private	.2 mile	64 acres
Segment 5		
Mt. Baker-Snoqualmie National Forest	3.3 miles	1,056 acres
Private	1.1 miles	312 acres
State	0.0 miles	40 acres
TOTAL	16.9 miles	5,408 acres

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of the river segments are classified as lying within areas of critical mineral potential. A review of available literature, including the Bureau of Mines MILS data, does indicate the area has a few precious and base metal resource prospects, none of which have a history of production. According to the BLM mining claim recordation data, only one mining claim has been located along the corridor. However, it has been abandoned.

The BLM has classified the entire river as being prospectively valuable for geothermal resources and for coal resources. None of the area is encumbered by mineral leases or lease applications.

Based upon the available information, it appears the area does have at least a low potential for the occurrence of locatable mineral resources. No serious interest in such resources is currently being expressed. The area also has at least a low potential for the occurrence of both coal and geothermal resources. However, as with the locatables, no serious interest in those resources is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments on any of the rivers.

The entire river system, with the exception of the East Fork Foss above Necklace Valley, is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

A preliminary permit for a hydroelectric project has been issued by FERC for Burn Creek, a tributary of the Foss River. Proposed facilities within the river corridor consist of a transmission line. The project capacity will be 3.4 megawatts.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: A county road parallels the Foss River upstream from its mouth, crossing the river at "Foss River Camp", just above the confluence with the Tye River. The county road becomes FS Road #68, and continues along the east bank of the Foss River and the West Fork Foss to the Alpine Lakes Wilderness boundary. The road crosses the East Fork Foss near the confluence of the two forks.

FS Collector Road 6840 crosses the Foss River below the confluence of the two forks and parallels the right bank downstream for 1.5 miles.

There are no roads paralleling the East Fork Foss. However, an old mining railroad grade parallels the river for 1-2 miles.

The Burlington Northern Railroad parallels the Foss on the west for 1.4 miles, crosses the river and heads back north to the SR 2 Highway corridor. This curious detour originated around the turn of the century when many coal claims existed on the Foss.

Three vehicle and one railroad bridge cross the river.

Many private summer homes are found along the lower 2 miles of the Foss River. Some homes are within 100 feet of the river.

The East Fork Foss Trailhead #1062 is located on Forest Road #68 near the confluence of the East and West Forks. The trail parallels the East Fork Foss River for 4 miles to the junction of the Necklace Valley Trail #1063. The West Fork Foss Lakes Trailhead #1064 begins at the end of Forest Road #68 and follows the West Fork Foss River for 1.5 miles to Trout Lake, before heading uphill to Big Heart Lake.

There are no developed campgrounds along the river system, and limited opportunities exist for their construction. The old Foss River Campground is located near the confluence of the East and West Forks. It is now used as a primitive campsite.

RECREATION ACTIVITIES: Many forest visitors drive the forest road for pleasure or to gain access for hunting, fishing and hiking opportunities. Two very popular hiking trails lead into the Alpine Lakes Wilderness. Both trails are heavily traveled; summer weekends are usually crowded.

Above the railroad bridge, there are 2 miles of Class IV and V water. This is the last kayak run of this type left in western Washington. There are technical Class III and IV rapids below the railroad bridge. There are no opportunities on the rivers for rafting. There is only occasional use by swimmers due to the cold water temperatures. Fishing for resident fish is a popular pastime.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Waterplay (swim, wade)	160	240
Fishing, Hunting	2,130	3,070
Camping	34,590	51,885
Viewing (scenery, wildlife, driving for pleasure)	7,000	10,640
Misc. (hike, picnic, berry picking, etc.)	16,560	32,460
TOTAL	60,440	98,295

WILDLIFE AND FISHERIES: Bald eagles forage near the mouth of the Foss River and black-tailed deer winter range occurs throughout the drainage. The river also provides excellent furbearer and riparian habitat.

Chinook and coho salmon spawn in the mainstem of the Foss River and the lower reaches of the two forks. Rainbow and cutthroat trout are also found. Loss of streamside cover due to logging may limit further production.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The gradient is moderately steep with fast riffle character, some rapids and a few cascades River width ranges from 21 to 60 feet wide. Twenty-six tributaries drain into the Foss River system.

GEOLOGY: Originating in massive mountains of granitic bedrock, this river system passes through volcanic and metasedimentary rocks on its way to the Skykomish. Deep V-shaped upper valleys become U-shaped down valley where glaciation has had a dominant influence.

Appendix E
Foss River
East and West Forks

CULTURAL RESOURCES: No systematic archaeological survey has been made of the Foss River drainage. Limited information is available from project surveys and published historical sources. No prehistoric sites have been recorded. The lack of sites may reflect the lack of a survey of the drainage. During the historic period, the area was within the territory of the Skykomish Indians. No locations used for traditional religious practices are known within the potential Wild and Scenic River corridor.

Known historic period sites represent mining and logging. The main use of this drainage around the turn of the century was for access to mines in the Snoqualmie drainage. The Dutch Miller Mine was reached from Seattle via the Great Northern Railway line to the Foss Creek Station, then by horse and foot trail up the Foss River to a pass between the Foss and Snoqualmie drainages. The mining company developed an interest in logging along the river and constructed a railroad to connect with the Great Northern line. No sites associated with these uses have been listed or identified as eligible for the National Register of Historic Places.

TIMBER: Clearcuts dominate downstream from the confluence of the East and West Forks.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
55.6	1.114	.144

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The Foss River, paralleled by forest roads, meets the South Fork Skykomish and Tye Rivers 3 miles east of Skykomish (pop. 280).

The West Fork of the Foss River, with its headwaters in the lakes above Delta Lake in the Alpine Lakes Wilderness, is paralleled by one of the most heavily used trails on the district. The thousands of visitors to this area significantly impact the environment as well as the economic climate of the Skykomish Area.

The East Fork of the Foss River, with its headwaters in the Alpine Lakes Wilderness in the well-known Necklace Valley, is bordered by a popular hiking trail, which also draws many of the visitors to this area. The community of Skykomish is about 8 miles from the confluence of the East Fork of the Foss and the Foss Rivers.

Skykomish is traditionally a logging, mining, and railroad community. The town also benefits economically from the many visitors attracted by the scenic and recreation characteristics of the area's rivers, mountains, and forests. Sixty miles from Everett and 75 miles from Seattle, Skykomish is within easy travel distance for thousands of visitors every year. Local businesses cater to campers, hikers, fishers, and hunters, as well as providing hotel facilities for Stevens Pass skiers.

CURRENT ADMINISTRATION: Downstream from their headwaters, the East Fork Foss flows through 6.7 miles of the Alpine Lakes Wilderness and the West Fork flows through 3.1 miles. Public lands are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. This river is in the Alpine Lakes area under management direction found in the Alpine Lakes Management Plan.

Under the guidelines of the Washington State Shoreline Management Act of 1971, the shoreline of the Foss River has been classified as Conservancy by King County. This classification is applicable only to lands within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development.

The land along the east bank of the Foss River, outside of federal jurisdiction, has been zoned by King County for Forestry Use. The land along the west bank has been zoned Rural Use.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the Foss, East Foss, and West Foss Rivers for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 2,000	$ 1,000
Costs of Implementation		2,000
Development of Management Plan		12,800
Development Costs	75,000	10,000
Operation and Maintenance Costs	0	2,500
TOTAL - First Five Years	**$77,000**	**$28,300**

General administration and operation and maintenance costs are estimated to continue at $1,100 annually.

Appendix E
Foss River
East and West Forks

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Wilderness-Transition	295
		Wilderness-Trailled	21
		Wilderness-General Trailless	2,090
Segment 2	Recreation	T&E Species (bald eagle)	21
		Alpine Lakes Scenic	168
Segment 3	Wild	Wilderness-Transition	168
		Wilderness-General Trailless	929
Segment 4	Recreation	T&E Species (bald eagle)	190
		Alpine Lakes Scenic	126
Segment 5	Recreation	T&E Species (bald eagle)	168
		Timber Management	147
		Alpine Lakes Scenic	718

MILLER RIVER (TO FORK)
EAST FORK MILLER RIVER
WEST FORK MILLER RIVER

King County

The Miller, East Fork Miller, and West Fork Miller Rivers were studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

The Miller River was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory (NRI) published by the National Park Service in 1982.

LOCATION: From their sources in the Alpine Lakes Wilderness to the confluence with the South Fork Skykomish River.

Segment 1 - East Fork Miller River from Lake Dorothy to the Alpine Lakes Wilderness boundary (0.8 miles).

Segment 2 - East Fork Miller River from the Alpine Lakes Wilderness boundary to the confluence with the West Fork Miller River (6.0 miles).

Segment 3 - West Fork Miller River from the headwaters in the SE 1/4 of Section 31, T 24 1/2 N., R.11 E. to the Alpine Lakes Wilderness boundary (2.1 miles).

Segment 4 - W. Fork Miller River from the Alpine Lakes Wilderness boundary to the confluence with the E. Fork Miller River (4.2 miles).

Segment 5 - Miller River from the confluence of the East and West Forks of the Miller River to the confluence with the South Fork Skykomish River (3.7 miles).

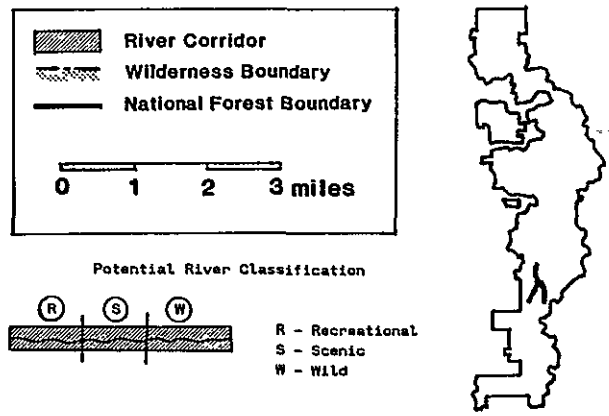
OUTSTANDINGLY REMARKABLE VALUES: The Miller River and its East and West Forks were found to possess "Outstandingly Remarkable" values for the following: Recreation, Fisheries and Wildlife

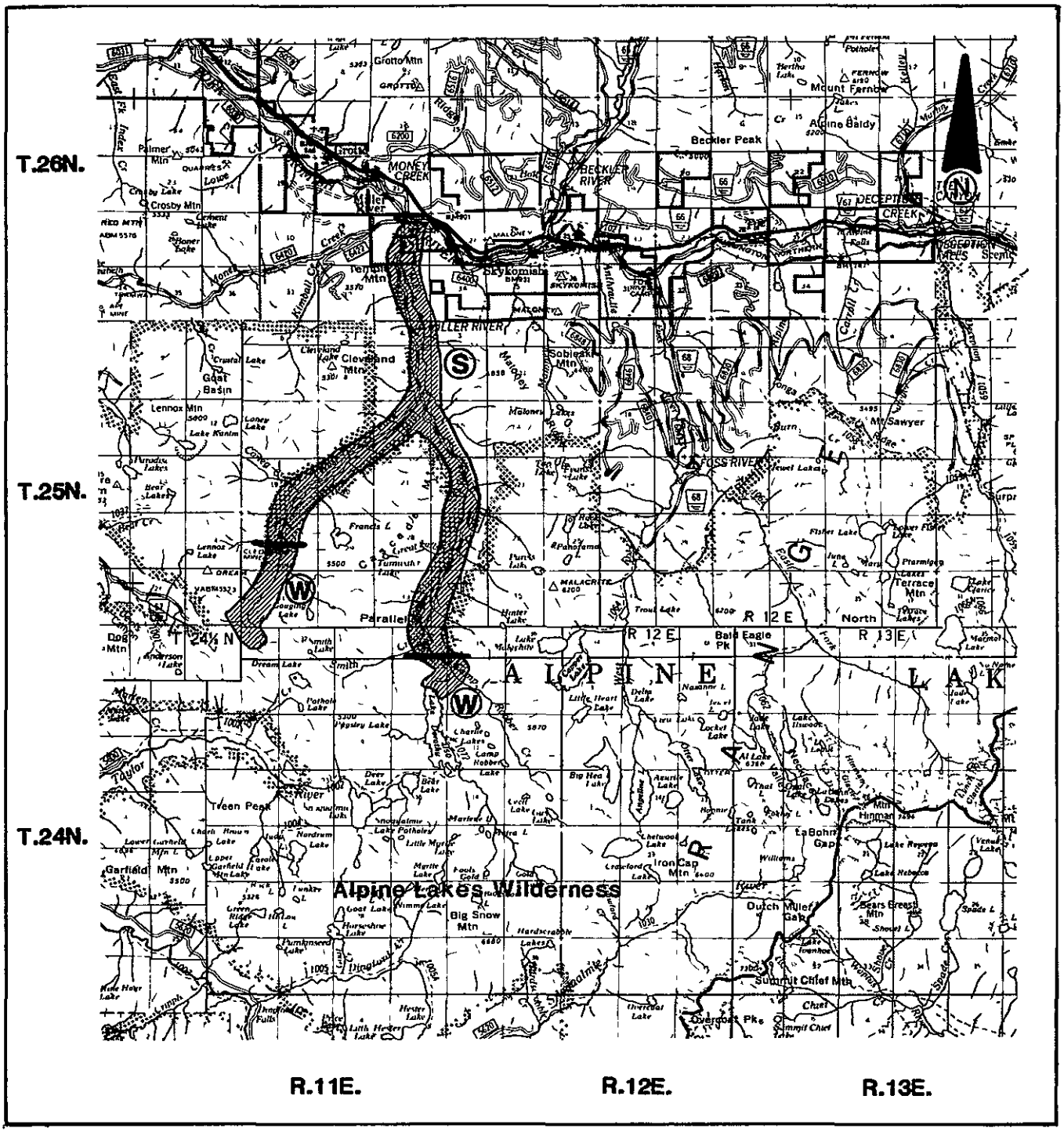
The very popular Lake Dorothy trailhead is located at the end of the East Fork Miller River Road. Area roads are used for pleasure driving. Fishing and kayaking are also popular activities.

The river corridor contains winter range for mountain goats and bald eagles. A SOHA has been identified on the West Fork.

Chinook and coho salmon spawn and rear in the drainage. Resident rainbow trout also inhabit the waters.

Miller River
East Fork
West Fork





RIVER MILEAGE:

Study:	16.8 miles
Eligible	16.8 miles
Forest Plan:	16.8 miles recommended for designation in preferred alternative

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	0.8	Wild	0.8
Segment 2	Scenic	6.0	Scenic	6.0
Segment 3	Wild	2 1	Wild	2.1
Segment 4	Scenic	4.2	Scenic	4.2
Segment 5	Scenic	3.7	Scenic	3.7

SUITABILITY DETERMINATION:

The Miller, East Fork Miller and West Fork Miller Rivers were found to be suitable for inclusion in the preferred alternative of the Forest Plan due to the lack of competing resource values and other public agency support. The potential hydro-electric value is incompatible with the Forest Plan land allocation. The Miller system was identified as a potential Wild and Scenic river in the Nationwide Rivers Inventory published by the National Park Service in 1982.

LANDOWNERSHIP:

	River Miles	Corridor Acres
Segment 1		
Mt. Baker-Snoqualmie National Forest (Alpine Lakes Wilderness - 0.8 miles)	0.8 miles	256 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	6.0 miles	1,920 acres
Segment 3		
Mt. Baker-Snoqualmie National Forest (Alpine Lakes Wilderness - 2.1 miles)	2 1 miles	672 acres
Segment 4		
Mt. Baker-Snoqualmie National Forest	4.0 miles	1,280 acres
Private	0 2 miles	64 acres
Segment 5		
Mt. Baker-Snoqualmie National Forest	2.9 miles	928 acres
Private	0.8 miles	256 acres
TOTAL	16.8 miles	5,376 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of the river segments are classified by the BLM as areas of critical mineral potential. A review of available literature, including the Bureau of Mines MILS data, however, does indicate the river corridor and adjacent areas have numerous reported occurrences of gold, silver, copper, zinc and antimony Of most significance are those occurrences reported to lie in Sections 10, 17, 24, 27 and 30, T. 25N., R.11 E. The BLM mining claim recordation data also indicates that 68 unpatented mining claims have been located in or adjacent to the river corridor. Of these 68 claims, however, 39 have been abandoned or declared to be null and void. The remaining claims lie within Sections 17, 19, 20, 30, T.25N., R.11 E. and in Sections 1 and 2, T. 24 N., R11 E.

The BLM has classified the entire river segment as being prospectively valuable ("PV") for geothermal resources and has classified 4 miles near the north end as "PV" for coal resources. However, none of the area has been encumbered by mineral leases or lease applications

Based upon the available information, it does appear that the area as a whole does have at least a low potential and the West Fork has a moderate potential for the occurrence of both precious and base metal mineral resources. The mining claims located along the West Fork indicate a continuing interest in that area's locatable mineral resources. The area also has a potential for the occurrence of both coal and geothermal resources, however, no serious interest in those resources is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments on the rivers. The river system is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

A preliminary permit for a hydroelectric project has been issued by FERC. Proposed facilities within the river corridor consist of a transmission line, a powerhouse, and a diversion structure and penstock. The project capacity will be 5.9 megawatts.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: County Road 6410 parallels the Miller River from its mouth to the confluence of the East and West Forks. The road continues up the East Fork, becoming FS Road 6412, ending at the Wilderness boundary.

FS Road 210 crosses 3/4 mile below the confluence of the West and East Forks. Local FS Roads 110, 120, and 130 are within 1/4 mile of the west bank in the upper half of the Miller County Road 64 crosses 1/4 mile above the confluence with the South Fork Skykomish.

Three vehicle bridges and one railroad bridge cross the rivers.

Seven summer homes line the Miller River in T 25N., R 11 E., Section 9.

The Miller River Campground is located 1 1/2 miles downstream from the East Fork and West Fork junction.

The Lake Dorothy Trail #1072 begins at the end of FS Road 6412. The trail parallels the river for 2 miles to its headwaters at Lake Dorothy. This is a popular and crowded trail on weekends

There have been some fish habitat projects on the Miller River. One mile upstream, several structures were put in the side channels in 1986-87: 23 digger logs, 10 boulder pools, 2 rock deflectors/groins, 6 boulder clusters, and 20 log deflectors.

Diking has been constructed at the confluence with the Skykomish River. The first mile above the confluence was diked in the early 1900's.

RECREATION ACTIVITIES: The very popular Lake Dorothy trailhead is located at the end of the East Fork Road. The roads are also popular for pleasure driving.

Fishing is a popular activity along the banks of the river. Swimmers occasionally use the rivers, but cold water limits use. The Miller River is a Class III to IV kayak run from the confluence of the East and West Forks to the South Fork Skykomish River.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Waterplay (swim, wade)	65	100
Fishing, Hunting	500	720
Camping	18,480	27,720
Viewing (scenery, wildlife, driving for pleasure)	2,300	3,500
Misc. (hike, picnic, berry picking, etc.)	6,700	13,100
TOTAL	28,045	45,140

WILDLIFE AND FISHERIES: The river drainage supports winter range for mountain goats and bald eagles. A SOHA has been identified on the West Fork.

Chinook spawn primarily in the mainstem of the Miller River. Coho use the two forks and shallow side channels. The juveniles rear throughout these waters, with coho having year round habitation. Resident rainbow trout are found throughout the drainage. Fish production is limited by a series of falls on the West Fork and loss of streamside cover, due to logging and increased development along the shorelines of the rivers.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The gradient is moderately steep. River width averages approximately 30 feet. The upper East Fork has numerous falls and cascades. At 6 miles, there is a 20-foot waterfall. Thirty tributaries drain into the Miller River system.

GEOLOGY: Originating in massive mountains of granitic bedrock, these river systems pass through volcanics and metasediments. Deep V-shaped upper valleys give way to broader U-shaped glacial valleys downstream where previous glaciation has had a dominant influence. These are high energy systems as evidenced by braiding and high bedloads.

Appendix E
Miller River
East and West Forks

CULTURAL RESOURCES: No systematic archaeological survey has been made of the Miller River drainage, and no prehistoric sites are recorded. The absence of sites is probably a result of lack of a survey. During the historic period, the drainage was within the territory of the Skykomish Indians. No locations used for traditional religious practices are known within the proposed Wild and Scenic River corridor.

Several mining claims were made in the vicinity of the West Fork during the late nineteenth and early twentieth centuries. Logging, recreation and Forest Service administration sites are also represented within the drainage. None of these are listed or identified as eligible for the National Register of Historic Places.

TIMBER: Land along the lower 2 miles of the Miller River is cut-over to the river. Public lands from the East and West Fork confluence to the South Fork Skykomish is primarily alder with scattered patches of old growth coniferous species. Above the confluence of the two forks, primarily old growth can be seen with scattered clearcuts present.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	----------ASQ----------	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
72.7	1.751	2.643

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The East Fork of the Miller River begins at well-known Dorothy Lake in the Alpine Lakes Wilderness. The thousands of visitors to this area impact the environment as well as the economic climate of the Skykomish area.

The community of Skykomish is 5 miles from the confluence of the West Fork and the East Fork of the Miller River. Traditionally a logging, mining, and railroad centered community, Skykomish also benefits economically from the many visitors drawn by the scenic and recreation characteristics of the area's rivers, mountains and forests. Sixty miles from Everett and 75 miles from Seattle, Skykomish is within easy travel distance for thousands of visitors every year. Local businesses cater to campers, hikers, fishers, and hunters, as well as providing hotel facilities for Stevens Pass skiers.

CURRENT ADMINISTRATION: The first 0.8 miles of the East Fork and 2.1 miles of the West Fork are located inside the Alpine Lakes Wilderness. The wilderness and other National Forest lands are administered by Mt. Baker-Snoqualmie National Forest, USDA Forest Service. These rivers are in the Alpine Lakes Area under management direction found in the Alpine Lakes Management Plan.

Under the guidelines of the Washington State Shoreline Management Act of 1971, the shoreline of the Miller River has been classified as Conservancy by King County. This classification is applicable only to lands outside of federal jurisdiction and within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development.

The land near the confluence of the Miller River and South Fork Skykomish, outside of federal jurisdiction, has been zoned by King County for Rural Use, with 1 home per 5 acres. The remainder of the river corridor is zoned for Forestry Use

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the Miller, East Fork Miller and West Fork Miller Rivers for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 2,000	$ 1,000
Costs of Implementation		2,000
Development of Management Plan		10,900
Development Costs	56,000	10,000
Operation and Maintenance Costs	40,500	2,500
TOTAL - First Five Years	**$98,500**	**$26,400**

General administration and operation and maintenance costs are estimated to continue at $9,200 annually.

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies lands administered by the National Forest Service.)

Appendix E
Miller River
East and West Forks

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Wilderness-Transition	84
		Wilderness-General Trailless	211
Segment 2	Scenic	Old Growth Habitat (spotted owl)	253
		Goat Habitat	42
		Timber Management	42
		Alpine Lakes Dispersed Recreation	211
		Alpine Lakes Scenic	739
Segment 3	Wild	Wilderness-General Trailless	823
Segment 4	Scenic	Alpine Lakes Dispersed Recreation	696
		Alpine Lakes Scenic	105
Segment 5	Scenic	Goat Habitat	21
		T&E Species (bald eagle)	21
		Timber Management	232
		Alpine Lakes Scenic	380

BECKLER RIVER
RAPID RIVER

Snohomish and King Counties

The Beckler and Rapid Rivers were studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

The Beckler River was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory (NRI) published by the National Park Service in 1982.

The Beckler River, upstream to the Rapid River, is designated by the State of Washington as a Scenic River under the State's Scenic Rivers Act.

LOCATION: The Beckler River flows from its headwaters near Jack Pass to its confluence with the Tye and South Fork Skykomish Rivers.

The Rapid River flows from its headwaters on Scrabble Mountain to its confluence with the Beckler River.

Segment 1 - The headwaters of the Beckler at Jack Pass in the NW 1/4 of Section 31, T 28 N., R.12 E. to the confluence with the South Fork Skykomish River (13.5 miles).

Segment 2 - The headwaters of Rapid River upstream from Janus Lake in the SE 1/4 of Section 13, T.27 N., R.13 E. to the Henry M. Jackson Wilderness boundary (7.0 miles).

Segment 3 - The Henry M. Jackson Wilderness boundary to the confluence with the Beckler River (6.0 miles).

RIVER MILEAGE:

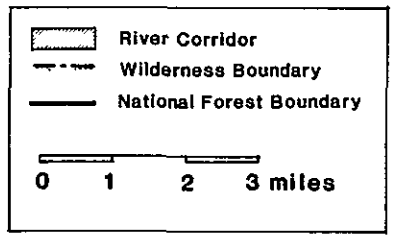
Study:	26.5 miles
Eligible:	26.5 miles
Forest Plan:	0.0 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The Beckler and Rapid Rivers were found to possess "Outstandingly Remarkable" values for the following: Recreation, Fisheries, and Wildlife.

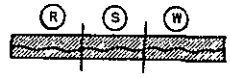
There are numerous camping opportunities along the Beckler and Rapid Rivers. All receive high use. Sightseers can complete a scenic loop trip by driving up the North Fork Skykomish Road out of Index, climb over Jack Pass and drop down into the Beckler Valley to Skykomish. Fishing for resident rainbow trout is a moderate to high use activity. Class III kayaking with some portages is found from the confluence of the Rapid and Beckler Rivers downstream to the mouth of the Beckler.

An extensive winter habitat for bald eagles and black-tailed deer is found along the corridors of both rivers. Spotted owls and mountain goats inhabit the Rapid River drainage.

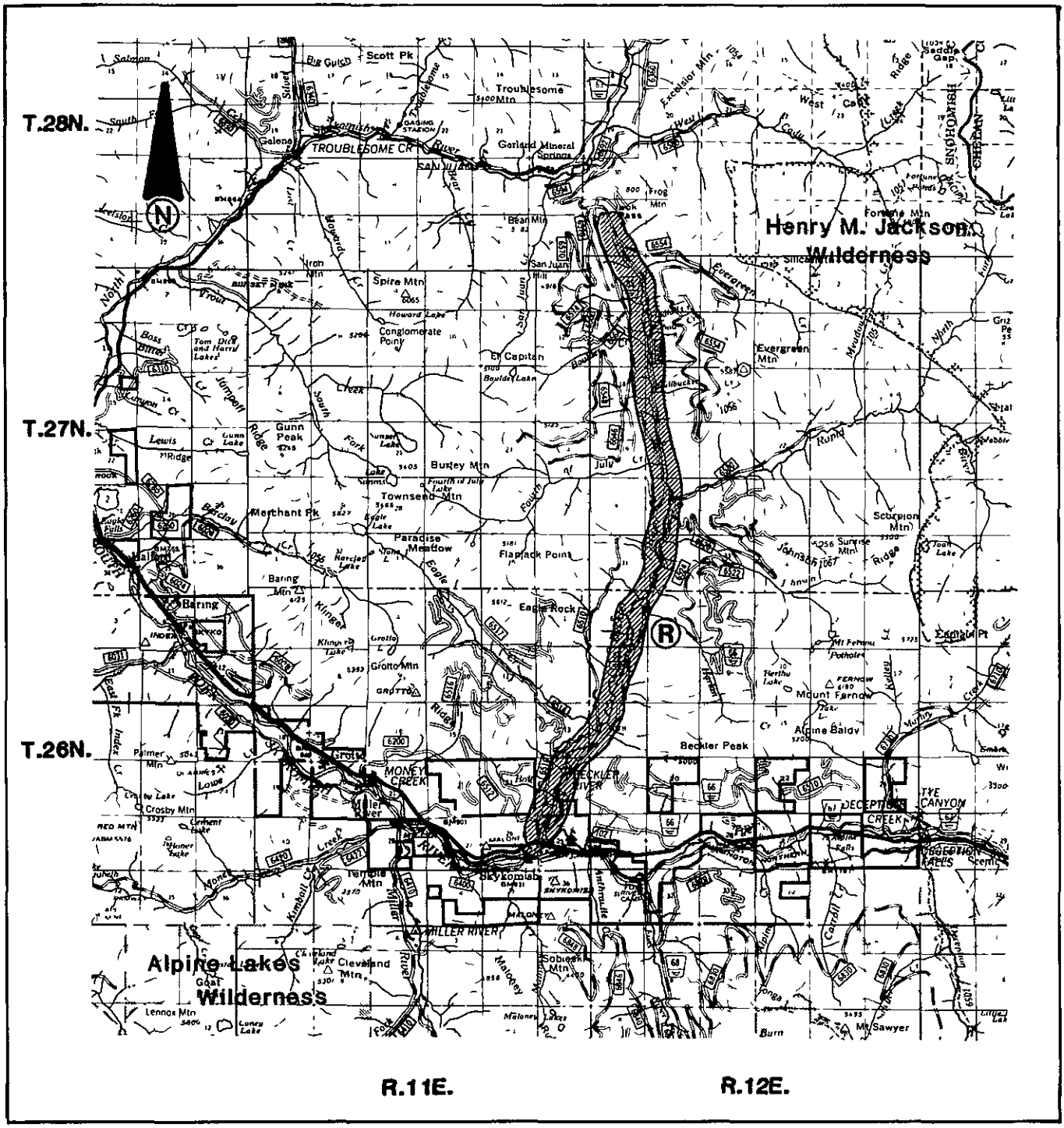
Beckler River



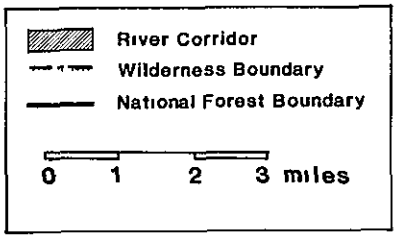
Potential River Classification



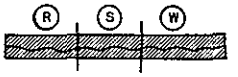
R - Recreational
S - Scenic
W - Wild



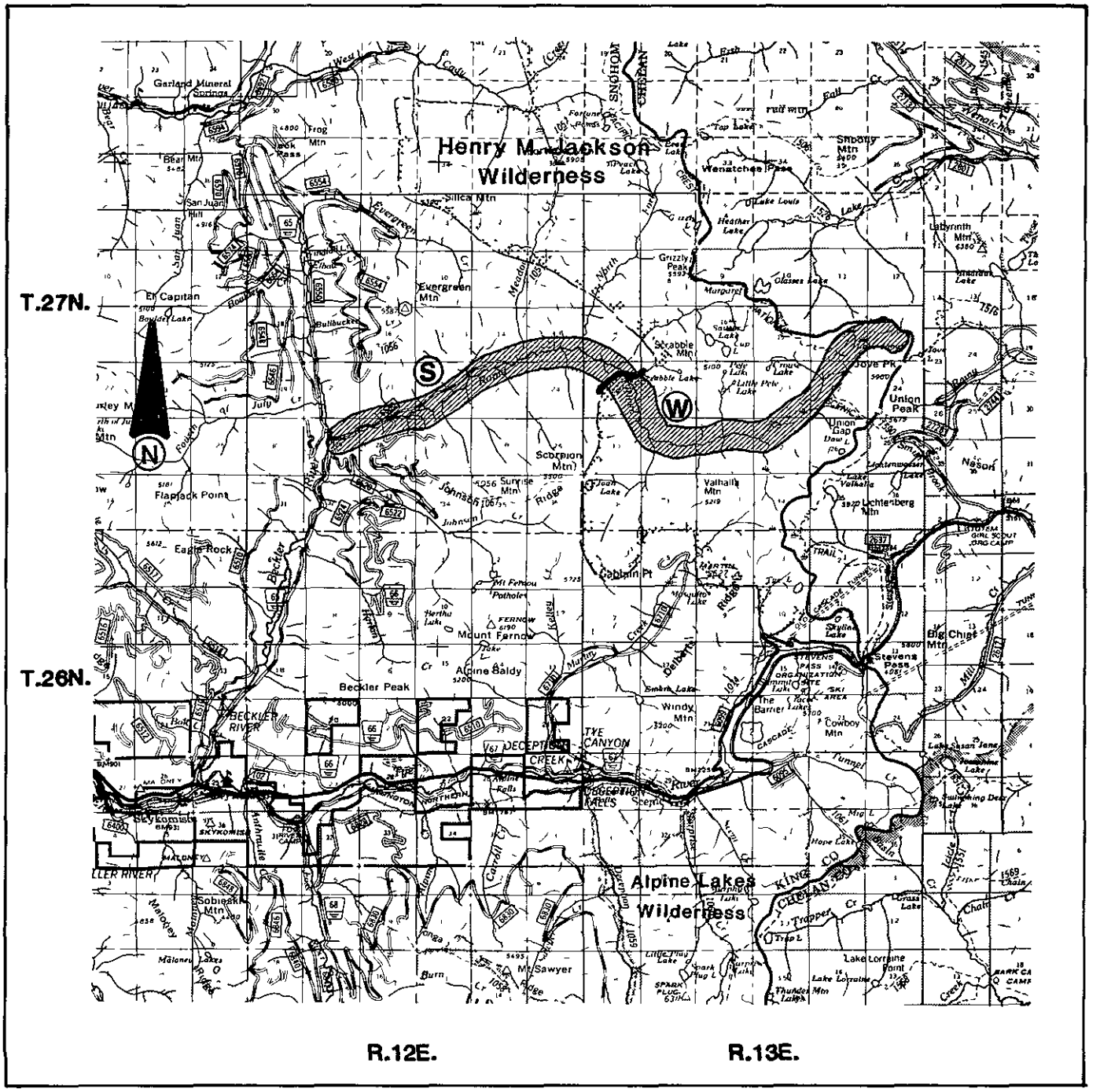
Rapid River



Potential River Classification



R - Recreational
S - Scenic
W - Wild



Both rivers support runs of steelhead trout, chinook, and coho salmon. The Beckler also receives use from chum and sockeye salmon.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Recreation	13.5	Not recommended	0.0
Segment 2	Wild	7.0	Not recommended	0.0
Segment 3	Scenic	6.0	Not recommended	0.0

SUITABILITY DETERMINATION:

The Beckler and Rapid Rivers were found to be not suitable for inclusion in the preferred alternative of the Forest Plan due to high competing resource values and the presence of extensive clearcut logging in both drainages. Preliminary permits for 8 hydro-electric projects have been issued by the FERC.

The Rapid River is not a logical addition to the system, unless the Beckler River was also found to be suitable.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest	9.3 miles	2,976 acres
Private	3.2 miles	984 acres
State	1.0 miles	360 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest (Henry M. Jackson Wilderness - 7.0 miles)	7.0 miles	2,240 acres
Segment 3		
Mt. Baker-Snoqualmie National Forest	4.3 miles	1,376 acres
Private	1.7 miles	544 acres
TOTAL	26.5 miles	8,840 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of the river segments are classified as areas of critical mineral potential. A review of available literature, including the Bureau of Mines MILS data, indicates the area has no known locatable mineral resources. The BLM mining claim recordation data does indicate that four mining claims were located along the Rapid River. However, all four have either been abandoned or declared to be null and void. On the Beckler River, 28 unpatented mining claims have been located in Sections 7, 18, 19 and 32, T.27 N., R.11 E. However, of those 28 claims, 20 have either been abandoned or declared to be null and void.

The BLM has classified both rivers as being prospectively valuable for geothermal resources. However, the areas are not considered to have potential for the occurrence of other leasable mineral commodities. None of the areas have been encumbered by mineral leases or lease applications.

Based upon the available information, it appears that the Rapid River area has a relatively low potential for the occurrence of locatable mineral resources. No serious interest in the locatables is currently being expressed. The claims located in the Beckler River area in Sections 18 and 19, T 27 N., R.12 E. do indicate some continuing interest in the areas potential. Both areas have at least a low potential for the occurrence of geothermal resources. However, as with the locatables, no serious interest in the geothermal potential is currently being expressed.

WATER RESOURCE DEVELOPMENT: Both the Beckler River and Rapid River have been classified as "Protected" from hydropower development by the Northwest Power Planning Council.

There is a high potential for small hydro use on the Beckler River. Over 20 applications have been filed. Preliminary permits for hydroelectric projects have been issued by FERC for 7 tributaries of the Beckler and 1 for Rapid River. The following table shows the location of the projects, the proposed facilities and the project capacity in megawatts:

Tributary	Proposed Facilities within Corridor	Megawatts
Beckler:		
Evergreen Creek	Transmission line	1.7
Rapid River	Transmission line	see below
Johnson Creek	Transmission line	2.5
Harlan Creek	Transmission line	2 3
Eagle Creek	Transmission line	1.9
4th of July Creek	Transmission line	1.7
Boulder	Transmission line	1.3
Rapid River:		
	Transmission line	17.3
	Powerhouse	
	Diversion structure & penstock	

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Several Forest Roads converge at Jack Pass near the headwaters of the Beckler: 6550, 6570, 6500, 616, 110 and 65. FS Road 6550 parallels the east bank downstream from Jack Pass until rejoining Forest Road 65 at 4th of July Creek. Road 65 continues to follow the Beckler to its mouth. Forest Road 6510 follows the west bank of the Beckler from Eagle Creek to the road intersection with Road 65, 1.5 miles upstream from the mouth of the river. The Beckler is traversed by 3 bridges. All major tributaries are crossed with either bridges or earth-covered culverts.

FS Road 6530 parallels the Rapid River from the wilderness boundary downstream to the confluence with Beckler River. The road crosses the river 3 times. This road also crosses the North Fork Rapid River just above the confluence. FS Road 65 crosses the mouth of Rapid River.

The Beckler River Campground (24 sites) and Picnic Area (2 sites) are on the east bank of the Beckler River 2.5 miles from the Skykomish Ranger District. Numerous dispersed recreation sites are found along the Beckler River.

There are two logging camps near Rapid River and numerous old railroad trestles in the lower six miles. One old railroad bridge lies 2 miles up from the confluence. A powerline crosses the Beckler near its mouth.

The Pacific Crest Trail crosses the headwaters area of Rapid River within the Henry M. Jackson Wilderness.

The Meadow Creek/Fortune Ponds Trailhead (#1057) is located at the end of FS Road 6530. The trail parallels the river for 1-1/2 miles before heading up Meadow Creek.

There are no homes or farms along either river.

There are no fish habitat projects on the mainstem Beckler, but some do exist on its tributaries. There has been bank seeding/planting, fish passage improvement, and 2 gabion deflectors placed on Boulder Creek. Bullbucker Creek has 3 weirs, 9 root wads, 4 log deflectors, 3 fish passage improvements, 2 boulder pools, 7 digger logs, and bank seeding/planting. Fish passage has been improved on Johnson Creek. Beagle Creek has 2 gabion deflectors, 1 weir, 29 log deflectors, 6 root wads, 3 boulder clusters, 3 boulder pools, and 26 digger logs.

RECREATION ACTIVITIES: There are camping opportunities along Beckler and Rapid River. All receive high use. Hikers use the Meadow Creek and Pacific Crest Trails. The Pacific Crest Trail crosses the Rapid River below Lake Janus. However, there is no developed access to the trail from the Beckler River Basin.

Sightseers can complete a scenic loop trip by driving up the North Fork Skykomish Road out of Index, climb over Jack Pass and drop down into the Beckler Valley to Skykomish. From the 2,500-foot summit of Jack Pass, there are impressive views of the Monte Cristo Peaks, and the North Fork Skykomish and Beckler River valleys.

Fishing for resident rainbow trout is a moderate to high use activity. Class III kayaking with some portages is available from the confluence of the Rapid and Beckler Rivers downstream to the mouth of the Beckler. There is no significant rafting use on the Beckler and low to moderate use by swimmers.

Recreation Activities (in estimated Recreation Visitor Days (RVD's)), for National Forest system lands only:

	1988 RVD'S	Projected 2000 RVD'S
Boating (power and non-power)	10	15
Waterplay (swim, wade)	240	360
Fishing, Hunting	2,900	4,175
Camping	18,000	27,000
Viewing (scenery, wildlife, driving for pleasure)	8,575	13,000
Misc. (hike, picnic, berry picking, etc.)	2,530	4,960
TOTAL	32,255	49,510

WILDLIFE AND FISHERIES: Along the rivers, there is extensive wintering bald eagle forage habitat. Both rivers have excellent black-tailed deer winter range, as well as furbearer habitat. Excellent riparian habitat exists for the black bear. Spotted owls and mountain goats can be found along the Rapid River.

The Beckler River has runs of chinook, coho, steelhead, chum and sockeye, while the Rapid River runs are limited to chinook, coho and steelhead. Resident rainbow trout inhabit both rivers. Increased fish production may be limited by loss of streamside cover from logging activities.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The upper Beckler River watershed is mountainous and quite steep with a narrow valley floor. The river drops sharply through a deep narrow cut. At Boulder Falls, 8 miles downstream from the headwaters, the valley walls narrow and steepen into a deep ravine for 2 miles. Below this, the valley floor widens, stream gradient becomes moderate and stream width averages 24 feet. The bottom of the river is predominantly boulder and rubble with some patch gravel. There are numerous cascades and rapids along the course of the river. Twenty-eight tributaries drain into the Beckler River. Water quality is excellent.

Rapid River is a steep mountain stream down to the last 3 miles. The gradient then becomes moderately steep as it cuts through a narrow channel. The bottom of the river is predominantly boulder and rubble with some patch gravel. There are numerous cascades and rapids. Thirty-one tributaries flow into the Rapid River. The water is clear and quality is excellent.

GEOLOGY: The bedrock in the Beckler River Valley is dominated by metasediments and schist with volcanic and granitic rocks occurring locally. The river flows through a typical glacial-shaped valley. Steep long sideslopes are mostly cutover. The V-shaped Rapid River is surrounded primarily by granitic and schist rocks.

CULTURAL RESOURCES: No systematic survey has been made of Beckler River. However, information is available from surveys made in conjunction with Federal projects, and published historical sources. No prehistoric sites have been recorded to date. The lack of sites may reflect the lack of survey of the drainage. During the historic period, the area was within the territory of the Skykomish Indians. No areas have been identified as important for traditional Indian religious practices.

Historic sites primarily represent logging activities of the Bloedel-Donovan Lumber Co. Logging began up the river in 1917, and a large camp was established just south of Fourth of July Creek. A railroad was constructed up the river with a branch leading off to the east, along the Rapid River. Camp 9 was situated at the mouth of the Rapid River Bloedel-Donovan sold the land at the end of World War II, and shortly after large company logging gave way to independent enterprises in the valley. None of the known historic sites are listed on the National Register of Historic Places.

TIMBER: Extensive clearcut logging, past and present has taken place along the Beckler River. Currently, the entire drainage has a "patch work" appearance.

Over half of the Rapid River watershed has been burned and salvage logged, and is in varying stages of reforestation.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

Total Timber Volume (MMBF)	ASQ: Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	ASQ: Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
195.1	9.823	9.052

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The Beckler River is paralleled by forest roads for its entire length. It enters the South Fork of the Skykomish River about a mile east of Skykomish (pop. 280).

Rapid River flows through undisturbed forest before being paralleled by a forest road to its confluence with the Beckler River. Eight miles southeast is the community of Skykomish (pop. 280).

Skykomish is traditionally a logging, mining, and railroad community. The town also benefits economically from the many visitors drawn by the scenic and Recreation characteristics of the area's rivers, mountains, and forests. Sixty miles from Everett and 75 miles from Seattle, Skykomish is within easy travel distance for thousands of visitors every year. Local businesses cater to campers, hikers, fishers, and hunters, as well as providing hotel facilities for Stevens Pass skiers.

CURRENT ADMINISTRATION: Seven miles of the Rapid River, starting at its headwaters, flow through the Henry M. Jackson Wilderness. Public lands along these rivers are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. The lower two miles of the Beckler is in the Alpine lakes Area under management direction found in the Alpine Lakes Management Plan.

Under the guidelines of the Washington State Shoreline Management Act of 1971, the shoreline of the Beckler River has been classified as Conservancy by King County. This classification is applicable only to lands outside of federal jurisdiction and within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development.

The King County Comprehensive Plan has zoned land along the Beckler River corridor, outside of federal jurisdiction, for Rural Use.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

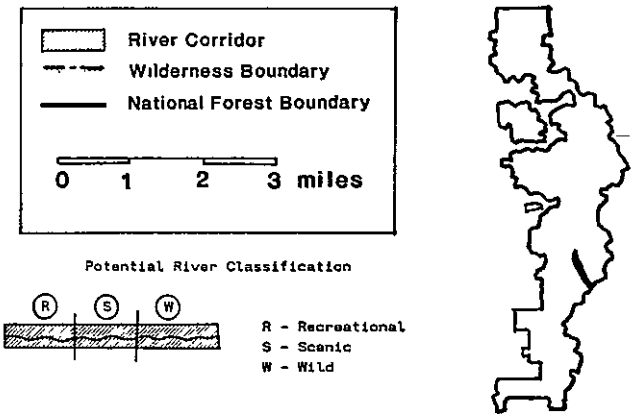
The following are expected funding requirements for the Beckler and Rapid Rivers for the next five years:

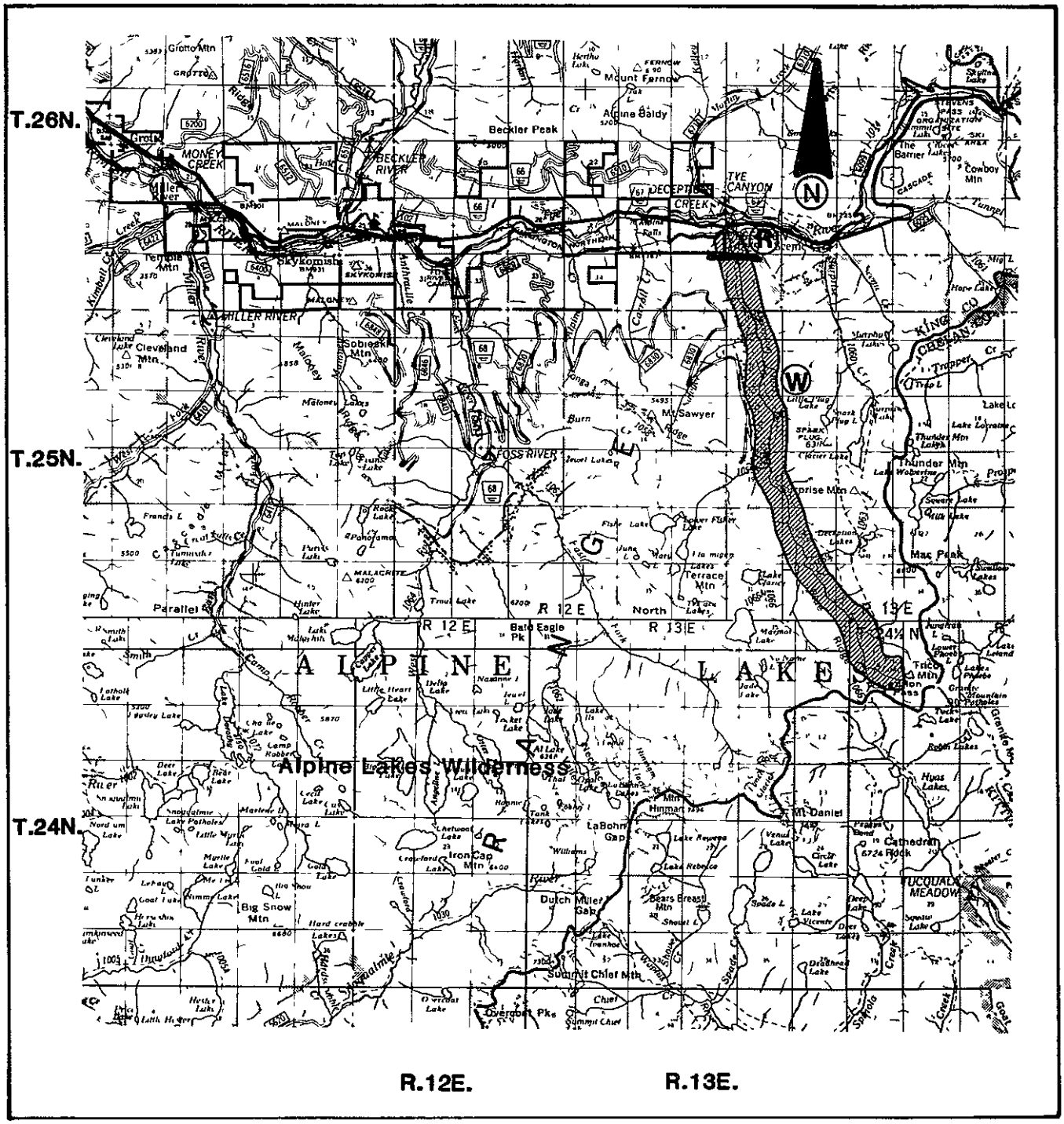
	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 3,000	$ 1,500
Costs of Implementation		3,000
Development of Management Plan		28,800
Development Costs	4,035,000	
Operation and Maintenance Costs	64,500	
TOTAL - First Five Years	**$4,102,500**	**$33,300**

The developed costs include a highway paving rest area and a trailhead.

General administration and operation and maintenance costs are estimated to continue at $13,800 annually.

Deception Creek





DECEPTION CREEK

King County

Deception Creek was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters at Deception Pass in the Alpine Lakes Wilderness downstream to the confluence with the Tye River.

Segment 1 - The headwaters at Trico Lake in the SW 1/4 of Section 5, T.24 N., R.14 E. to the Alpine Lakes Wilderness boundary (9.8 mi).

Segment 2 - The Alpine Lakes Wilderness boundary to the confluence with the Tye River (0.5 mi).

RIVER MILEAGE:

Study:	10.3 miles
Eligible:	10.3 miles
Forest Plan:	10.3 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: Deception Creek was found to possess "Outstandingly Remarkable" values for the following. Wildlife and Historical/Cultural.

The drainage supports an extensive black-tailed deer winter range. There is also excellent riparian habitat for black bears and furbearer habitat. Spotted owls have been found in the drainage.

The mouth of Deception Creek is within the Stevens Pass Historic District, listed on the National Register of Historic Places. Established in 1976, the Historic District recognizes the engineering achievements of the Great Northern Railroad in constructing a route across the Cascades.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	9.8	Wild	9 8
Segment 2	Recreation	0.5	Recreation	0 5

SUITABILITY DETERMINATION:

Deception Creek was found to be eligible for inclusion in the preferred alternative of the Forest Plan due to a lack of competing resource values and ease of management. All but .5 mile of Deception Creek is in the Alpine Lakes Wilderness.

Appendix E
Deception Creek

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Alpine Lakes Wilderness - 9.8 mi)	9.8 miles	3,136 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	0.5 miles	160 acres
TOTAL	10.3 miles	3,296 acres1/

1/Acres based on a 1/4-mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: Neither river segment is classified as an area of critical mineral potential nor is encumbered by unpatented mining claims. A review of available literature, including the Bureau of Mines MILS data, indicates the area has no known locatable mineral resources.

The BLM has classified the entire river as being prospectively valuable ("PV") for geothermal resources. The southern 7 miles is classified as "PV" for coal resources. One lease application was received for Section 31, T.26 N., R.13 E., however, that application has been withdrawn.

Based upon the available information, it appears that the area has a relatively low potential for the occurrence of locatable mineral resources, and no serious interest in the locatables is currently being expressed. The area does have at least a low potential for the occurrence of geothermal and coal resources. However, as with the locatables, no serious interest in these resources is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments on Deception Creek.

Deception Creek is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: The Deception Creek Trail #1059 follows the creek for most of its length. The trail intersects the Pacific Crest Trail near Deception Pass. The Pacific Crest Trail crosses Deception Creek near its headwaters. A short road goes from U.S. Highway 2 to the trailhead and accesses the powerlines The powerlines, railroad and Highway 2 cross Deception Creek in the lower 1/4 mile.

Deception Falls Picnic Area and Nature Trail, located at the mouth of the river, is planned to be improved. The current trail is a 1/2-mile loop from Deception Falls to the Tye River.

A footbridge is planned for construction between the U.S. Highway 2 bridge and the confluence with the Tye River. The Highway 2 bridge is planned to be widened.

There are no homes, farms or developed campgrounds in the drainage.

Two sets of powerlines cross the river at .2 miles from the confluence with the South Fork Skykomish River.

RECREATION ACTIVITIES: Hiking is a popular activity along Deception Creek The Deception Creek Trail provides access to the Alpine Lakes Wilderness and receives heavy use. The Deception Creek Picnic Area, Nature Trail and Viewpoint is heavily used by sightseers.

There are very limited opportunities for rafting, canoeing and kayaking. Both fishing and swimming are low use activities in the creek.

	1988 RVD'S	Projected 2000 RVD'S
Waterplay (swim, wade)	10	15
Fishing, Hunting	10	15
Camping	1,600	2,300
Viewing (scenery, wildlife, driving for pleasure)	46,575	70,800
Misc. (hike, picnic, berry picking, etc.)	28,820	56,500
TOTAL	77,015	129,630

WILDLIFE AND FISHERIES: The drainage supports an extensive black-tailed deer winter range. There is also excellent riparian habitat for black bears and furbearer habitat. Spotted owls have been found in the drainage.

There are no anadromous fish runs due to the impassable falls located near the mouth of Deception Creek The creek does contain a population of resident trout.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: Deception Creek is a steep mountain stream typical of the Skykomish River drainage. There are numerous cascades and rapids. Eleven tributaries drain into Deception Creek.

Water quality is excellent.

GEOLOGY: The bedrock geology is dominated by granitics and metasediments This mostly V-shaped valley heads in massive long, forested slopes which blend into rock outcrop and perennial snow on the upper ridges. Numerous tributary streams and occasional avalanche tracks are present on the sideslopes.

CULTURAL RESOURCES: No systematic archaeological survey has been made of Deception Creek and no prehistoric sites are known. The lack of known sites is believed to reflect the lack of a survey in the drainage. During the historic period, the area was within the territory of the Skykomish Indians. No locations used for traditional religious practices are known within the drainage.

The mouth of Deception Creek is within the Stevens Pass Historic District, listed on the National Register of Historic Places Established in 1976, the Historic District recognizes the engineering achievements of the Great Northern Railroad in constructing a route across the Cascades. No railroad features have been identified within the potential Wild and Scenic River corridor.

TIMBER: Limited logging has occurred along the lower 1/2 mile of the creek. No clearcuts are visible from the creek.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system land only:

Total Timber Volume (MMBF)	ASQ: Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	ASQ: Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
7.7	.010	.010

1/ Based on proposed preferred alternative with revised minimum management requirements.

SOCIO-ECONOMIC EFFECTS: Deception Creek flows into the Tye River close to Deception Falls, 8 miles east of Skykomish. Skykomish has traditionally been a logging, mining and railroad community. The town now also benefits economically from the many visitors drawn by the scenic and recreation characteristics of the area's rivers, mountains and forest. Sixty miles from Everett and 75 miles from Seattle, Skykomish is within easy travel distance for thousands of visitors every year. Local businesses cater to campers, hikers, fishers and hunters, as well as providing hotel facilities for Stevens Pass skiers.

CURRENT ADMINISTRATION: All but the lower 1/2 mile of the creek is located within the Alpine Lakes Wilderness. The Wilderness, and other National Forest lands, are administered by the Mount Baker-Snoqualmie National Forest, USDA Forest Service. This river is in the Alpine Lakes Area under management direction found in the Alpine Lakes Management Plan.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for Deception Creek for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$10,000	
Development of Management Plan		4,200
Development Costs	70,000	
Total - First Five Years	**$80,000**	**$4,200**

General administration and operation and maintenance costs are estimated to continue at $2,000 annually.

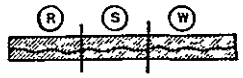
LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

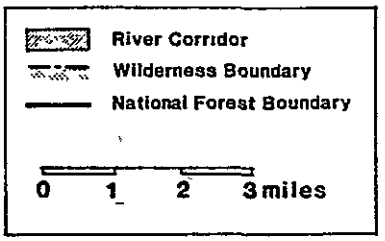
	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Wilderness-Trailled	929
		Wilderness-General Trailless	2,027
		Alpine Lakes Dispersed Recreation	63
		Alpine Lakes Scenic	21
Segment 2	Recreation	Old Growth Habitat (spotted owl)	84
		Alpine Lakes Dispersed Recreation	42

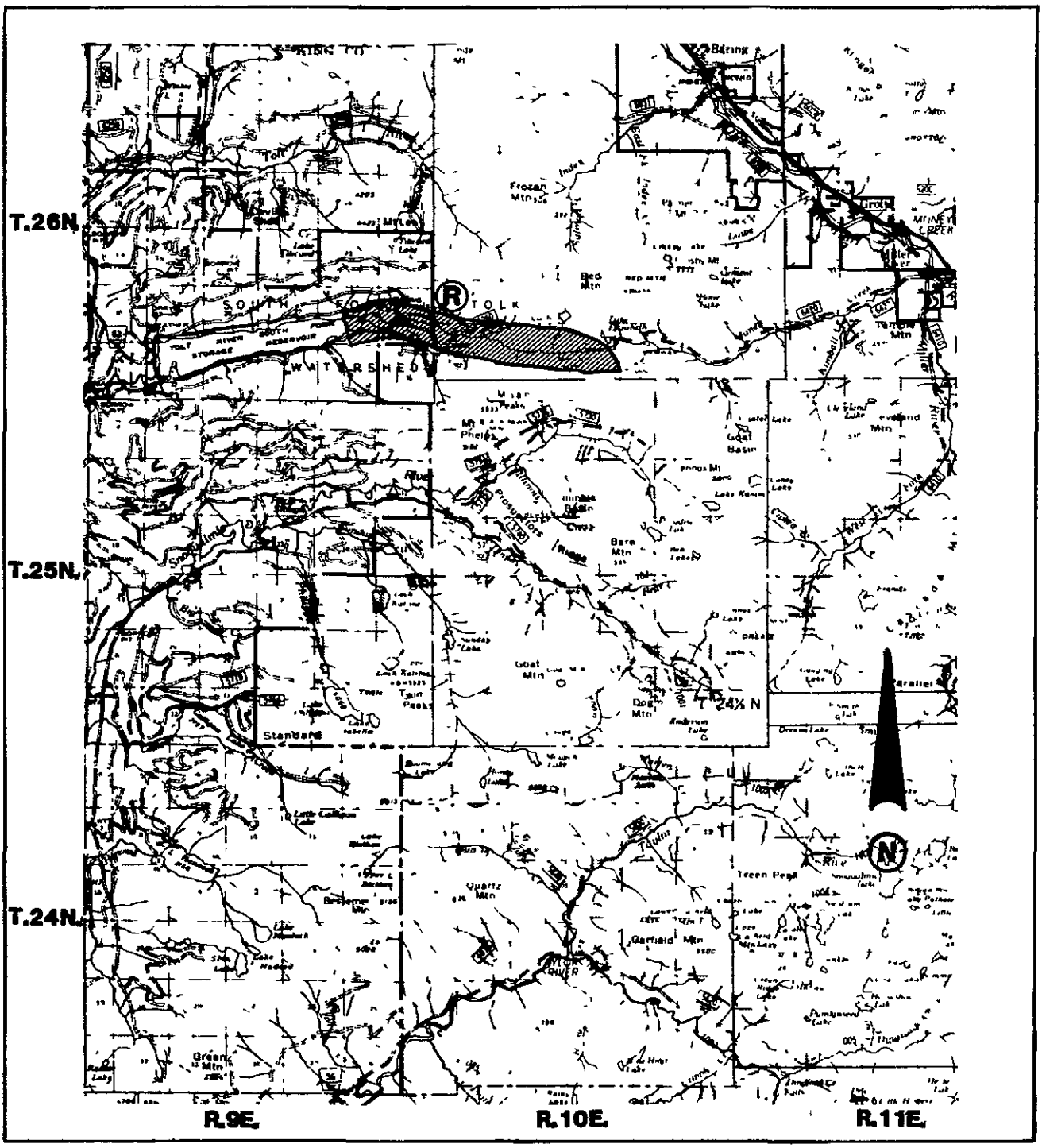
South Fork Tolt River

Potential River Classification



R - Recreational
S - Scenic
W - Wild





SOUTH FORK TOLT RIVER

King County

The South Fork Tolt River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters, near Lake Elizabeth downstream to the eastern end of the Tolt River Reservoir, owned by the City of Seattle.

Segment 1 - Headwaters in SE 1/4 of Sec 33, T.26 N., R.10 E. to the Tolt Reservoir (5.4 mi).

RIVER MILEAGE:

Study:	5.4 miles
Eligible:	5.4 miles
Forest Plan:	0 0 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The South Fork Tolt River was found to possess "Outstandingly Remarkable" values for the following: Fisheries.

The South Fork is an important wild resident trout river. Special fishing restrictions provide quality fishing.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Recreation	5.4	Not recommended	0.0

SUITABILITY DETERMINATION:

The South Fork of the Tolt River was found to be not suitable for inclusion in the preferred alternative of the Forest Plan. There is extensive logging in the drainage and timber harvest is the highest value. Difficult access for the public, due to private ownership to the west, creates a management problem.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest	3 4 miles	1,089 acres
Private	2.0 miles	639 acres
TOTAL	5.4 miles	1,728 acres1/

1/Acres based on a 1/4-mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of the river segment has been classified by the BLM as an area of critical mineral potential. A review of available literature, including the Bureau of Mines MILS data, indicates the area has no known locatable mineral resource occurrences. However, BLM mining claim recordation data does indicate that Section 33, T.26 N., R.10 E. has been encumbered by forty unpatented mining claims, of which ten have been abandoned or declared to be null and void.

The BLM has classified the eastern 3 miles of the river as being prospectively valuable for geothermal resources. However, the area is not considered to have potential for the occurrence of other leasable mineral commodities and none of the area is encumbered by mineral leases or pending lease applications.

Based upon the available information, it appears that the area has a relatively low potential for the occurrence of locatable mineral resources. However, interest in Section 33, T.26 N., R.10 E. is being expressed by the thirty *remaining unpatented mining claims located there. The area does have at least* a low potential for the occurrence of geothermal resources. No serious interest in that resource is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments along the river.

The South Fork Tolt is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: The reservoir and virtually the entire river, except for the uppermost two miles, have existing roads within the 1/4 mile corridor. Forest roads for log haul parallel both sides of the river along the lower 2.9 miles, ending in NW 1/4 Sec. 31, T.26 N., R.10 E.

The private portion of the river is closed to public access because it is a domestic water supply for the City of Seattle.

Two bridges cross the river on log hauling roads in Sec. 25, T.26 N., R.9 E. and NE 1/4 Sec. 31, T.26 N., R.10 E.

There are no homes, farms, or developed campgrounds along the South Fork Tolt.

RECREATION ACTIVITIES: *There are low levels of recreation use along the South* Fork Tolt drainage due to the restriction on public access. Limited amounts of hunting and fishing occur.

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	100	145
Viewing (scenery, wildlife, driving for pleasure)	100	150
Misc. (hike, picnic, berry picking, etc.)	100	200
TOTAL	300	495

WILDLIFE AND FISHERIES: The upper basin contains a population of mountain goats.

No anadromous fish can navigate upstream past the South Fork Falls and the Tolt Reservoir dam. However, the South Fork Tolt is an important wild resident trout river. Special fishing restrictions and limited access provide quality fishing.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The upper three miles of the South Fork Tolt has a steep gradient. The next three miles is moderately steep, with mostly fast riffles, a few cascades and a few short pool-riffle stretches. The river bottom is composed mostly of rubble, scattered boulders and some gravel areas.

Water quality is excellent.

GEOLOGY: The bedrock geology consists of granitic and metasedimentary rocks. This short river originates in steep, massive, mountains of rock outcrop and perennial snow on ridgetops and peaks. The valley becomes relatively wide within a few miles of origin due to the pronounced effects of continental glaciation.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the Tolt River and few projects have been done to provide information.

The lack of sites is believed to reflect the lack of survey rather than use. Historically, the Tolt River was within the territory of the Skykomish tribe. Locations used by the Duwamish tribe for traditional religious practice exist within the corridor.

The Tolt River watershed does not appear to have played a significant role in regional development and is virtually unmentioned in historic documents.

Reviewing mining documents from the turn of the century reveals that many mining claims existed in the area. Ore was taken out through Lake Elizabeth and Money Creek, where there were a number of mill sites. Red Mountain is also mentioned often in old documents.

TIMBER: Except for the highest slopes, the South Fork Tolt receives heavy logging use.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
16.2	1.305	1.192

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The headwaters of the South Fork of the Tolt River lie near Lake Elizabeth and the once-profitable Damon Mine. The South Fork Tolt flows into the Tolt Reservoir, a municipal watershed for Seattle.

Although roads do exist into the area from Carnation, 15 miles from the north end of the Reservoir, public access is restricted by the City of Seattle. Any access would be into the headwaters area, on foot from the Money Creek drainage off the Skykomish River drainage.

CURRENT ADMINISTRATION: The public lands along this river are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. This river is in the Alpine Lakes Area under management direction found in the Alpine Lakes Management Plan.

The shoreline environment from the National Forest boundary in Sec. 31, T.26 N., R.10 E. downstream to the Tolt Reservoir is designated by King County as Conservancy. The Conservancy Environment consists of shoreline areas which are primarily free from intensive development. It is the most suitable designation for shoreline areas of high scenic or historical values, for areas unsuitable for development due to biophysical limitations and for commercial forest lands.

The zoning ordinance on private land along the South Fork Tolt River is Forestry.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the South Fork Tolt River for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$1,000	
Development of Management Plan		6,000
Total - First Five Years	**$1,000**	**$6,000**

General administration and operation and maintenance costs are estimated to continue at $200 annually.

NORTH FORK SNOQUALMIE RIVER
LENNOX CREEK

King County

The North Fork Snoqualmie River and Lennox Creek were studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: Lennox Creek flows from its headwaters inside the Alpine Lakes Wilderness downstream to its confluence with the North Fork Snoqualmie River. The North Fork of the Snoqualmie River flows from its headwaters at Lake Kanim in the Alpine Lakes Wilderness downstream 26 miles to its confluence with the Middle Fork Snoqualmie.

Segment 1 - Headwaters of Lennox Creek in NW 1/4 of Sec. 36, T.25N., R.10 E. to the Alpine Lakes Wilderness boundary (0.3 mi)

Segment 2 - Alpine Lakes Wilderness boundary to the confluence with the North Fork Snoqualmie River (6.9 mi).

Segment 3 - Headwaters of North Fork Snoqualmie at Lake Kanim in SE 1/4 of Sec. 11, T.25N., R.10 E. to the Alpine Lakes Wilderness boundary (1.0 mi).

Segment 4 - Alpine Lakes Wilderness boundary to Lennox Creek (5.1 mi).

Segment 5 - Lennox Creek to Wagner Bridge in NE 1/4 of Sec. 20, T.25N., R.9 E. (8.0 mi).

Segment 6 - Wagner Bridge to confluence with Middle Fork Snoqualmie River (12.1 mi).

RIVER MILEAGE:

Study:	33.4 miles
Eligible:	33.4 miles
Forest Plan:	12.1 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: Lennox Creek was found to possess "Outstandingly Remarkable" values for the following: Fisheries and Wildlife.

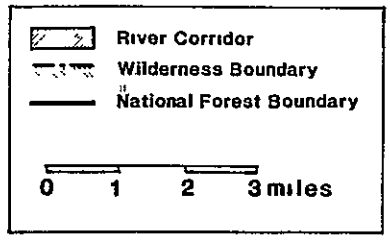
The North Fork Snoqualmie River was found to possess "Outstandingly Remarkable" values for the following: Recreation and Fisheries.

Both the North Fork Snoqualmie and Lennox Creek are important resources for resident cutthroat trout. Special fishing restrictions provide quality fisheries.

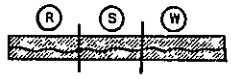
The Lennox River corridor provides extensive winter range for black-tailed deer and mountain goats, as well as good riparian habitat.

North Fork Snoqualmie River

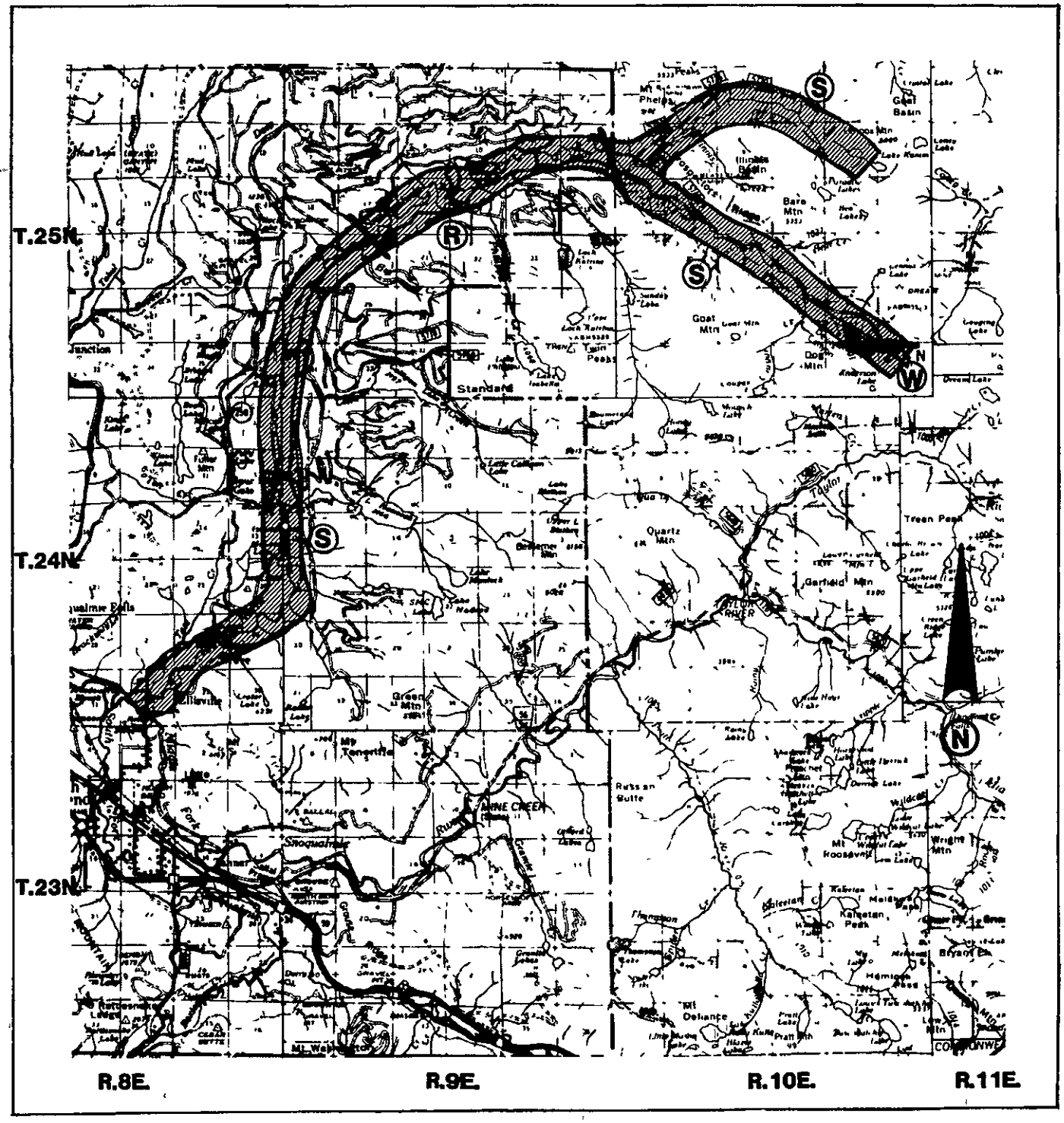
Lennox Creek



Potential River Classification



R - Recreational
S - Scenic
W - Wild



The lower 6 miles of the North Fork Snoqualmie offers a great diversity of challenges for advanced kayaking and canoeing. Fishing for trout is also a high use activity.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	.3	None recommended	0.0
Segment 2	Scenic	6.9	None recommended	0.0
Segment 3	Wild	1.0	None recommended	0.0
Segment 4	Scenic	5.1	None recommended	0.0
Segment 5	Recreation	8.0	None recommended	0.0
Segment 6	Scenic	12.1	Scenic	12.1

SUITABILITY DETERMINATION:

Portions of the North Fork of the Snoqualmie River were found to be suitable for inclusion in the preferred alternative of the Forest Plan. The lower seven miles below the Wagner Bridge - all state or private ownership - are recommended for designation. While there was little public support for designation and timber harvest is the highest value on the National Forest lands in this area, it was felt that the lower river had very high recreation potential and deserved designation.

Lennox Creek was found to be not suitable for inclusion in the preferred alternative. It is tributary to the North Fork of the Snoqualmie, and is an illogical addition without the upper reaches of the North Fork.

LANDOWNERSHIP:

	River Miles	Corridor Acres
Segment 1		
Mt. Baker-Snoqualmie National Forest (Alpine Lakes Wilderness - 0.3 mi)	0.3 mile	96 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	6.9 miles	2,208 acres
Segment 3		
Mt. Baker-Snoqualmie National Forest (Alpine Lakes Wilderness - 1.0 mi)	1.0 mile	320 acres
Segment 4		
Mt. Baker-Snoqualmie National Forest	5.1 miles	1,632 acres
Segment 5		
Private	6.0 miles	2,200 acres
State	2.0 miles	360 acres
Segment 6		
Private	12.1 miles	3,872 acres
TOTAL	33.4 miles	10,688 acres1/

1/Acres based on a 1/4-mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of the river segments have been classified as areas of critical mineral potential. However, the area near the eastern 7 miles of the river has been encumbered by 99 unpatented mining claims, of which 43 have either been abandoned or declared to be null and void. A review of available literature, including the Bureau of Mines MILS data, indicates that the portion of the river lying in T.25N., R.10 E. does contain reported occurrences of both precious and base metal mineral resources. In addition, Sections 24 and 25, T.24 N., R.8 E. contain reported occurrences of both copper and gold resources.

The BLM has classified the eastern 6 miles of the river as being prospectively valuable for geothermal resources. The area is not considered to have potential for the occurrence of other leasable mineral commodities, and none of the area has been encumbered by mineral leases or lease applications.

Based upon the available information, it appears that the eastern 6 miles of the river has a low to moderate potential for the occurrence of both precious and base metal resources. Interest in those resources is currently being expressed in the form of numerous unpatented mining claims. It also appears that a small part of the area has at least a low potential for the occurrence of geothermal resources. However, no interest in that resource is currently being expressed.

WATER RESOURCE DEVELOPMENT: For many years, the North Fork Snoqualmie Valley has been considered to be a good location for a dam. The dam would control flooding downstream and/or create a water supply reservoir for domestic use.

The upper 15.4 miles of the North Fork Snoqualmie and all of Lennox Creek are classified as "Protected" from hydropower development by the Northwest Power Planning Council.

Preliminary permits for hydroelectric projects have been issued by FERC for four tributaries of the North Fork Snoqualmie: Lennox Creek, Big Creek, Hancock Creek and Tate Creek.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Logging roads are extensive along both sides of the North Fork Snoqualmie except for that portion in the wilderness. The North Fork County Road parallels the North Fork Snoqualmie sporadically, along with Weyerhaeuser logging roads, from its mouth to the Forest boundary, where it becomes F.S. Road #57. The road continues upstream, paralleling Lennox Creek from its mouth to the Wilderness boundary. F.S. Road #5730 parallels the North Fork from the confluence with Lennox Creek to the Wilderness boundary.

Six bridges traverse the North Fork Snoqualmie River. One bridge is found on the North Fork Road near the mouth of the river, one on the Weyco Road to Lake Hancock and one on the Weyco Road at Sunday Creek. The Wagner Bridge lies near the confluence with Big Creek, and the other two bridges are on F.S. Road #5730 over the North Fork. There are also 3 bridges that span Lennox Creek.

No developed campgrounds exist along either river.

The Bare Mtn. (#1037) and Lennox Cr. (#1001) Trailheads are located on F.S. Road #57 in the Lennox Creek drainage.

Residences line the North Fork Snoqualmie along the lower 3 miles

Pastures are also found in the lower 3 miles.

The proposed 905-acre Three Forks Park site is located at the confluence of the North, South and Middle Forks of the Snoqualmie River. In 1978, Washington State Parks prepared a draft conceptual plan to meet the Snohomish Mediated Agreements requirement of developing a major recreation area at the Three Forks location. The plan called for most of the site to be managed as a natural area for wildlife habitat. It was also suggested for teaching beginning recreation skills in canoeing, kayaking, hiking and camping. Limited development is envisioned.

RECREATION ACTIVITIES: From Deep Creek to the swinging bridge, the lower 6 miles of the North Fork Snoqualmie offers a great diversity of challenges for advanced kayaking and canoeing. Heaviest use is from late April through June. There is no kayaking on Lennox Creek.

Fishing for resident trout is a high use on the North Fork Snoqualmie. Lennox Creek receives moderate use. The wild resident trout population is of high quality.

Hunting occurs on the uplands. Other dispersed recreation use in the drainages is low to moderate.

	1988 RVD'S	Projected 2000 RVD'S
Boating (power and nonpower)	50	80
Waterplay (swim, wade)	750	1,125
Fishing, Hunting	750	1,080
Camping	8,000	12,000
Viewing (scenery, wildlife, driving for pleasure)	500	760
Misc. (hike, picnic, berry picking, etc.)	1,000	1,960
TOTAL	11,050	17,005

WILDLIFE AND FISHERIES: The river corridors provide extensive winter range for black-tailed deer and mountain goats, as well as good riparian habitat.

There are no natural salmon runs above Snoqualmie Falls. Hatchery propagated chinook and coho have been planted in the upper drainages. Both the North Fork Snoqualmie and Lennox Creek are important resources for resident cutthroat trout. Special fishing restrictions provide quality fisheries.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The entire length of Lennox Creek and the upper 6 miles of the North Fork Snoqualmie cut through a narrow, steep-sloped valley. Below Lennox Creek for 7 miles, the valley is broad and flat. Downstream, the valley narrows and then broadens.

Appendix E
North Fork Snoqualmie River
Lennox Creek

Numerous small falls are found on the lower reaches of Lennox Creek. Below Hancock Creek, the North Fork Snoqualmie River falls over a series of cascades, with some drops exceeding 4 feet.

Water quality is excellent of both river.

GEOLOGY: Originating in massive, granite dominated mountains, the river flows through a wide, U-shaped glacially carved valley. Headwater mountains are highly dissected with rock outcrop and patches of perennial snow at higher elevations. The downstream topography is more subdued and is surrounded by forested (or cutover) ridge systems.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the North Fork Snoqualmie/Lennox Creek drainage. Existing information comes primarily from published historical sources. During the historic period, the area was within the territory of the Snoqualmie Indians. There is some evidence that the mouth of the North Fork was used during the historic period by the Indian groups and currently holds some value for traditional religious practices.

Mining began in the upper valley in 1896 and numerous claims were filed within a year. The Lennox Mining and Development Company was located on Lennox Creek and prospectors built a small town at the mouth of the creek. A railroad was extended up the North Fork for logging in the early part of the century. None of the sites known from the North Fork Snoqualmie - Lennox Creek drainage are listed on the National Register of Historic Places.

TIMBER: Logged areas are found intermittently for most of the length of Lennox Creek. Extensive logging is found throughout most of the North Fork Snoqualmie drainage, especially on private land outside the forest boundary.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest systems lands only:

	----------ASQ----------	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
89.0	4.628	4.268

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The North Fork Snoqualmie River flows into the Snoqualmie River approximately 1/2 mile from the community of North Bend and about 5 miles from the community of Snoqualmie. Lennox Creek has its origin in the Alpine Lakes Wilderness but for most of its length is paralleled by a forest road.

The local communities, only about 30 miles from Seattle, are increasingly populated by people who work in the city. They are also strongly impacted by visitors seeking the scenic and recreation amenities of the area. These include hiking, camping, hunting and fishing. Traditional occupations within the timber industry still provide the livelihood of a number of residents.

CURRENT ADMINISTRATION: The upper 0.3 miles of Lennox Creek and 1.0 miles of the North Fork flow within the Alpine Lakes Wilderness. Public lands are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. These lands are in the Alpine Lakes Area under management direction found in the Alpine Lakes Management Plan.

The Shoreline Environment has been designated by King County as Conservancy for both river banks outside Federal jurisdiction. The Conservancy Environment consists of shoreline areas which are primarily free from intensive development. It is the most suitable designation for shoreline areas of high scenic or historical values, for areas unsuitable for development due to biophysical limitations and for commercial forest lands.

Zoning for the banks of both rivers is classified as Forestry except for the section from Crater Lake to the mouth of the North Fork. This section is zoned as Rural Area with one home per 2.5 - 10 acres.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the North Fork Snoqualmie River and Lennox Creek for the next five years.

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$5,000	$ 5,000
Costs of Implementation		1,000
Development of Management Plan		58,200
Development Costs		60,000
Operation and Maintenance Costs		12,000
Total - First Five Years	**$5,000**	**$136,000**

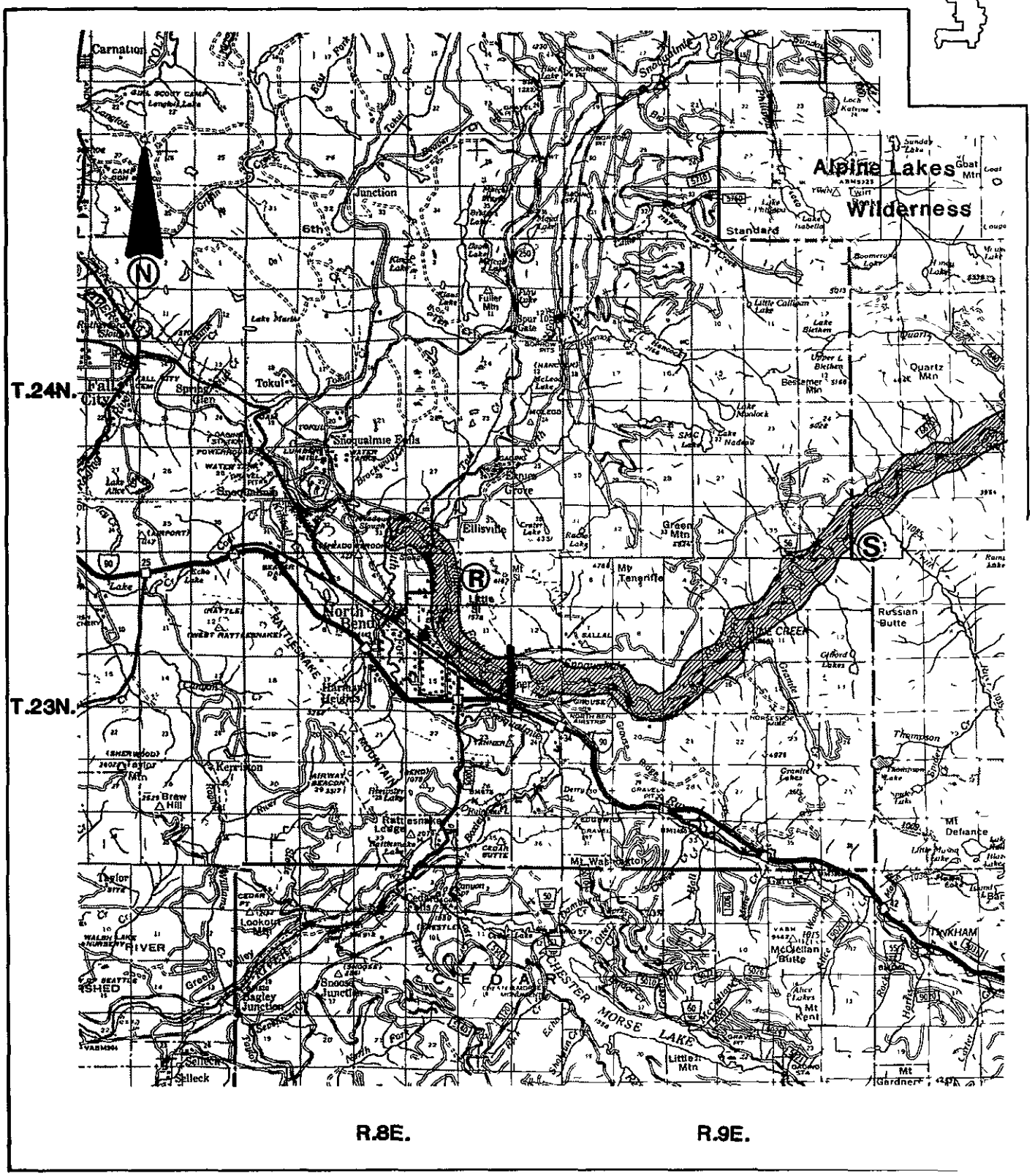
General administration and operation and maintenance costs are estimated to continue at $4,400 annually.

Middle Fork Snoqualmie River (1)

River Corridor
Wilderness Boundary
National Forest Boundary
0 1 2 3 miles

Potential River Classification

R - Recreational
S - Scenic
W - Wild



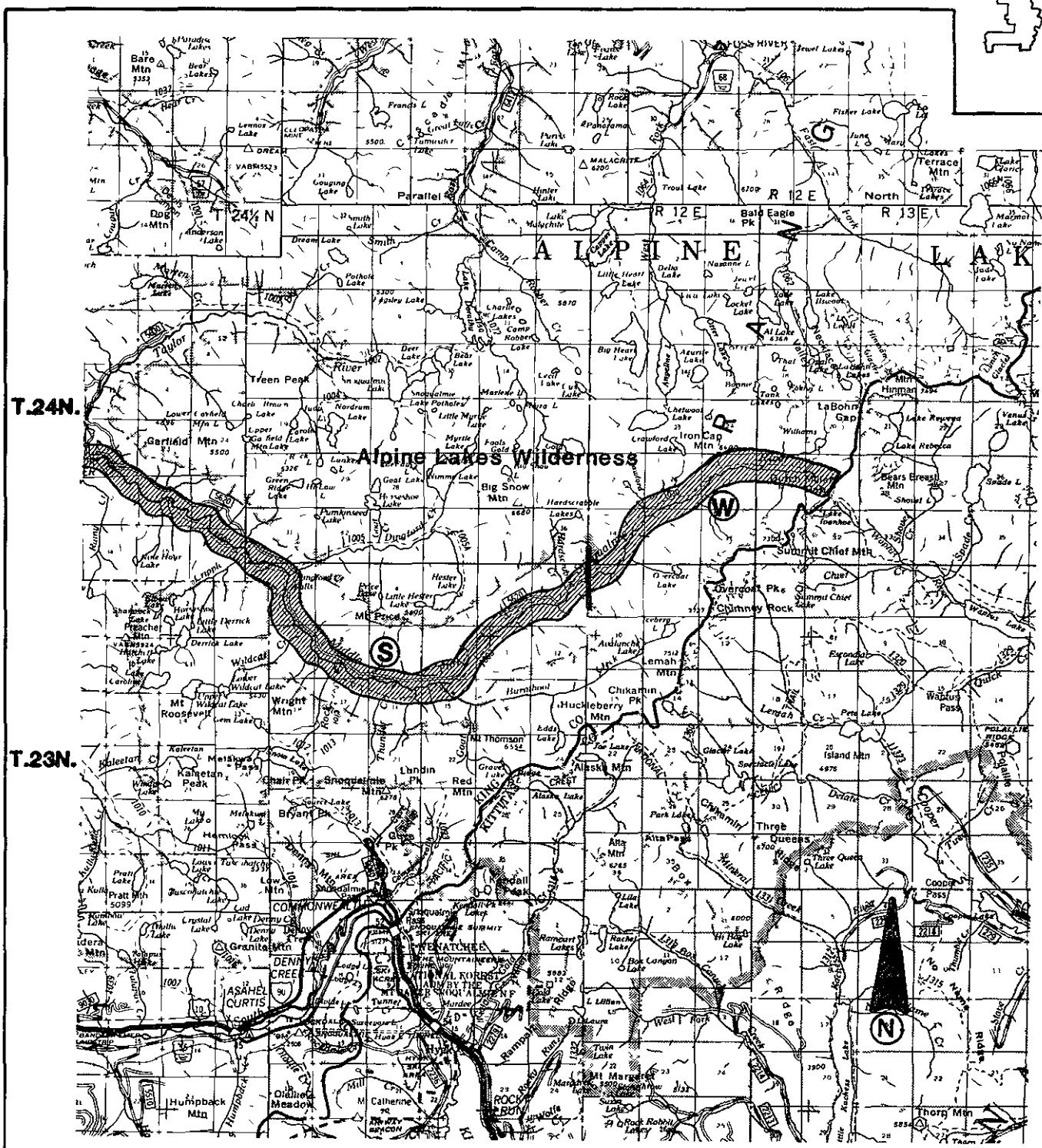
Middle Fork Snoqualmie River (2)

Potential River Classification

R - Recreational
S - Scenic
W - Wild

River Corridor
Wilderness Boundary
National Forest Boundary

0 1 2 3 miles



MIDDLE FORK SNOQUALMIE RIVER

King County

The Middle Fork Snoqualmie River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

The Middle Fork Snoqualmie River was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory published by the National Park Service in 1982.

LOCATION: From its headwaters near La Bohn Gap in the Alpine Lakes Wilderness downstream to its confluence with the South Fork Snoqualmie River.

Segment 1 - The headwaters near La Bohn Gap in the NW 1/4 of Section 20, T.24 N., R.13 E. to the Alpine Lakes Wilderness Boundary (6.4 mi).

Segment 2 - The Alpine Lakes Wilderness boundary to the confluence with the Taylor River (13.2 mi)

Segment 3 - The Taylor River confluence to a location near the community of Tanner in the NW 1/4 of Section 13, T.23N., R.8 E., (15.9 mi).

Segment 4 - Near the community of Tanner to the confluence with the North Fork Snoqualmie River (4.2 mi)

RIVER MILEAGE:

Study:	39 7 miles
Eligible:	39.7 miles
Forest Plan:	39 7 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The Middle Fork Snoqualmie River was found to possess "Outstandingly Remarkable" values for the following: Recreation, Wildlife and Fisheries.

Though use is only moderate at the present time, the potential is high for rafting, canoeing, kayaking and fishing. Use is high for hunting and for driving for pleasure along the river corridor. Planned trail reconstruction along the river and the numerous existing trailheads provide excellent hiking and dispersed recreation opportunities.

A SOHA with three sighted pair is located adjacent to the river in the Dingford Creek area. There is a large variety of wildlife species including elk, black-tailed deer, mountain goat, black bear and beaver. The river corridor contains extensive deer winter range, and excellent riparian and furbearer habitat.

There are excellent resident cutthroat populations throughout the entire drainage.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	6.4	Wild	6.4
Segment 2	Scenic	13.2	Scenic	13.2
Segment 3	Scenic	15.9	Recreation	15 9
Segment 4	Recreation	4.2	Recreation	4.2

SUITABILITY DETERMINATION:

The Middle Fork of the Snoqualmie River was found to be suitable for inclusion in the preferred alternative of the Forest Plan due to its many outstandingly remarkable features, very high public support, and the support of other agencies for designation. The Middle Fork has a very high potential for recreation, and was identified as a potential Wild and Scenic River in the Nationwide Rivers Inventory published by the National Park Service in 1982.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Alpine Lakes Wilderness - 6.4 mi)	6.4 miles	2,048 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	12.0 miles	3,864 acres
Private	1 2 miles	360 acres
Segment 3		
Mt. Baker-Snoqualmie National Forest	4.9 miles	1,568 acres
Private	9.6 miles	2,960 acres
State	1.4 miles	560 acres
Segment 4		
Private	4.2 miles	1,344 acres
State	0.0 miles	160 acres
TOTAL	39.7 miles	12,704 acres1/

1/Acres based on a 1/4-mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of the river segments are classified by the BLM as areas of critical mineral potential. However, a review of available literature, including the Bureau of Mines MILS data does indicate the area has some occurrences of both precious and base metal resources. The BLM mining claim recordation data indicates that 259 unpatented mining claims have been located along the river from Section 16, T.23N., R.11 E., eastward. Of these 259 claims, only 2 have been abandoned. Of the reported occurrences, those of most interest are quartz deposits located near the river, and the gold, silver and copper occurrences reported for Sections 1, 14 and 18, T. 23N., R.11 E. and for Section 36, T.24 N., R11 E. According to V.E. Livingston (1971), the Middle Fork mineralized zone extends northeast from Goldmeyer Hot Springs to Crawford Creek, a distance of about 6 miles

This mineralization contains widespread low-grade copper and possible molybdenum concentrations which have been extensively explored in the past. At least 5 to 10 million tons of ore containing copper concentrations of 0.5 to 0.7 percent have been identified.

The BLM has classified the eastern 24 miles of the river as being prospectively valuable for geothermal resources. None of the area is considered to have a potential for the occurrence of other leasable mineral commodities Sections 10, 11, 15 and 23, T.23N., R.11/E. have been leased in the past. However, these leases have terminated.

Based upon the available information, it appears that the eastern 12 to 13 miles have a moderate potential for the occurrence of base and precious metal resources. The numerous unpatented mining claims in that area indicate a continuing interest in its locatable mineral resources. The area does have a potential for the occurrence of geothermal resources. However, no serious interest in the resource is currently being expressed.

WATER RESOURCE DEVELOPMENT: The Middle Fork Snoqualmie River is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

Preliminary permits for hydroelectric projects have been issued by FERC on the following tributaries to the Middle Fork Snoqualmie: Burntboot Creek, Dingford Creek, Taylor River, Granite Creek and Pratt River Proposed facilities within the river corridor consist of a transmission power line.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Forest roads parallel the river from its confluence with the South Fork Snoqualmie River to within 1 mile of the Alpine Lakes Wilderness boundary.

Three road bridges cross the river· 1 near the confluence with the North Fork, 1 at North Bend and 1 at the confluence with Granite Creek. Two trail bridges cross the river. One is in the Alpine Lakes Wilderness in Section 26, T. 24 N., R. 12 E. The other is near Dingford Creek confluence in Section 6, T.26 N., R.11 E

Many private dwellings and new housing developments are found along the lower seven miles of the river. An occupied cabin on private property is located near the confluence with the Taylor River.

The Dingford Creek Trailhead #1005 is located on Forest Road 5620 At the end of the road, the Dutch Miller Gap Trail #1030 begins. The trail heads eastward, paralleling the river for the length of the trail. The Pratt River Trailhead #1035 and the Rock Creek #1013.1 are accessed by fording across the Middle Fork.

The Middle Fork Trail #1003 is planned for reconstruction and expansion. The trail will parallel the south bank of the river from the Pratt River area to connect with the Dutch Miller Gap Trail #1030. Bridge crossings are planned one mile upstream from the confluence of Taylor River, Burntboot Creek and another upstream of Burntboot Creek.

The Taylor River Campground has been closed, however, the Alpine Lakes Plan identifies need for construction of a new campsite near the Taylor River confluence with the Middle Fork Snoqualmie River. The Department of Natural Resources has a campground at Mine Creek (17 sites), about 5 miles upstream from Tanner.

A minor amount of rip-rap is in place at the confluence with Rock Creek. There are also extensive sections of rip-rap along the river from the town of North Bend to the mouth of the river.

King County has proposed acquiring land along the north bank of the river near the mouth to create the Mt. Si Conservation Area. The area will be used for general recreation and hiking.

King County has received 55 acres of land for a proposed regional park at the confluence of the three forks of the Snoqualmie River. Most of the site will be managed as a natural area for wildlife habitat. The U.S. Army Corps of Engineers has proposed a 1.25 mile levee along the Middle Fork for flood control. The levee top would be used as a pedestrian/bicycle trail and would have a small rest area with benches. Future extension of the trail to connect with the proposed multi-agency sponsored Sound to Mountain Trail is possible.

There is substantial housing developments being constructed along the Mt. Si Road upstream to Section 13, T.23N., R.8 E.

The proposed Puget Sound to Mountain Trail would link the Snoqualmie Valley Trail from the town of Snoqualmie to the Granite Lakes. The trail would follow the Middle Fork from Tanner to Granite Creek.

RECREATION ACTIVITIES: The Middle Fork Snoqualmie drainage incurs heavy use by hunters, sightseers, hikers and campers. The drainage is within an easy driving distance from Seattle and attracts many visitors. There is moderate fishing use along most of the river downstream of Goldmeyer Hot Springs. Moderate kayaking and canoeing use exists downstream of the Taylor River confluence. Outside of the Forest boundary, the use increases. Rafting use is moderate outside the Forest boundary and swimming use is low.

	1988 RVD'S	Projected 2000 RVD'S
Boating (power and nonpower)	65	100
Waterplay (swim, wade)	5,100	7,650
Fishing	5,100	7,345
Camping, Hunting	40,600	60,900
Viewing (scenery, wildlife, driving for pleasure)	4,000	6,080
Misc. (hike, picnic, berry picking, etc.)	1,500	2,940
TOTAL	56,365	85,015

WILDLIFE AND FISHERIES: A SOHA with three sighted pair is located adjacent to the river in the Dingford Creek area. There is a large variety of wildlife species including elk, black-tailed deer, mountain goat, black bear and beaver. The river corridor contains extensive deer winter range, and excellent riparian and furbearer habitat.

No natural salmon utilization exists above Snoqualmie Falls on the Snoqualmie River. Juvenile chinook and coho salmon are occasionally planted to make use of natural rearing potential. There are excellent resident cutthroat and rainbow trout populations throughout the entire drainage.

Appendix E
Middle Fork Snoqualmie River

STREAMFLOW, GRADIENT AND VALLEY PROFILE: From its headwaters to Burntboot Creek, the Middle Fork Snoqualmie exhibits typical mountain stream character, flowing swiftly within a confined channel over steep gradient. There are numerous cascades and fast riffle stretches. Below Burntboot Creek, the gradient is mostly moderate for 19 miles to below Granite Creek. Here the river is contained within a broad, stable channel with a fast riffle character. A few rapids, short cascades and a number of large deep pools separate fast water stretches. Sixty tributaries drain into the Middle Fork Snoqualmie River.

Stream flows reach a maximum in June and again in December when the river reaches almost 2,000 cubic feet per second (cfs) at the Middle Fork stream gauge. The low flow occurs in late August to mid-September at 500 cfs.

The Snoqualmie River system is listed by the State Department of Ecology as a "River of Statewide Significance" based on water volume.

Water quality is excellent above Taylor River. Below this junction, clay deposits cause muddying of the water during periods of high runoff.

GEOLOGY: Granite, grandodiorite, honrblende gneiss, and associated rock types comprise the bedrock geology in this rugged area. Past glaciation has carved out the valley and left deposits of glacial till and unstable lacustrine materials in this mostly U-shaped valley. Valley sideslopes, consisting of deeply dissected forested slopes associated with nearly vertical massive rock bluffs, merge into rocky upper slopes where patches of snow often last through summer.

CULTURAL RESOURCES: No systematic archeological survey has been made of the Middle Fork. Few project surveys have been conducted, and historical research is limited. No prehistoric sites have been recorded. The lack of sites is believed to reflect the lack of a survey of the drainage During the historic period, the area was within the territory of the Snoqualmie Indians. No locations used for traditional religious practices are known within the potential Wild and Scenic River corridor.

Historic period sites represent mining, logging, recreation and Forest Service administration. Prospecting began on the Middle Fork in 1869, but no substantial placers or lodes were discovered. The main use of the drainage was for accessing other mining districts Timber harvest commenced in the 1920's and included the construction of logging railroads. Camp Brown was used by the North Bend Lumber Company during this period. It later housed a CCC crew, and then became a Fire Guard Station. The building was washed away in a 1959 flood. None of the sites known from the Middle Fork are listed on the National Register of Historic Places.

TIMBER: Most of the drainage is in second growth forest as a result of old railroad logging. Logging is a low influence along the river.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	----------ASQ----------	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
138.6	1.880	1.880

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The river flows through the town of North Bend (population 1,701) and about 8 miles from the town of Snoqualmie (population 1,370). Both communities have been traditionally supported by logging and the forest products industry. More recently, many of the residents are employed in the Seattle metropolitan area, 24 miles distant. North Bend is also a retail and service area for residents in the Upper Snoqualmie Valley and is promoting its industrial development potential. The economy of the area is increasingly changed by the thousands of visitors yearly who are attracted to the scenic and recreation qualities of the area. The recreation opportunities include skiing, camping, hiking, hunting and fishing.

CURRENT ADMINISTRATION: The upper 5.5 miles of the river flow through the Alpine Lakes Wilderness. These, and other National Forest lands, are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. These lands are in the Alpine Lakes Area under management direction found in the Alpine Lakes Management Plan.

Under the guidelines of the Washington State Shoreline Management Act of 1971, the shorelines of the Middle Fork Snoqualmie has been classified as Natural from the forest boundary to the west section line of Sec. 17, T.23N., R.9 E. and as Conservancy from the west section line to the river mouth. These classifications are applicable only to lands outside of federal jurisdiction and within 200 feet of the ordinary high water mark. A Natural designation denotes shoreline areas characterized by the presence of some unique natural features considered valuable in their undisturbed or original condition and which are relatively intolerant of intensive human use. A Conservancy designation denotes shoreline areas which are primarily free from intensive development.

From the forest boundary to the Mt. Si Road in North Bend, the land along the Middle Fork Snoqualmie, outside of federal jurisdiction, has been zoned for Forestry Use. From Mt. Si Road to the confluence with the North Fork, the land is zoned for Rural Use, with 1 dwelling per 2.5 to 10 acres.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the Middle Fork Snoqualmie River for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 10,000	$ 50,000
Costs of Implementation		15,000
Development of Management Plan		52,700
Development Costs	1,000,000	50,000
Operation and Maintenance Costs	360,000	5,000
Total - First Five Years	**$1,370,000**	**$172,700**

General administration and operation and maintenance costs are estimated to continue at $85,000 annually.

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Wilderness-Transition	42
		Wilderness-Trailled	633
		Wilderness-General Trailless	1,182
Segment 2	Scenic	Alpine Lakes Dispersed Recreation	506
		Alpine Lakes Scenic	3,019
		Old Growth Habitat (spotted owl)	232
Segments 3 and 4	Recreation	Old Growth Habitat (spotted owl)	63
		Pine martin/Pileated woodpecker Habitat	63
		Alpine Lakes Scenic	781

TAYLOR RIVER

King County

The Taylor River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters on Snoqualmie Lake within the Alpine Lakes Wilderness to its confluence with the Middle Fork Snoqualmie River.

Segment 1 - Snoqualmie Lake to the Alpine Lakes Wilderness boundary (1.2 mi).

Segment 2 - Alpine Lakes Wilderness boundary to Quartz Creek Road (5.4 mi).

Segment 3 - Quartz Creek Road to confluence with Middle Fork Snoqualmie River (1.6 mi).

RIVER MILEAGE:

Study:	8.2	miles
Eligible:	8.2	miles
Forest Plan:	8.2	miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The Taylor River was found to possess "Outstandingly Remarkable" values for the following: Recreation and Fisheries.

A large number of hunters use the area surrounding the Taylor River. Dispersed camping occurs along the river corridor. Large numbers of dayhikers and backpackers use trails that head into lakes within the Alpine Lakes Wilderness.

There are excellent resident cutthroat trout populations throughout the entire drainage.

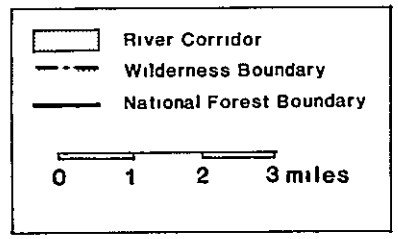
POTENTIAL AND RECOMMENDED CLASSIFICATION:

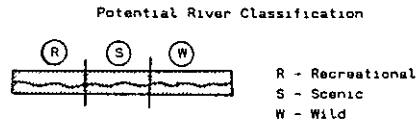
Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	1.2	Wild	1.2
Segment 2	Wild	5.4	Scenic	5.4
Segment 3	Recreation	1.6	Recreation	1.6

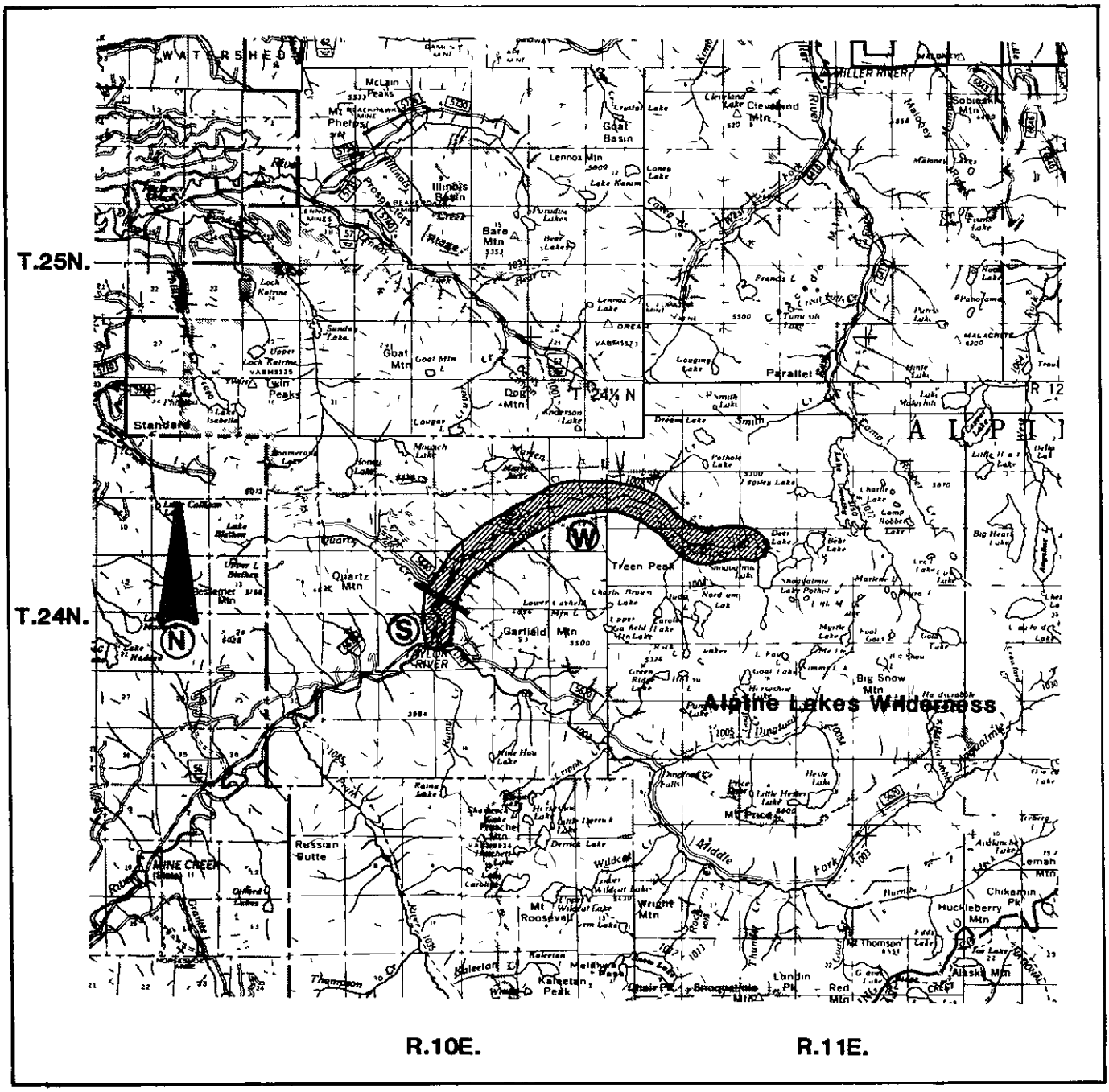
SUITABILITY DETERMINATION:

The Taylor River was found to be suitable for inclusion in the preferred alternative of the Forest Plan due to little or no competing resource value, high public interest, high potential recreation value. Designation is compatible with the Alpine Lakes Management Plan.

Taylor River







LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Alpine Lakes Wilderness - 1.2 mi)	1.2 miles	384 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	5.4 miles	1,728 acres
Segment 3		
Mt. Baker-Snoquamie National Forest	1.4 miles	448 acres
Private	0.2 miles	64 acres
TOTAL	8 2 miles	2,624 acres1/

1/Acres based on a 1/4-mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of the river segments are classified by the BLM as areas of critical mineral potential, and none are encumbered by unpatented mining claims. Although a review of available literature indicates Section 16, T.24 N , R.10 E. contains an interesting mineral occurrence, the river corridor itself has no reported locatable mineral resource occurrences

The BLM has classified the entire river as being prospectively valuable for geothermal resources, however, the area is not considered to have potential for the occurrence of other leasable mineral commodities, and none of the area has been encumbered by mineral leases or lease applications.

Based upon the available information, it appears that the river has at least a low potential for the occurrence of locatable mineral resources. However, there is no current serious interest in the locatable minerals. Even though the area has potential for the occurrence of geothermal resources, no serious interest in that resource is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are no water impoundments along the river. The Taylor River is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

A preliminary permit for a hydroelectric project has been issued by FERC The project will be 44 megawatts.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Forest Road 5630 follows the river upstream for 6 1/2 miles to the wilderness boundary. Only the lower mile is presently open. At 1 mile, a concrete bridge is being constructed across the river to replace one that was burned several years ago. The bridge will provide access up the Quartz Creek Road (5640). Forest Road 5630 will remain closed to motorized traffic beyond the Quartz Creek Road junction.

Forest Road 5630 crosses the river twice, both times near the confluence with Quartz Creek.

Forest Road 5630 is now used as a trail and provides access to the Martin Lake Trailhead (#1006). The Snoqualmie Lake Trail (#1002) begins at the east end of the road and parallels the Middle Fork to its headwaters at Snoqualmie Lake. The Nordrum Lake Trail (#1004) also begins at the end of the road and crosses the river (no bridge) on its route up to the lake.

There are no homes, farms or developed campgrounds along the Taylor River.

Rip-rap has been placed along the piers of the new concrete bridge.

RECREATION ACTIVITIES: A large number of hunters use the area surrounding the Taylor River. Dispersed camping occurs from the confluence with the Middle Fork to about 1/2 miles upstream. The Forest Service Road is currently closed to motorized traffic beyond the first bridge crossing. The road is used by day hikers and by backpackers heading to lakes within the Alpine Lakes Wilderness.

Fishing is a moderate use along the entire length of the river. Little river use occurs by rafters, kayakers or swimmers.

	1988 RVD'S	Projected 2000 RVD'S
Boating (power, nonpower)	30	50
Waterplay (swim, wade)	2,000	3,000
Camping	10,000	15,000
Viewing (scenery, wildlife, driving for pleasure)	500	760
Misc. (hike, picnic, berry picking, etc.)	800	1,570
TOTAL	14,080	20,380

WILDLIFE AND FISHERIES: A number of species use the Taylor River drainage, including deer, marten, mountain goats, bear and beaver. It is an excellent winter range for black-tailed deer and also provides excellent riparian and furbearer habitat.

Salmon cannot migrate past Snoqualmie Falls on the Snoqualmie River. There are excellent resident cutthroat trout populations throughout the entire river drainage.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The Taylor River contains lengthy reaches with mostly moderate gradients and good pool-riffle conditions. The river bottom is primarily gravel-rubble. Twenty-two tributaries drain into the river.

Water quality is excellent.

GEOLOGY: The bedrock geology is comprised of granite, granodiorite, hornblend gneiss, and associated rock types in this rugged area. Past glaciation has carved out and left deposits of glacial till in this mostly U-shaped valley. Valley side slopes, consisting of dissected, very steep, forested sideslopes associated with nearly vertical cliffs, merge into massive rock ridgetops and peaks where patches of snow last through summer.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the Taylor River. However, one prehistoric site is known and others may exist. Localities used by members of the Indian community to practice their traditional religion exist within the river corridor.

There was some logging activity up the Taylor River in the early 1900's However, no historic sites associated with this logging are documented at this time. The lack of sites is probably reflective of survey patterns rather than lack of use. The Forest Service presence was established as early as 1910, by which time a ranger station had been constructed near the mouth of the river. This site is believed to be eligible for the National Register of Historic Places.

TIMBER: The area is primarily second growth forest. The valley bottom was logged extensively.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National System lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
52.6	.438	438

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The communities in the area were traditionally supported by the logging and forest products industries. The economy of the area is increasingly changed by the thousands of visitors yearly attracted to the scenic and recreation qualities of the area. These include camping, hiking, hunting, and fishing.

CURRENT ADMINISTRATION: The upper 1 1/2 miles of the river is within the Alpine Lakes Wilderness. These, plus other National Forest lands are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. These lands are in the Alpine Lakes Area under management direction found in the Alpine Lakes Management Plan.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the Taylor River for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 1,000	$ 1,000
Costs of Implementation		2,000
Development of Management Plan		3,800
Development Costs	87,000	20,000
Operation and Maintenance Costs		4,000
Total - First Five Years	**$88,000**	**$30,800**

General administration and operation and maintenance costs are estimated to continue at $1,200 annually.

Appendix E
Taylor River

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Wilderness-Transition	211
		Wilderness-General Trailless	190
		Alpine Lakes Dispersed Recreation	42
Segment 2	Scenic	Wilderness-General Trailless	274
		Alpine lakes Dispersed Recreation	865
		Alpine Lakes Scenic	675
Segment 3	Recreation	Alpine Lakes Scenic	211

PRATT RIVER

King County

The Pratt River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters near Melakwa Lake in the Alpine Lakes Wilderness to its confluence with the Middle Fork Snoqualmie River

Segment 1 - Headwaters at Melakwa Lake in the NE 1/4 of Sec 25, T.23N., R.10 E. to the Alpine Lakes Wilderness boundary (1.6 mi).

Segment 2 - Alpine Lakes Wilderness boundary to the confluence with the Middle Fork Snoqualmie River (7.9 mi).

RIVER MILEAGE:

Study:	9.5 miles
Eligible:	9.5 miles
Forest Plan	9.5 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The Pratt River was found to possess "Outstandingly Remarkable" values for the following: Recreation, Geological, Fisheries, Wildlife and Ecological.

There is moderate to heavy hiking use near Tuscohatchie Lake and moderate hunting use near the mouth. An old trail system that originally ran the whole length of the Pratt River is scheduled to be reconstructed at a future date. There is also light fishing use.

Clay formations called concretions are found in the river and along its banks in the lower stretches

The Pratt River area has extensive winter range for black-tailed deer and mountain goats. There are also excellent riparian and furbearer habitats for black bear, beaver and other furbearers.

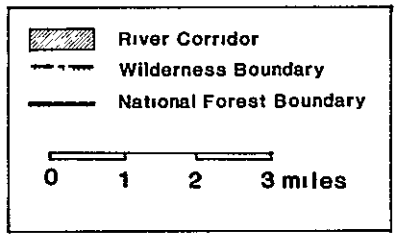
The Pratt River hosts a population of resident cutthroat trout.

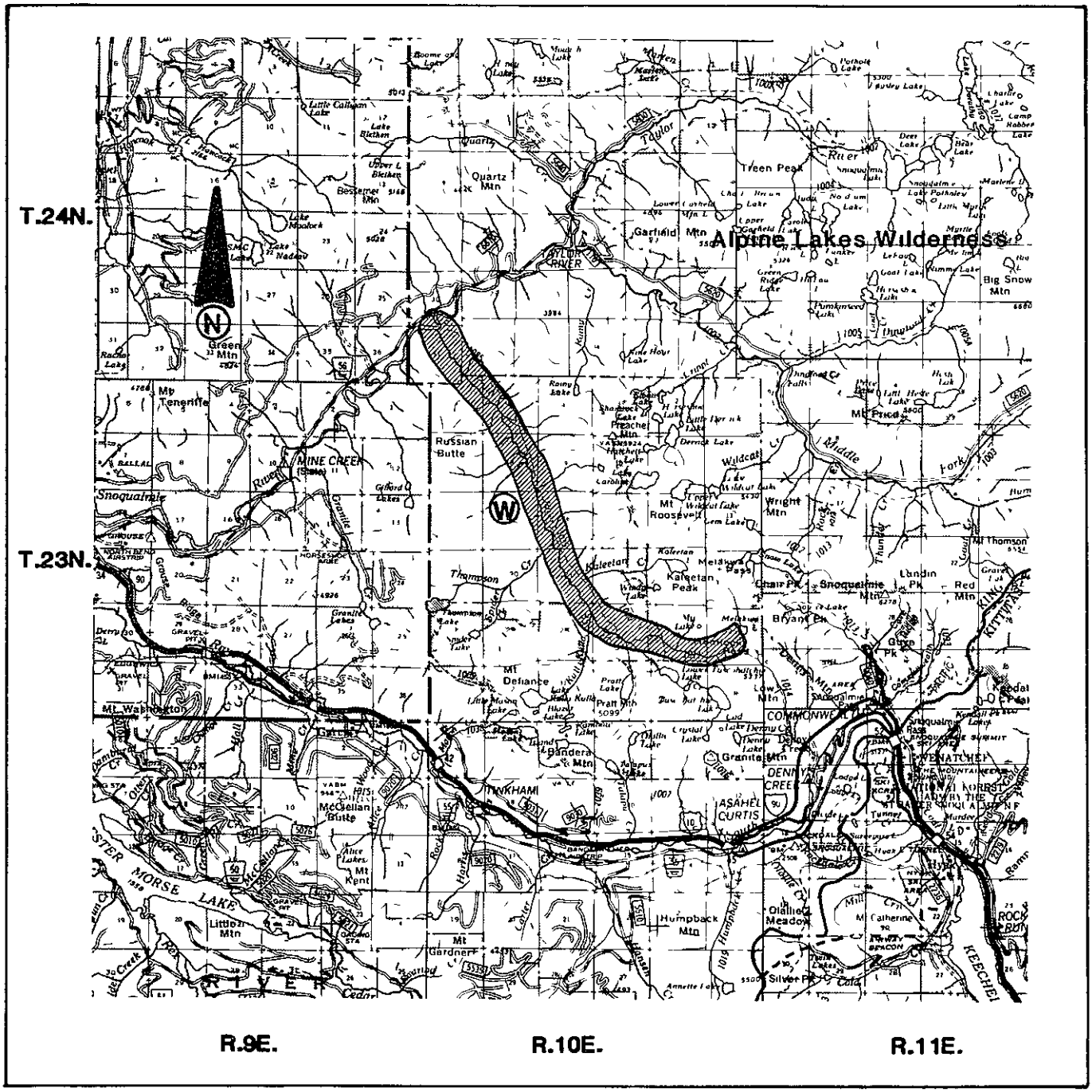
The Pratt drainage supports stands of low elevation old-growth. The old-growth is predominant in the wilderness and near the river's mouth.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	1.6	Wild	1.6
Segment 2	Wild	7.9	Recreation	7.9

Pratt River




T.24N.
T.23N.
Alpine Lakes Wilderness
R.9E.
R.10E.
R.11E.
Green Mtn
Mt Teneriffe
MINE CREEK
Snoqualmie
Russian Butte
Quartz Mtn
Garfield Mtn
Treen Peak
Big Snow Mtn
Mt Price
Middle Fork
Wright Mtn
Mt Roosevelt
Kaleetan Peak
Mt Thomson
Snoqualmie Mtn
Red Mtn
Bryant Pk
Chair Pk
Mt Deliance
Mt Washington
Bandera Mtn
McClellan Butte
Alice Lakes
Mt Kent
Little Mtn
Mt Gardner
Humpback Mtn
Granite Mtn
Denny Mtn
Oldfield Meadow
Silver Pk
Mt Catherine
Cedar
Taylor
Middle
Thunder
Wildcat
Thompson
Granite
Kaleetan
Melakwa
Pratt
Dutch Miller
Denny Cr
Humpback
Rock Run
Keechelus
Kittitas
Yakima
Cedar
Morse Lake
Lake Kachess
Lake Keechelus
Lake Easton
Lake Cle Elum
Lake Kleena Kleene
Lake Hancock
Lake Nadeau
Lake Hyas
Lake Lorraine
Lake Ingalls
Lake Stuart
Lake Caroline
Lake Ethel
Lake Dorothy
Lake Wenatchee
Lake Wenatchee State Park
Tumwater Campground
Nason Ridge
Stevens Pass
Stevens Pass Ski Area
Scenic
Cle Elum
Roslyn
Ronald
Easton
Snoqualmie Pass
Summit
Commonwealth Basin
Denny Creek
Asahel Curtis
Tinkham
Hyak
Ski Acres
Ski Hi
Ski Area
Pacific Crest Trail
Iron Horse State Park
Milwaukee Road
Chicago Milwaukee St Paul & Pacific
Burlington Northern
Interstate 90
Interstate 82
Interstate 5
Interstate 405
Interstate 84
Interstate 182
Interstate 205
Interstate 105
Interstate 705

SUITABILITY DETERMINATION:

The Pratt River was found to be suitable for inclusion in the preferred alternative of the Forest Plan due its many outstandingly remarkable values. It is one of the few relatively undisturbed drainages in the North Cascades. The Pratt received the greatest number of site-specific comments during the DEIS public response period; nearly all of these comments supported Wild and Scenic River designation and/or protection from timber harvesting.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Alpine Lakes Wilderness - 1.6 mi)	1.6 miles	512 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	6.7 miles	2,168 acres
Private	1.2 miles	360 acres
Total	9.5 miles	3,040 acres1/

1/Acres based on a 1/4-mile corridor on each side of the river

MINERAL AND ENERGY RESOURCE ACTIVITIES: None of the river segment is classified by the BLM as an area of critical mineral potential or is encumbered by unpatented mining claims. A review of available literature indicates that the area has only one reported locatable mineral prospect, which is a tungsten prospect located in Section 27, T.23N., R.10 E.

The BLM has classified the entire river as being prospectively valuable for geothermal resources. The area is not considered to have potential for the occurrence of other leasable mineral commodities and none of the area has been encumbered by mineral leases or lease applications.

Based upon the available information, it appears that the river has a relatively low potential for the occurrence of locatable mineral resources. There is no serious interest in the locatable minerals. The area does have a potential for the occurrence of geothermal resources, but no serious interest in that resource is currently being expressed.

WATER RESOURCE DEVELOPMENT: No water impoundments exist on the Pratt River. The Pratt River is classified as "Protected" from hydropower development by the Northwest Power Planning Council

A preliminary permit for a hydroelectric project has been issued by FERC. The proposed project facilities consist of a transmission line, diversion structure, power house and pen stock. The project capacity will be 44 megawatts.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: There are no roads, trail bridges, home sites or campgrounds along the river.

The Pratt River Trail (#1035) follows an old railroad grade up the river, beginning near the confluence with the Middle Fork Snoqualmie. In places, the trail is within 1/4 mile of the river. Currently, there is no direct access to the trail. The trailhead is reached by fording across the Middle Fork Snoqualmie River.

About half the length of the river flows through a clearcut area created in the 1940's.

RECREATION ACTIVITIES: There is moderate to heavy hiking use near Tuscohatchie Lake and moderate hunting use near the mouth. An old trail system that originally ran the whole length of the Pratt River is scheduled to be reconstructed at a future date. The lower portion of the drainage receives low recreation use due to the lack of access. There is light fishing use and no use by rafters, kayakers or swimmers.

	1988 RVD'S	Projected 2000 RVD'S
Waterplay (swim, wade)	50	75
Fishing, Hunting	200	300
Camping	50	75
Viewing (scenery, wildlife, driving for pleasure)	500	760
Misc. (hike, picnic, berry picking, etc)	1,000	1,960
TOTAL	1,800	3,170

WILDLIFE AND FISHERIES: The Pratt River area has extensive winter range for black-tailed deer and mountain goats. There are also excellent riparian and furbearer habitats for black bear, beaver and other furbearers.

The Pratt River hosts a population of resident cutthroat trout. There are no anadromous fish due to the impassable falls on the Snoqualmie River.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The river contains lengthy reaches with moderate gradients and good pool-riffle conditions. Short stretches of rapids are common. Fourteen tributaries drain into the river.

The water quality is excellent. The lower one mile has clay banks which contribute to sedimentation. The bottom of the river consists of gravel-rubble.

GEOLOGY: Granite, granodiorite, hornblend gneiss, and associated rock types comprise the bedrock geology in this area. Past glaciation has carved out the valley and left deposits of glacial till and unstable lacustrine materials in this mostly U-shaped valley. Clay banks along the lower river contain interestingly shaped hard clay concretions. Long forested valley sideslopes merge into rock outcrops and perennial snow patches on ridgetops and peaks.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the Pratt River. Few project surveys have been done and historical research is limited. There are no known localities used for traditional Indian religious practices within the potential Wild and Scenic River corridor.

Around the turn of the century, there were mining interests near the headwaters of the river. None of these early claims is within the river corridor However, there was a trail known in the 1890's as Tuscohatchie Creek and provided access to the iron ore deposits.

The North Bend Logging Company extended a logging railroad up the Pratt in the early 1900's. Evidence of this railroad can still be seen. There are no sites within the river corridor listed on the National Register of Historic Places.

TIMBER: The Pratt River drainage is primarily in second growth forest. Most of the valley bottom was railroad logged in the 1940's.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest systems land only:

	----------ASQ----------	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
54.2	3.230	2.957

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The mouth of the Pratt is located approximately 10 miles from North Bend (pop. 1,825). The community was traditionally supported by the logging and forest products industries. Currently, it is attracting many residents whose employment is in Seattle. The economy of the area is increasingly changed by the thousands of visitors yearly attracted to the scenic and recreation qualities of the area which include camping, hiking, hunting, and fishing.

CURRENT ADMINISTRATION: The upper 1.6 miles of the river are in the Alpine Lakes Wilderness. These, plus other National Forest lands in the drainage, are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. This river is in the Alpine Lakes Area under management direction found in the Alpine Lakes Management Plan.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the Pratt River for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 2,000	$2,000
Costs of Implementation		2,000
Development of Management Plan		3,500
Development Costs	35,000	
Total - First Five Years	**$37,000**	**$7,700**

General administration and operation and maintenance costs are estimated to continue at $800 annually.

Appendix E
Pratt River

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the *preferred alternative. (Note: This applies to lands administered by the* National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Wild	Wilderness-Trailled	253
		Wilderness-General Trailless	316
Segment 2	Recreation	Old Growth Habitat (spotted owl)	570
		Deer and Elk Habitat Enhancement	337
		Goat Habitat	42
		Timber Management	718
		Alpine Lakes Dispersed Recreation	105
		Alpine Lakes Scenic	190

SOUTH FORK SNOQUALMIE RIVER

King County

The South Fork Snoquamie River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters at Source Lake three miles north of Snoqualmie Pass, downstream to its confluence with the Snoqualmie River.

Segment 1 - Headwaters at Source Lake in NE 1/4 of Sec. 30, T.23N., R.11 E. to the confluence with the Snoqualmie River (30.6 mi)

RIVER MILEAGE:

Study:	30.6 miles
Eligible:	30.6 miles
Forest Plan:	0.0 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The South Fork Snoqualmie River was found to possess "Outstandingly Remarkable" values for the following: Wildlife, and Historical/Cultural.

The river corridor contains excellent habitat for black-tailed deer, elk, black bear and furbearers.

The South Fork was the natural travel route between Snoqualmie Pass and the mainstream Snoqualmie. This cross-cascade route was known in the middle 1800's as the Indian Foot Trail. Other historic period sites represent mining, railroad and logging activities

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Recreation	30.6	None recommended	0

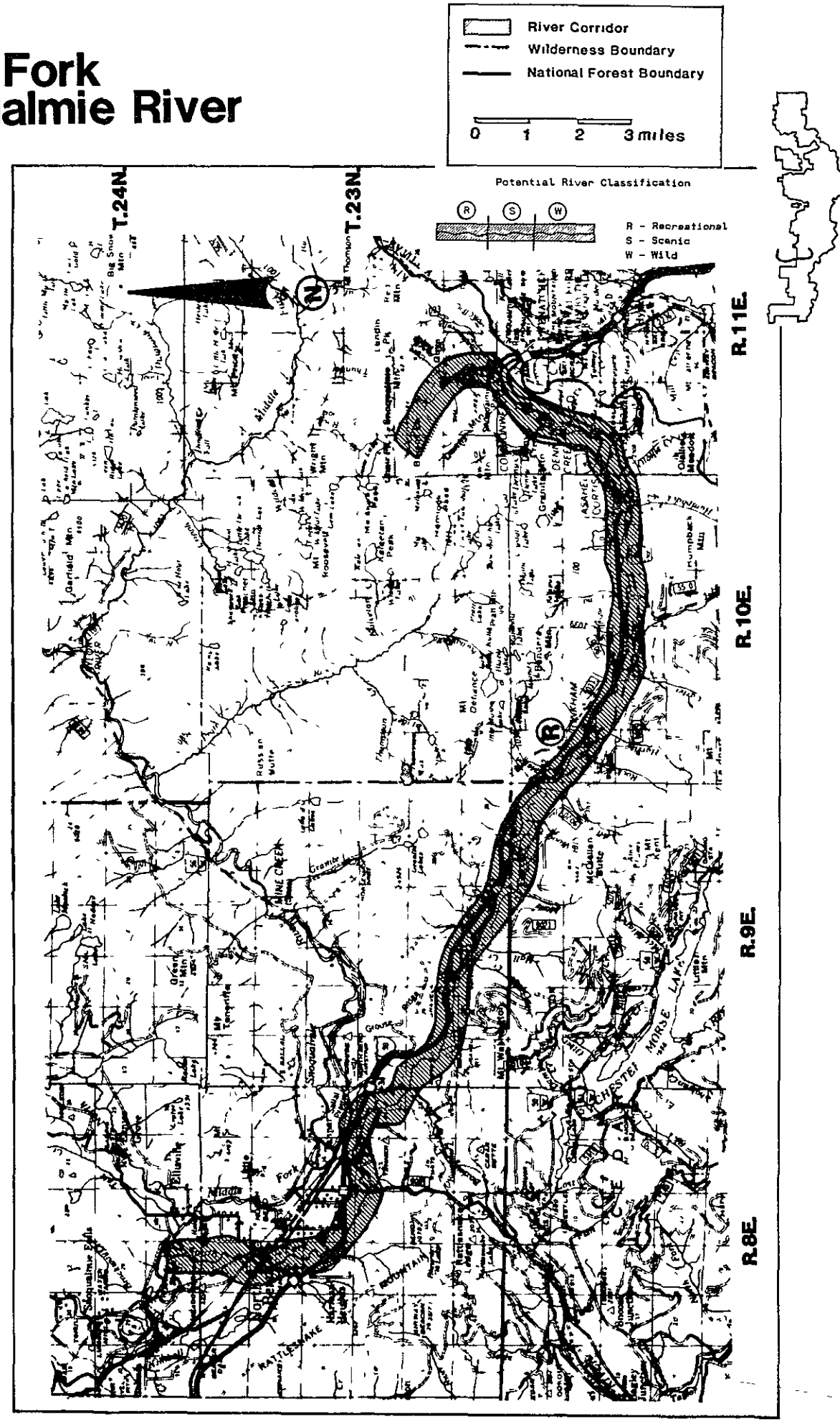
SUITABILITY DETERMINATION.

The South Fork of the Snoqualmie River was found to be not suitable for inclusion in the preferred alternative of the Forest Plan due to low public support, and because most of the river is in state or private ownership.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest	9.0 miles	2,880 acres
State Park	0 9 miles	288 acres
Private	19.5 miles	6,224 acres
State	1.2 miles	400 acres
Total	30.6 miles	9,792 acres

South Fork Snoqualmie River



MINERAL AND ENERGY RESOURCE ACTIVITIES: None of this river segment is classified by the BLM as an area of critical mineral potential. BLM mining claim recordation data indicates that only thirteen mining claims have been located along the river. Of those thirteen, ten have been abandoned or have been declared to be null and void. A review of available literature does indicate that a few precious and base metal prospects do occur along the river. However, none are known to have experienced any significant exploration or development activity. The Denny Mountain limestone deposit is reported to occur in Sections 5 and 6, T.22 N., R.11 E. None of the deposit appears to lie within the river corridor.

The BLM has classified the eastern 6 miles of the river as being prospectively valuable ("PV") for coal resources and the eastern 12 to 14 miles as "PV" for geothermal resources. None of the area has been encumbered by mineral leases or lease applications.

Based upon the available information it appears that the area does have at least a low potential for the occurrence of both base and precious metal resources. Little interest in such resources is currently being expressed. Portions of the area also have a potential for both coal and geothermal resources. However, no interest in these resources is currently being expressed.

WATER RESOURCE DEVELOPMENT: There are a number of falls which prevent fish migration along the upper 6 to 7 miles.

Two FERC projects are located on the South Fork Snoqualmie. One has been constructed on Weeks Falls with impacts in the proposed corridor consisting of a transmission line, a diversion structure and penstock, and a powerhouse. The project generates 3.5 megawatts of power and is located on State Park lands.

The other FERC Project is at Twin Falls. Facilities within the river corridor consist of a transmission line, a diversion structure and penstock and a powerhouse. The project capacity is 19 megawatts of power. This project is also located on State Park lands.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: Interstate 90 parallels the river for most of its length. Numerous other forest roads also parallel and cross the river.

There are at least 14 bridge crossings. Several are major interstate highway bridges.

There are farms along the lower 10 miles of the river.

Numerous home sites, commercial businesses, and the town of North Bend are found at the lower end of the river.

There are several cabins above Twin Falls and twelve summer homes in the Denny Creek area.

The upper 3 1/2 miles of the river is in the permit area of downhill ski areas.

Forest Service campgrounds are found at Denny Creek (39 sites plus 1 group site), Tinkham Road (47 sites) and Commonwealth (6 tent sites). Asahel Curtis Picnic Area (28 sites) is just downstream from Olallie Creek. Twin Falls State Park is also found on the river, though it is currently undeveloped with difficult access.
Trails that begin near the South Fork include the Asahel Curtis Nature Trail (#1023), the Wagon Road (#1021), the Denny Creek Trail (#1014), the McClellan Butte Trail (#1015), and Annette Lake Trail (#1019). The Franklin Falls Trail (#1036), and Snow Lake Trail (#1013) parallel stretches of the river.

The proposed Sound to Mountain Trail would parallel the South Fork from Cedar Falls to Cabin Creek, using the old Burlington-Northern Railroad grade.

Fifty-five acres of land have been acquired by King County to create Three Forks Park at the confluence of the North, Middle and South Forks of the Snoqualmie River. The final size of the park is proposed to be 905 acres. The plan calls for the park to be managed as a natural area for wildlife habitat.

Camp Waskowitz is located 2 miles east of North Bend. The camp is owned by the Shoreline School District.

The old Milwaukee Railroad Covered Bridge crosses the river north of Highway 202.

Powerlines cross the river in the SE 1/4, Sec. 4 north of North Bend and at the confluence with Boxley Creek (below Twin Falls State Park).

Dikes have been placed along the river banks near the town of North Bend to protect residents and businesses from floods up to the 500-year flood plain.

Extensive sections of rip-rap are found from Snoqualmie Pass to the mouth of the river.

The only known section of channelization is near Twin Falls State Park, where the Washington D.O.T. re-channeled the river to put in a bridge for Interstate 90.

There is a small emergency airfield open to the public in Section 16, T.22 N., R.10 E.

RECREATION ACTIVITIES: The ski areas at Snoqualmie Pass are very popular destination stops during the winter. Denny Creek Road, as well as other area roads, receive moderate cross-country skiing use.

The campgrounds along Interstate 90 are heavily used throughout the summer months. A popular nature trail loops around the Asahel Curtis Picnic Area. Numerous trailheads are located within the river drainage. Many receive heavy use during summer weekends.

	1988 RVD'S	Projected 2000 RVD'S
Boating (power, nonpower)	65	110
Waterplay (swim, wade)	4,000	6,000
Fishing, Hunting	5,000	7,200
Camping	54,000	81,000
Viewing (scenery, wildlife, driving for pleasure)	5,000	7,600
Misc. (hike, picnic, berry picking, etc.)	26,640	52,215
TOTAL	94,705	154,125

WILDLIFE AND FISHERIES: The river corridor area has excellent riparian habitat for black-tailed deer, black bear and furbearers. Elk also inhabit the area.

There is no natural utilization by salmon above Snoqualmie Falls. The Falls are located over three miles downstream from the South Fork. Hatchery propagated chinook and coho juveniles are occasionally planted in the South Fork Snoqualmie, making use of its available rearing potential. A large portion of the river provides high quality production habitat, suitable for use by adult and juvenile salmon. The South Fork Snoqualmie has an important population of wild resident trout. Special fishing restrictions promote a quality fishery.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: Numerous falls, cascades and rapids occur in the upper 7 miles of the river. Below Change Creek, is a narrow channel with numerous cascades and rapids with 2 large falls. Approximately 30 small tributaries feed into the South Fork Snoqualmie. Each one is a short, very steep mountainous stream.

Water quality is excellent.

GEOLOGY: Granite, granidorite, and associated rock types comprise the bedrock geology. Past glacial activity has carved out this mostly U-shaped valley. A ravine-like valley persists.

CULTURAL RESOURCES: No systematic archaeological survey has been done of the South Fork Snoqualmie River and no prehistoric resources are known. The lack of sites is believed to reflect survey patterns rather than lack of use. There are documented prehistoric sites on the mainstream Snoqualmie and the South Fork is the natural travel route between Snoqualmie Pass and the mainstream Snoqualmie. This cross-cascade route was known in the middle 1800's as the Indian Foot Trail.

Locations used by the Indian community for practice of their traditional religion exist within the corridor.

During the Indian conflict of 1855 - 56, Fort Smalley was built in the vicinity of North Bend. It was abandoned shortly thereafter and is presently marked by a plaque and listed on the county historic site inventory.

Attention was focused on a transportation system after the decline of military activity. The first train of six wagons crossed Snoqualmie Pass and followed the route along the South Fork in 1865. In 1905, the first motorized traffic passed along the route. Segments of this original route are preserved.

The Chicago, Milwaukie and St. Paul Railroad was built across Snoqualmie Pass and along the South Fork in 1908.

Other historic period sites represent mining and logging activities. Iron-ore was mined in the vicinity of the headwaters during the 1880's - 90's. In the early 1900's, the South Fork Timber Company operated an immense mill three miles upriver from North Bend. The railroad was being constructed up the South Fork at this time. None of the sites known from these activities is listed on the National Register of Historic Places.

TIMBER: Harvest units are common on Forest Service lands along the upper slopes, but these rarely reach down into the river corridor. Logging on private lands is extensive in this drainage.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
79.7	1.060	1.052

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The lower portion of the South Fork Snoqualmie River flows through the community of North Bend, population 1,825. North Bend has traditionally been dependent upon the timber industry. The community is now a retail and service area for residents in the upper Snoqualmie Valley and is promoting its industrial development potential. Additionally, the recreation and scenic attractions of the area and the nearness to Seattle attract thousands of visitors each year. Alpine skiing, cross-country skiing, camping, hiking, hunting and fishing are available and contribute to the economy of the area.

CURRENT ADMINISTRATION: Public lands along the river are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service. These lands are in the Alpine Lakes Area under management direction found in the Alpine Lakes Management Plan.

Under the guidelines of the the Washington State Shoreline Management Act of 1971, the shoreline of the South Fork Snoqualmie has been classified by King County as:

Northern Bank: Conservancy from the National Forest boundary in Sec. 33, T.23N., R.11 E downstream to approximately the N/S centerline of the NW 1/4 of the NW 1/4 of Sec. 24, T.23N., R.8 E.

Rural from approximately the N/S centerline of the NW 1/4 of NW 1/4 of Sec. 24, T.23N., R.8 E downstream to bridge on Cedar Falls Road in Sec. 22, T.23N., R.8 E.

Conservancy from the bridge on the Cedar Falls Road in Sec. 22, T.23N., R.8 E downstream to the confluence with the Main Fork of Snoqualmie River in Sec. 33, T.24 N., R.8 E.

Southern Bank: Conservancy from the Snoqualmie National Forest boundary in Sec. 33, T.23N., R.11 E downstream to east section line of Sec. 23, T.23N., R.8 E.

Rural from the east section line of Sec. 23, T.23N., R.8 E. downstream to the bridge on the Cedar Falls Road in Sec. 22, T.23N., R.8 E.

Conservancy from the bridge on the Cedar Falls Road in Sec. 22, T.23N., R.8 E. downstream to the confluence with the Main Fork of Snoqualmie River in Sec. 33, T.24 N., R.8 E.

These classifications are applicable only to lands outside of federal jurisdiction and within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development. A Rural designation denotes areas characterized by agricultural uses, low density residential where most urban services are not available, and areas which provide buffer zones and open space between predominantly urban areas.

The King County Comprehensive Plan has zoned the land along the South Fork Snoqualmie for Forestry Use for the area above Twin Falls. Below Twin Falls the area is zoned for Rural Use, permitting 1 home per 2.5 to 10 acres.

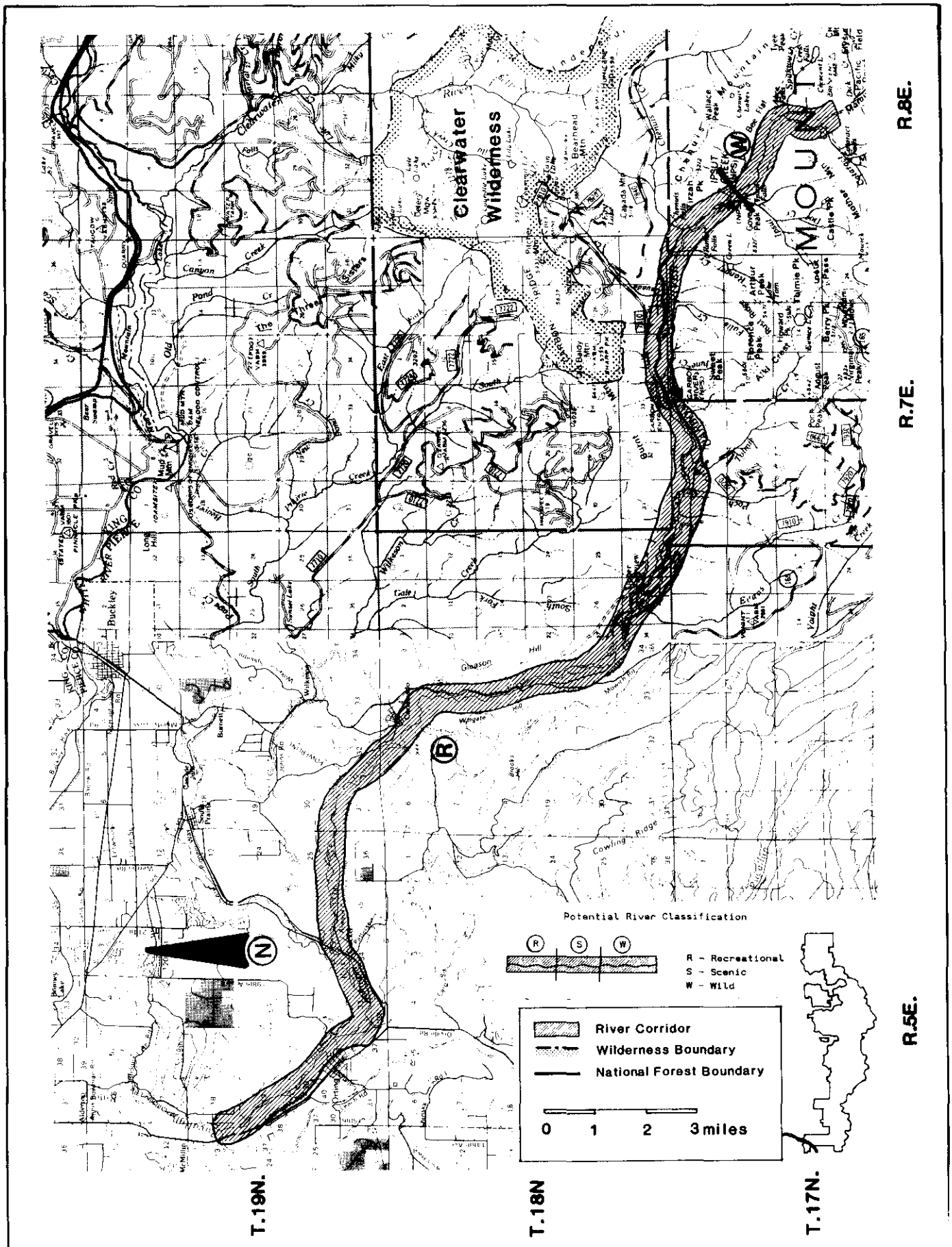
FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the South Fork Snoqualmie River for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$ 2,000	$ 2,000
Costs of Implementation		12,000
Development of Management Plan		56,000
Development Costs	221,000	75,000
Operation and Maintenance Costs	177,000	15,000
Total - First Five Years	**$400,800**	**$160,700**

General administration and operation and maintenance costs are estimated to continue at $39,200 annually.

Carbon River



CARBON RIVER

Pierce County — Mt. Rainier National Park

The Carbon River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

A bill is currently in the State Legislature to designate the Carbon River, from its headwaters in Mt. Rainier National Park to its confluence with the Puyallup River, a State Scenic River.

LOCATION: From its headwaters in Mt. Rainier National Park to its confluence with the Puyallup River.

Segment 1 - Headwaters on Carbon Glacier on the northwest slopes of Mt. Rainier to Ipsut Creek (4.0 mi).

Segment 2 - Ipsut Creek to the confluence with the Puyallup River (28.4 mi).

RIVER MILEAGE:

Study:	32.4 miles
Eligible:	32.4 miles
Forest Plan:	0.0 miles recommended for designation in preferred alternative

Note: This recommendation is pending evaluation by the National Park Service.

OUTSTANDINGLY REMARKABLE VALUES: The Carbon River was found to possess "Outstandingly Remarkable" values for the following: Scenic and Fisheries.

From the river, there are occasional, dramatic views of Mt. Rainier. Near the headwaters the steep gradient produces numerous cascades and waterfalls. The water course continues to flow through rapids and steep cascades and, in several places, through canyons.

Chinook, pink, chum and coho salmon spawn and rear in the river. There are also populations of dolly varden and sea-run and resident cutthroat trout.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	4.0	Not recommended	0.0
Segment 2	Recreation	28.4	Not recommended	0.0

SUITABILITY DETERMINATION:

The Carbon River was found to be not suitable for inclusion in the preferred alternative of the Forest Plan due to the low amount of the total length within the National Forest. This river received little support in the response to the Draft EIS, but was listed as a suitable addition to the State Scenic River System in the 1988 Washington State Scenic River Assessment.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Rainier National Park	4.0 miles	1,280 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	1.2 miles	240 acres
Mt. Rainier National Park	5.0 miles	1,600 acres
Private	21.7 miles	7,088 acres
State	0.5 miles	160 acres
TOTAL	32.4 miles	10,368 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: Even though approximately three miles of this river have been identified by the BLM as lying within an area of critical mineral potential, a review of available literature, including the Bureau of Mines MILS data, indicates that the area has no reported occurrences of locatable mineral resources. The area does have numerous reported occurrences of coal, and sand and gravel resources, some of which have produced in the past.

The BLM has classified the western 25 miles of the river as being prospectively valuable ("PV") for oil and gas resources and the eastern 5 miles as "PV" for geothermal resources. Most of the area is classified "PV" for coal, with a large portion of the classification being valuable for coal resources. Numerous occurrences of coal are reported for Sections 4, 5, 9 and 27, T.18 N., R.6 E., some of which have produced in the past. Of most interest, is the part of the river that crosses a deposit near Carbonado. This deposit is reported to contain resources of bituminous coal in numerous beds 28 inches to greater than 42 inches thick. The reserve is significant. In addition to the coal, interest in oil and gas has been expressed, and Sections 4 and 6, T.17 N., R.7 E. and Section 3, T.18 N., R.8 E. are presently encumbered and/or have been encumbered by oil and gas leases.

Based upon the available information it appears that the area has a relatively low potential for the occurrence of locatable mineral resources. No serious interest in the locatable mineral is currently being expressed. However, the area does have known coal resources and also has potential for the occurrence of oil, gas and geothermal resources. Interest in the oil and gas is currently being expressed in the maintenance of existing leases.

WATER RESOURCE DEVELOPMENT: There are no water impoundments in the river drainage. A preliminary permit for a FERC project has been granted for a location downstream from Prairie Creek on private land. The Carbon River below Tolmie Creek is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: There are a number of roads within the drainage, including: Fairfax Carbon Glacier Road, State Highway 165, Patterson Road, Orting Kapowsin Road and State Highway 162.

State Highway 162 parallels the river from McMillan to Crocker, where a highway bridge crosses the river at its confluence with South Prairie Creek. Highway 165 parallels the Carbon River from Carbonado to 1/2 mile south of the Fairfax Bridge. The highway crosses the river on the Fairfax Bridge. The Carbon River Road/Forest Highway 11 parallels the river from 1/2 mile south of the Fairfax Bridge to the end of the road inside Mt. Rainier National Park.

An abandoned railroad crossing traverses the river in Sec. 27, T.18 N., R. 6 E. at Fairfax.

Forest Road 7810/Copley Lake Road crosses the Carbon River near the National Park Boundary. The gabion construction of the bridge requires additional stabilization on the north side of the river. This crossing has washed out twice in the last 5 years.

Powerlines cross the river in Sec. 4, T.19 N , R.6 E. (at Carbonado)

The river has a history of flooding and is heavily channelized.

There is scattered land development around the mining towns of Fairfax and Carbonado. Farms are found in the vicinity of the town of Orting.

The Voight Salmon hatchery is located just east of Orting.

A National Park Service Campground is located at Ipsut Creek, at the end of the Carbon River Road. There are 29 sites.

The Chenius Falls Trailhead, inside Mt. Rainier National Park, is located 2 miles east of the Carbon River Entrance. The trail crosses the river.

The Moraine Park Trail, also inside Mt. Rainier National Park, begins at the Ipsut Creek Campground. The trail follows the Carbon River to its headwaters on the Carbon Glacier and then continues to Moraine Park and Mystic Lake. Portions of the this trail intersect the Wonderland Trail, which circles the base of Mt. Rainier. There is one river crossing.

The "Valley to Foothills Trail", a new "Rails to Trails" project, has been proposed. The route of the Northern Pacific Railway would become a foot trail, beginning at the confluence of the Carbon and Puyallup Rivers and ending at the town of Carbonado. This trail would parallel the Carbon River to Crocker, head north away from the river corridor along Highway 162 through South Prairie and Wilkeson, and meet the river again at Carbonado. The trail would cross the Carbon River at Crocker.

RECREATION ACTIVITIES: Except for fishing, river-based Recreation use of the Carbon River is low. Steelhead trout and coho salmon are heavily fished with sea-run cutthroat trout, dolly varden and resident trout also fished. There are above average conditions for canoeing and kayaking, except for a 4-mile stretch in the vicinity of Carbonado. Due to glacial discoloration and very cold temperatures, swimming is not practical.

The Carbon River Entrance provides campers, hikers and sightseers access to the northwest corner of Mt. Rainier National Park.

	1988 RVD'S	Projected 2000 RVD'S
Fishing, Hunting	2,000	2,880
Camping	500	750
Viewing (scenery, wildlife, driving for pleasure)	5,000	7,600
Misc. (hike, picnic, berry picking, etc.)	500	980
TOTAL	8,000	12,210

WILDLIFE AND FISHERIES: Elk, deer, bald eagles, mountain goats and various species of waterfowl are found within the Carbon River drainage.

Chinook, pink, chum and coho salmon spawn and rear as far upstream as Fairfax. Cold glacial waters and cascades limit further migration. Deep pools located in the lower river offer excellent holding and resting areas for adult salmon and provide exceptional rearing habitat. Dolly varden, and sea-run and resident cutthroat trout are also found in the river. The Washington Department of Fisheries established the Voight Creek Salmon Hatchery in 1917.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The Carbon River is fed by the Carbon Glacier on Mt. Rainier. Near the river's headwaters, the gradient is precipitous and there are numerous cascades and a few waterfalls. The narrow valley floor then broadens and the river gradient becomes moderately steep. The river channel is less confined and partially unstable with much channel splitting and some braiding. Below the town of Fairfax, side walls form a canyon with a steep gradient. There are numerous rapids and steep cascades separated by short, lesser gradient pool-riffle stretches. There is a cascade area at Carbonado followed by a 3.5 mile deep and narrow ravine. The river channel then widens and narrows intermittently with channel splitting and deep pools. The last 6 miles are a continuous series of long channel split sections down to the confluence with the Puyallup River. Twenty-two tributaries drain into the Carbon River. Water quality is discolored due to glacial runoff.

GEOLOGY: Volcanic pyroclastic and andesitic rocks compose the bedrock geology of the youthful valley. This river begins abruptly at the terminus of the Carbon Glacier at low elevation. This river is unique in that for approximately the first 15 miles the river channel is very wide and braided. It is sediment choked from the massive amount delivered by the Carbon Glacier allowing it to swing wildly throughout its channel. The valley does narrow to a deep ravine near the crossing of State Highway 165.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the Carbon River and no resources are known. Localities used by Indians to practice their traditional religion exist within the river corridor.

Coal was discovered in the Carbon River area in 1862. Mining activities increased when the suitability of coal for manufacturing coke was realized. For the next 50 years, small towns (such as Carbonado, Melmont and Fairfax) located within the corridor, developed to provide housing, supplies, and services for the workers and their families. Regular rail shipments were made to the Puget Sound and San Francisco Bay markets. The market declined in 1920.

It is expected that a cultural resource inventory of historic sites within the corridor would result in the documentation of sites associated with these settlements and the mining activities.

Timber interests were growing as mining declined during the early 1900's. Several small companies used the railroad along the Carbon River to transport logs for sale to the mill in Fairfax. By 1930, much of the private timber had been removed, and by 1933, many of the companies went out of business.

TIMBER: Logging is the principal land use outside the National Park.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest lands only.

	----------ASQ----------	
	Preferred	Preferred
Total	Alternative	Alt. with
Timber	w/o W&SR	Eligible W&SR
Volume	Designation	Designation
(MMBF)	(MMBF/yr.)1/	(MMBF/yr.)1/
24.0	240	.240

1/ Based on preferred alternative with management requirements.

LIVESTOCK GRAZING: There is some grazing on private land in the lower valley and flatland areas.

SOCIO-ECONOMIC EFFECTS: The Carbon River is paralleled by trail and then by road, passing through the small communities of Carbonado, Wilkeson, Burnett, South Prairie and Orting. Increasingly inhabited by people who work in the Tacoma area, these communities were traditionally supported by farming and the forest product industries. Thousands of visitors every year seek the scenic and recreation opportunities of the area and make their contribution to the local economies.

CURRENT ADMINISTRATION: The upper 9 miles of the river are in Mount Rainier National Park which is administered by the National Park Service (NPS). The headwaters downstream to Ipsut Creek Campground are in the Mt. Rainier National Park Wilderness. Downstream from the campground to the NPS entrance headquarters, portions of the river corridor are in wilderness except for 100 feet on either side of the gravel road that parallels the river. National Forest lands are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

Under the guidelines of the Washington State Shoreline Management Act of 1971, approximately 50 percent of the shoreline along the Carbon River has been classified by Pierce County as Natural. The remaining shorelines are classified Conservancy or Rural. These classifications are applicable only to lands outside of federal jurisdiction within 200 feet of the ordinary high water mark. A Natural designation denotes areas characterized by the presence of some unique natural features considered valuable in their undisturbed or original condition and which are relative intolerant of intensive human use. A Conservancy designation denotes shoreline areas which are primarily free from intensive development. A Rural designation denotes shoreline areas that are characterized by agricultural uses, low density residential or areas providing open space between predominantly urban uses.

Sections 25, 26 and 27, all near the community of Crocker, are zoned for General Use by Pierce County.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the Carbon River for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 10,000	
Costs of Implementation		5,000
Development of Management Plan		58,700
Operation and Maintenance Costs	250,000	
Total - First Five Years	**$260,000**	**$63,700**

General administration and operation and maintenance costs are estimated to continue at $52,000 annually.

WHITE RIVER

King and Pierce Counties — Mt. Rainier National Park

The White River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters in Mt. Rainier National Park downstream to the confluence with the Clearwater River.

Segment 1 - Headwaters at Emmons Glacier on the northeast slopes of Mt. Rainier to Huckleberry Creek (20.0 mi).

Segment 2 - Huckleberry Creek to the confluence with the Clearwater River (17.7 mi).

RIVER MILEAGE:

Study:	37.7 miles
Eligible.	37.7 miles
Forest Plan:	37.7 miles recommended for designation in preferred alternative

Note: This recommendation is pending evaluation by the National Park Service.

OUTSTANDINGLY REMARKABLE VALUES: The White River was found to possess "Outstandingly Remarkable" values for the following: Recreation, Fisheries, Wildlife and Historical/Cultural.

Trout fishing is a popular activity on the river. Good rafting exists from the West Fork Road bridge to the bridge at Bridge Camp. Campers, hikers and sightseers visit the area for access to the National Forest and Mt. Rainier National Park. There are magnificent views of Mt. Rainier from the river corridor.

Fish found in the White River include spring chinook and coho salmon, steelhead, dolly varden, rainbow and resident cutthroat trout.

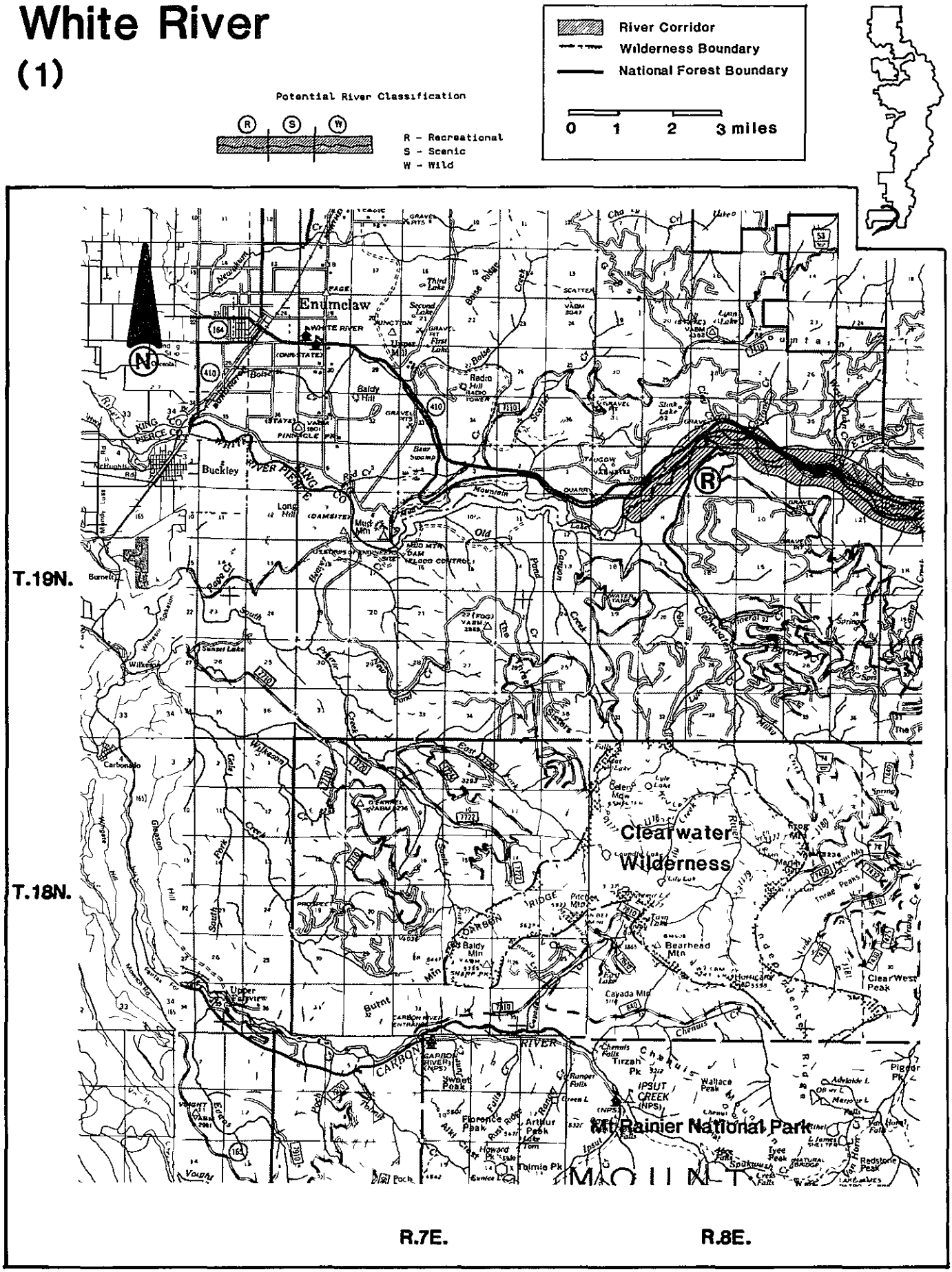
The area has excellent deer and elk winter range. Bald eagles and mountain goats are also a primary species of interest. A SOHA is centered on the river just north of Mt. Rainier National Park.

Historic period sites represent logging, recreation and Forest Service administration. During the 1930's there was a CCC camp located along the river and the construction of the Silver Creek Ranger Station was a result of that program.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Scenic	20.0	Scenic	20.0
Segment 2	Recreation	17.7	Recreation	17.7

White River
(1)



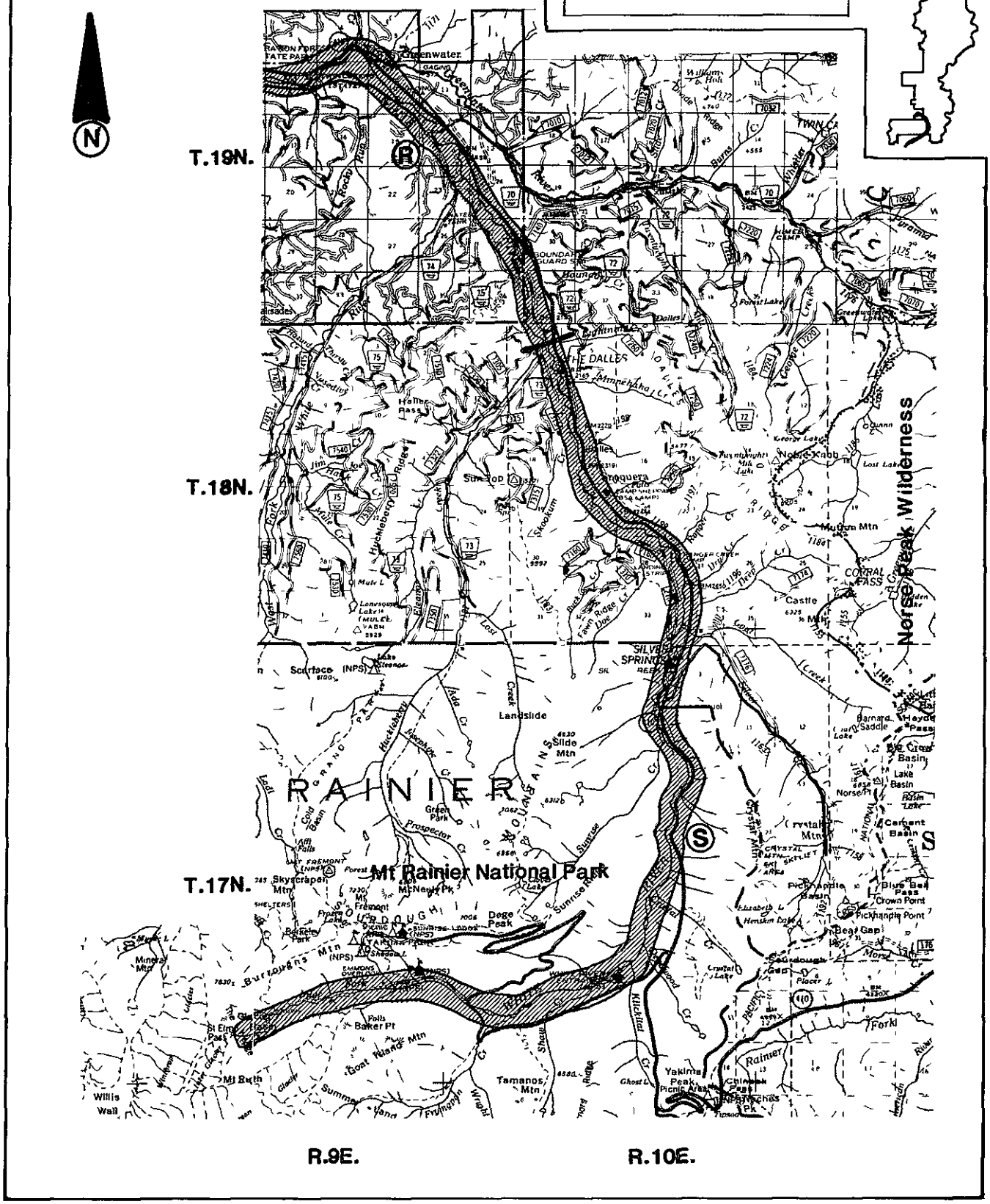
White River
(2)

Potential River Classification

R - Recreational
S - Scenic
W - Wild

River Corridor
Wilderness Boundary
National Forest Boundary

0 1 2 3 miles



SUITABILITY DETERMINATION:

The White River was found to be suitable for inclusion in the preferred alternative of the Forest Plan due its many outstandingly remarkable values, few competing resource uses, and high public support for designation. Joint Forest Service and Park Service management is recommended.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
NPS, Mt. Rainier National Park	13.3 miles	4,256 acres
Mt. Baker-Snoqualmie National Forest	6.7 miles	2,144 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	0.4 mile	128 acres
Private	15.9 miles	5,088 acres
State, Federation Forest State Park	1.4 miles	448 acres
TOTAL	37.7 miles	12,064 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: Neither river segment is classified by the BLM as an area of critical mineral potential. A review of available literature, including the Bureau of Mines MILS data, indicates that there are clay deposits and sulfur and perlite prospects located in T.19 N., R.8 E., Sections 4, 7 and 11, and in T.19 N., R.8 E. Sections 32 and 33. The clay (alunite) deposit was first discovered in 1928 and at least 3,600 feet of diamond drilling and 4,400 feet of exploratory drilling has occurred. This deposit not only has significant potential for industrial uses, but it also represents a prime target for future precious metal exploration.

As indicated, the area has an alunite deposit. As a consequence, the western three miles has been classified as being prospectively valuable ("PV") for potassium resources. In addition, both river segments are classified as being "PV" for geothermal resources. The area is not considered to have potential for the occurrence of coal, nor is it classified "PV" for oil and gas. However, the following lands have been encumbered by oil and gas leases: T.18 N., R.10 E., Sections 5,6,7,8,17,20,21 and 34, T.19 N., R.10 E., Section 30 and T.17 N., R.10 E. Section 3.

Based upon the available information, it appears that most of the area has a relatively low potential for the occurrence of locatable mineral resources. No serious interest in the form of mining claims is currently being expressed. However, it does appear that the western five or six miles does contain known deposits of clay and possibly perlite, which may indicate a potential for the occurrence of a hydrothermal deposit of precious metals. That potential has not been appropriately evaluated. It also appears that the area has potential for the occurrence of geothermal resources. However, no interest in that resource is currently being expressed. The area is not "PV" for oil and gas but some interest has been expressed in the past with the issuance of noncompetitive leases. Whether such interest will continue is not known.

WATER RESOURCE DEVELOPMENT: Mud Mountain Reservoir extends from the confluence of the White and Clearwater Rivers downstream 5.5 miles to the Mud Mountain Dam. The reservoir is below the White River segments being considered for designation. The dam is earth core and rock-filled, and is 425 feet high and 700 feet long.
The White River is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: There are numerous private roads, logging roads and Forest Service roads within the White River drainage. State Highway 410 parallels the river to the Mt. Rainier Park entrance. Park roads parallel the river to the White River Campground, 1 1/2 miles from Emmons Glacier.

Mather Memorial Parkway (State Hwy 410) has congressional designation and has been managed for recreation and viewing for pleasure.

Bridges cross the river at 6 locations.

The communities of Greenwater and Crystal Village are the only populated areas in the upper river above Mud Mountain Dam. There are approximately 180 recreation residences on private lands within the corridor.

Federation Forest State Park, 17 miles east of Enumclaw, contains 612 acres of virgin old growth forest. The park has an interpretive center depicting Washington flora and fauna, river access and a day-use area.

There are 2 National Forest campgrounds along the river. The Dalles Campground, near Minnehaha Creek, has 45 camp sites and 10 picnic sites. Silver Springs Campground has 56 camp sites and 10 picnic sites. Rip-rap is used to protect the campgrounds.

The Buck Creek Trail #1169 begins on State Highway 410, 28 miles from Enumclaw. The trail crosses the White River over a cable suspension bridge.

The Skookum Flats Trail, #1194, follows the west side of the White River for 8.2 miles. The trail begins on the Huckleberry Creek Road #73 and ends at the Mt. Rainier National Park Boundary

The Dalles Nature Trail, #1204, and the Dalles River Trail, #1204-A, begin at Dalles Campground. The Nature Trail is within the campground and is a barrier-free trail open to wheelchairs. The River Trail follows the White River from the campground to the Huckleberry Creek Road #73.

The White River Trail, #1199, parallels Highway 410 for 6 miles, beginning at Corral Pass Road, #7174, and heading downhill. The trail is on the opposite side of the road from the river.

Rearing channels have been constructed to protect fish habitat.

RECREATION ACTIVITIES: Trout fishing is a popular activity on the river. Good rafting exists from the West Fork Road bridge to the bridge at Bridge Camp. However, the remainder of the river is too shallow in summer for use. There is incidental canoeing and kayaking use from the West Fork confluence to the Old Pond Creek just above Mud Mountain Dam.

There is moderate use along the river by campers and picnickers. Some ORV use occurs on the gravel bars. Many hikers and sightseers visit to the area to use the extensive trail system and for views of wildflowers, glaciers and Mt. Rainier.

	1988 RVD'S	Projected 2000 RVD'S
Boating (power, nonpower)	500	825
Fishing, Hunting	500	720
Camping	100,000	150,000
Viewing (scenery, wildlife, driving for pleasure)	500,000	760,000
Misc. (hike, picnic, berry picking, etc.)	50,000	98,000
TOTAL	651,000	1,009,545

WILDLIFE AND FISHERIES: The area has extensive winter range for black-tailed deer and Roosevelt elk. Bald eagles and mountain goats are also primary species of interest. A SOHA is centered on the river just north of Mt. Rainier National Park.

Salmon are transported and released 10 miles above the dam near Greenwater. Spring chinook and coho salmon spawn in the shallow, slower moving riffle areas. Steelhead, dolly varden, rainbow and resident cutthroat trout also inhabit the waters. Major limiting factors to increased salmon production include flooding, heavy silt loads, low summer flows, limited food supply in glacial watersheds and extremely cold water temperatures.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The White River is a fast-flowing glacial stream, fed by the Emmons and Fryingpan Glaciers on Mt. Rainier. The river displays its mountainous origins with heavy boulders, deep-cut banks and a meandering channel with many splits. The river flows from the snowfields to a narrow valley floor with a steep, precipitous gradient. Near the community of Greenwater, the gradient moderates and the valley floor broadens slightly.

The river channel is unstable with numerous splits and braiding. The river contains falls, rapids, cascades and riffles. The gradient is approximately fifty feet per mile. There are 33 tributaries to the White River.

GEOLOGY: Andesitic, basaltic, and associated pyroclastic rocks comprise the bedrock geology of the valley.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the White River and no prehistoric resources are recorded. The lack of sites may reflect survey patterns rather than lack of use. Some prehistoric sites may be expected to be associated with the use of Naches Pass as a travel and trade route. When documented during the historic period, this route followed the White River for a portion of its length. Prehistoric sites have been found along the river below the Wild and Scenic River corridor.

In the late 1800's, the upper reaches of the White River were actively explored for gold and quartz. Access to these claims were by way of a horse trail that followed the river.

Historic period sites represent logging, recreation and Forest Service administration. During the 1930's there was a CCC camp located along the river. The construction of the Silver Creek Ranger Station was one result of the program. This historic ranger station is still visible from the highway and will be evaluated for inclusion on the National Register of Historic Places.

TIMBER: Outside of Mt. Rainier National Park, timber harvesting is a major land use activity. Extensive clearcut areas cover the area.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
97.5	.056	.052

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The White River with its headwaters in Mt. Rainier National Park at Emmons Glacier, is paralleled by State Highway 410 for much of its length The highway passes through Greenwater, Buckley and Enumclaw. Logging and tourism help support the local economies. Many residents also find employment in the Tacoma and Seattle metropolitan areas.

Visitors come to this area to enjoy sightseeing in Mt. Rainier Park and the National Forest. Other recreation opportunities include climbing, hiking, skiing at Crystal Mountain Ski Area, cross-country skiing, ORV and horse use, fishing, hunting and camping.

CURRENT ADMINISTRATION: From its headwaters downstream 13.3 miles, the White River flows through Mount Rainier National Park, administered by the National Park Service Some of the river corridor is classified Mt. Rainier National Park Wilderness where the corridor is beyond 200 feet of the road that goes to Sunrise Lodge. From there, the river flows through Mt. Baker-Snoqualmie National Forest, USDA Forest Service

Under the guidelines of the Washington State Shoreline Management Act of 1971, the shoreline of the White River has been classified as:

> Conservancy from the National Forest Boundary to the community of Greenwater
>
> Intermingled areas of Conservancy and Rural from the community of Greenwater to the confluence with the Clearwater River.

These classifications are applicable only to lands not under federal jurisdiction and within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development. A Rural designation denotes shoreline areas characterized by agricultural uses, low density residential where most urban services are not available and areas which provide buffer zones and open space between predominantly urban areas.

The north bank of the river lies in King County and the south bank in Pierce County. The King County Comprehensive Plan has zoned the land along the north shore of the White River corridor, outside of federal jurisdiction, for Forestry Use. Pierce County has zoned land along the south shore for General Use.

FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

The following are expected funding requirements for the White River for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 1,000	$ 2,000
Costs of Implementation		10,000
Development of Management Plan		60,800
Development Costs	119,000	
Operation and Maintenance Costs	419,500	
Total - First Five Years	**$539,500**	**$72,800**

General administration and operation and maintenance costs are estimated to continue at $84,500 annually.

LAND ALLOCATION WITHIN RECOMMENDED WILD AND SCENIC RIVER:

This river is recommended for designation under the Wild and Scenic Rivers Act. The following lists the Forest Plan management emphasis allocations for the preferred alternative. (Note: This applies to lands administered by the National Forest Service.)

	Recommended River Classification	Management Emphasis	Acres
Segment 1	Scenic	Special Area - Mather Memorial Parkway	2,724
		Pine martin/pileated woodpecker habitat	42
Segment 2	Recreation	Scenic Corridor (Middleground)	42
		Special Area - Mather Memorial Parkway	211

CLEARWATER RIVER

Pierce County

The Clearwater River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987 Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From its headwaters on Bearhead Mountain in the Clearwater Wilderness to its confluence with the White River.

Segment 1 - The headwaters in the Clearwater Wilderness on Bearhead Mountain in the NW 1/4 of Section 28, T 18 N., R.8 E. to the Clearwater Wilderness boundary (3.6 mi).

Segment 2 - The Clearwater Wilderness boundary to the confluence with the White River (6.2 mi).

RIVER MILEAGE:

Study·	9.8	miles
Eligible:	9.8	miles
Forest Plan:	0 0	miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The Clearwater River was found to possess "Outstandingly Remarkable" values for the following: Fisheries and Wildlife

The river corridor supports an extensive black-tailed deer and Roosevelt elk winter range. Spotted owls are found in the upper river drainage within the wilderness boundary.

Chinook and coho spawn and rear in the Clearwater Resident cutthroat and rainbow trout populations are also found.

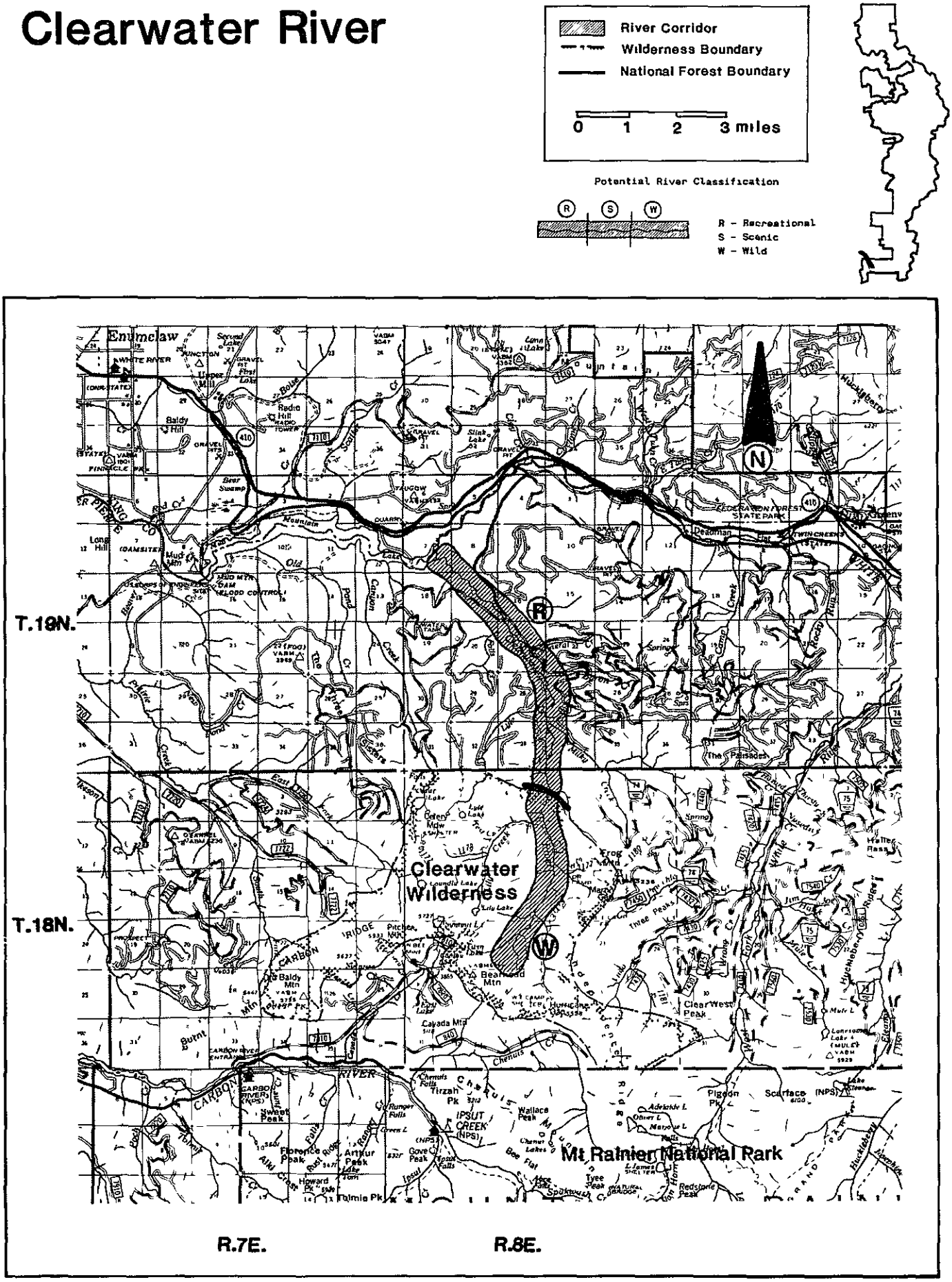
POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	3.6	Not recommended	0.0
Segment 2	Recreation	6.2	Not recommended	0.0

SUITABILITY DETERMINATION:

The Clearwater River was found to be not suitable for inclusion in the preferred alternative of the Forest Plan due to the large amount of private ownership in the river corridor and low public interest. Wilderness designation protects the river inside of the National Forest.

Clearwater River



LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Clearwater Wilderness - 3.6 mi)	3.6 miles	1,152 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	0.4 mile	100 acres
Private	5.8 miles	1,884 acres
TOTAL	9.8 miles	3,136 acres1/

1/Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: The southern five miles, most of which lies in the Clearwater Wilderness area, have been classified by the BLM as an area of critical mineral potential. A review of available literature, including the Bureau of Mines MILS data, indicates that the area has no reported locatable mineral resources. BLM mining claim recordation data indicates that none of the area is currently encumbered by unpatented mining claims.

The north 1 mile of the river is classified by the BLM as prospectively valuable ("PV") for alunite (potassium-bearing clay) and the entire river is classified "PV" for geothermal resources. This may indicate a potential for the occurrence of precious metal resources. None of the area is currently encumbered by mineral leases or lease applications and no interest in those resources is currently being expressed.

WATER RESOURCE DEVELOPMENT: No water impoundments occur along the river. The Clearwater River is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: A private forest road parallels the river. There are jeep trails and additional roads in the area. The private road crosses the Clearwater River approximately 2 1/4 miles south of its confluence with the White River.

There are no homes, farms or developed campgrounds along the river.

The Clearwater Trail #1178 crosses the Clearwater above Lily Creek.

RECREATION ACTIVITIES: There is a moderate amount of dispersed recreation use along the river. Steelhead, dolly varden, rainbow and cutthroat trout are frequently fished. There is limited kayaking from the private road bridge to the confluence with the White River.

	1988 RVD'S	Projected 2000 RVD'S
Misc. (hike, picnic, berry picking, etc.)	200	400

WILDLIFE AND FISHERIES: The river corridor supports an extensive black-tailed deer and Roosevelt elk winter range outside the wilderness. Spotted owls are found in the upper river drainage within the wilderness boundary.

Salmon are transported and released into the White River 10 miles above the dam near Greenwater. Adult chinook and coho salmon move downstream and into the Clearwater River. They have been observed as far as 5 miles up the Clearwater. Resident cutthroat and rainbow trout inhabit the entire drainage.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: The Clearwater River originates from springs and natural runoff on Bearhead Mountain and descends through a narrow, steep, heavily forested valley. In the lower 4 miles, the valley gradually broadens and the gradient moderates. Heavy rubble predominates with considerable angular rock and gravel in the lower portions of the river. There are several cascades in the river and a number of falls and cascades in the tributaries. Fourteen tributaries drain into the Clearwater River

The Clearwater River is listed by the State Department of Ecology as a "River of Statewide Significance" based on water volume. The water quality is excellent.

GEOLOGY: The area is dominated by andesitic and associated pyroclastic rocks, with some granitic intrusions occurring in the headwaters area. Most of the valley is V-shaped, but does broaden somewhat as it leaves the Forest.

CULTURAL RESOURCES: No systematic cultural resource surveys have been made of the Clearwater River and there are no known resources. No known locations used for traditional religious practices are within the potential Wild and Scenic River corridor.

TIMBER: Logging is the principal activity outside of the wilderness. On private lands, there are some areas with extensive clearcuts.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	----------ASQ----------	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt with Eligible W&SR Designation (MMBF/yr.)1/
6.9	025	.025

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The Clearwater River flows into the White River approximately 8 1/2 miles east of the town of Enumclaw, near State Highway 410. Easy access to Mt. Rainier National Park, scenic drives, camping opportunities and numerous hiking trails attract visitors who help to boost the economies of communities such as Enumclaw (population 5,427) and Buckley (population 3,143). These communities rely upon the forest product industry, farming and tourism. Many residents of the area are employed in the Tacoma or Seattle metropolitan areas and commute daily.

CURRENT ADMINISTRATION: The Clearwater River originates and flows through 3 1/2 miles of the Clearwater Wilderness. The wilderness plus other National Forest lands are administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.

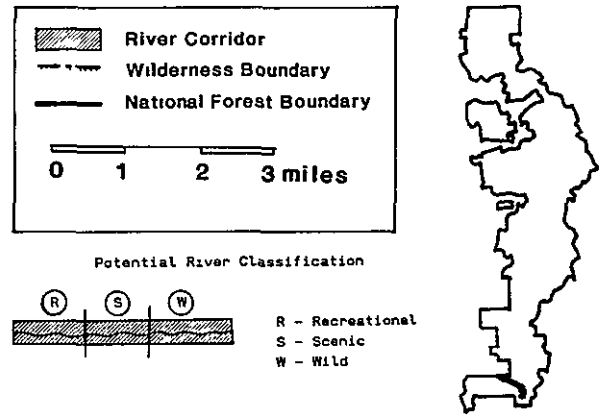
FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

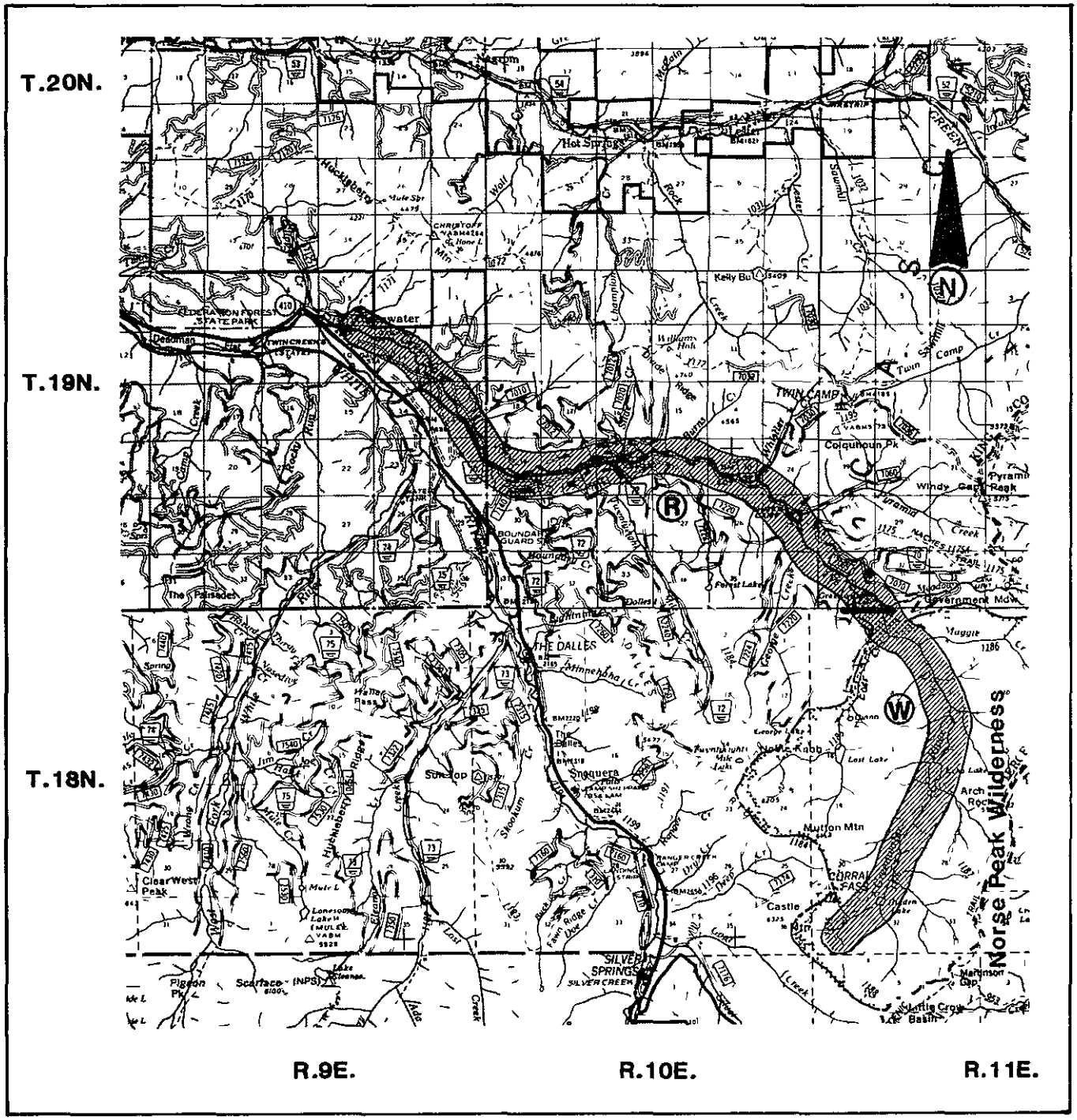
The following are expected funding requirements for the Clearwater River for the next five years:

	Expected Expenses Independent of Designation	Addit. Expenses with Designation
General Administration	$ 1,000	$ 1,000
Costs of Implementation		2,000
Development of Management Plan		15,100
Development Costs	70,000	
Operation and Maintenance Costs		
Total - First Five Years	**$71,000**	**$18,100**

General administration and operation and maintenance costs are estimated to continue at $400 annually.

Greenwater River





GREENWATER RIVER

Pierce County

The Greenwater River was studied for potential Wild and Scenic River designation by the MBS in conjunction with the Forest Planning process. The study included an eligibility and suitability assessment. The DEIS and Draft Plan were issued December, 1987. Public and other agency comment to the DEIS led to reevaluating eligibility and suitability.

LOCATION: From the headwaters on Castle Mountain to the confluence with the White River, near the community of Greenwater.

Segment 1 - Headwaters on Castle Mountain in the SW 1/4 of Sec. 5, T.17 N., R.11 E. to the Norse Peak Wilderness boundary (8.4 mi).

Segment 2 - Norse Peak Wilderness boundary to the confluence with the White River (13.0 mi).

RIVER MILEAGE:

Study:	21.4 miles
Eligible:	21.4 miles
Forest Plan:	0.0 miles recommended for designation in preferred alternative

OUTSTANDINGLY REMARKABLE VALUES: The Greenwater River was found to possess "Outstandingly Remarkable" values for the following: Fisheries and Historical/Cultural.

The Greenwater River is one of the principal spawning areas for spring chinook. Also found are coho salmon, eastern brook trout and resident cutthroat and rainbow trout.

A historic cross-country travel route through Naches Pass follows A PORTION OF the Greenwater. Other historic sites represent early homestead claims.

POTENTIAL AND RECOMMENDED CLASSIFICATION:

Segment	Potential Classification	Miles	Recommended Classification in Preferred Alt.	Miles
Segment 1	Wild	8.4	Not recommended	0
Segment 2	Recreation	13.0	Not recommended	0

SUITABILITY DETERMINATION:

The Greenwater River was found to be not suitable for inclusion in the preferred alternative of the Forest Plan due to high competing resource values.

LANDOWNERSHIP:

Segment 1	River Miles	Corridor Acres
Mt. Baker-Snoqualmie National Forest (Norse Peak Wilderness - 8.4 mi)	8.4 miles	2,688 acres
Segment 2		
Mt. Baker-Snoqualmie National Forest	8.5 miles	2,720 acres
Private	4.5 miles	1,440 acres
TOTAL	21.4 miles	6,848 acres1/

1/ Acres based on a 1/4 mile corridor on each side of the river.

MINERAL AND ENERGY RESOURCE ACTIVITIES: Neither river segment is classified by the BLM as an area of critical mineral potential nor encumbered by unpatented mining claims. A review of available literature, including the Bureau of Mines MILS data, indicates that none of the area has reported occurrences of locatable mineral resources.

The BLM has classified the entire river as being prospectively valuable ("PV") for geothermal resources. None of the area is considered to have potential for the occurrences of other leasable mineral commodities. Even though it is not classified "PV" for oil and gas, the following lands have been encumbered by noncompetitive oil and gas leases, all of which have terminated: T.18 N., R.11 E. Sections 5,9,29 and 32, and T.19 N., R.10 E., Sections 20,22 and 24.

Based upon available information, it appears that the area has a relatively low potential for the occurrence of locatable mineral resources. No interest in such resources is currently being expressed. The area does have potential for the occurrence of geothermal resources and some of the area has been encumbered by oil and gas leases in the past. However, no interest is currently being expressed in those resources.

WATER RESOURCE DEVELOPMENT: There are no water impoundments on the river. The Greenwater River is classified as "Protected" from hydropower development by the Northwest Power Planning Council.

TRANSPORTATION, FACILITIES AND OTHER DEVELOPMENTS: The area is served by Forest Road 70 and several private logging roads. They cross and recross the river through "checkerboard" ownership to Meadow Creek. There are plan to pave Forest Road 70 in 1989.

Highway 410 crosses above the confluence with the White River at the community of Greenwater. In addition, the Greenwater is crossed three times by other roads.

The community of Greenwater is the only populated area. Except for a few summer homes along the river banks, there is little development.

There are many dispersed sites, but no developed campgrounds along the river.

The Naches Wagon Road Trail #1175 begins near the intersection of Forest Roads 70 and 7060. The trails heads over Naches Pass into the Wenatchee National Forest.

The Echo Lake Trailhead #1176 is also located at the intersection of Forest Roads 70 and 7060. The trail parallels the river past Greenwater Lakes to Echo Lake. The trail then continues up the Greenwater River to Hidden Lake, before heading uphill to Corral Pass. There are numerous dispersed campsites along the trail.

Portions of the river are channelized to stabilize a meandering river for the purpose of improving salmon rearing and spawning.

RECREATION ACTIVITIES: There is heavy dispersed camping and ORV use along the river. Many of the sites are accessed by hiking along the river.

Canoeing and kayaking use occurs sporadically along the lower 6 miles. There is swimming and wading during late summer. Steelhead, resident rainbow and cutthroat trout fishing is extremely popular.

	1988 RVD'S	Projected 2000 RVD'S
Boating (power and nonpower)	500	825
Waterplay (swim, wade)	4,000	6,000
Fishing, Hunting	2,000	2,880
Camping	45,000	67,500
Viewing (scenery, wildlife, driving for pleasure)	2,000	3,040
Misc. (hike, picnic, berry picking, etc.)	10,000	19,600
TOTAL	63,500	99,845

WILDLIFE AND FISHERIES: Elk, deer, eagles, great egrets, and various waterfowl present. There is extensive winter range for black-tailed deer and Roosevelt elk.

Small to moderate numbers of coho populate the Greenwater. The river is one of the principal spawning areas for spring chinook in the White River drainage system. Adult salmon swim upstream as far as Burns Creek, where steep gradients and cascades block further access. Eastern brook trout and resident cutthroat and rainbow trout inhabit the entire river system. Logging activity in the drainage has reduced streamside cover and increased the rate of siltation.

STREAMFLOW, GRADIENT AND VALLEY PROFILE: Along the upper 12 miles, the river drops steeply and rapidly. There are numerous cascades, small lakes and falls above George Creek. Below Burns Creek the gradient moderates and the channel takes a more winding course toward the community of Greenwater. A few stretches have numerous channel splits. Over the lower four miles, the river flows through a relatively broad, flat valley with good pool-riffle balance.

The river bottom is composed primarily of bedrock and boulders. Thirty tributaries flow into the Greenwater River.

GEOLOGY: Andesitic, basaltic, and associated pyroclastic rocks comprise the bedrock geology of this area. Most of the valley is V-shaped but broadens somewhat during the last 5 miles or so.

CULTURAL RESOURCES: No systematic archaeological survey has been made of the Greenwater River. However, information is available from a number of project surveys. Evidence of use during the prehistoric period is present, but not abundant within the Wild and Scenic River corridor. The lack of sites is believed to represent survey patterns rather than lack of use. Prehistoric artifacts are thought to be associated with a cross-Cascade travel route through Naches Pass. This route was used during the historic period and followed a portion of the Greenwater.

The first non-Indian use of the Naches Pass Trail was probably by members of the Hudson's Bay Company in the 1830's. Efforts to establish a wagon road began in 1850 and continued for several years. In 1853, the historic immigrant wagon party made its way across Naches Pass, dropping into the Greenwater Valley and crossing the river 16 times. Portions of the trail are still visible and it is under consideration for inclusion on the National Register of Historic Places. It is currently listed on the State Historical Register.

Other historic sites represent early homestead claims, some of which were made for the financial gain of timber investors. Many were abandoned by 1910 with remains of some of the sites still found within the river corridor.

TIMBER: Logging is a principal activity with some areas having been extensively clearcut outside the Wilderness.

The following table describes total timber volume and annual sale quantity (ASQ) in millions of board feet for National Forest system lands only:

	ASQ	
Total Timber Volume (MMBF)	Preferred Alternative w/o W&SR Designation (MMBF/yr.)1/	Preferred Alt. with Eligible W&SR Designation (MMBF/yr.)1/
46.4	2.748	2.532

1/ Based on preferred alternative with management requirements.

SOCIO-ECONOMIC EFFECTS: The Greenwater River passes through a series of lakes, which are popular hiking and fishing destinations. Outside the wilderness area, the river is paralleled by roads to its confluence with the White River at Greenwater (pop. 100). Greenwater gains its economic support from the timber industry and by providing services to the many visitors who come to enjoy the many recreation opportunities in the National Forest and Mt. Rainier National Park.

CURRENT ADMINISTRATION: The upper 8 miles of the river is within the Norse Peak Wilderness. The wilderness and other National Forest lands are *administered by the Mt. Baker-Snoqualmie National Forest, USDA Forest Service.*

Under the guidelines of the Washington State Shoreline Management Act of 1971, the shoreline of the Greenwater River has been classified as Conservancy by King and Pierce Counties. This classification is applicable only to non-federal lands within 200 feet of the ordinary high water mark. A Conservancy designation denotes shoreline areas which are primarily free from intensive development.

The land along the north shore of the Greenwater River, outside of federal jurisdiction, is zoned by King County for Forestry Use. The land along the south shore is zoned by Pierce County for General Use.

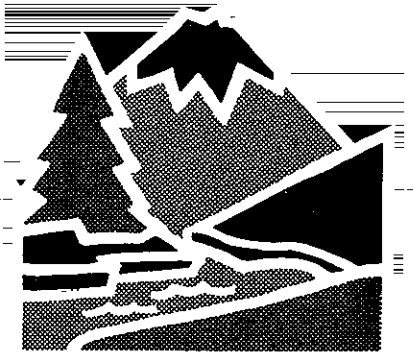
FUNDING NEEDS IF CLASSIFIED AS A WILD AND SCENIC RIVER:

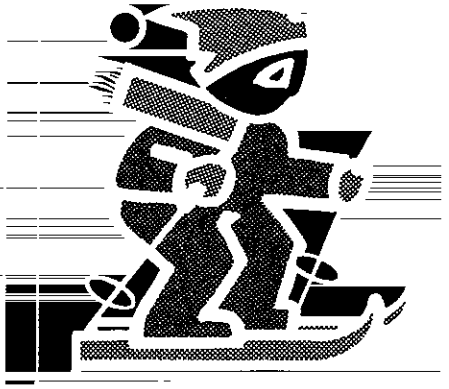
The following are expected funding requirements for the Greenwater River for the next five years:

	Expected Expenses Independent of Designation	**Addit. Expenses with Designation**
General Administration	$150,000	
Costs of Implementation		50,000
Development of Management Plan		22,500
Development Costs		120,000
Operation and Maintenance Costs	30,000	30,000
Total - First Five Years	**$180,000**	**$177,500**

General administration, operation and maintenance costs are estimated to continue at $42,000 annually.

Appendix





APPENDIX F

SELECTION OF HARVEST CUTTING METHOD

Harvest cutting methods include both even-aged and uneven-aged silvicultural systems. Even-aged harvest cutting methods (silvicultural treatment methods) generally include clearcutting, shelterwood cutting, and seedtree cutting. Uneven-aged harvest cutting methods (silvicultural treatment methods) generally include individual tree selection and group selection cutting. The intent of this appendix is to document the rationale for selection of the broad harvest cutting methods (even-aged or uneven-aged) to be applied on the Mt. Baker-Snoqualmie National Forest. The specific harvest treatment methods (such as clearcutting, seedtree cutting, or group selection) will be selected on a site specific basis as identified in project-level environmental analyses or in silvicultural prescriptions written or approved by certified silviculturists.

EVEN-AGED VERSUS UNEVEN-AGED SELECTION CRITERIA

The criteria used for selection of harvest cutting methods were developed using selection criteria identified in the Regional Guide for the Pacific Northwest Region (1984), as well as direction provided in 36 CFR 219.27 (b) for management prescriptions that involve manipulation of tree cover. A brief description of the criteria follows. These descriptions are intended as a guide; refer to the regulations and Regional Guide for more precise interpretations.

Selection Criteria From the Regional Guide

1. The selected method must permit the production of a volume of marketable trees sufficient to utilize all trees that meet utilization standards and are designated for harvest.

2. The selected method must permit use of a logging method which can remove designated trees without excessive damage to the residual stand and while meeting other established land management objectives. Table 3-1 in the Regional Guide displays the compatibility of logging systems with common harvest cutting methods. Generally, ground based logging methods, helicopters, and cable methods using slack pulling carriages are appropriate for all harvest methods while cable methods without slack pulling carriages and balloons are appropriate only for clearcuts.

3. The selected harvest method must be capable of providing special conditions that are required to meet resource management objectives. Table 3-2 in the Regional Guide displays commonly used harvest methods which achieve desired forest character. Generally, both even-aged and uneven-aged methods can meet desired forest character with the exception of a mosaic of forest and opening and maximum wildlife species diversity. Here, uneven-aged methods are not applicable.

4. The selected method must permit control of vegetation to establish desired numbers and rates of growth of trees as well as other vegetation needed to achieve special management objectives. Tables 3-3 and 3-4 in the Regional Guide outline these harvest cutting methods. Generally, both even-aged and uneven-aged methods can be used in vegetation zones occurring on the MBS; however, uneven-aged methods are not applicable for wildlife forage production or optimum tree seedling and sapling growth.

5. The selected method must promote a stand structure and species composition which minimizes serious risk from insects, disease, animal damage, and wildfire and will allow treatment of existing insect, disease and fuel conditions. Table 3-5 in the Regional Guide displays harvest cutting methods favorable to the reduction and treatment of these agents. Generally, uneven-aged methods are not applicable where dwarf mistletoe and root disease present serious risks.

6. The selected method must meet multiple-use management objectives identified in the Regional Guide and Forest Plan.

Selection Criteria From 36 CFR 219.27(b)

The seven criteria identified in 36 CFR 219.27(b) which direct management prescriptions for the manipulation of tree cover can be summarized as follows:

1. Be best suited to multiple use goals, considering biological, environmental, engineering, economics, and other impacts.

2. Assure that lands can be adequately restocked.

3. Not be chosen primarily because of the greatest dollar return or timber output, although these factors should be considered.

4. Consider the potential impacts on residual trees and adjacent stands.

5. Avoid permanent reduction of site productivity and ensure conservation of water and soil.

6. Provide the desired effects to meet special management objectives.

7. Be practical in terms of transportation and harvesting requirements and total costs of timber sale preparation, logging and administration.

Combined Criteria For Selection of Harvest Cutting Method

The criteria identified in the Regional Guide and in 36 CFR 217.27(b) were subsequently combined to eliminate duplication of intent and simplify the rationale for selecting the harvest cutting methods used to implement the Final Forest Plan. A summary of the seven combined criteria follows:

1. The selected method must permit the production of a volume of marketable trees sufficient to utilize all trees that meet utilization standards and are designated for harvest. (Regional Guide: Criterion 1)

2. The selected method must use available and acceptable logging methods. (Regional Guide: Criterion 2, 36 CFR: Criterion 4)

3. The selected method must be capable of meeting special management and multiple-use objectives. (Regional Guide: Criteria 3 and 6 , 36 CFR: Criteria 1 and 6)

4. The selected method must permit control of vegetation to establish desired species composition, density, and rates of growth (Regional Guide: Criterion 4, 36 CFR: Criteria 4 and 6)

5. The selected method must promote a stand structure and species composition which minimizes risks from insects, disease, and wildfire. (Regional Guide: Criterion 5)

6. The selected method must assure that lands can be adequately restocked. (36 CFR: Criterion 2)

7. The selected method must be practical and economical in terms of transportation, harvesting, preparation and administration of timber sales. (36 CFR: Criterion 7)

In addition, no harvest cutting method was selected primarily because it resulted in the greatest dollar return or provided the highest output of timber, or which permanently reduced site productivity, or could not assure conservation of the water and soil resources. (36 CFR: Criteria 3 and 5)

WORKING GROUPS AND MANAGEMENT AREAS

Both even-aged and uneven-aged harvest cutting methods were available and evaluated for selection within the Forest's species zones and management area combinations. The three species zones and their applicable management emphasis area combinations are summarized below:

Species Zones 1/	Management Emphasis
1. Western hemlock Tsuga heterophylla	a. Scenic Views and Recreation b. Riparian and Fish Habitat c. Big Game Habitat d. Threatened and Endangered Species e. Timber Production f. Municipal Watersheds
2. Pacific silver fir Abies amabilis	a. Scenic Views and Recreation b. Riparian and Fish Habitat c. Big Game Habitat d. Threatened and Endangered Species e. Timber Production f. Municipal Watersheds
3. Mountain hemlock & subalpine fir Tsuga mertensiana and Abies lasiocarpa	a. Scenic Views and Recreation b. Riparian and Fish Habitat c. Big Game Habitat d. Threatened and Endangered Species e. Timber Production f. Municipal Watersheds g. Mountain Hemlock Study

1/ Refer to Henderson for detailed zone descriptions and definitions; a brief description may be found in Chapter III of the FEIS. These species zones are based on climax species types. The species presently occupying these areas may be Douglas fir, red alder, or combinations of species.

Appendix F

LITERATURE CITED OR REVIEWED

The evaluation of harvest cutting methods is based on operational experience and research findings published in the following documents:

Burns, R.M., tech. comp. 1983. Silvicultural systems for the major forest types of the United States. Ag. Handb. 445, USDA, Washington, D.C. 191 p.

Daniel, T.W., J.A. Helms, and F.S. Baker. 1979. Principles of Silviculture. McGraw-Hill, Inc. New York. 500 p.

Fowells, H.A., tech. comp. 1965. Silvics of forest trees of the United States. Ag. Handb. 271, USDA, Washington, D.C. 762 p.

Goheen, D.J., G.N. Filip, C.L. Schmitt, and T.F. Gregg. 1980. Losses From Decay in Western Hemlock. U.S.F.S. Forest Pest Management P.N.W. Region, R6-FPM-045 19p.

Hadfield, J.S. 1985. Laminated Root Rot - A Guide For Reducing and Preventing Losses in Oregon and Washington Forests. USDA, Forest Service, PNW Region, Portland, OR. 13p.

Henderson, J.A. and D. Peter. 1981-1985. Preliminary Plant Associations and Habitat Types. (6 different publications covering the Mt. Baker-Snoqualmie National Forest) USDA Forest Service, Pacific Northwest Region.

Minore, D. 1979. Comparative autecological characteristics of northwestern tree species: a literature review. USDA Forest Service Gen. Tech. Rpt. PNW-87, PNW for. and Range Exp. Stn., Portland, OR 72 p.

Scharpt, R.F., and J.R. Parmeter, Jr., tech. coords. 1978. Proceedings of the Symposium on Dwarf Mistletoe Control Through Forest Management. USDA Forest Service, Gen. Tech. Rep. PSW-31, PSW Forest and Range Experiment Station, Berkley, California. 190 p.

Smith, D. 1962. The practice of silviculture. John Wiley & Sons, Inc. New York. 578 p.

Wright, E. and L.A. Isaac. 1956 Decay Following Logging Injury to Western Hemlock, Sitka Spruce, and True Firs USDA Forest Service Tech. Bul. 1148. 34 p.

RATIONALE FOR SELECTION OF HARVEST CUTTING METHOD

The following analysis documents the rationale for selection of harvest cutting method within each species zone/management emphasis area based on those combined criteria which have a significant effect on the selection:

General

The following are the most significant factors considered in selecting harvest cutting methods for most of the species/management emphasis zones on the Mt. Baker-Snoqualmie National Forest:

Blowdown: Mature and old growth stands on this National Forest are generally overstocked and have relatively small root systems resulting from decades of growing in an overstocked condition. When these stands are disturbed by the selective removal of some of the trees in the stand, the result is usually accelerated deterioration of the remaining stand manifested by extensive blowdown and sunscald. When clear cutting, area boundaries are designed to take advantage of windfirm boundaries as much as possible. Even so, some blowdown may occur along the boundary between the new clearcut and old growth stand.

Root Rot: Root rots are commonly found throughout the Mt. Baker-Snoqualmie. The diseases are spread by root-to-root contact between susceptible species. Control often requires killing trees in an area around the infected trees and replanting with resistant or immune species so infected roots can rot away and no longer serve as infection centers. Uneven-aged management, particularly the single-tree selection system, perpetuates these root disease centers and will increase the problem over time.

Bole Rots: Most bole rots are caused by wounding of the stems, especially when it occurs near ground level. Uneven-aged management causes much wounding of the leave trees during the logging operations, especially on the steep ground typical of most of this forest which must be logged by cable methods. The thin barked species such as western hemlock and true firs are more easily damaged than the relatively thicker barked Douglas-fir. Long term reductions in yields of about 10 to 15 percent would occur in our forest from bole rots if uneven-aged management were used (Wright 1956).

Dwarf Mistletoe (Arceuthobium spp.): Dwarf mistletoes are parasitic plants which are found primarily on western hemlock and the true firs on the MBS. Douglas-fir is not affected here. Dwarf mistletoes vigor improves when provided with more light in partial cuts which occur during uneven-aged methods. This parasite is spread primarily by a unique, explosive seed dispersal mechanism which ejects the seeds up to about 50 feet from the seed source; the seeds stick to the host where infection takes place. Uneven-aged methods intensify and perpetuate the spread of dwarf mistletoes. Growth of the host is reduced and mortality may occur. Old bole infections may provide entrance points for decay fungi and weakened trees are more susceptible to attack by insects. Dwarf mistletoe is the major forest disease problem in the west causing an estimated loss of 3.2 billion board feet of timber annually (Scharpt 1978). Figures are not available for the MBS, but yields are estimated to be reduced by up to 50 percent on some heavily infested stands.

Genetics: Even-aged methods permit the use of genetically improved seedlings. These seedlings come from a population with a broad genetic base due to tree selection throughout the breeding zone. Also, selection for superior form and growth is expected to increase the yield in stands planted with improved stock.

Stand Composition: Uneven-aged methods would lead to the development of stands composed primarily of shade tolerant species such as hemlock and silver fir. These species are generally of lower commercial value than Douglas-fir and noble fir, the two main commercial species which are shade intolerant and best suited to even-aged management methods. It is estimated that the intolerant species favored by even-aged methods have a commercial value of $70.00 per thousand board feet more than the shade tolerant species which would be fostered by uneven-aged management. With an average volume of 40 MBF per acre, this represents a difference in value of $2,800 per acre.

Stand Density: On the MBS, overstocking has a significant adverse effect on board foot yields. Uneven-aged management will result in overstocking and it will be difficult to control stand densities throughout the rotation. Even-aged management permits precommercial and commercial thinnings to be done at intervals during the life of the stand so that densities can be maintained at optimum levels.

Under uneven-aged management, young trees are forced to compete against older, more well-established trees; they do not grow as well as if they were free to grow. To maintain suitable growth rates, tree densities would have to be reduced significantly, which could adversely affect timber yields for uneven-aged methods.

Economics: As described under stand composition above, the difference in species value is significant. In addition, uneven-aged methods require about five times the equipment move-in and -out costs, and about the same increase for set up, skid road line changes, and take-down costs for cable logging topography. Felling costs would be more in uneven-aged methods because the same ground would be covered about five times, and it is more costly to fell trees in a partial-cut due to hang ups from leave trees. These increased logging costs are expected to result in about $200 per acre more for uneven-aged methods bringing the total difference in cost to about $3000 per acre.

Big Game Habitat: In order to provide optimum habitat for deer, elk, and mountain goats, vegetation is managed to provide diverse combinations of forage, hiding cover, and thermal cover. Even-aged methods provide the mosaic of forest and openings which best meet these needs. The frequent entries needed for uneven-aged methods present an undesirable probability of big game harassment. Prescribed burning for forage enhancement is only practical for even-aged methods.

Clear cutting is the most commonly appropriate even-aged method for the above factors.

Visual Management: Uneven-aged methods provide the most natural appearing stands but this type of appearance is usually only required in foreground areas. Visual objectives in middle and background areas can often be met by using techniques of shape, size, and timing of even-aged cuttings. Individual tree selection, group selection cutting, clear cutting, and shelterwood cutting are all commonly used to meet visual management objectives. Many different site specific factors enter into the decision of which method is most appropriate.

WESTERN HEMLOCK SPECIES ZONE

1a. Western Hemlock - Scenic Views and Recreation

Timber stands managed in this area will provide a variety of species, snags, and size classes. Large, old-growth trees will provide an important stand component. Both even-aged and uneven-aged harvest cutting methods are biologically applicable and can provide for the visual variety and maintenance of the large tree component. Here, the special conditions required to meet visual management objectives may be the primary consideration (combined criterion 3). Uneven-aged methods may produce a more uniform canopy which

provides the visually desirable appearance of a natural stand. While economic returns and timber volume production are also important, they may play a secondary role in this management area, depending on the recreation intensity and visual objectives. Tree growth rates should be sufficient to produce the characteristic large tree component within the rotation age and maintain trees in a healthy condition (combined criterion 4). In addition, trees should be managed to minimize risks from insects, windthrow, disease, and wildfire (combined criterion 5). Uneven-aged methods may require artificial regeneration to maintain the appropriate species composition and may be restricted to sites where acceptable logging methods can be applied (combined criterion 2).

Uneven-aged methods are not applicable where insect or disease conditions cannot maintain stands relatively free of risk (combined criterion 5). Serious dwarf mistletoe problems are common in western hemlock. Uneven-aged methods will perpetuate and intensify this problem and are not applicable where most mistletoe infected trees cannot be removed at one entry (combined criterion 5). Many root disease fungi infect susceptible trees by root-to-root contact. Control may require killing trees in a zone around the infected area. Uneven-aged management, particularly the single-tree selection system, can perpetuate root disease "centers" and spread infections (combined criterion 5).

Either even-aged or uneven-aged methods may be selected here. The ultimate selection should be based on specific stand and site characteristics. An environmental analysis will be used in deciding which method should be selected.

1b. Western Hemlock - Riparian and Fish Habitat

This area will be managed to maintain riparian habitat diversity and integrity. Cover will be provided to maintain desirable water temperatures. Timber generally will be managed under extended rotations and large old-growth trees will provide an important stand component. Satisfactory growth rates should be maintained and stands protected from insects, disease, windthrow, and fire (combined criterion 5). While economic returns and timber volume production are important, they play a secondary role in this management area.

Both even-aged and uneven-aged methods are biologically applicable and may be selected here. Uneven-aged methods may require artificial regeneration to maintain the appropriate species composition and may be restricted to sites where acceptable logging methods can be applied (combined criterion 3). Uneven-aged methods may perpetuate windthrow.

Serious dwarf mistletoe problems are common in western hemlock. Uneven-aged methods will perpetuate and intensify this problem and are not applicable where most mistletoe infected trees cannot be removed at one entry (combined criterion 5). Many root disease fungi infect susceptible trees by root-to-root contact. Control may require killing trees in a zone around the infected area. Uneven-aged management, particularly the single-tree selection system, can perpetuate root disease "centers" and spread infection (combined criterion 5). Understory brush species commonly flourish in riparian zones. Uneven-aged management may favor growth of hardwoods and prevent regeneration of tall growing conifers so that shading is reduced on larger streams (combined criteria 4 and 6). Bole rots caused by wounding of leave trees during logging, when using uneven-aged methods, may reduce yields by 10 to 15 percent in the

long run. Uneven-aged methods may provide a more uniform canopy which provides the visually desirable appearance of a natural stand.

Either even-aged or uneven-aged methods may be selected here. The ultimate selection should be based on specific stand and site characteristics. An environmental analysis will be used in deciding which method should be selected.

1c. Western Hemlock - Big Game Habitat

In this area, vegetation will be managed to provide optimum habitat needs for deer, elk, and mountain goats. Vegetation will be managed to provide diverse mixtures of forage, hiding cover, and thermal cover. Although both even-aged and uneven-aged harvest cutting methods are biologically acceptable, even-aged methods can best provide for the special conditions within this management area (combined criterion 3). Uneven-aged methods are generally not applicable where the desired character is a mosaic of forest and openings. In addition, the transportation system and entry frequency necessary for management of uneven-aged stands present an undesirable probability of big game harassment.

Serious dwarf mistletoe problems are common in western hemlock. Uneven-aged methods will perpetuate and intensify the problem and are not applicable where most mistletoe infected trees cannot be removed at one entry (combined criterion 5). Prescribed burning is often recommended for site preparation and forage enhancement and cannot be used with uneven-aged methods.

For these reasons, even-aged harvest cutting methods are recommended for this group. The final selection of the regeneration harvest system will be based on specific stand and site characteristics. An environmental analysis will be used in deciding which regeneration system should be selected. For this species zone, the clearcutting regeneration system is the predominant and commonly appropriate even-aged method.

1d. Western Hemlock - Threatened and Endangered Species

Habitat management for bald eagles and peregrine falcons will emphasize large, overmature trees potentially useable as perch trees and nest sites. Suitable trees should be available throughout time and should be widely distributed. A density of at least eight large trees per acre is satisfactory. Both even-aged and uneven-aged methods are biologically acceptable and can produce the small groups of large trees over time. The selected harvest cutting method must be capable of providing the special conditions which are required to meet the resource management objectives (combined criterion 3), and they take precedence over economic considerations and timber volume production. The selected method should be capable of developing large diameter perch and nest trees at the appropriate point in the rotation (combined criteria 3 and 4).

Either even-aged or uneven-aged methods may be selected here. The ultimate selection should be based on specific stand and site characteristics. An environmental analysis will be used in deciding which method should be selected.

1e. Western Hemlock - Timber Production

Economic returns and timber production are primary considerations in this area. Both even-aged and uneven-aged cutting methods may be biologically acceptable but uneven-aged methods are not applicable for optimum tree growth (combined criterion 4). Even-aged methods are most practical and economical in terms of transportation, harvesting, preparation, and administration of timber sales (combined criterion 7). The size, shape, juxtaposition, and timing of even-aged cutting areas can be varied to provide high levels of big game habitat while meeting visual management objectives and other multiple-use objectives (combined criterion 3). Uneven-aged methods may provide a more uniform canopy which provides the visually desirable appearance of a natural stand.

Serious dwarf mistletoe problems are common in western hemlock. Uneven-aged methods will perpetuate and intensify this problem and are not applicable where most mistletoe infected trees cannot be removed at one entry (combined criterion 5). Many root disease fungi infect susceptible trees by root-to-root contact. Uneven-aged management, particularly the single tree selection system, can perpetuate root disease "centers" and provide for the continued spread of infections (combined criterion 5).

This area often contains the greatest gross volumes per acre and the most decadent stands which often requires that logging slash be treated by prescribed burning for site preparation and/or hazard reduction (combined criteria 5 & 6). Uneven-aged methods do not normally allow prescribed burning to be used. Even-aged methods permit the use of genetically improved seedlings. Bole rots caused by wounding of leave trees during logging, when using uneven-aged methods, may reduce yields by 10 to 15 percent in the long run.

For these reasons, even-aged harvest cutting methods are recommended for this group. The final selection of the regeneration harvest system will be based on specific stand and site characteristics. An environmental analysis will be used in deciding which regeneration system should be selected. For this species zone, the clearcutting regeneration system is the predominant and commonly appropriate even-aged method.

1f. Western Hemlock - Municipal Watersheds

The primary emphasis for this group is the production of high quality and quantity water. Timber production is emphasized to the extent that the water quality goal can be met. Varying emphasis is placed on other resources depending on the specific watershed.

Even-aged methods permit the use of genetically improved seedlings and are best suited for optimum tree growth (combined criterion 4). Even-aged methods are most practical and economical in terms of transportation, harvesting, preparation and administration of timber sales (combined criterion 7) and use commonly available and acceptable logging methods (combined criterion 2). Uneven-aged methods may provide a more uniform canopy which provides the visually desirable appearance of a natural stand.

Even-aged harvest methods are most desirable to convert old-growth stands to stands of desirable species which are free of disease-causing wounds (combined criterion 5). Bole rots caused by wounding of leave trees during logging, when

using uneven-aged methods, may reduce yields by 10 to 15 percent in the long run.

Serious dwarf mistletoe problems are common in western hemlock. Uneven-aged methods would perpetuate and intensify this problem and are not applicable where most mistletoe infected trees cannot be removed at one entry (combined criterion 5). Even-aged methods reduce the frequency of soil disturbance, and reduce the need for construction of landings, haul roads, and skid roads. Over 80 years of sustained road building and heavy cutting using the even-aged method have occurred in the Cedar River Watershed; throughout this period of activity, the watershed has met the water needs of the City of Seattle.

For these reasons, even-aged harvest cutting methods are recommended for this group. The final selection of the regeneration harvest system will be based on specific stand and site characteristics. An environmental analysis will be used in deciding which regeneration system should be selected. For this species zone, the clearcutting regeneration system is the predominant and commonly appropriate even-aged method.

PACIFIC SILVER FIR SPECIES ZONE

2a. Pacific Silver Fir - Scenic Views and Recreation

The rationale described under 1a. Western Hemlock - Scenic Views and Recreation also applies to this group. This zone generally has steeper topography than the western hemlock zone, making uneven-aged management more costly and difficult. With increasing elevation, the amount of western hemlock decreases and the amount of silver fir increases, making dwarf mistletoe less of a problem.

Either even-aged or uneven-aged methods may be selected here. The ultimate selection should be based on specific stand and site characteristics. An environmental analysis will be used in deciding which method should be selected.

2b. Pacific Silver Fir - Riparian and Fish Habitat

The rationale described for 1b. Western Hemlock - Riparian and Fish Habitat also applies to this group Steeper topography may favor more even-aged methods while smaller amounts of mistletoe infected trees will favor more uneven-aged management.

Either even-aged or uneven-aged methods may be selected here. The ultimate selection should be based on specific stand and site characteristics. An environmental analysis will be used in deciding which method should be selected.

2c. Pacific Silver Fir - Big Game Habitat

The rationale described for 1c. Western Hemlock - Big Game Habitat also applies to this group, although more of this area will be managed for mountain goat habitat and less for deer and elk than in the western hemlock zone. Dwarf mistletoe is still a problem in the silver fir zone, but is usually not as

serious as in the western hemlock zone, especially in the higher elevations of this zone where the proportion of silver fir increases.

For these reasons, even-aged harvest cutting methods are recommended for this group. The final selection of the regeneration harvest system will be based on specific stand and site characteristics. An environmental analysis will be used in deciding which regeneration system should be selected. For this species zone, the clearcutting regeneration system is the predominant and commonly appropriate even-aged method.

2d. Pacific Silver Fir - Threatened and Endangered Species

The rationale described for 1d. Western Hemlock - Threatened and Endangered Species applies to the Pacific silver fir zone as well, although fewer bald eagles and peregrine falcons are found in the silver fir zone.

Either even-aged or uneven-aged methods may be selected here. The ultimate selection should be based on specific stand and site characteristics. An environmental analysis will be used in deciding which method should be selected.

2e. Pacific Silver Fir - Timber Production

The rational described for 1e. Western Hemlock - Timber Production applies to the Pacific silver fir zone as well, although dwarf mistletoe is not as serious a problem in this zone and less prescribed burning and more reliance on residual seedlings is done in the silver fir zone.

For these reasons, even-aged harvest cutting methods are recommended for this group. The final selection of the regeneration harvest system will be based on specific stand and site characteristics. An environmental analysis will be used in deciding which regeneration system should be selected. For this species zone, the clearcutting regeneration system is the predominant and commonly appropriate even-aged method.

2f. Pacific Silver Fir - Municipal Watersheds

The rationale described for 1f. Western Hemlock - Municipal Watersheds applies to the silver fir zone as well, although dwarf mistletoe is not as serious a problem in this zone and less prescribed burning and more reliance on residual seedlings is done in the silver fir zone. Even-aged harvest methods permit maximum snow pack build up and late season water runoff, by varying the size, shape, and orientation of harvest units (combined criteria 3).

For these reasons, even-aged harvest cutting methods are recommended for this group. The final selection of the regeneration harvest system will be based on specific stand and site characteristics. An environmental analysis will be used in deciding which regeneration system should be selected. For this species zone, the clearcutting regeneration system is the predominant and commonly appropriate even-aged method.

MOUNTAIN HEMLOCK OR SUBALPINE FIR SPECIES ZONE

Rationales 3a - 3f apply only to the White River and North Bend Ranger Districts. Rationale 3g applies only to the Skykomish, Darrington, and Mt. Baker Ranger Districts.

3a. Mountain Hemlock or Subalpine Fir - Scenic Views and Recreation

The rationale described for 2a. Pacific Silver Fir - Scenic Views and Recreation also applies to this group. The mountain hemlock/subalpine fir zone has the least problem with dwarf mistletoe of any of the zones. This zone also has the lowest timber values and the most expensive harvest costs, because of steep and rough topography.

Either even-aged or uneven-aged methods may be selected here. The ultimate selection should be based on specific stand and site characteristics. An environmental analysis will be used in deciding which method should be selected.

3b. Mountain Hemlock or Subalpine Fir - Riparian and Fish Habitat

The rationale described for 2b. Pacific Silver Fir - Riparian and Fish Habitat also applies to this group. This zone has the least problem with dwarf mistletoe of any of the zones. This zone also has the lowest timber values and the most expensive harvest costs because of steep and rough topography.

Either even-aged or uneven-aged methods may be selected here. The ultimate selection should be based on specific stand and site characteristics. An environmental analysis will be used in deciding which method should be selected.

3c. Mountain Hemlock or Subalpine Fir - Big Game Habitat

The rationale described for 2c. Pacific Silver Fir - Big Game Habitat also applies to this group. Most of the big game management emphasis for this area will be for mountain goats, as this zone is generally located at higher elevations, well above deer and elk winter range.

For these reasons, even-aged harvest cutting methods are recommended for this group. The final selection of the regeneration harvest system will be based on specific stand and site characteristics. An environmental analysis will be used in deciding which regeneration system should be selected. For this species zone, the clearcutting regeneration system is the predominant and commonly appropriate even-aged method.

3d. Mountain Hemlock or Subalpine Fir - Threatened and Endangered Species

The rationale described for 2d. Pacific Silver Fir - Threatened and Endangered Species applies to this species zone as well. Bald eagles and peregrine falcons are rarely found in this high elevation zone.

Either even-aged or uneven-aged methods may be selected here. The ultimate selection should be based on specific stand and site characteristics. An environmental analysis will be used in deciding which method should be selected.

3e. Mountain Hemlock or Subalpine Fir - Timber Production

The rationale described for 2e. Pacific Silver Fir - Timber Production applies to this zone as well. Dwarf mistletoe is rarely a serious problem in this species zone and prescribed burning is usually discouraged to favor residual seedlings. Low timber values and high harvest costs in this species zone favors even-aged management.

For these reasons, even-aged harvest cutting methods are recommended for this group. The final selection of the regeneration harvest system will be based on specific stand and site characteristics. An environmental analysis will be used in deciding which regeneration system should be selected. For this species zone, the clearcutting regeneration system is the predominant and commonly appropriate even-aged method.

3f. Mountain Hemlock or Subalpine Fir - Municipal Watersheds

The rationale described for 2f. Pacific Silver Fir - Municipal Watersheds applies to this zone as well. Dwarf mistletoe is rarely a serious problem in this species zone and prescribed burning is usually discouraged to favor residual seedlings. The heaviest snowfall occurs in this species zone, thus even-aged methods have the greatest potential for increasing late season flows of water.

For these reasons, even-aged harvest cutting methods are recommended for this group. The final selection of the regeneration harvest system will be based on specific stand and site characteristics. An environmental analysis will be used in deciding which regeneration system should be selected. For this species zone, the clearcutting regeneration system is the predominant and commonly appropriate even-aged method.

3g. Mountain Hemlock - Mountain Hemlock Study

This species zone has been tentatively classified as not suited for timber production on the Skykomish, Darrington, and Mt. Baker Ranger Districts because reasonable assurance of obtaining reforestation success within five years of final harvest does not exist. Up to 250 acres will be cut in a structured study design to test various even-aged harvest methods.

Because of low timber values and high harvest costs, even-aged harvest methods are the only methods which can produce a volume of marketable trees (combined criterion 1) and are practical and economical (combined criteria 7). Only even-aged methods meet the special management objective of determining how to meet reforestation standards for even-aged harvested areas (combined criterion 3). Only even-aged methods permit control of vegetation to establish desired species composition, density, and rates of growth (combined criterion 4).

For these reasons, even-aged harvest cutting methods are recommended for this group. The final selection of the regeneration harvest system will be based on specific stand and site characteristics and the objective of the study. An environmental analysis will be used to indicate which regeneration system should be selected.

Appendix C

APPENDIX G

THE PLANS AND POLICIES OF OTHER FEDERAL AGENCIES, STATE AND LOCAL GOVERNMENTS, AND INDIAN TRIBES

Regulation requires the review of the planning and land use policies of other Federal agencies, state and local governments and Indian tribes prior to preparing a Forest Plan EIS. Below is a list of plans reviewed. A summary of the plans pertaining to National Forest land and the potential conflicts with the Forest Plan (the Preferred Alternative in this Final EIS) is also included below.

LIST OF PLANS AND POLICIES OF OTHERS

County Plans

Pierce County - Draft Environmental Impact Statement Pierce County Washington, September,1985.

Snohomish County - Shoreline Management Master Program, September 1974 amended August, 1984.

Snohomish County - Stanwood Area Comprehensive Plan Final Environmental Impact Statement, December, 1984.

Snohomish County - Darrington Area Comprehensive Plan, April, 1984.

Snohomish County - Granite Falls Area Comprehensive Plan, May, 1984.

Snohomish County - Skykomish Valley Area Comprehensive Plan, October, 1980.

Snohomish County - Stream Rehabilitation Program, 1984.

Snohomish County - Draft Comprehensive Park and Recreation Plan, June, 1986

King County - Executive Proposed General Development Guide The King County Comprehensive Plan, April, 1984.

Skagit County - Comprehensive Plan for the Eastern Planning District, May, 1982.

Whatcom County - Comprehensive plan for Whatcom County, Washington, Whatcom County Planning Commission, 1970.

Whatcom County - Lake Whatcom Subarea, a Component of the Whatcom County Comprehensive Land Use Plan, August, 1982.

Municipality Plans

City of Seattle - Cedar-Tolt Watershed Management Plan Final Environmental Impact Statement, August, 1979.

City of Seattle - 1985 COMPLAN - Seattle Comprehensive Regional Water Plan, City of Seattle Water Dept., 1985.

City of Seattle - Cedar River Watershed Cooperative Agreement, May, 1962.

City of Seattle - Cedar River Secondary Use Analysis, 1989, Ordinance #114632.

City of Tacoma - Memorandum of Understanding Between USDA Forest Service and the City of Tacoma, 1984.

City of Tacoma - Requirements For Protection of Water Supply In The Green River Watershed, City of Tacoma Department of Public Utilities Water Division, Revised January 23, 1980.

City of Everett - Sultan River Basin Resource Management Plan, Prepared by Wilsey and Ham, Inc, December, 1977.
City of Bellingham - No Plan

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Washington Forest Practices Rules and Regulations - Washington State Forest Practices Board, October, 1982.

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Strategies for Washington's Wildlife: 1982-1995 - Washington State Department of Game, 1982.

State of Washington Natural Heritage Plan - State of Washington Department of Natural Resources, 1985.

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Forest Resource Plan - State of Washington Department of Natural Resources, November, 1984.

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Wildlife Program Plans - Washington Department of Game, April, 1984.

1984-1993 Forest Land Management Program, State of Washington Department of Natural Resources, November, 1983.

A Multiple Use Plan For Sultan Basin (DNR, 1968).

1989 Puget Sound Water Quality Management Plan, October,1988.
Puget Sound Water Quality Authority

Washington State Trails Policy Plan, draft- January,1990.
Interagency Committee for Outdoor Recreation

Washington's Statewide Comprehensive Outdoor Recreation Plan, 6th addition, 1985. Interagency Committee for Outdoor Recreation.

Federal Agencies

North Cascades National Park-Ross Lake Natural Recreation Area-Lake Chelan Recreation Area General Management Plan, United States Department of the Interior, National Park Service, June, 1988.

Mount Rainier National Park, Final Master Plan Mount Rainier National Park, Washington, Department of Interior, Prepared by Pacific Northwest Region National Park Service, June 1984.

Mount Rainier National Park Wilderness Management Plan, Department of Interior, National Park Service, May,1989.

Indian Tribes

No written plans. Refer to the discussion in Chapter IV, FEIS.

Other Plans

Snohomish River Basin Resource Management Program, Main Report. Prepared by the Snohomish Study Team for the Pacific Northwest River Basins Commission, September 29, 1981.

A Land Use Study For The Route 2 Corridor/South Fork Skykomish River, King County, Washington. King County Department of Planning and Community Development, Planning Division, December, 1983.

Sultan River Project No. 2157, Washington Draft Environmental Impact Statement, Federal Energy Regulatory Commission Office of Electric Power Regulation, April, 1980.

Sultan River Project: "Recreation Plan," Public Utility District No. 1, Snohomish County Washington and City of Everett December, 1982.

Sultan River Project Exhibit S, "Fish and Wildlife Management Plan," Public Utility District No. 1, Snohomish County Washington and City of Everett (Plan not approved).

Sultan River Project Stage II, "Erosion, Sedimentation and Slope Stability Control Plan," Public Utility District No. 1, Snohomish County Washington and City of Everett, July, 1981.

Stillaguamish Watershed Action Plan, January, 1990. Prepared by a committee representing interest groups such as farmers, the environmental committee, the forest industry, citizens, homeowners and tribes as well as Snohomish County and other agencies. Approved by the Washington State Department of Ecology. January, 1990.

Draft Management Plan for Skagit Valley Recreational Area and E. C. Manning Provincial Park and Cascade Recreation Area, Sept 1987, B.C. Parks.

Appendix G

SUMMARY OF PLANS AND CONFLICTS

County Plans

Whatcom County - Comprehensive Plan for Whatcom County: The plan's policy for forested land is that timber should be regarded as the preferred use of these lands. Care should be taken to screen uses which may tend to detract from forest production even though such uses may be appropriate or necessary within the forestry area. Local planning should emphasize protection of the forest land resource base rather than operation of management concepts.

This plan is very broad and general. There are no apparent conflicts with the Forest Plan .

Whatcom County - Lake Whatcom Subarea, Whatcom County Comprehensive Land Use Plan: The plan states that the principal use of Forestry areas, in the Lake Whatcom Subarea, shall be sustained yield forest management which is conducted in accordance with the Washington State Forest Practice Act.

Environmental policies include promoting groundwater quality which is suitable for domestic consumption, recognizing and protecting wetlands, fostering continued fish and wildlife habitat integrity in the subarea, encourage air pollution abatement, minimize noise impacts and identify, designate and protect environmentally sensitive areas.

There should be no conflicts between this plan and the Forest Plan.

Skagit County - Comprehensive Plan for the Eastern Planning District: The Plans forestry land use goal is that timber resource of the Eastern District should be protected, enhanced and appropriately utilized. The plans policies are: Sustained yield practices and policies of forestry management should be utilized and encouraged; The multiple use concept of forest management should be encouraged and utilized in appropriate areas; Commercial timber lands should be protected from incompatible land uses for economic, safety and aesthetic reasons: Recreational uses and areas should be encouraged in appropriate forest areas provided they do not conflict with or become burdensome to commercial timber operations and; The area watersheds should be managed to the highest levels possible to maintain the integrity of our water resources.

There appears to be no conflict with the Forest Plan.

Snohomish County - Shoreline Management Master Program: No apparent conflict with Forest Plan.

Snohomish County - Stanwood Area Comprehensive Plan: No apparent conflict with Forest Plan.

Snohomish County - Darrington Area Comprehensive Plan: The plan recommends sustained yield forest management practices should be employed on all private, state and federal land which has been designated for timber production.

There is no apparent conflict between the Darrington plan and the Forest Plan.

Snohomish County - Granite Falls Area Comprehensive Plan: The plan's goals and policies for forested lands (including National Forest lands over which the county has no regulatory authority) are:

1. Conserve and protect forest land in Granite Falls area for long term forestry related uses.

2. Support all governmental or private actions which will maintain or increase the viability of forestry in designated areas.

No apparent conflicts with the Forest Plan.

Snohomish County - Skykomish Valley Area: The plan's goals and policies as they relate to National Forest Lands are:

Forestry: Goal: To conserve and protect forest land in this county for long-term forestry and related uses.

Policies:

Recognize that timber harvesting is an important part of the Skykomish Valley's economy and lifestyle.

Recognize the Forest Practices Act and it's rules and regulations as the regulator of forest practices.

Compatible recreation activities should be encouraged on forest land.

The periodic evaluation of forest practices should be encouraged in order to promote the maximum economic return consistent with the protection of resource productivity, fish and wildlife habitats, and water quality.

Water Resources: Goal: Maintain the existing quality of valley water supplies, maintain in-stream flow of rivers and integrity of circulation systems and natural drainageways.

Policies:

Disruption of fish and wildlife habitat should be minimized.

Instances where water quality is especially critical to biological productivity or ecosystem integrity, strict standards should be applied to protect the resource.

Manage wetlands and riparian areas as directed by the Forest Practices Act.

Scenic Resource: Goal: Retention of the existing scenic vistas.

Policies:

Land forms should be respected.

Logged areas replanted to remove visual blight.

Protect the Skykomish River as a valuable scenic resource.

No apparent conflict with the Forest Plan.

Snohomish County - Stream Rehabilitation Program - Summary of the steps Snohomish County has taken to restore streams in specific areas where the

natural systems have been altered by new residential and industrial development, agriculture and timber harvesting.

There are no apparent conflicts with the Snohomish County stream rehabilitation program and the Forest Plan.

King County - Executive Proposed General Development Guide The King County Comprehensive Plan - The King County plan proposed that National Forest lands within King County be designated as resource lands where incentives and land use regulations will promote long term agriculture, forestry, extraction of minerals and for other resources.
No apparent conflicts with the King County plan and Forest Plan.

Pierce County - Draft Environmental Impact Statement: The plan's policies encourage that public and private forest lands be wisely managed and protected from conflicting uses. Activities associated with timber production, such as road building, brush control, lumber milling and construction of fire facilities are all allowed.

No apparent conflict with the Forest Plan.

Municipality Plans

City of Seattle - Watershed Management Documents: (Cedar-Tolt Watershed Management Plan, 1979; Seattle Comprehensive Regional Water Plan, 1985; and Cedar River Watershed Cooperative Agreement, May, 1962.)

These plans state that timber harvest activities are compatible with water quality standards. They call for a variable rotation age for different growing sites, resulting in approximately a 110 year rotation for all sites. Average acreage harvested annually would be about 550 acres or 35 MMBf.

As old growth is harvested in the Cedar Watershed the City of Seattle plans to acquire the harvested areas through land exchange. Eventually the City would become sole property owner within the Cedar Watershed (20-30 years).

In the Tolt River Watershed, the goal of the City of Seattle is to remain a minority owner and not assume total ownership.

The wildlife population within the Cedar Watershed would fluctuate, controlled by available food supply. Snags would be left for cavity nesters. Nesting sites of Peregrine Falcon, Bald Eagle, Osprey, Spotted Owl and Heron would be protected according to applicable laws and recommended practices contained in the Forest Practices Act.

The plans call for recreational use of the watersheds to remain closed to public access except for periphery use of National Forest lands in the Cedar Watershed and National Forest lands in the east end of the South Fork Tolt River.

The Forest Plan has been coordinated with these documents with no apparent conflict between them.

City of Seattle - (Cedar River Secondary Use Analysis, 1988; Ordinance 114632, 1989; Resolution 27916, 1989) The City of Seattle has adopted this plan; it details alternatives for timber harvest, recreation use, fisheries, education,

research, and cultural resources on City-owned lands. The key feature of the Ordinance and Resolution is to balance City-owned land management between habitat preservation and timber management. Also, the City is interested in acquiring National Forest land with standing old growth in selected portions of the watershed. All unsupervised recreation is prohibited on City-owned lands.

The City's official response to the Forest Plan strongly urges the Forest to designate three old-growth areas (SOHA')s. The Preferred Alternative of this FEIS for the Cedar River watershed features a new prescription (20D) calling for renegotiation of a Cooperative Agreement with the City. It includes one SOHA in the watershed. Until this new agreement is negotiated, the Forest will continue to follow the 1962 Agreement; no new land exchanges affecting National Forest land will be initiated. When Management Area 20D is implemented and a new Agreement reached, the Forest Plan will be amended to include the direction in the new Agreement.

City of Tacoma - Memorandum of Understanding, 1984, Watershed Management and Water Treatment Plan, Vol. II, 1987: For the purpose of managing the water supply values on the National Forest in the Green River drainage and providing for management to best harmonize resource use with domestic water supply needs for the City of Tacoma.

City policy strictly controls public and commercial access on the western one-half of the watershed. The eastern half is a checker-board ownership of Federal, private, and some City-owned lands, and these are accessible to the public via Stampede and Tacoma Passes. The MOU provides for land exchange, relinquishment of certain public use access over roads; control of timber sale purchasers and firewood cutters to protect water quality; discouraging overnight camping within 200 feet of any perennial stream; agreement by the FS not to develop campgrounds within the drainage without water quality safeguards and consultation with the City; and to discourage issuance of recreation event special use permits.

The Forest Plan acknowledges this MOU and there is no conflict between them.

City of Everett - Sultan River Basin Resource Management Plan - The objective of the Sultan River Basin management plan is to provide a common framework to guide the desired activities of a variety of government agencies having jurisdiction and interests in the Basin in a way which will allow maximum utilization of resources while preserving and maintaining the highest levels of water quality. The plan identifies a need for a management agreement (probably in the form of a memorandum of understanding). It also contains general management guidelines for the management of the timber resource in the basin. There are no apparent conflicts with this plan and the Forest Plan.

State Plans

Washington Forest Practices Rules and Regulations - These are the rules and regulations for road construction, timber harvesting, reforestation, and the use of chemicals on forest lands in the state of Washington.

There are no apparent conflicts between the Washington Forest Practices rules and regulations and the Forest Plan.

Safety Standards for Logging Operations State of Washington - Snag management policy could result in a conflict between the Forest Plan alternatives and

State Standards. The State Safety Standards for Logging Operations requires that snags within other than tractor units should be felled for safety.

Strategies for Washington's Wildlife: 1982 - 1995 - This document contains a comprehensive strategy for the management of Washington's wildlife and fish resources until 1995, and projects state wide goals for population levels. Management emphasis for the state plan is habitat protection and improvement.

This plan calls for increase in deer and elk populations. The Forest plan does not project increased deer and elk populations sufficient to meet the recommended goals of this plan.

Wildlife Program Plans - Washington Department of Game - The plan states population objectives and harvest objectives for wildlife in 1989. It lists key elements needed to complete the population and harvest objectives and shows the priorities for activity within a plan. See Appendix 1.

Possible conflicts between this document and the Forest Plan exist. They would be similar to those in the preceding document.

State of Washington National Heritage Plan - This plan presents criteria for selection and approval of natural areas and lists the natural heritage resources to be considered for protection, including threatened and endangered plant and animal species. In addition, the plan identifies priorities for protection, outlines methods of protection and identifies the rolls of various agencies and groups in natural area protection.

No apparent conflicts with the Forest Plan.

Washington State Heritage Plan I - The plan identifies principle state agencies responsible for the management of cultural resources and places them in the context of other public and private agencies. The plan makes programmatic recommendations for state cultural heritage agency activities.

No apparent conflicts with the Forest Plan.

A Statewide Comprehensive Plan for Fish and Wildlife on the National Forests in the State of Washington - The goal of the plan is to maintain and enhance existing fish and wildlife populations. For fish and wildlife habitat objectives for 1990, see Chapter III, Wildlife, FEIS. Figures broken out by the Mt. Baker-Snoqualmie's share of the statewide objectives are not available.

No apparent conflict with this document and the Forest Plan.

1984-1993 Forest Land Management Program - The ten-year forest land management program is intended to guide forest management by the State Department of Natural Resources on state owned lands. The plan is intended to provide a general level of guidance for DNR activities (Financial planning, forest land planning, heritage protection. forest protection. forest production and timber harvest).

There should be no conflict between this plan and the Forest Plan.

A Multiple Use Plan for Sultan Basin (DNR) - DNR management plan for their lands in the Sultan Basin. There should be no conflict with the Forest Plan.

Puget Sound Water Quality Management Plan - Puget Sound Water Quality Authority's management plan. The purpose of this plan is to restore and protect biological health and diversity of Puget Sound. The strategy of achieving this purpose is to protect and enhance three resources, the Sound's water and sediment quality; its fish and shellfish; and its wetlands.

There is no apparent conflict between this plan and the Forest Plan.

Washington State Trails Policy Plan (draft- 1990) - This plan was prepared by the Interagency Committee for Outdoor Recreation in cooperation with the National Park Service. The purpose of this plan is to prepare a state trails plan as part of the state-wide outdoor recreation and open space plan. The goal of this plan is to improve and expand the trails system for a wide variety of users from hikers to snowmobilers.

Washington's Statewide Comprehensive Outdoor Recreation Plan - This plan was prepared by the Interagency Committee for Outdoor Recreation. Comprehensive plan for the State of Washington on which outdoor recreational policy decisions can be based. The plan shows the relationship of physical resources and developed facilities to opportunities for participation now and in the future.

No apparent conflicts with the Forest Plan.

Federal Agency Plans

North Cascades National Park Land Protection Plan - The plan identifies methods of assuring the protection of the national, historic, scenic, cultural, recreational or other significant resources, and to provide for adequate visitor use.

No apparent conflict with this plan and the Forest Plan.

Mount Rainier National Park Master Plan - The master plan proposed concepts to facilitate existing visitor use of the park and to accommodate increased visitation according to the ability of the park resources to sustain visitor use. The plan proposed removing unessential facilities from prime resource areas of the park, conducting a transportation study for future reduction of private vehicle use in the park, and adopting an interim bus system for Paradise and Sunrise to reduce private vehicle use.

The plan proposed that lands along the west and north boundaries of the Park have a primary objective of preservation and that greater control over visitor use, especially within the subalpine meadows be exercised. These adjacent lands are located within the Mt Baker-Snoqualmie N.F. Conflict between this plan and the Forest Plan could arise when these lands are designated other than preservation.

Other Plans

Sultan River Project No. 2157 - Washington, Draft Environmental Impact Statement - This document is the EIS for the license amendment (1980) to phase II if the Sultan River Project. There should be no conflicts between this EIS and the Forest Plan.

Sultan River Project; Recreation Plan (revised) - The plan reflects the continued concerns of protecting water quality, but given the new treatment facilities, proposes a removal of some of the previous use restrictions.

Restrictions on use of organic or live bait, shoreline fishing and rubber rafts in Spada lake will be lifted and electric motors will be permitted. Swimming will not be permitted.

The plan would continue to prohibit camping adjacent to the reservoir on NF lands. It proposed multiple boat launching sites and day use facilities at Spada Lake, developing fishing access on the west bank of the Sultan River City of Everett property, Spada Lake overlooks on NF and DNR lands, and backcountry camp facilities at Wallace lake in lieu of facilities in Sultan Basin.

No apparent conflict with the Forest Plan.

Sultan River Project Exhibit S, Fish And Wildlife Management Plan - This plan has not been approved. However, there is no apparent conflict with this plan and the Forest Plan.

Sultan River Project Stage II, Erosion, Sedimentation and Slope Stability Control Plan - Defines specific procedures for the stabilization and retention of soil disturbed by construction activities in the Sultan River Project.

No apparent conflicts with the Forest Plan.

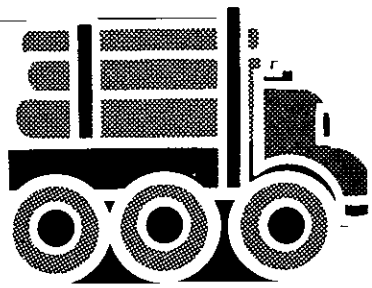
Stillaguamish Watershed Action Plan - This is a plan for the reduction and elimination of Non-Point Source Pollution in the Stillaguamish Watershed. Development and implementation of a resource management plan for the Stillaguamish could affect the rate and location of future harvest and other management activities in order to reduce the cumulative impact from all forestry activities in the watershed.

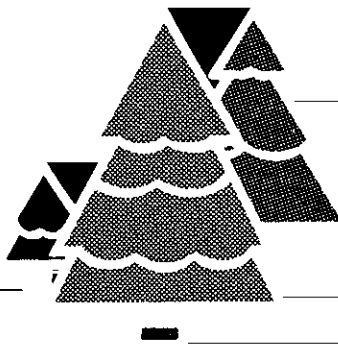
All of the recommendations of the plan that involve the Forest Service are consistent with the Forest Plan.

Draft Plan for Skagit Valley Recreation Area and E. C. Manning Provincial Park and Cascade Recreation Area - The purpose of this plan is to enhance conservation and recreational opportunities within these recreational areas and within the Park.

No apparent conflict with the Forest Plan.

Appendix H





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INTRODUCTION

This appendix is included in the Final Environmental Impact Statement for the Forest Plan in response to decisions of the Chief of the Forest Service and the Deputy Assistant Secretary of Agriculture regarding appeal No. 1770, brought by the Northwest Forest Resource Council on September 18, 1989. The appeal centered on direction from the Regional Forester to incorporate "minimum management requirements" (MMR's) in forest plan alternatives. The appellant requested that the appropriateness of the MMR's be examined through the environmental impact statement process. The information in this appendix also responds to comments about Management Requirements (MR's) that were raised during the review of the Draft Environmental Impact Statement.

A summary of Management Requirements is provided in Chapter II, "Management Requirements" section. Additional information is in Appendix B "Development of Management Requirements " The Standards and Guidelines (or specifications) for implementation of the management requirements are found in the Forest Plan.

This appendix addresses the issue raised by the appellant: For those management requirements which cause significant reductions in allowable sale quantity (ASQ) or present net value (PNV), alternate ways of meeting the management requirements are examined and their opportunity costs (reductions in ASQ and PNV) are compared.

Appendix J of the Draft Environmental Impact Statement, "Sensitivity Analysis of Significant Forest Minimum Management Requirements" has been completely replaced by the material presented here. The Appendix J of the Draft is part of the planning record.

CHANGES BETWEEN DEIS AND FEIS

- Spotted Owl Habitat Areas were changed to meet the Record of Decision for the FSEIS to the EIS for an Amendment to the Pacific Northwest Regional Guide.

- Management requirements for mountain goats were enlarged, and the MR for deer and elk was dropped to meet regional direction, as discussed in the DEIS Appendix I.

- A new way of meeting water quality MR's was developed in response to public comment. The hydrologic cumulative effects constraint developed with public and scientific review is designed to ensure that unacceptable adverse hydrologic cumulative effects will be avoided.

BACKGROUND OF MANAGEMENT REQUIREMENTS

WHAT ARE MANAGEMENT REQUIREMENTS?

Many laws and regulations guide Forest Service activities. One law in particular, the National Forest Management Act of 1979 (NFMA), and its implementing regulations provide direction for the Forest planning process. The direction for National Forest Systems Land and Resource Management Planning, in Section 36 of the Code of Federal Regulations, Part 219 (36 CFR) specify: (1) the minimum specific management requirements to be met in

accomplishing the goals and objectives of the National Forest System (36 CFR 219.27) and (2) the minimum requirements for integrating individual forest resource planning into the Forest Plan (36 CFR 219.14 through 219.26). The term "management requirements (MR's)" will be used in this appendix to refer to these NFMA regulations instead of "minimum management requirements (MMR's)" which were used in the Draft Environmental Impact Statement and Proposed Forest Plan.

Some management requirements are procedural in nature and need not be dealt with here. Some requirements were analyzed and were available for review during the Regional Guide Environmental Impact Statement process and are not dealt with here. See Appendix B for a more complete discussion. The management requirements which have not been fully dealt with elsewhere, and which require additional analysis due to significant opportunity costs associated with implementation are:

1. Dispersion of timber harvest openings.

2. Maintenance of habitat (particularly mature and old growth habitat) to assure viable populations of wildlife.

3. Protection of riparian areas, water resources, and water quality.

These management requirements are described in greater detail in later sections of this appendix. MR's for other wildlife habitats and other requirements noted in 36 CFR 219.27 which have not been addressed in other Environmental Impact Statements do not cause significant opportunity costs when implemented.

LEGAL REQUIREMENTS VERSUS IMPLEMENTATION METHODS

The management requirements from NFMA and its implementing regulations are legal requirements. They represent "ends" which must be met during forest plan implementation. For example, the NFMA implementing regulations require that "fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area." It is mandatory that, whatever implementation methods are chosen, the management requirement be met.

Specifications or standards for achievement for each management requirement are established at the national level or through analysis at the regional level for most of the management requirements. These are listed in the regulations or as Standards and Guidelines in the Regional Guide. Additional specifications identified on the Forest are listed as Standards and Guidelines in the FEIS, Appendix D, and the Land and Resource Management Plan, Chapter IV. The specification must be based on knowledge of the resources involved. For example, in meeting the management requirement for viable populations of vertebrate species it is necessary to define the type of habitat required by the species, the maximum distance between habitats which will still provide reasonable assurance of genetic interaction, and the size of habitat area needed to support a breeding pair.

Often, the pool of scientific knowledge is insufficient to provide the entire basis for defining the specific conditions or standards that will satisfy or meet a management requirement. When this happens it is necessary to rely on the field experience and the professional judgement of knowledgeable

professionals and to establish monitoring and research that will provide better information for future planning efforts.

Implementation methods are the "means" or "ways" in which the management requirements will be met. Usually there is more than one way in which a management requirement can be met. Determining the most appropriate means of meeting the specifications for each management requirement involves careful analysis at the Forest level. Considering and analyzing different means or ways of meeting a specific management requirement are particularly important if there are potentially significant reductions in present net value (PNV) or allowable sale quantity (ASQ) involved.

HOW IMPLEMENTATION METHODS TO MEET THE MANAGEMENT REQUIREMENTS ARE DEVELOPED

The selection of means sufficient to meet management requirements is based on effectiveness in meeting resource protection and on minimizing reductions to PNV or ASQ. The general process used in evaluating alternative ways of meeting the management requirements is as follows:

1. Identify the desired "end" for each management requirement.

2. Assemble existing information about the resources addressed by the management requirement.

3. Analyze the existing information to determine what conditions or specifications need to exist on-the-ground to assure meeting the "ends" of the management requirement. (See Table H-1.)

4. Develop various ways or means to meet the management requirement. (See Table H-2.)

5. Evaluate the effectiveness of the alternative means in meeting the managements. Estimate the environmental effects of each set of means.

6. For each set of means, estimate the effects on economic efficiency (as measured by changes in present net value) and the effects on timber availability (as measured by allowable sale quantity).

7. Where opportunity cost of meeting a management requirement exceed two percent of PNV or ASQ of the present net value benchmark, the analysis used to select the means are presented. Two percent was used because differences less than two percent would not be significant in terms of opportunity costs of alternative means. A higher threshold would preclude evaluation of many alternatives.

For discussion purposes, opportunity costs are reductions in present net value (PNV) and reductions in allowable sale quantity (ASQ) that result from implementing resource protection measures (means or ways) to meet the *management requirements set forth in NFMA regulations. In order to meet timber* harvest dispersion requirements; provide for wildlife habitat; and protect riparian areas, water resources, and water quality requirements of NFMA on Mt. Baker-Snoqualmie National Forest land, some opportunities to maximize present net value or to maximize timber production must be foregone.

Discussions are grouped by harvest dispersion, by wildlife habitat, and by riparian and water quality management requirements in separate sections. In each section, the management requirements are displayed along with relevant specifications from national and regional guidelines, and, where appropriate, alternative implementation methods (means or ways) are analyzed.

Table H-1 summarizes each of the management requirements (ends) subject to analysis of opportunity costs on the Mt. Baker-Snoqualmie National Forest and summarizes the specifications or standards of achievement for those ends. Table H-2 shows the alternative means considered for implementing each management requirement where the opportunity cost exceeded two percent.

In analyzing the effects of meeting the MR's on present net value (PNV) and allowable sale quantity (ASQ), FORPLAN runs were made with and without constraints designed to simulate meeting the management requirement. The PNV benchmark was used for this analysis. This benchmark is a FORPLAN run which identifies the mix of management activities which would result in the highest level of economic efficiency (i.e , the highest PNV) in managing Mt. Baker-Snoqualmie National Forest resources. It also identifies the ASQ associated with the most economically-efficient mix of management activities.

A benchmark was chosen to use in the with-and-without-constraint comparison, rather than an issue-based Forest Plan alternative, because management practices necessary to meet other objectives of the issue based alternatives may partially or fully meet the MR, thus clouding any analysis of opportunity costs induced by the management requirement. The true effect when measured against a fully developed alternative is significantly less because the objectives of that alternative may satisfy the management requirements to a large extent.

IMPLEMENTATION METHODS WITH HIGH OPPORTUNITY COSTS

Table H-3 displays the opportunity costs of the implementation measures selected for meeting management requirements on the Mt. Baker-Snoqualmie National Forest. Only those implementation measures with opportunity costs of two percent or larger are shown: dispersion of harvest units to meet silvicultural guidelines and NFMA vegetation management and diversity specifications; maintaining mature and old growth habitat for wildlife; protection of riparian area values; and limiting timber harvest acres to prevent unacceptable adverse hydrologic cumulative effects.

IMPLEMENTATION METHODS WITH LOW OPPORTUNITY COSTS

Management requirements for other wildlife habitat requirements for threatened and endangered species, sensitive species (except spotted owl), special habitats, and dead and defective tree habitat are not addressed in this analysis because opportunity costs of providing sufficient habitat to maintain viable populations are less than two percent.

Table H-1. Summary of Management Requirements and Associated Specifications.

Ends	Summary of Specifications
Disperse timber harvest openings	Insure timber harvest openings meet size limits and spacing requirements established by the Regional Guide.
Provide habitat to maintain viable populations of existing native and desired non-native vertebrate species	
Northern spotted owl	Maintain mature and old-growth conifer stands (for nesting and feeding) per FSEIS requirements. (see Table H-5.)
Pileated Woodpecker and Pine Marten	Maintain mature growth conifer stands (for nesting and feeding) of adequate size and distribution to permit interaction among breeding pairs of dependent species. (See Tables H-7 and H-8.)
Mountain goat	Maintain mature and old-growth conifer stands of adequate size and conditions, in critical goat use areas, to maintain viable goat populations on the Forest. (See Table H-9.)
Protect Riparian Areas and Water Quality	Allow no management practices which seriously and adversely affect water conditions or fish habitat through detrimental changes to stream temperatures or chemical composition, blockage of water courses, scouring of stream channels, or deposits of sediment. Comply with the requirements of the Clean Water Act, the Safe Drinking Water Act, and all substantive and procedural requirements of Federal, State, and local governmental bodies with respect to the provision of public water systems and the disposal of waste water.

Table H-2 Summary of Alternative Means Considered for Implementing Each Management Requirement.

Management Requirements	Alternative Means
Locate timber harvest openings to achieve desired combination of multiple-use objectives.	Harvest not more than 30% of each watershed in the first decade, 30% in the second decade, and 20% in each succeeding decade. No alternative means was analyzed for this MR
Provide for adequate habitat to maintain viable populations of existing native and desired non-native vertebrate species.	
Northern Spotted Owl, Pileated Woodpecker, and Pine Marten	Dedicate habitat sites for no timber harvest. Manage habitat sites on long rotations to provide adequate suitable habitat at all times.
Mountain Goats	Dedicate habitat sites for no timber harvest. Manage habitat sites on an extended rotation to provide adequate optimal thermal cover acres at all times
Protect Riparian Areas	Allow no removal of vegetation from riparian areas. Allow no timber harvest in 25% of the riparian area, allow harvest using a minimum 160-year rotation on 50% of the riparian area, and manage the remaining 25% of the riparian area in the same manner as the adjacent land allocation.
Protect Water Quality	Watershed by watershed classification and evaluation of watershed conditions. Determine limits on acres harvested by decade by watershed to prevent unacceptable adverse hydrologic cumulative effects. Review of literature and discussions with academic and scientific community members indicates no process for assessing and mitigating hydrologic cumulative effects applicable to the Mt. Baker-Snoqualmie National Forest exists.

Table H-3. Opportunity Cost of Meeting the Management Requirements with the Selected Implementation Methods

Selected Implementation Method	First Decade ASQ MMCF/Year (MMBF/Year)	Change in ASQ 1/ Percent	PNV MM $	Change in PNV Percent
PNV Benchmark with No Protection Measures	63.9 (306)	-	2631	-
Opportunity Cost of Timber Harvest Dispersion	59 1 (283)	-8	2484	-6
Opportunity Cost of Mature and Old Growth Habitat for Northern Spotted Owl, Pileated Woodpecker, Pine Marten, and Mt. Goat	50.1 (240)	-22	2410	-8
Opportunity Cost of Riparian Protection	59.6 (285)	-7	2580	0
Opportunity Cost of Water Quality Protection	41.0 (196)	-36	2297	-13

1/ Percent change calculated on cubic foot basis

IMPLEMENTATION METHODS THAT MEET MORE THAN ONE MANAGEMENT REQUIREMENT

Implementation methods selected to meet water quality management requirements also provide fish habitat in streams and riparian habitat adjacent to streams to assure the maintenance of viable populations of species dependent on these habitats. Alternative implementation methods for meeting water quality management requirements will also meet fish habitat and riparian habitat requirements. No additional discussion or analysis is displayed in Appendix H for these management requirements.

TIMBER HARVEST DISPERSION MANAGEMENT REQUIREMENT

SOURCE OF THE TIMBER HARVEST DISPERSION MANAGEMENT REQUIREMENT

Management requirements for dispersion of timber management openings are based on NFMA which states: "Openings shall be located to achieve the desired combination of multiple-use objectives. The blocks or strips shall be shaped and blended with the natural terrain, to the extent practicable, to achieve *aesthetic, wildlife habitat, or other objectives established in the Plan* (36 CFR 219.27(d)(1).

Direction in the Regional Guide relating to harvest openings states, "Created openings will be separated by blocks of land that generally are not classed as created openings and that contain one or more logical harvest units. A harvested area will no longer be considered a created opening for silvicultural purposes when stocking surveys indicate prescribed tree stocking that is at least 4-1/2 feet high and free to grow."

SPECIFICATIONS FOR THE TIMBER HARVEST DISPERSION MANAGEMENT REQUIREMENT

The Forest utilized the theoretical harvest dispersion factor formula developed by the Region, which resulted in a harvest dispersion factor of 30%. This 30% represents the maximum amount of land that can be assigned to a regeneration timber harvest prescription in a 10 year period. An accessibility constraint of 30% applies to each allocation zone on the Forest for Decades 1 and 2. The accessibility constraint increases to 20% in the third and fourth decade to reflect the harvest occurring in the first two decades. After the first 4 decades, a 20% constraint is applied to the North and South portions of the Forest rather than to the allocation zones.

ALTERNATIVE WAYS OF MEETING THE MANAGEMENT REQUIREMENT FOR TIMBER HARVEST DISPERSION

No alternative means of meeting this management requirement were identified. The modeling results of the accessibility constraints were tested by plotting units scheduled for harvest in a benchmark run onto an allocation zone/analysis area map. The resulting pattern indicated that the adjacency requirements could be met in most instances, though not with a lot of leeway. This evaluation and the experiences of adjacent Forests where harvest dispersion factors ranged from 25 percent to 30 percent indicates alternative means of meeting this MR are extremely limited or do not exist.

EVALUATION OF IMPLEMENTATION METHODS TO MEET TIMBER HARVEST DISPERSION MANAGEMENT REQUIREMENT

Only a single method was developed and investigated for this management requirement.

OPPORTUNITY COSTS

The opportunity costs of the implementation method for meeting the timber harvest openings management requirement were estimated by comparing the differences in PNV and ASQ that would occur with and without the constraints that meet the requirements.

Table H-4 Displays the PNV and ASQ opportunity costs of the harvest dispersion management requirement.

Table H-4. Opportunity Cost of Meeting the Harvest Dispersion Management Requirement

Selected Implementation Method	First Decade ASQ MMCF/Year (MMBF/Year)	Change in ASQ 1/ Percent	PNV MM $	Change in PNV Percent
PNV Benchmark with No Protection Measures	63.9 (306)	-	2631	-
Opportunity Cost of Timber Harvest Dispersion	59.1 (283)	-8	2484	-6

1/ Percent change calculated on cubic foot basis

RATIONALE FOR THE SELECTED IMPLEMENTATION MEANS

The harvest dispersion constraint was developed on the assumption that harvest units would be 40 acres in size and that it would take 11 to 16 years (depending on elevation and method of reforestation) for trees to reach 4-1/2 feet in height. These assumptions may overestimate or underestimate actual conditions on the ground.

Region-wide criteria and a suggested method for calculation of a theoretical harvest dispersion constraint were available to all Forests. The calculation of the harvest dispersion constraint includes two variables, the size of the harvest unit, and length of time for reproduction to reach 4-1/2 feet in height.

Coordination with the Wenatchee, Gifford Pinchot, and Olympic National Forests indicated that there were differences between Forests that could potentially result in differences in modeling proxies for harvest dispersion. There are differences between Forests in the amount of the Douglas fir type (maximum size of harvest unit of 60 acres) and other forest types (maximum size of harvest unit of 40 acres). The length of time required for a tree to reach 4-1/2 feet also varies between Forests because of differences in species composition, growth rates and methods of reforestation.

The harvest dispersion factor selected by the four Forests varies from 25% to 30%. This difference appears reasonable based on the physical and biological differences between the Forests.

IMPLICATIONS FOR FOREST PLAN ALTERNATIVES

FEIS Chapter II and Appendix B discuss the effects of this method of meeting the harvest dispersion requirement in FEIS Alternatives. The analysis of opportunity costs of the selected means of harvest dispersion in Table H-4 shows the maximum PNV and ASQ effects. Actual Plan alternatives will have somewhat less opportunity costs as overlaps from lands withdrawn for wildlife, scenery, recreation, or other nontimber objectives will help provide dispersion of harvest units.

ROLE OF MONITORING AND RESEARCH

The Forest Monitoring Plan (Forest Plan Chapter 5) calls for monitoring of size and dispersion of harvests units to insure NFMA requirements are met. At scheduled Plan reviews, monitoring data will be evaluated to determine the effectiveness of the means selected to model the requirement for harvest dispersion.

EXISTING NATIVE VERTEBRATE SPECIES VIABLE POPULATIONS MANAGEMENT REQUIREMENT

SOURCE OF THE MANAGEMENT REQUIREMENT

The NFMA regulations require that:

"Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure continued existence in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area." (36 CFR 219. 19).

DESCRIPTION OF THE MANAGEMENT REQUIREMENT

All vertebrate species in Region Six were assessed with regard to population numbers and/or distribution that could result in either Forest or Regional extinction during the next five decades. Management requirements were developed for species whose viability would be at risk if no management actions were taken to protect their habitats.

The focus was on habitats that were likely to be limiting in the future (in short supply either in total acreage or in distribution) and on identification of particular species that could be used to represent all species dependent on those habitats. This identification was done on a subregional basis, recognizing the variability of situations within the Region. Once these species were identified, the Region defined their habitat requirements and biological characteristics. The species are included in the list of Management Indicator Species (MIS) that the Forests address in forest planning and subsequent monitoring.

Table H-5 displays current Regional management requirement direction regarding limited habitats and wildlife species by sub-regional zones The Mt. Baker-Snoqualmie National Forest is in Zone 2.

Northern spotted owl, pileated woodpecker, pine marten, and mountain goat are the only species for which alternative ways of meeting management requirements are evaluated. Management requirements for threatened and endangered species, sensitive species (except spotted owl), special habitats, and dead and defective tree habitat are not addressed in this analysis because opportunity costs associated with providing sufficient habitat to maintain viable populations are less than two percent. The management requirements for fish

are met with the same management practices which provide the requirements for riparian area and water quality, therefore further analysis is not provided.

Table H-5. Species Matrix for Addressing Management Requirement for Wildlife and Threatened and Endangered Species.

Zone Habitat	Zone 1 North Coastal	Zone 2 Westside Cascades	Zone 3 Eastside Cascades	Zone 4 Blue Mountain
Mature and Old Growth (Seral Stages V and VI)	*Northern Spotted Owl Pine Marten Pileated Woodpecker	*Northern Spotted Owl Pine Marten Pileated Woodpecker	*Northern Spotted Owl Pileated Woodpecker Northern three-toed woodpecker	Pine Marten Pileated Woodpecker Northern three-toed woodpecker
	*The Final Supplemental Environmental Impact Statement and subsequent Record of Decision provide direction for management of spotted owl habitat in Region Six.			
Dead and Defective	Primary Cavity Excavators	Primary Cavity Excavators	Primary Cavity Excavators	Primary Cavity Excavators
Riparian	The Forest determined and documented as part of the planning records, whether it needed to address wildlife in addition to fish, and if so which wildlife species would represent the riparian habitat. Coordination of this process with adjacent Forests was necessary to determine consistency.			
Big Game		Mountain Goat	Mountain Goat (Wenatchee)	
Threatened *Endangered* Species	Bald Eagle *Peregrine* Falcon Brown Pelican Aleutian Canada Goose	Bald Eagle *Peregrine* Falcon	Bald Eagle *Peregrine* Falcon Grizzly Bear Woodland Caribou (Colville)	Bald Eagle *Peregrine* Falcon

HABITAT NEEDS

Once the species needing management requirements were identified, the Region defined habitat requirements and biological characteristics. These are the basis for providing habitat and also for deciding how best to represent the species' needs in the planning process and in the FORPLAN Model. Regional specifications for MR species are summarized in "A Report on Minimum Management Requirements for Forest Planning on National Forests of the Pacific Northwest Region, USDA Forest Service" (USDA Forest Service, June 1986).

Habitat needs were defined using information from existing research whenever possible (see bibliography). This information was used to define the habitat conditions, habitat dispersal, and habitat size necessary to meet the management requirement. When information was available, but did not fit exactly the management requirement context, professional judgement was used to apply the information in estimating habitat needs. When information was not available, habitat needs were developed using professional judgment of a number of more knowledgeable biologists on the subject. Information from existing research was used whenever possible (Note: Habitat needs of spotted owls are described in the Final Supplement to the Environmental Impact Statement for an Amendment to the Pacific Northwest Regional Guide, USDA Forest Service 1988).

Specific information on habitat needs, specifications for meeting habitat requirements, and alternative ways of meeting the management requirements for northern spotted owls, pileated woodpecker, pine marten, and mountain goats are presented in the following sections. For each species, information is provided for these three habitat factors:

Principal Habitats Used

Information about the seral stages and Kuchler vegetation types which are used by the various species is documented in many research papers for individual species. Information as to which Kuchler type and/or seral stage are primary or secondary habitat, and the amount of dependency upon each habitat, is based mostly on professional judgment (Guenther and Kucera 1978, Phillips and others, 1981).

Dispersal Distance Between Habitats

Usually no research information is available for optimum dispersal distance between habitats. As a result, dispersal distance is often determined on the basis of observations, experience, and professional judgment. Dispersal distance is based on the ability of an individual species to travel to the next habitat often enough to prevent isolation of sub-populations. Distances are adjusted to consider the network and overlap of habitat formed by the species (e.g., Pileated woodpecker and pine marten).

Size of Habitat Areas

The size of individual habitat areas provided for each wildlife species is based on the habitat acreage needed to support the basic social or reproductive unit of the species, i.e., breeding pairs. Both home range and species density information are used to estimate the needed size of habitat area. This was supplemented with professional judgement where no data were available for the specific habitat types being managed.

SPECIFICATIONS FOR MEETING THE HABITAT REQUIREMENTS FOR NORTHERN SPOTTED OWL

Specific Regional direction for the northern spotted owl is found in the Final Supplement to the Environmental Impact Statement (FSEIS) for an Amendment to the Pacific Northwest Regional Guide released in August, 1988. In response to an appeal of the R-6 Regional Guide, the Supplement was prepared to address planning direction for spotted owl habitat management. Standards and guidelines adopted as a result the Supplement will be used by National Forests

in the Region to meet the management requirement to maintain viable populations of spotted owls.

The final SEIS was prepared after a series of public meetings and study of the nearly 42,000 comments received on the Draft Supplement issued in the summer of 1986. A summary of the analysis of public comments, substantive comments, and copies of letters received from government agencies and elected officials can be found in Appendix G of the FSEIS.

The Forest Service Preferred Alternative (F) directs that the amount of suitable habitat at each designated SOHA will vary by physiographic province. Specific criteria were followed in locating designated SOHA's on the Mt. Baker-Snoqualmie. Current distribution of owl habitat on lands unsuitable for timber production was evaluated for adequacy of distribution. SOHA's were designated on lands suitable for timber production only where necessary to meet distribution standards. Standards and Guidelines for the Forest Service preferred alternative (F) are briefly summarized in the following discussion. Chapter II of the Final Supplement should be reviewed for detailed description of the direction. These Regional Standards and Guidelines provide specifications or standards for achievement of management requirements for northern spotted owls:

1. **Amount of suitable habitat in designated habitat areas:** Designated habitat areas shall contain the following amount of suitable habitat: 2200 acres within 2.1 miles of the nest site or likely nest site if the exact nest site is unknown. Habitat shall occur as one contiguous stand if possible or, as a 300 acre stand containing the known or suspected nest site with the remaining habitat as contiguous as possible. Each stand shall be larger than 60 acres.

2. **Spacing of Designated Habitat Areas:** Designate habitat areas where: greater than six miles separates areas which occur in reserved lands or in lands unsuited for timber production, and which are capable of *supporting less than three breeding pairs of spotted owls; or where* greater than 12 miles separates such areas capable of supporting three or more pairs

3. **Threatened and Endangered Species:** No spotted owl habitat management activities shall adversely effect Federally listed threatened or endangered species or their habitat.

4. **Identification of Suitable Habitat:** Suitable habitat shall be identified in Forest Plans according to the general definition in the spotted owl Final Supplement and with concurrence by the Regional Forester.

5. **Management of Habitat:** Spotted owl habitat can be provided through prescriptions using even-aged or uneven-aged silvicultural systems, or no scheduled harvest Prescriptions to be used and where they will apply shall be specified in the Forest Plans.

6. **Location of designated Habitat Areas:** Designate habitat areas only on lands suitable for timber production as needed to meet spacing standards.

7. **Priority for Locating Designated Areas:** Priority for locating designated areas follows status of occupancy by spotted owls. The highest priority is given to locations with verified occupancy by spotted owl pairs; next highest to locations with confirmed sightings of owls; lowest priority to locations where the presence or absence of owls is unknown.

The Final Supplemental Environmental Impact Statement (FSEIS) to the Regional Guide (for spotted owl habitat management guidelines) does not include the number of designated habitat areas as part of any alternative. The number of habitat areas are not specified in the Regional Guide, but will be a consequence of applying standards and guidelines in Forest Plans.

ALTERNATIVE WAYS OF MEETING THE MANAGEMENT REQUIREMENTS FOR NORTHERN SPOTTED OWL

The Forest considered two alternative ways of providing mature and old-growth habitat for viable wildlife populations. These were the dedicated approach, where the required acres would be constrained to a no timber harvest prescription and a managed approach which provided for managing the habitat on an extended rotation basis to provide the desired structural characteristics of the stand.

ALTERNATIVE 1: Dedicated Sites

Under a dedicated habitat strategy, each acre of spotted owl habitat is withdrawn from timber production. Dedication of existing stands assures that desired structural characteristics will be available, but may risk loss of individual stands through catastrophe or decay. Recent literature on old-growth suggests this risk is much less than once thought.

ALTERNATIVE 2: Managed Sites

Management of sites assumes that existing old growth stands can be harvested as they are replaced by other stands that grow into an old-growth condition Delay in harvesting the existing old-growth stands would occur if replacement stands fail to develop desired structural characteristics on schedule. Management of old growth on a harvest basis and replacing it removes structural characteristics important to old-growth and may hasten the decline of the residual stand (Franklin 1981). There is a risk that all habitat components are not well-enough understood to manage for the full complex of habitat characteristics needed.

EVALUATION OF IMPLEMENTATION METHODS TO MEET NORTHERN SPOTTED OWL MANAGEMENT REQUIREMENT

An efficiency analysis was conducted to compare the dedicated versus managed approach utilizing the methodology developed by the Siuslaw National Forest. This analysis indicated that a dedicated approach was more efficient than a managed strategy in terms of timber outputs. An economic evaluation was conducted for marten habitat areas, comparing the managed and dedicated strategies. This analysis confirmed that dedicated was more efficient in terms of PNV at a 4% discount rate. In addition there is uncertainty about whether the structural characteristics of mature and old growth habitat can be duplicated through management.

The minimum time required to produce mature forest habitat is 100 years. It requires at least 250 years to produce old-growth forest habitat. At both 100 and 250 years, the average replacement area would contain more volume than the original habitat area. Rotating the areas would result in less timber yield than harvesting the potential replacement area and leaving the original area to continue providing habitat. Dedicating the habitat minimizes the opportunity costs of ASQ and PNV. Thus the dedicated stand option was selected to provide for all mature and old-growth habitat management requirements.

Table H-6 compares the empirical yield table volumes after 100 and 250 years with the volumes from the intensive managed yield tables at ages 100 and 250.

Table H-6. Comparison of Stand Volumes After 100 and 250 Years.

	Stand Volumes After 100 and 250 Years (MCF/Acre)			
	100 Years		250 Years	
Site 1/	Empirical	Managed	Empirical	Managed
North				
DF High	--	12.931	--	20.463
DF Low	--	11.593	--	13.959
PSF Low	--	9.598	--	9.521
Average	6.776	--	8.527	--
South				
DF High	--	10.008	--	17.638
DF Low	--	9 196	--	11.433
PSF Low	--	9.412	--	9.368
Average	5.467	--	10.374	--

1/ DF = Douglas-fir
PSF = Pacific silver fir

OPPORTUNITY COSTS

The opportunity costs of designating the habitat areas (selected method) were not determined for spotted owls alone. Because of the interactions of habitat needs of all the mature and old growth species (Spotted owl, pileated woodpecker, pine marten, and mountain goat), opportunity costs were determined for the combination of all species requiring mature and old growth habitat. The discussion of opportunity costs for these management requirements are found at the end of this section (page H-27).

CONSEQUENCES OF THE DIFFERENT WAYS OF MEETING THE MANAGEMENT REQUIREMENT

Populations of spotted owls would not be expected to differ significantly under any of the options available to meet the management requirement. There are,

however, differences in the opportunity costs as dedicated habitat areas would have the least impact on timber outputs and therefore PNV.

RATIONALE FOR THE SELECTED METHOD

The Mt. Baker-Snoqualmie National Forest chose to provide spotted owl habitat by dedicating habitat sites. This alternative maintains necessary habitat, and has the least effect on timber outputs; it is an economically efficient way of meeting the management requirement with the least opportunity costs.

The dedicated habitat approach has the advantage that the location of the habitat site does not change over time, making implementation less complicated than continuously relocating the habitat site as the stands are harvested and replaced

IMPLICATIONS FOR FOREST PLAN ALTERNATIVES

Plan alternatives were designed to address public issues. As a result most alternatives, including the preferred, incorporate objectives for retention of old-growth and mature timber for a variety of reasons, such as wildlife, visual, and recreation. To the extent possible, spotted owl habitat areas overlap with areas selected for other purposes (such as Wilderness, unroaded recreation areas, special interest areas and other lands determined as not appropriate or unsuited for timber production), wherever these meet habitat suitability and distribution requirement.

ROLE OF MONITORING AND RESEARCH

The Forest Monitoring Plan (Forest Plan Chapter V) calls for monitoring populations and habitats of spotted owls.

The Final Supplemental Environmental Impact Statement to the Regional Guide (Appendix D) identifies specific monitoring and research needs and describes how the information will be obtained. Intensive inventory, monitoring, and research being conducted by the Spotted Owl Research, Development, and Application Program will provide new information. This should allow an opportunity to re-evaluate and possibly adjust management direction within five years

SPECIFICATIONS FOR MEETING HABITAT REQUIREMENTS FOR PILEATED WOODPECKER AND PINE MARTEN

A number of wildlife species are known to depend on or prefer mature conifer habitat during some part of their life cycle on the Mt. Baker-Snoqualmie National Forest. By providing a dispersion of mature conifer habitat sites for the pileated woodpecker and pine marten, we are assuming that the other species preferring mature conifer habitats will have adequate habitat to maintain viable populations throughout the planning period.

Regional specifications for pileated woodpecker and pine marten are discussed in the following sections. The specifications are summarized from "A Report on Minimum Management Requirements for Forest Planning on the National Forest of the Pacific Northwest Region, USDA Forest Service" (USDA Forest Service, June 1986). In developing the report, various habitat sizes and dispersal distances

were considered. Based on that analysis, minimum habitat sizes and maximum dispersal distances were identified for each species. This information is based on the best available data. Alternatives which addressed changes to size or distribution were not considered in developing the Forest Plan for the Mt. Baker-Snoqualmie National Forest.

Habitat specifications for pileated woodpecker and pine marten are summarized in Table H-7 and H-8.

PILEATED WOODPECKER SPECIFICATIONS

Principal Habitats Used

Pileated woodpeckers need mature or old growth stands of timber for nesting and feeding. Habitats were identified in Bull and Meslow (1977), Guenther and others (1978), and Thomas (1979).

Dispersal Distance Between Habitats

An initial five-mile maximum dispersal distance between habitats from professional judgment documented in Phillips and Roberts (1985). In June of 1986, the distance between habitats was modified to one habitat area for every 12,000 to 13,000 acres (about five miles apart) to allow greater flexibility in application.

Size of Habitat Areas

The size of nesting areas in Region Six for the pileated woodpecker has been identified as a range of 100 to 540 acres. To meet the needs of pileated woodpeckers both east and west of the Cascades, 300 acres of old growth or mature timber for nesting area, plus 300 acres of feeding area was defined as a Region-wide requirement. Three hundred acres of nesting area appears to be an average for different habitats. As more data specific to westside and eastside habitats (eastside may be further subdivided) become available, the size of the nesting area may be adjusted (Bull and Meslow, 1977; Bull, 1975; Mannan, 1982; Mellen, 1986). A 1,000-acre unit was established as the minimum size territory that a pair of woodpeckers would defend. This was determined from research data. Snag size and density were taken from Thomas (1979), and acreage figures from Bull (1975), and Bull and Meslow (1977). See Table H-7 for summary of habitat specifications.

Table H-7. Pileated Woodpecker Habitat Requirements.

Principal Habitats Used Zone 2 (West Cascades) 1/	Dispersal Distance Between Habitats	Size of Area to which wildlife Prescriptions Apply	Habitat Requirements to be Used in Analyses
		All Zone	600 acres/pair Within a 1,000-acre unit:
A. Reproducing			
Seral Stages V and VI of Kuchler types K2, K5, K29, and riparian	One habitat area for 12,000 to 13,000 acres.		Maintain 300 acres of conifers in seral stages VI and/or V, per pair for reproducing.
B. Feeding			Maintain a minimum average of two hard snags per acre greater than or equal to 12 inches dbh within the 300-acre reproductive area. Forty-five of these 600 snags should be greater than or equal to 20 inches dbh.
All seral stages of Kuchler types listed for reproducing habitat, provided snags are present.			When possible, maintain reproductive area in 300 contiguous acres. If not possible, habitat may be arranged in blocks no less than 50 acres and no more than 1/4 mile apart.
			Maintain a minimum average of two hard snags per acre greater than or equal to 10 inches dbh on an additional 30 acres for feeding.

1/ Mt Baker-Snoqualmie National Forest is in Zone 2, Westside Cascades. Principal habitats used vary by zone in the Region.

PINE MARTEN SPECIFICATIONS

Principal Habitats Used

The pine marten uses seral stages III-VI--closed sapling-pole, large mature, and old growth (Thomas, 1979; Guenther and Kucera, 1978; Phillips and others, 1981). The Kuchler types used are from Guenther and Kucera (1978). The principal habitat for pine marten is seral stages V and VI (mature and old growth).

Dispersal Distance Between Habitats

Burke (1982) recommends that the maximum dispersal distance between habitat areas for pine marten should be two miles. In 1984 the Regional Forester changed the dispersal distance from two miles to three miles. This change was made because it was felt where more than one adjacent habitat is available for dispersal, the dispersal distance can be extended to three miles for pine marten. This change has been reviewed by a number of biologists within and outside the Forest Service and most agree that it would appear not to create a population viability problem for represented species In June of 1986, the dispersal distance specification for pine marten habitat was changed to one habitat for every 4,000 to 5,000 acres (about three miles apart) to allow greater flexibility in application.

Size of Habitat Areas

In the professional judgment of the biologists listed in Phillips and Roberts (1985), a breeding female pine marten can be supported on 160 acres of quality habitat. Research is variable as to the size of area needed, but the female pine marten home range is estimated to be 160 acres (Campbell, 1979). The biologist listed in Phillips and Roberts (1985) judged that this area should be contiguous to ensure that there would be enough habitat within the home range of the female. They also judged that crown closure should equal or exceed fifty percent. Research papers indicate that areas with a low percent crown closure receive little or no use by pine marten. Therefore, to ensure an adequate crown closure, a minimum requirement of 50 percent closure was selected.

Research shows that pine marten require dead and down material for foraging, cover, and denning. Six down logs/acre (Burke, 1982) was selected as the minimum down material requirement. The number and size of snags required was selected to ensure that the amount of down material was achieved. The specifications for pine marten habitat are summarized in Table H-8.

Table H-8. Pine Marten Habitat Requirements.

Principal Habitats Used Zone 2 (West Cascades) 1/	Dispersal Distance Between Habitats	Size of Area to which wildlife Prescriptions Apply	Habitat Requirements to be Used in Analyses
	One habitat area for every 4,000 to 5,000 acres	160 acres per habitat area.	Maintain 160 contiguous acres of conifer in seral stages V or VI with a crown closure 59 percent or greater.
A. Reproducing			
Seral stages V and VI of Kuchler types K2, K5, K6, K29.		(This figure represents the territory of one female and part of the territory for a male)	Within 160-acre unit: Maintain an average of two hard snags per acres *greater than or* equal to 12 inches dbh.
B. Feeding			
Seral stages III-VI of Kuchler types listed for reproducing habitat.			Twenty-four of these 320 snags should be greater than or equal to 20 inches dbh. Maintain a minimum average of Six down logs per acre at least 12 inches dbh and 20 feet long.

1/ Mt. Baker-Snoqualmie National Forest is in Zone 2, Westside Cascades. Principal habitats used vary by zone in the Region.

ALTERNATIVE WAYS OF MEETING THE MANAGEMENT REQUIREMENT FOR PILEATED WOODPECKER AND PINE MARTEN

On the Mt. Baker-Snoqualmie National Forest, mature conifer habitat is defined as a stand of predominantly conifers which are over 100 years old.

Habitat areas for pine marten and pileated woodpeckers were mapped using Regional spacing, size, and habitat suitability criteria. Pine marten sites area to be located every 4,000 to 5,000 acres and pileated woodpecker sites every 12,000 to 13,000 acres.

Whenever possible sites were place within Wilderness, Wild River, RNA's other areas unsuitable for timber production, and in areas of reduced harvest levels, wherever these met habitat quality and distribution requirements.

Once the minimum number of habitat sites was determined using Regional spacing and habitat suitability specifications, the Forest considered two options for providing mature conifer habitat. One was to dedicate the required number of acres of suitable habitat in each site. These areas would not be managed for timber production and would be expected to remain in suitable habitat condition for several decades. The second option was to manage timber stands on a larger area in order to harvest timber and produce replacement stands over time.

ALTERNATIVE 1: Dedicated Sites

Under a dedicated mature conifer strategy, the required amount of mature conifer is withdrawn from timber production. Dedication of mature conifer sites has the advantage that the location of the stand does not change over time, making implementation less complicated. Dedication also assures that desired structural characteristics will be available for wildlife. There may be some risk of loss of individual stands through catastrophe.

ALTERNATIVE 2: Managed Sites

This option involves the projection of long rotations on enough acres to maintain the necessary habitat through time, with all areas being rotated. The "normal" rotation age for stands in General Forest is projected to be about 100 years. Production of mature conifer habitat is expected to take around 100 year; rotations of 140 are used to model a managed regime providing mature habitat from age 100 to 140. This means that for every acre of suitable habitat, 2-1/2 acres would be managed as replacement stands when the original acre is harvested.

Management of mature conifer sites assumes that existing stands can be harvested as other stands grow into a mature conifer condition to replace them. If replacement stands fail to develop desired structural characteristics (ie. large diameter snags and down material) as predicted mature conifer habitat would either be lost for a period of time or further delay in harvesting the existing mature conifer stands would occur.

EVALUATION OF IMPLEMENTATION METHODS TO MEET PILEATED WOODPECKER AND PINE MARTEN MANAGEMENT REQUIREMENTS

A discussion of the evaluation of alternative means of meeting all mature and old-growth habitat management requirements is included in the section on northern spotted owl.

OPPORTUNITY COSTS

The opportunity costs of designating the habitat areas (selected method) were not determined for pileated woodpecker or pine marten alone. Because of the interactions of habitat needs of all the mature and old growth species (Spotted owl, pileated woodpecker, pine marten, and mountain goat), opportunity costs were determined for the combination of all species requiring mature and old growth habitat. The discussion of opportunity costs for these management requirements are found at the end of this section (page H-27).

CONSEQUENCES OF THE DIFFERENT WAYS OF MEETING THE MANAGEMENT REQUIREMENT

Populations of pileated woodpeckers and pine marten would not be expected to differ significantly under either alternative. Both would maintain the same amount and distribution of Habitat. There are, however, differences in the opportunity costs as dedication of habitat areas would have the least impact on timber outputs and therefore PNV.

RATIONALE FOR THE SELECTED METHOD

The Mt. Baker-Snoqualmie National Forest chose to provide mature conifer habitat for pileated woodpecker and pine marten by dedicating sites where needed on tentatively suitable timber land. This alternative achieves the desired habitat with the least effect on timber outputs and is and economically efficient way of meeting the management requirement. Modeling these areas as designated for this planning period does not preclude future planners from designating replacement areas as substitution opportunities can be identified (i.e., some existing pole stands could be substituted for originally designated area by the 5th decade). Whether areas are modeled as designated or rotated, there would be little difference in implementation for the first planning period.

IMPLICATIONS FOR FOREST PLAN ALTERNATIVES

Plan alternatives were designed to address public issues. As a result most alternatives, including the preferred, incorporate objectives for retention of old-growth and mature timber for a variety of reasons, such as wildlife, visual, and recreation. To the extent possible, pileated woodpecker and pine marten habitat areas overlap with areas selected for other purposes (such as Wilderness, unroaded recreation areas, special interest areas and other lands determined as not appropriate or unsuited for timber production), wherever these meet habitat suitability and distribution requirement.

Spotted owl, pine marten, pileated woodpecker and goat areas overlap with each other in some cases, and they overlap with areas selected for other purposes (such as unroaded recreation areas and special interest areas) wherever these sites meet habitat suitability and distribution requirements. Methods

resulting in the opportunity cost shown in Table H-3 would benefit other resource uses as well.

ROLE OF MONITORING AND RESEARCH

The Forest Monitoring Plan (Forest Plan Chapter V) calls for monitoring populations and habitats of pileated woodpecker and pine marten. At scheduled plan review, monitoring data will be considered in determining the suitability and effectiveness of the selected method for meeting the management requirement for viable populations. This will be an important test of the appropriateness of the selected modeling assumptions.

Information needs for both pine marten and pileated woodpecker include:

1. Dispersal distances:

   a. How far can juveniles successfully disperse?
   b. As habitat becomes increasingly fragmented, what is the ability of dispersing individuals to locate habitat islands?
   c. What effect does the size of habitat areas have on the ability of dispersing individuals to locate these sites?

2. Size of mature conifer habitat sites:

   a. Occupancy and use of habitat sites, particularly as the sites become more isolated.
   b. Reproductive success within habitat sites.
   c. Home range size in fragmented forests.

3. Utilization and reproductive success of pine marten and pileated woodpeckers in mature conifer sites managed on a 100 year rotation (ie. are managed sites meeting habitat needs as compared to natural stands).

4. Population density, home range size and distribution of pine marten in reserved and other no-timber-harvest areas.

5. Reliable cost-effective methods of inventorying and monitoring pileated woodpecker and pine marten numbers are needed. Research is underway to improve these techniques.

SPECIFICATIONS FOR MEETING THE HABITAT REQUIREMENTS FOR MOUNTAIN GOAT

Principle Habitats Used

The mountain goat uses rock outcrops, cliffs, avalanche chutes, rim rocks, and seral stages V and VI (mature and old growth) of Kuchler types K1, K2, and K3.

Size of Habitat Areas

On the Mt. Baker-Snoqualmie, it was determined that habitat areas would be 45 acres per goat, based on the regional requirement of 10 acres per goat for each month on the winter range. Mountain goat habitat on the Forest was mappped by goat family group habitat areas, using the best available information on goat

occurrence and habitat requirements. The total number of family group areas mapped was 124: 16 in wilderness, 34 partially in wilderness, and 74 outside wilderness.

Once the family groups were established, an MR area was determined for each family group area, using the habitat specifications described in Table H-9. To the extent possible, 585 acres (45 acres per goat for an average 13 goats in the family) of MR habitat was delineated. In a number of areas, this amount of suitable cover was not present; in these cases, all of the existing suitable cover was delineated. Wilderness family groups had larger amounts of suitable cover available in a number of cases. Since these areas are what is minimally required and, therefore, very important if that is the only thermal cover left, they must be set up in areas of high use and/or critical need during winter months. The following criteria describe those needs.

PRIORITIES:

Seral Stage	Seral stages V and VI are required to fulfill the optimal cover and thermal cover needs of mountain goat. These stages correspond with the R2Map codes, S1 and S2, used to map the optimal cover/thermal cover MR's.
Aspect	Because winter range is most critical and goats concentrate primarily on south, southwest, and west-facing slopes during winter, these locations were preferred over other exposures. Wilderness cells (R2Map cell = 21.12 acres) were not chosen if they were on north-facing slopes.
Road Proximity	Mountain goats are highly sensitive to road disturbance (vehicle traffic, poaching, snowmobiles, and cross-country skiers on closed roads), therefore cells furthest from adjacent roads were selected.
Continuous Edge	Optimally, old growth cells were maintained along the flanks of rock outcrops, cliffs, etc., to provide an adequate distribution of adjoining thermal cover.
Adjacent Rock	Because mountain goats require steep ledges, cliffs, and rock outcrops, cells contiguous with this habitat were chosen first.
Wilderness Areas	Cells with wilderness designation were chosen first, if they also met the above criteria.
Tentatively Suitable Timber	Tentatively suitable timber was not chosen as part of the MR area if other cells were as appropriate for goat range.

Table H-9. Mountain Goat Requirements.

Principal Habitats Used Zone 2 (West Cascades) 1/	Dispersal Distance Between Habitats	Size of Area to which wildlife Prescriptions Apply	Habitat Requirements to be Used in Analyses
Rock outcrops, cliffs, avalanche chutes, rim rocks, and seral stages V & VI of Kuchler types K1, K2, and K3 adjacent to state landforms.	Not Established	45 acres per goat.	Forage and thermal cover within defined winter range boundaries. Maintain 50% of conifer habitat in seral stages V and VI on identified winter ranges. Allow 7-20 acres of winter range per goat per month.

1/ Mt. Baker-Snoqualmie National Forest is in Zone 2, Westside Cascades. Principal habitats used vary by zone in the Region.

ALTERNATIVE WAYS OF MEETING THE MANAGEMENT REQUIREMENT FOR MOUNTAIN GOATS

Once the family groups were established, the management requirement areas determined, and the management requirement habitat delineated, the Forest considered two options for providing adequate mountain goat habitat.

ALTERNATIVE 1: Dedicated Sites

Under a dedicated site strategy, the required amount of mature and old-growth habitat needed for thermal cover is withdrawn form timber production. Dedication of habitat has the advantage that the location of the stand does not change over time, making implementation less complicated. Dedication also assures that desired structural characteristics will be available for wildlife. There may be some risk of loss of individual stands through catastrophe.

ALTERNATIVE 2: Managed Sites

The managed sites option requires the projection of long rotations on enough acres to maintain the necessary thermal cover through time with all acres being harvest over time.

EVALUATION OF IMPLEMENTATION METHODS TO MEET MOUNTAIN GOAT MANAGEMENT REQUIREMENTS

As discussed above, it was necessary that habitat areas designated as MR areas be areas actually used by goats and containing, to the full degree possible, all of their habitat requirements. Current goat numbers are lower than expected, based on what is known about habitat requirements and available

habitat. There is a risk that their habitat requirements are not fully understood. Because of the lowered number of goats, it was determined that it was necessary to choose areas for MRs with the best indications, based on actual goat use, that they are suitable. This does not allow for managing larger areas to contain different areas of suitable habitat over time. The current literature does not support the idea that goat optimal cover and escape cover conditions can be provided through timber management.

Therefor, dedicating MR goat habitat areas of actual use and the best possible habitat conditions was selected.

OPPORTUNITY COSTS

The opportunity costs of designating the habitat areas (selected method) were not determined for mountain goat alone. Because of the interactions of habitat needs of all the mature and old growth species (Spotted owl, pileated woodpecker, pine marten, and mountain goat), opportunity costs were determined for the combination of all species requiring mature and old growth habitat. The discussion of opportunity costs for these management requirements are found at the end of this section (page H-27).

CONSEQUENCES OF THE DIFFERENT WAYS OF MEETING THE MANAGEMENT REQUIREMENT

Populations of mountain goats would not be expected to differ significantly under either alternative if each alternative would maintain equal quality of habitat. As discussed above, there is a risk that habitat requirements are not fully understood and managed sites therefore might not provide all needed habitat characteristics. Both would maintain the same amount and distribution of Habitat. In addition, there are differences in the opportunity costs as dedication of habitat areas would have the least impact on timber outputs and therefore PNV.

RATIONALE FOR THE SELECTED METHOD

The Mt. Baker-Snoqualmie National Forest chose to provide habitat for mountain goat by dedicating sites where needed on tentatively suitable timber land. This alternative achieves the desired habitat with the least effect on timber outputs and is and economically efficient way of meeting the management requirement. In addition, the managed habitat alternative was not favored because current literature does not support the idea that goat optimal cover and escape cover conditions can be provided through timber management.

IMPLICATIONS FOR FOREST PLAN ALTERNATIVES

Plan alternatives were designed to address public issues. As a result most alternatives, including the preferred, incorporate objectives for retention of old-growth and mature timber for a variety of reasons, such as wildlife, visual, and recreation. To the extent possible, mountain goat habitat areas overlap with areas selected for other purposes (such as Wilderness, unroaded recreation areas, special interest areas and other lands determined as not appropriate or unsuited for timber production), wherever these meet habitat suitability and distribution requirement.

Spotted owl, pine marten, pileated woodpecker and goat areas overlap with each other in some cases, and they overlap with areas selected for other purposes

(such as unroaded recreation areas and special interest areas) wherever these sites meet habitat suitability and distribution requirements. Methods resulting in the opportunity cost shown in Table H-3 would benefit other resource uses as well.

ROLE OF MONITORING AND RESEARCH

The Forest Monitoring Plan (Forest Plan Chapter V) calls for monitoring populations and habitats of mountain goat. At scheduled plan review, monitoring data will be considered in determining the suitability and effectiveness of the selected method for meeting the management requirement for viable populations. This will be an important test of the appropriateness of the selected modeling assumptions.

OPPORTUNITY COSTS FOR ALL MATURE AND OLD-GROWTH MANAGEMENT REQUIREMENTS

The opportunity costs of the implementation methods for meeting the habitat requirements for northern spotted owl, pileated woodpecker, pine marten, and mountain goat were estimated by comparing the differences in PNV and ASQ that would occur with and without the constraints that meet the requirements.

Table H-10 Displays the PNV and ASQ opportunity costs of the mature and old-growth habitat management requirements.

Table H-10. Opportunity Cost Meeting the Mature and Old-Growth Habitat Management Requirements.

Selected Implementation Method	First Decade ASQ MMCF/Year (MMBF/Year)	Change in ASQ 1/ Percent	PNV MM $	Change in PNV Percent
PNV Benchmark with No Protection Measures	63.9 (306)	-	2631	-
Opportunity Cost of Mature and Old Growth Habitat for Northern Spotted Owl, Pileated Woodpecker, Pine Marten, and Mt. Goat	50.1 (240)	-22	2410	-8

1/ Percent change calculated on cubic foot basis

Appendix H

WATER QUALITY MANAGEMENT REQUIREMENTS

SOURCE OF THE WATER QUALITY MANAGEMENTS REQUIREMENTS

Management requirements for water quality are based on NFMA which states: "Forest planning shall provide for compliance with requirements of the Clean Water Act, the Safe Drinking Water Act, and all substantive and procedural requirements of Federal, State, and local governmental bodies with respect to the provision of public water systems and the disposal of waste water." (36 CFR 219.23(d).

"Special attention shall be given to land and vegetation for approximately 100 feet from the edges of all perennial streams, lakes and other bodies of water. This area shall correspond to at least the recognizable area dominated by the riparian vegetation. No management practices causing detrimental changes in water temperature or chemical composition, blockages of water courses, or deposits of sediment shall be permitted within these areas which seriously and adversely affect water conditions or fish habitat." (36 CFR 219.27 (e).

The Clean Water Act seeks to control nonpoint sources of water pollution. To comply with Section 208 of the Act, Forest Service Region Six, the states of Oregon and Washington (which manage implementation of the Act in the respective states), and the Environmental Protection Agency agreed on a process whereby each state reviews Forest Service management practices to determine if they meet or exceed state water quality standards Practices that are judged to meet or exceed the standards are certified as Best Management Practices (BMP's) which the Forest Service then agrees to continue.

SPECIFICATIONS FOR THE WATER QUALITY MANAGEMENT REQUIREMENTS

Requirements set forth in NFMA regulations require the Forest Service not allow management practices which seriously and adversely affect water conditions or fish habitat through detrimental changes to stream temperatures or chemical composition, blockage of water courses, or deposits of sediment. In addition direction established in the Forest Plan must comply with the requirements of the Clean Water Act, the Safe Drinking Water Act, and all substantive and procedural requirements of Federal, State, and local governmental bodies with respect to the provision of public water systems and the disposal of waste water.

On the Mt. Baker-Snoqualmie National Forest, most of the activities which affect water quality are related to timber harvesting. They include removal of trees and road construction. (For more discussion, see FEIS, Chapter IV, "Soils and Water" section).

The primary approach to maintaining water quality on Mt Baker-Snoqualmie National Forest lands is to: 1) limit or prohibit timber harvest on certain unstable slopes (by designating such lands as unsuitable for timber production), 2) limit amount of harvesting in riparian areas to protect riparian values and fisheries habitat, and 3) limit the amount of timber harvest per decade in individual watersheds to prevent unacceptable adverse cumulative effects on water quality.

In the FEIS, the specifications established by the Forest are called Standards and Guidelines. The required watershed condition, and the standards that

indicate achievement of the water quality management requirement, are described in the Land and Resource Management Plan, Chapter IV. The following specifications are addressed in this appendix.

Water Quality and Riparian Area Standards and Guidelines:

Emphasize maintenance and/or improvement of water quality and fish habitat capability.

Retain instream woody material plus standing trees adjacent to the stream, needed for future debris recruitment plus bank and channel stability.

Maintain streamside vegetation so at least 80% of the fish habitat stream surface has shade during the summer low flows. Maintain or restore 75% of other small woody and herbaceous vegetation.

ALTERNATIVE WAYS OF MEETING THE MANAGEMENT REQUIREMENTS FOR WATER QUALITY

Alternative ways for the meeting specification shown above could be modeled in FORPLAN to simulate the required end conditions. These become alternative constraints in the model that set limits on how FORPLAN schedules timber harvest to maximize PNV. (FORPLAN constraints are discussed in the FEIS, Appendix B, "Development of Management Requirements.") The following alternatives were considered:

ALTERNATIVES CONSIDERED IN DETAIL

ALTERNATIVE 1: Schedule No Timber Harvest in Riparian Areas

This alternative is designed to minimize vegetation disturbance and schedules no timber harvest in riparian areas.

ALTERNATIVE 2: Schedule Reduced Yield Timber Harvest in Riparian Areas

This alternative allows a moderate level of removal of trees from the riparian area. No timber harvest is allowed in 25% of the riparian area, harvesting on a minimum 160-year rotation is allowed on 50% of the riparian area, and the remaining 25% of the riparian area is managed in the same manner as the adjacent land allocation.

ALTERNATIVE 3: Use Existing Watershed/Sediment Model(s) to Assess and Mitigate Unacceptable Adverse Hydrologic Cumulative Effects of Management Activities

This alternative was abandoned when review of literature and discussions with academic and scientific community members indicated that no process for assessing and mitigating hydrologic cumulative effects applicable to the Mt. Baker-Snoqualmie National Forest exists.

ALTERNATIVE 4: Develop Local Process to Prevent Unacceptable Adverse Hydrologic Cumulative Effects Forestwide

This alternative requires the development and use of a watershed by watershed classification and evaluation of watershed conditions. The process determines limits on acres harvested by decade by watershed to prevent unacceptable adverse hydrologic cumulative effects.

EVALUATION OF IMPLEMENTATION METHODS TO MEET WATER QUALITY MANAGEMENT REQUIREMENTS

Of the two alternatives that address riparian areas, Alternative #1 (No Harvest) was determined to be more restrictive than necessary to achieve the goals and objectives for protection of riparian values. Allowing the level of harvest in Alternative #2 is considered to be consistent with the requirement to protect riparian values.

Of the two alternatives that address the hydrologic cumulative effects issue, only Alternative #4 provides a means to respond to the needs to insure management activities do not result in unacceptable adverse hydrologic cumulative effects.

OPPORTUNITY COSTS

The opportunity costs of implementation meeting water quality management requirements were estimated by comparing the differences in PNV and ASQ that would occur with and without the constraints that simulate the means for accomplishing the required condition.

Table H-11. compares the PNV and ASQ opportunity costs of the implementation methods (means) for water quality protection.

Table H-11 Opportunity Cost Associated with Means for Meeting the Water Quality Management Requirements.

Selected Implementation Method	First Decade ASQ MMCF/Year (MMBF/Year)	Change in ASQ 1/ Percent	PNV MM $	Change in PNV Percent
PNV Benchmark with No Protection Measures	63.9 (306)	-	2631	-
Opportunity Cost of Riparian Protection	59.6 (285)	-7	2580	0
Opportunity Cost of Water Quality Protection	41 0 (196)	-36	2297	-13

1/ Percent change calculated on cubic foot basis

CONSEQUENCES OF ALTERNATIVE WAYS OR MEANS OF MEETING WATER QUALITY

While opportunity costs were not determined for the no harvest in riparian areas alternative, it is clear that this alternative would have a higher opportunity cost in terms of ASQ and PNV than would the alternative that allows a moderate level of harvest. The no harvest alternative would go beyond the requirements of protecting the riparian area values.

RATIONALE FOR THE SELECTED IMPLEMENTATION MEANS

The Forest chose to meet riparian area protection needs while allowing timber management activities to occur at moderate levels in the riparian areas (Alternative #2) This alternative achieves the desired condition of the riparian areas with the least effect on timber outputs and is an economically efficient way of meeting the management requirement.

The application of the hydrologic cumulative effects analysis (Alternative #4) was necessary to insure activities outside riparian areas did not contribute to unacceptable adverse hydrologic cumulative effects. At this time, the method used is the only known method of meeting the management requirement for water quality on the Mt. Baker-Snoqualmie National Forest. The MR's for water quality are in full compliance with NFMA.

IMPLICATIONS FOR FOREST PLAN ALTERNATIVES

FEIS Chapter II and Appendix B discuss the effects of the means used to meet riparian area and water quality management requirements. The analysis of opportunity costs of riparian area and water quality protection shown in Table H-11 shows the maximum PNV and ASQ effects of meeting these requirements. Actual Plan alternatives will have somewhat less opportunity costs as overlaps from lands withdrawn for other allocations or constrained for other management requirements will help meet water quality requirements.

ROLE OF MONITORING AND RESEARCH

Protection needs and methods for protecting riparian areas are well documented. The Monitoring Plan in Chapter 5 of the Forest Plan provides for continued monitoring of riparian areas and fish habitat conditions. Reviews of the results of this monitoring will be used to determine the suitability and effectiveness of the means selected to meet management requirements for protection of riparian areas.

The needs for protection of water quality and the potential unacceptable adverse effects on water quality of some management activities are well documented. However, the means for ensuring the cumulative effects of management activities will not have an unacceptable adverse effect on water quality are not well established or accepted. Again, the Monitoring Plan provides for continued monitoring of management activities and their effects on water quality. Results of this monitoring will be used to evaluate the hydrologic cumulative effects analysis process and insure its efficiency and effectiveness in meeting the water quality management requirement. If necessary, the process will be modified to correct deficiencies found during the monitoring process.

Research in the area of hydrologic cumulative effects of forest management activities is receiving considerable attention by the scientific and academic community. Any new research findings concerning hydrologic cumulative effects and forest management will be reviewed and if appropriate, incorporated into the process used by the Forest. The Forest will continue to work with the scientific and academic community to refine and further validate the hydrologic cumulative effects analysis process used in the Forest Plan.

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DEVELOPMENT AND APPLICATION OF A HYDROLOGIC CUMULATIVE EFFECTS ANALYSIS PROCESS ON THE MT. BAKER-SNOQUALMIE NATIONAL FOREST

1990

In response to comments received on the DEIS, additional analysis (with considerable peer review and involvement of interested public groups) was done to address the issue of hydrologic cumulative effects and develop a procedure to meet water quality management requirements on the Mt. Baker-Snoqualmie National Forest.

Public Comments to the DEIS on Hydrologic Cumulative Effects

There were a total of 117 substantive comments from the public on fishery resources; 66 of these comments directly or indirectly addressed cumulative effects of forest practices on fishery and water quality values. In addition, 60 of the 75 substantive comments regarding the management of riparian areas were directed to impacts or effects to riparian values from forest management activities over space and time. The general public comments also included a number of comments in this area, including: "cumulative effects analysis for fish is inadequate;" "cumulative effects of forest activities on watersheds and water resources are not addressed;" "need more MMR's (MR's) for soils, watershed;" and "protect vital watersheds."

Substantive public comments were received from the following agencies and tribal governments:

Washington State Department of Fisheries
Washington State Department of Wildlife
U.S. Fish and Wildlife Service
Environmental Protection Agency

Lummi Indian Tribe
Nooksack Indian Tribe
Sauk-Suiattle Indian Tribe
Skagit System Cooperative
Tulalip Indian Tribe
Muckelshoot Indian Tribe

There were two predominant areas of concern: the relationship between timber management activities (harvesting, road construction) and the viability of fish and fish habitat. (For example, what are the effects of sedimentation and bedload movement generated by Forest management activities to on- and off-Forest fishery resources, over space and time?) A second area of concern was the effectiveness of Best Management Practices to protect and maintain fish habitat and riparian areas, and the effectiveness of fish habitat restoration/improvement as a measure to mitigate the effects of forest management activities, over space and time. In one section of their input, The State strongly recommended, in place of BMP's, the need for MR's be developed for fish, in order to provide strengthened Forest-wide requirements for the protection of habitat.

Chronology of Developing a Process to Address the Issue

During preparation of the DEIS, the Forest recognized the need for a method to address hydrologic cumulative effects on all areas of the Forest including riparian lands so that a more effective range of management options could be developed. However, no methodology was identified that could be directly adopted to the Forest to meet management requirements, specifically for water quality and riparian areas. As a result, in the draft EIS, consideration of *hydrologic cumulative effects was focused on: 1) identifying the major causes* of adverse cumulative effects on water quality and/or quantity; and 2) identifying watershed potentials for unacceptable adverse cumulative effects.

At the June 16, 1988 meeting with the Regional Forester to "Set the Course," highlights of public comments to the DEIS were presented. The Forest identified cumulative effects as one of two major issues identified in the public response that needed attention in progressing to a final forest plan.

Strategies to address the hydrologic cumulative effects issue were developed at this meeting. Included were additional public consultation, a literature search and work to determine if predictive models to determine hydrologic effects on westside Cascade watersheds were available (working with the Director of Watershed, Regional Office).

An informal progress report was made to Regional Office Resource Directors in early December, 1988 and a formal "Check the Course" meeting was held December 21, 1988.

At the "Check the Course" meeting, work to date on the hydrologic cumulative effects analysis was presented No suitable model had been found, and the Forest had proceeded to develop an MBS-specific process (discussed in detail below.) In addition, no predictive model had been found to tie sediment production to fish habitat capability. This led to inclusion of fisheries as a major component of hydrologic cumulative effects analysis. Final results of the analysis were not available yet and the Forest was directed to continue work, with an additional "Check the Course" meeting scheduled.

On June 14, 1989, at a second "CTC" meeting, the results of the Forest's work were presented. The procedure for identifying a method to meet water quality and riparian MR's would be applied in all alternatives It's intent, again, is to insure that effects of management activities prescribed by the Forest Plan meet the intent of water quality laws and regulations. Arrangements for peer (scientific community) and industry review were discussed

During the summer and fall of 1989, meetings were held with State and Federal agencies, timber industry representatives, members of the academic and scientific communities, and representatives of environmental groups. The purposes of the meetings were to describe the process being used, solicit reactions to the process, and identify opportunities to improve the process.

The meeting with timber industry representatives created considerable interest and apprehension on their part, as expected. In a letter dated Oct 6, 1989, they stated their understanding of the issues that were presented at the meeting and requested additional information that has been subsequently given to them. They also stated in their letter that they would submit written comments in the near future No additional comments had been received on May 7, 1990.

The meeting with members of the scientific community resulted in several useful comments. Comments made by the scientists at the meeting and subsequent written comments indicate they had a favorable impression of the procedure. Dr. Terrance Cundy (hydrologist) stated in written response (11/13/89) that the approach should be thoroughly documented and described so that outside analysts can understand the procedure, assumptions, and the philosophical context. He also stated: "As described, the approach is based on watershed and stream processes and functions. I believe this is a good strategy."

Dr. R. Dennis Harr, research hydrologist, also provided written feedback (11/10/89). He provided some comments related to how we displayed the acceptable and unacceptable criteria relative to upper and lower watersheds, and the dynamics of woody debris He stated that "any additional information you can include to describe how you arrived at the harvestable acreage by decade figures would improve the credibility of these figures". He further stated that rain-on-snow criteria was an important issue that was not addressed on the example watershed (Finney Creek) used at the meeting. In conclusion he stated: "All in all, I think what you have developed is the best that could have been developed given the current state of knowledge."

Drs. Jim Sedell and Gorder Reeves (fisheries biologists) were also at the meeting and provided written feedback (12/13/89). They provided comments as to how we we might better define acceptable and unacceptable criteria for in-channel stability, pool condition, and large woody debris.

We have also presented the process to the Washington State Department of Natural Resources (DNR), the Greater Forest Ecosystem Alliance, and at meetings sponsored by the National Audubon Society's Adopt-a-Forest Program. People at these presentations showed considerable interest and we felt that our information was well received. The DNR was especially interested but somewhat apprehensive as they are concerned that this process could have a significant effect on them.

Background and Legal Requirements

The Organic Act of 1897 provides that "No national forest shall be established except to improve or protect the forest within the boundaries, or for the purpose of securing favorable conditions of water flows, ..."

The Multiple-use Sustained-Yield Act of 1960 also requires that the National Forests be administered for among other things, watershed, wildlife and fish purposes.

In addition, the Council on Environmental Quality (CEQ) regulations require that all Federal Agencies consider cumulative impacts in environmental analysis. CEQ regulation 40 CFR 1508.7 defines cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." General requirements for cumulative effects analysis are identified in the National Environmental Policy Act (NEPA) regulations, 40 CFR 1508.25, (a)(2) & (c) and 1508.27 (b)(7).

The National Forest Management Act (NFMA) regulations require a systematic Planning process and state that, to the extent feasible, this process be used to meet both Planning and National Environmental Policy Act requirements. Therefore, it is necessary to analyze cumulative effects as part of our Forest Plan.

Through the Boldt Decision (Phase II) we are managing through cooperative efforts fish habitat on National Forest lands in usual and accustomed fishing areas of Puget Sound Treaty Tribes. Responses to our Draft Forest Plan from tribal biologists, as well as State Agency biologists and other Federal

agencies such as EPA and the U.S. Fish and Wildlife Service, dictate we display a hydrologic cumulative effects analysis in our Final Forest Plan.

Section 208 of the Clean Water Act and Section 319 of the Water Quality Act of 1987 are the legal precedents that most affect forest management because they address nonpoint source pollution. The Region has established some guidelines on how we will comply with those water quality requirements.

1. Requirements of the Clean Water Act will be met by applying Best Management Practices. (See FSM 1561.5, R-6 Supplement 48 (8/79), agreement with the State of Washington.)

2. Within the concept of Best Management Practices, cumulative effects should be addressed and impacting activities scheduled and dispersed, when water quality might be unacceptably impacted. This is particularly important for high risk areas where management activities have been or might be concentrated over a short period of time.

3. Within the bounds of the above direction, Forest should address water quality in their analysis in the manner most appropriate given their information base and particular conditions.

Guideline 2 above is of particular concern on the MBS because of the occurrence and frequency of management activities in watersheds having a large amount of unstable soils.

Regional direction (1920 Regional Forester letter dated 9-24-84) states, "To avoid adverse cumulative soil and water effects, management actions should be dispersed rather than concentrated. Beyond that precept there was little in the way of hard scientific facts that could be relied upon." The concern on the MBS is that in many of the more sensitive watersheds on the Forest, dispersing management activities and state-of-the-art BMP's are not adequate to avoid unacceptable adverse hydrologic cumulative effects. It appears in some cases such things as reducing future outputs or foregoing outputs for a period of time may be necessary

Process Used by the Forest

Refer to Attachment 1 for the References used to develop the Forest's hydrologic cumulative effects strategy.

The process used by the Forest to complete its hydrologic cumulative effects analysis consisted of two separate parts. These were: 1) Watershed Sensitivity Analysis - a preliminary analysis of the sensitivity of all watersheds and the assignment of each watershed to one of three categories of sensitivity and 2) Watershed Condition Analysis and analysis to determine the actual method or constraint to be used to meet MR's - a three step site-specific analysis of each watershed in the two most sensitive categories from the Watershed Sensitivity Analysis The first step of this second analysis further examined the stream channel conditions and upslope conditions for each watershed. The next step was to determine, based on the above conditions and other considerations, whether the watershed was in an acceptable or unacceptable condition. The final step in the second analysis was to establish a maximum level of harvest on national forest lands that will maintain a watershed in an

acceptable condition or will improve an unacceptable watershed to acceptable conditions.

Watershed Sensitivity Analysis

A preliminary analysis was made of the sensitivity of all watersheds on the Forest using the following set of watershed condition factors: 1) management history, 2) climatic conditions, 3) presence of landslides, 4) inherent soil stability, 5) stream channel stability, and 6) off-site impacts. A team of the Forest's Soil Scientist, Hydrologist, Fishery Biologist, and Geotechnical Engineer made the first-cut analysis based on information at hand and their extensive field experience. This analysis was based on the planning guidance found on pages 8-9 of the "Process for Cumulative Effect Analysis" (RO letter 9/24/84). As a result of this analysis, watersheds were placed in one of three categories defined as follows:

Category I: watersheds where there has been little or no effect on water quality or quantity values. The existing natural and geomorphic features produce stable watershed conditions within the watershed and off-site. Of the total on the Forest, 8 watersheds were rated as Category I.

Category II: watersheds with recent management activity (over the last 30 to 40 years) that, together with some natural events, have caused adverse impacts to water quality - quantity values within and/or outside the Forest's watershed boundaries. The existing natural and geomorphic features can and have produced unstable conditions in some areas of the watershed. There are 53 Category II watersheds on the Forest.

Category III: watersheds with a very high frequency of management activities over the past 30 to 40 years. The magnitude of these activities has been significant within the watershed (large areas with activity occurring in a very short time period - 5 to 15 years). The existing natural and geomorphic features have produced and can continue to produce highly unstable and dynamic watershed conditions (within the watershed and off-site). Significant impacts have occurred within and outside the Forest's watershed boundaries. Of the total, 17 watersheds were rated as Category III. All of these lie north of Highway 2.

Watershed Condition Determination of Method/Constraint to Meet MR's

After the watershed sensitivity analysis, it was determined that an additional, more site-specific, analysis of the Category II and III watersheds would be necessary because of past level of management activities in most of these watersheds The results of this additional analysis would identify limits of activity necessary to protect or allow recovery of these watersheds. The sensitivity of the Category I watersheds was determined to not be as critical and normal silvicultural created opening constraints would mitigate any unacceptable adverse cumulative effects.

The Forest organized individual District Interdisciplinary (ID) teams to *conduct the watershed condition and method or constraint analysis for Category* II and III watersheds.

The ID teams were composed of the most experienced personnel (with up to 25 years experience on the Forest) from the Supervisor's Office and each District, many of whom could offer insight from their personal experience over the years of working on the Mt. Baker-Snoqualmie. The team reviewed in-place empirical data and developed historical perspectives on watershed conditions from examination of aerial photos taken over the past 30 to 40 years. This process was applied to every Category II and III watershed on the Forest (a total of 70 watersheds).

The Regional Hydrologist worked with the Forest in developing a format for a worksheet for documenting the process in each watershed. That format required the IDT to direct their analysis and answer questions about stream channel conditions. We separated the analysis and discussion between the upper watershed (1st and 2nd order streams) from the lower watershed (3rd and 4th order streams). For both the upper and lower watershed areas, we looked at present and past in-channel stability, streambank stability, status of large woody debris, and channel pattern (lower watershed only). (See Attachments 2 and 3: diagram defining Upper and Lower watershed limits and a text: Evaluation of Present Stream Channel Conditions.)

The team also looked at upslope conditions by reviewing past harvest rates, road density and condition, presence of landslides, amount of unstable soils, and ability to revegetate and recover.

Some other considerations were incorporated, such as: 1) our expectations of the effect of new or improved Best Management Practices (BMP's), 2) what the estimated effects of mitigation measures would be if prescribed, 3) the relationship of the mature sawtimber left in a watershed to streams and unstable soils, 4) the amount of roading necessary to harvest the remaining timber and potential location to streams and unstable soils, and 5) the practicability of helicopter logging.

All of the above analysis and documentation was summarized in order to provide an overall evaluation of the existing watershed conditions. It was also used to reach an agreement on a desired future condition measured at the Forest boundary. (See Attachment 2 - Determining Watershed Boundaries). Thus, extensive state and private logging outside the National Forest was not considered. Depending upon the consensus of the IDT on the magnitude of the past cause and effect relationships projected to the future, a maximum harvest acreage per decade was assigned for each watershed. In addition, each watershed was rated as being in an acceptable or unacceptable condition. (See Table 1 for a summary of the criteria used to rate watershed condition as acceptable or unacceptable.)

The harvest rate assigned to a watershed is meant to maintain an acceptable condition, or improve an unacceptable condition within the National Forest. The harvest rate was developed based on the tentatively suitable acres identified in the EIS and became a dispersion constraint - the method to meet management requirements and applied to all alternatives.

Preliminary Results of Analysis and Steps to Proceed to Final Forest Plan

A total of 70 Category II and III watersheds were analyzed by the ID teams at the Ranger Districts. The documentation and results of the watershed condition

and management requirement analysis were reviewed by a Forest Supervisor's Interdisciplinary (ID) team and a Regional ID team to assure consistency in application of the principals of this analysis strategy.

Table 1
Criteria for Determining Watershed Condition

Criteria applicable to all stream orders (1st, 2nd; 3rd, 4th). Acceptable/ unacceptable rating is determined by considering the upper and lower watershed and arriving at an overall score.

ACCEPTABLE	UNACCEPTABLE
In-Channel Stability	
Channel scouring is evident but not excessive and can be attributed to natural causes.	*Considerable amount of deep downcutting* with evidence of continued scouring. Documentation indicates majority is the result of management activities.
Pool Condition	
Pool area occupies as much surface area as riffles. Ratio of 50/50 or better (pools/riffles). Pools are 2 feet or deeper (3rd & 4th order).	Pools are consistently shallow, usually being less than 2 feet deep and tend to be much less than 50% of the surface area. Pools tend to be filled in by sediment and/or bedload.
Streambank Stability	
80% to 85% of banks appear stable.	Extensive exposed banks with instability conditions predominating.
Wood Debris	
Adequate moments of embedded, well-anchored LWD are in place. Riparian area condition provides for recruitment of LWD into the future.	LWD is not in place and well-anchored. Because of lack of LWD, system lacks structure to provide stable pools and channel stability. Riparian area is lacking in the ability to recruit future supply of LWD.

As a result of the watershed condition analysis, 19 watersheds were rated as *being in an unacceptable condition and 51 in an acceptable condition. The* preponderance of the unacceptable watersheds were found on the more geological sensitive north end of the Forest - 15 of 19, approximately 80%. (see Chapter III of the EIS for a description of the geology of the Forest.)

The consequences of a watershed being rated in an unacceptable condition would be the application of a tighter harvest level for some period, usually at least the first two decades of the Plan. This allows for hydrologic recovery to take place before resuming what could be a higher harvest level and still avoid

adverse hydrologic cumulative effects. However, only one unacceptable watershed (AZ #31, Deer Cr. SE) was assigned to a "no harvest" level because of the seriousness of the watershed condition. This "no harvest" would occur for the first two decades of the Plan and harvesting could resume at an acceptable level in the third decade.

All of the other unacceptable watersheds showed some level of harvest. In most cases, the level was reduced for the first two decades increasing in the third and fourth decades. The ID team's rationale was that some harvest could take place in a watershed while recovery was taking place if the harvest activity would be conducted using improved BMP's and located in the less sensitive portion of the watershed.

This analysis is not meant to be an end in itself. It is viewed as a programmatic level of analysis that will be used for the Forest Plan. It is the intent of the Forest to continue to monitor these effects of management in an effort to fine-tune many of the assumptions we made at this programmatic level of analysis. We are presently developing a strategy for project level analysis of hydrologic cumulative effects which would be a source of more specific information that would help us: 1) develop and design better options for project implementation and 2) adjust any planning level assumptions. We view this as adaptive management.

A summary of the results of the watershed condition analysis and the results of the analysis - a set maximum number of acres available for timber harvest, per decade, by watershed - is shown in Table 2. Table 3 displays additional information about watersheds found to be in unacceptable conditions. Also, refer to the Attachments for additional documentation of the analysis and the rationale for the watershed condition and the constraint Summary sheets are included for all watersheds considered, plus one completed worksheet for a watershed.

Modeling

The hydrologic cumulative effects analysis procedure developed by the ID team is incorporated into the Forest's FORPLAN model as a set of constraints. To meet the water quality and riparian management requirements, there is a set maximum number of acres available for final harvest by watershed.

Accessibility constraints applied by watershed set a maximum on the amount of an area that can be scheduled for harvest in a decade. For the first decade, the accessibility constraints were developed by calculating the percent of the area that can be entered, while still "keeping" watersheds that rated acceptable from deteriorating, and allowing watersheds in an unacceptable condition to recover (eventually to an acceptable condition). The percents that went into FORPLAN modeling were based on the maximum harvest acreage limits developed by the ID team.

For the second and subsequent decades, the method or constraint to meet MR's was modeled by "flow constraints" on acres of final harvest Forest-wide (by North and South). Accessibility constraints were not used in these decades because of insufficient information available from the model to track the vegetation condition class by zone after management is implemented in the first decade. The flow constraints were developed in concert with the Forest's

resource specialists to reflect the continuing need to manage, in order to keep cumulative hydrologic effects below the unacceptable levels. The flow constraints allow final harvest acres in Decade 2 to increase by 4% over the Decade 1 final harvest acres; by 10% in Decade 3 over Decade 2; by 4% in Decade 4 over Decade 3; and 0% increase thereafter - a total increase in final harvest acres of approximately 18% over the first decade levels.

Individual Watershed Worksheets

Again, refer to the Attachments for more detailed information. The complete worksheets and maps for all watersheds analyzed are available in the Planning Records.

Table 2
AZ SUMMARY

AZ	NAME	CATEGORY	RATING	TOTAL ACRES	NF ACRES	ACRES HARVEST PER DECADE 1	2	3	4
Mt. Baker Ranger District									
2	ILLABOT CK	II	A	15,606	15,522	425	425	425	425
3	CHILLMUNRD	II	A	11,677	11,677	250	250	250	250
4	CANYON CK	III	U	17,463	17,463	100	200	420	420
5	LRNOFKNOOK	II	A	16,521	13,284	400	400	400	400
6	GLAMFNOOKN	II	A	12,500	9,441	280	280	280	280
8	MDFKNOOKUR	II	A	6,777	6,777	250	250	250	250
9	URNOFKNOOK	II	A	24,942	24,731	980	980	980	980
10	MDFKNOOKSO	II	A	6,187	6,187	200	200	200	200
11	SOFORKNOOK	III	U	19,825	19,045	325	325	390	450
14	SWIFT-PARK	II	A	6,607	6,439	250	250	250	250
15	BAKER	II	A	23,810	23,142	650	1025	1025	1025
16	BKLKUNRD	II	A	10,764	10,300	350	350	350	350
17	LKSHANNON	II	A	10,194	10,012	300	300	300	300
18	LKSHANUNRD	III	U	12,968	11,888	200	300	400	400
20	JACKCRMUR	III	U	11,274	8,404	200	325	325	325
22	MRSKRVMR	II	A	13,896	12,482	625	625	625	625
23	URSKAGITRV	II	A	10,775	9,483	330	330	330	330
26	CASCADE RV	II	A	23,713	23,671	1100	1100	1100	1100
27	LRSKAGITRV	II	U	3,547	3,252	75	75	185	185
28	LRSKRVMUR	II	A	11,003	10,961	550	550	550	550
29	DEER CK NW	III	U	12,261	10,474	100	200	400	400
30	FINNEY CR	III	U	21,226	20,888	100	100	850	850
31	DEER CR SE	III	U	6,274	6,274	0	0	262	262
32	DEERCRUNRD	III	U	7,179	7,179	110	110	220	220
38	SAUK RV NE	II	U	6,420	6,209	100	100	200	200
Darrington Ranger District									
34	MRNOFKSTNO	II	U	3,887	3,887	200	200	200	200
35	MRNOFKSTSO	II	A	8,784	6,990	500	500	500	500
37	URNOFKSTIL	III	U	31,339	30,809	1000	1000	1000	1000
39	SAUK RV SE	III	A	45,128	43,421	1700	2500	3000	3000
40	SUIATTLERV	II	A	42,108	41,749	2500	1700	1700	1700
41	SU-RVMUNRD	II	A	10,792	10,792	750	350	350	350
42	WHITECHUCK	II	A	15,965	15,965	650	650	650	650
44	CANYON CR	III	U	16,388	15,816	250	250	250	250
45	SAUDRVUNRD	II	A	16,450	16,450	450	450	450	450
46	LRSOFKSTLL	III	U	17,696	16,008	350	350	350	350
48	URSOFKSTLL	III	U	35,140	34,063	500	500	500	500
49	SAUKRVFORK	III	A	25,721	25,446	250	250	250	250

Table 2 (continued)

AZ	NAME	CATEGORY	RATING	TOTAL ACRES	NF ACRES	ACRES HARVEST PER DECADE 1	2	3	4
Skykomish Ranger District									
47	SULRVUNRDN	II	A	3,631	2,597	150	200	200	200
51	SULRVURSE	II	A	6,609	6,166	300	300	300	300
52	SULTAN RV	III	A	15,682	7,917	100	100	100	100
53	NFSKYURSO	II	A	20,990	19,830	650	650	650	650
54	NFKSKYURNO	III	A	14,421	14,001	500	500	500	500
55	NOFKSKYRV	III	A	12,330	9,735	1060	1060	1060	1060
56	NFKSKYURW	II	A	11,930	11,192	310	310	310	310
57	SKYRVMUNRD	II	A	11,358	9,227	350	350	350	350
59	TYE RIVER	II	A	6,796	4,095	100	150	150	150
60	BECK-RAPID	II	A	44,810	39,788	3600	4000	4000	4000
61	SOFKSKYUR	II	A	5,258	5,153	240	240	240	240
62	SOFKSKYRV	II	A	3,589	2,344	270	270	270	270
63	SKY-TOLT	II	A	20,828	3,632	300	200	200	300
65	SFKSKYALMR	II	A	24,726	23,503	430	430	430	430
67	TY-BEC-MU	II	A	21,389	20,166	700	1000	1000	1500
68	FOSSRVALMU	II	A	6,546	6,313	500	500	500	500
69	MILLERALMU	II	A	5,955	5,386	200	200	200	200
North Bend Ranger District									
70	TLTRVMUMUR	II	A	7,266	6,612	250	250	250	250
71	NFKSNQALMU	II	A	9,457	7,305	700	700	700	700
72	TAYLORALMR	II	A	6,554	6,172	250	250	250	250
73	MFKSNQALMU	II	A	5,025	4,345	350	350	350	350
74	URMFKSNQMU	II	A	12,289	11,529	800	800	800	800
75	PRATT-ALMU	II	A	10,009	9,165	650	650	800	1000
77	SFKSNOQMU	II	U	25,097	17,419	200	200	200	200
81	URGREENRV	II	U	36,073	17,062	500	500	1000	1500
82	GREENRVNO	II	A	34,567	7,384	300	300	800	800
83	GREENRVSO	II	A	27,548	12,124	1000	1500	2500	3000
White River Ranger District									
84	GREENWATER	II	U	28,754	18,520	650	880	1320	1320
85	LRWHITERV	II	U	4,346	2,321	250	250	250	250
86	CLEARWATER	II	A	3,315	3,315	407	407	407	407
90	HUCKLBRYCK	II	A	10,008	10,008	1300	1300	1300	1300
91	WFWHITERV	II	A	16,874	16,874	2000	2000	2000	2000
93	CARB-PUYAL	II	A	20,967	15,711	1150	1150	1150	1150

Table 3
Summary Table of Unacceptable Condition Watersheds

Number	Name	Total Acres	N.F. Acres	Acres of Tent. Suit. Mature Timber Remain.
4	Canyon Creek (N)	17,463	17,463	3,463
11	S.Fk.Nooksack	19,825	19,045	7,263
18	Lake Shannon	12,968	11,888	5,912
20	Jackman Cr.	11,274	8,404	3,083
27	Lower Skagit	3,547	3,252	1,055
29	Deer Cr. NW	12,261	10,474	4,329
30	Finney Cr.	21,226	20,888	5,574
31	Deer Cr. SE	6,274	6,274	2,428
32	Deer Cr. Unrd.	7,179	7,179	4,160
34	M.R.N.Fk.Stilly	3,887	3,887	1,625
37	N.Fk Stilly	31,339	30,809	11,572
38	Sauk R. NE	6,420	6,209	2,174
44	Canyon Cr. (S)	16,388	15,816	5,828
46	Lower S.Fk.Stilly	17,696	16,008	5,342
48	Upper S.Fk.Stilly	35,140	34,063	8,615
77	S.Fk. Snoq. R.	25,097	17,419	5,371
81	Upper Green R.	36,073	17,062	8,447
84	Greenwater	27,867	18,520	6,546
85	Lower White R.	4,346	2,321	1,710

The following Attachments provide more documentation of the hydrologic cumulative effects analysis, including a completed worksheet for one sample watershed and the Summary Sheets for all watersheds.

Attachment 1

Support Documentation for MBS Forest Plan
Watershed Cumulative Effects Assessment

The following listed references (citations, publications) were used to develop the Forest's hydrologic cumulative effects strategy for the Forest Plan. This Forest strategy development began in 1984 and has evolved for the past five years to its present form. Because of the complexity and gaps in knowledge in this subject area, our strategy has been dynamic; as new information and knowledge as been published, we have reviewed and incorporated, it appropriate, this into our strategy.

Basic Documents Used to Develop the CEA Strategy

1. **"Management of Wildlife and Fish Habitats in Forests of Western Washington and Oregon, Part 1", 1985.**

   Chapter 10 Salmonids, principal authors: Fred Everest, Neil Armantrout, Steven Keller, William Parante, James Sedell, Thomas Nickelson, James Johnston, Gorden Haugen.

2. **"Streamside Management: Forestry and Fishery Interactions", 1987.**

   Variables Related to Fish Habitat - Chapters 1-6.

   Forest Management of the Streamside Zone - Chapters 8-9.

Supporting Documents Used to Develop the CEA Strategy

1. **"Cumulative Effects of Forest Practices on the Environment: A State of the Knowledge", Geppert, Lorenz, Larson, 1984.**

   * validation that there is a potential for cumulative effects from current forest practices.

   * control of much of the cumulative effects is possible by manipulating future application of forest practices in time and space.

   * using basin examination approach to analyze watershed cumulative effects.

2. **"Watershed Workbook: Forest Hydrology Sensitivity Analysis for Coastal British Columbia", D. J. Wilford, 1987.**

   * identification of important in-channel attributes and how these respond to past and proposed timber management activities.

   * change in channel morphology linked to changes in upslope conditions.

   * recovery aspects of impacted in-channel conditions as well as upslope recovery.

* use of empirical data and professional judgement to establish linkages between forest management activities of past and present to upslope conditions, to in-channel conditions, and finally to fish habitat.

3. **"Cumulative Watershed Effects: Problem and Approach, L. M. Reid, G. Ziemer", 1988.**

   * framework for linking upslope conditions to in-channel conditions.

   * use of empirical correlations, process-based studies, local watershed studies, and professional experience and judgement together or in combination to assess watershed cumulative effects.

4. **"Cumulative Watershed Effects: An Empirical Evaluation of Responses by Stream Biota, Charles Hawkins, L. Decker", (current).**

   * approach to establish relationships between physical variables (upslope physical features, in-channel morphical attributes, and management activity) to biotic variables (fish abundance) within the stream system.

   * use of basin-wide approach.

   * reliance on establishment of empirical relationships between forest management activities (type and intensity) and biotic variables to predict cumulative effects on a basin basis.

5. **"Fish Habitat Evaluation Handbook (Monitoring), FSH 2609.23, USDA/USFS/R-6", 1985.**

   * identification of in-channel attributes likely to be influenced by forest management activities.

   * identification of in-channel attributes that could be estimated and or measured from existing District knowledge and data.

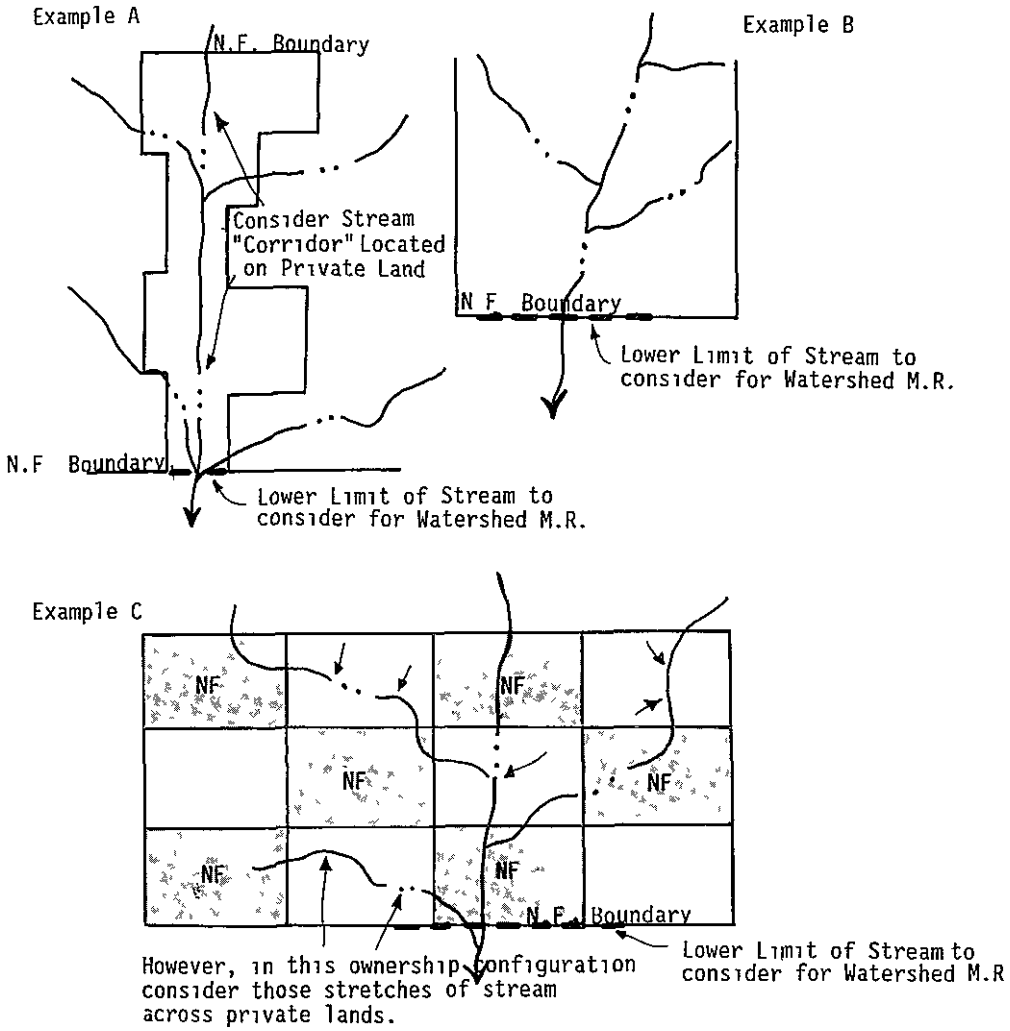
   * identification of in-channel attributes that could be quantitatively be measured now in the future.

Attachment 2

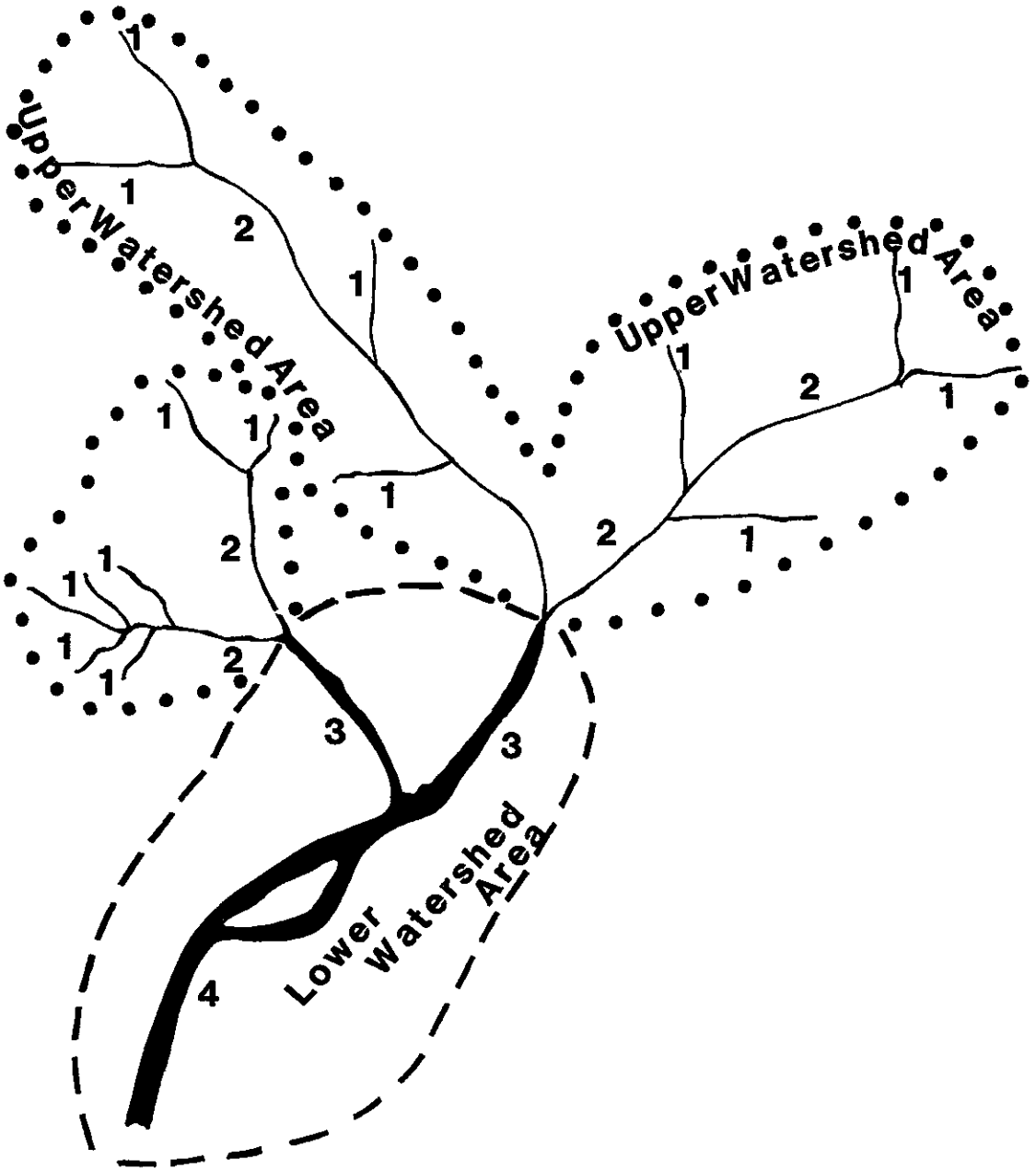
Determining Watershed Boundaries for the Hydrologic Cumulative Effects Analysis

The constraint on number of acres available for final harvest, to meet management requirements, applies only to National Forest lands. Because of landownership patterns on this Forest, it was necessary to develop guidelines for the Interdisciplinary Teams to follow as they delineated watershed boundaries for the analysis procedure.

Examples of NF Boundary configurations to establish boundaries of watersheds:



Attachment 3



This diagram depicts the boundary or limits of the upper and lower watershed areas, based on the stream channel network system. Generally, most of the first and second order channels are in the upper watershed area, while the third and fourth order channels are in the lower watershed. Note that these orders DO NOT correspond to the Class I, II, III, and IV Stream Classes referred to elsewhere in the documents.

Attachment 4

Process used to Evaluate Present Stream Channel Conditions

Introduction

A generally accepted way of determining whether we are meeting management requirements in our watersheds is to evaluate the condition of some key stream channel factors, which can provide a measurement for assessing effects of management on instream and/or downstream beneficial uses. The primary beneficial use in most all of the MBS watersheds is habitat for substantial salmon and trout populations. Protecting and maintaining viable populations of these species requires a significant amount of high quality spawning and rearing habitat. In a number of these same watersheds, there are also secondary benefitting uses such as providing a supply of water to a municipality or for a downstream fish hatchery operation.

To determine the present Forest-wide methods for meeting management requirements for watersheds in this planning period, the requirements need to be stated in terms and conditions that translate to measurable or estimable factors. The rate or degree of change due to management activities is of primary importance. At this time, the forest does not have an adequate Forest-wide data base on salmonid spawning/rearing habitat condition or capability that could be used as criteria to establish a method to meet water quality and riparian management requirements. But by examining some key in-channel factors of stream systems and assessing how they have changed over time it is possible to measure (from the data sets and empirical data we do have) or to estimate (using our best professional judgement which includes extensive field experience) stream channel conditions and establish a method to meet management requirements based on the acceptability or unacceptability of their present condition.

Rationale

The stream channel evaluation factors identified are reasonable and proximate surrogates for the quality and condition of the spawning and rearing habitat on the Forest for that time period when such evaluations are made. This is supported by current research (see "Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington", 1985) and current management (see "Fish Habitat Evaluation Handbook, FSH 2609.23", 1987).

These factors can be used to determine past, present, and future effects of proposed management activities.

For most of the Forest's watersheds, the protection and maintenance of high quality salmoid habitat will also afford the secondary beneficial uses within these watersheds the same degree of protection.

Furthermore, the protection and maintenance of substantial amounts of high quality salmonid habitat in the stream and river systems within the Forest boundaries will influence downstream, off-Forest, non-USFS beneficial uses within these watersheds.

To measure and/or to estimate the rate of change or the degree of change over time, assume the time period (at a minimum) to be from 1950 to the present (the past 35-40 years). In most of the Forest's watersheds, this time period has

resulted in the most significant changes to stream channel conditions. We are interested mainly in the changes due to management activities during this time. The ID Team will examine and note the difference between changes related to management as opposed to those changes caused by major natural events such as floods or landslides.

In most, if not all the major Forest watersheds, the salmonid populations, especially the salmon and steelhead runs, have been able to adapt, over time, to a range of natural or background conditions and events to reproduce and maintain viable populations. Within the major watersheds, there is no known evidence of where a population of salmon or steelhead has been lost or become unviable due to a natural condition or event.

The resource objectives for fish habitat and watershed restoration or improvement activities within the forest's watersheds are to accelerate the natural recovery of fish habitat, unstable channel and upslope conditions.

The entire watershed will be analyzed. However, it is appropriate to examine upper watersheds (1st and 2nd order streams and their adjacent riparian areas) separate from lower main-stem channels (3rd-5th order streams and associated floodplains).

Evaluating on a watershed basis creates a problem in coming up with the final product because the boundaries of the Forest AZ's are not always pure watershed boundaries. In a number of situations, more than one (sometimes 3 or 4) AZ constitutes a watershed. In these cases, the ID Team should evaluate the stream channel conditions on a watershed basis (not on an AZ basis).

Documentation during this step is critical. At a minimum, a time-series of aerial photos should be used to make these stream channel evaluations. Use of this resource tool needs to be supported by empirical data and file data where it is available Be sure to record data or work from external sources (agency, tribes, and research).

Determination

Evaluate the upper watershed area, the fish bearing first and second order channels (these are the Forest's lightly and deeply incised Class III and IV streams) The ID Team needs to determine the existing overall stream channel condition (for the entire upper watershed area) based on three in-channel factors of in-channel stability, streambank stability and LWD.

In assessing in-channel stability:

Determine how many of these channels are either down-cut or have scoured to bedrock.
Is channel scouring evident now and in the past.
What is the pool frequency in these small channels. Has it changed?
What is the present and past ability of these channels to store/transport sediment to downstream third to fifth order channels.

In assessing streambank stability:

Determine how many or what percent of these channels have significant area of exposed streambanks as evident from present and past bank

erosion. (If possible, make qualitative estimate of natural versus man-caused bank erosion.)

In assessing Large Woody Debris (LWD):

Determine how many or what percent of channels having an adequate amount of LWD in the channel (structures for pool formation). Has there been a significant change over time?
What is the recruitment for future LWD into these channels from the adjacent riparian areas.

Evaluate the lower watershed area, the third to fifth order channels, and determine the existing overall stream channel condition based on the following channel factors of in-channel stability, LWD, and channel pattern.

In assessing in-channel stability:

Examine the entire channel length and determine the extent of downcutting and widening.
Determine what has been the ability of these channels to store/transport sediment.
Determine the frequency or amount of bedload deposition in these channels over time.
Determine the overall pool quantity and quality (size and depth) in these channels.

In assessing LWD:

Determine the presence or amount of LWD along the entire channel length.
Determine if it is stable and if it is well distributed or is it all concentrated in one or two areas.

In assessing channel pattern:

Determine what type of channel, straight or meandering; is it one channel or is it braided. Assess overall changes.
If possible determine the sinuousity of the channel in order to describe channel response to changes in sediment loading and flow. (See page 23.77 in FSH 2609.23)

When attempting to determine these in-channel factors, focus attention on those channels where there has been timber harvesting and road building activities during the past 30-40 years. Also determine what percent or portion these impacted channels are in relation to all the streams in the watershed.

Based on how the ID Team evaluated the upper and the lower watershed areas, make an overall determination if the present stream channel conditions of that watershed are acceptable or unacceptable. In some cases acceptable and unacceptable conditions may exist in the same watershed. Document where such condition exist and consider this in the final analysis. Again, keep in mind the analysis should be in the context of changes due to past management activities.

Description of Present Condition Upslope

Past Harvest Rate

Determine clearcut acres harvested per decade by ownership. Consider the effects of location of existing clearcuts to streams and unstable soils.

Road Density and Condition

Roads decrease slope stability and modify slope hydrology.

Determine miles of road constructed per decade and present density in miles/mi2. Add supporting statements where applicable to address factors such as:

- Relation to unstable soils.
- Stacked roads on hillslopes.
- Condition of fills and cutslopes.
- Condition of road drainage system.

Presence of Landslides

Landslides are a major source area for sediment.
Consider and document:

- Size.
- Distribution.
- Delivery of sediment to channel.
- Source whether natural, in unit, or road related.
- Observed changes in rate of occurrance.
- Compare with effects in adjacent undeveloped drainages.

Attachment 5

Sample Completed Worksheet - For One Watershed

WATERSHED: _FINNEY CREEK_ **ALLOCATION ZONE:** _#30_

	ACRES
TOTAL WATERSHED:*	**21,226**
NATIONAL FOREST	20,888
TOTAL HARVESTED	10,012
TENTATIVELY SUITABLE	17,019
PRIVATE LAND	338
TOTAL HARVESTED	202
TOTAL AZ:	**21,226**
NATIONAL FOREST	20,888
TENTATIVELY SUITABLE	17,019
MATURE (MLS & MSS) TIMBER	5,574
PRIVATE LAND	338

* All w/in NF boundary

I. STREAM CHANNEL CONDITIONS:

UPPER WATERSHED AREA

A. IN-CHANNEL STABILITY :

How many 1st & 2nd order channels are down-cut or scoured to bedrock?

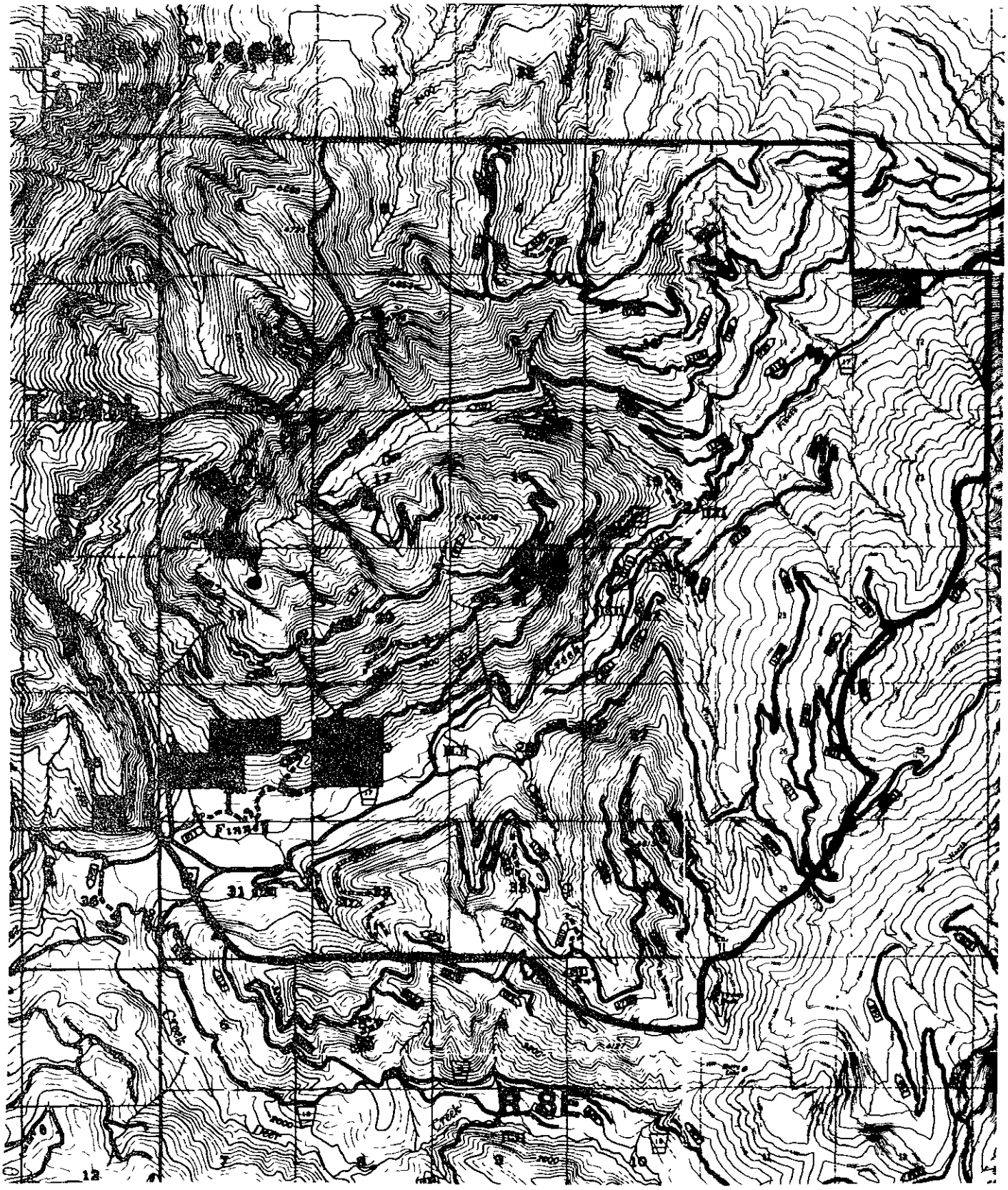
Approximately 75% (12 of 16 streams) of the major channels that are tributary to Finney Creek are affected.

Comment on the channel scouring that is evident (past and present):
Debris torrents originating in the upper watershed have scoured channels to bedrock in the streams described above. Some natural scouring in highly unstable soils (Nervous Bride Creek area) prior to the mid 1970s did occur. There has been increased scouring since the mid 1970s largely due to human related activities.

Comment on the pool frequency:
Pool frequency has decreased due to the increased scouring activity.

Comment on the ability to store/transport sediment to downstream 3rd to 5th order channels:

Due to the steepness of channel gradients and loss of pool storage & in-channel woody debris, streams have lost ability to store sediment.



B. STREAMBANK STABILITY:

How many, or what percentage of these channels have exposed banks as evident from present or past bank erosion?
Approximately 80 - 85% of the 1st and 2nd order channels.

C. LARGE WOODY DEBRIS:

Comment on the amount and stability of LWD in these channels:
There is very little large woody debris remaining.

Comment on the recruitment potential of LWD into these channels from the adjacent riparian areas:
On the north side tributaries: Six major tributaries are lacking LWD recruitment potential due to past harvest activities adjacent to them.

On the south side tributaries: Moderate to high potential for LWD recruitment is possible adjacent to these streams.

LOWER WATERSHED AREA

A. IN-CHANNEL STABILITY:

Comment on the extent or the amount of down-cutting along the entire channel length:
Some downcutting in the intermediate reaches of Finney Creek itself (below the slide @ MP 9.0 on Rd. #17). Some deposition is apparent in other reaches.

Comment on the ability of these channels to store/transport sediment:
Low to moderate ability to store sediment and moderate to high ability to transport, due to the fact that fine sediments have been removed leaving a coarse, cobble-sized substrate.

Comment on the overall pool quantity and/or quality (size and depth) in these channels:
Pool quantity and quality is significantly decreased.

Comment on the extent or frequency, over time, of bedload deposition in these channels:
Significant deposition began in the mid-1970s due to debris torrent activities in the side channels (tributaries to Finney Cr.).

B. LARGE WOODY DEBRIS:

Comment on the extent or amount of LWD along the entire channel length:
Due to increase in sediment transport and dam break activity, the majority of the large woody debris has been removed from the system.

Comment on the stability and the distribution of LWD along the entire channel length:
Poor - largely not there and what is present is in a few scattered jams or clumps above the mean water level. A few individual scattered, loose pieces are present, but not stable.

C. CHANNEL PATTERN:

Comment on the predominant channel type (straight or meandering, 1 or 2 main channels or braided channels):
Primarily straight - mostly one main channel.

Comment on the sinuosity of the channel:
Historically, there was some sinuosity in the headwaters area, but this has since been lost.

II. UPSLOPE CONDITIONS

A. PAST HARVEST RATE:

Percent cut per decade: (Of Entire Watershed)

NF ownership	Private
≤1% cut 30's	_0% cut 30's
_0% cut 40's	_0% cut 40's
_4% cut 50's	≤1% cut 50's
13% cut 60's	≤1% cut 60's
17% cut 70's	≤1% cut 70's
14% cut 80's	_0% cut 80's
48% total	_1% total

Comments on location of previous cutting in relation to streams, unstable soils, etc:
Prior to the mid-1970s, harvest was fairly well dispersed. Following extensive blowdown in the mid to late 1970s harvest became concentrated in the upper watershed. Less attention was given to riparian protection and unstable soils prior to 1980.

B. ROAD DENSITY AND CONDITION:

What is the avg. Rd mi/sq mi density in the tent suit area? - 4.0 miles/sq. mi.
(There are a total of 106.4 miles in the WS)

15% constructed 30's-50's
41% constructed 60's
40% constructed 70's
_4% constructed 80's

Comments on location of roads in relation to unstable soils:
In several areas existing roads cross unstable soil areas. Generally, these unstable soil areas are limited to stream draws.

Comments on placement of roads on hillsides (stacking):
There is a high degree of stacking in the entire watershed.

Comments on conditions of cuts and fills:
Prior to the mid-1970s, road construction specifications called for sidecast excavation with uncontrolled fill placement. This amounts to 50 - 60% of the existing road system. Approximately 19 miles of the maintenance level 1 & 2 roads have been treated (sidecast pullback, waterbarring, insloping, etc.). An extensive watershed/road deficiency inventory is currently underway with FRP funds planned to correct existing deficiencies prior to future failures occurring.

Comments on condition of road drainage system:
Prior to the mid-1970s constant grades were prevalent with culvert spacing and sizing inadequate. Waterbar activities were limited to temporary roads and the work that was done in this regard was largely inadequate. We have begun road rehabilitation efforts in the drainage to correct existing deficiencies. (See inventory note above.)

C. PRESENCE OF LANDSLIDES:

The following are the known major landslides in the watershed:

1. Nervous Bride Creek area (natural slide area)
2. Gee Point/Upper Finney area (occurred in 1960 to 1970's)
3. Clendenen Creek slide (1940's/natural)
4. Rd. #17, MP 9.0 (1986)
5. Homestead Creek area (1970's/80's)
6. Hatchery Creek
7. Quartz Creek

Comment on size of landslides:
Other than the MP 9.0 slide & Homestead Cr. area, most landslides are relatively small in area & translate into debris torrents downstream channels (See Section A - In-channel Stability).

Comment on distribution of landslides:
They are evenly distributed.

These slides have contributed to the instability of streambanks:

There have been 8 slides in 7 years along 2 miles of Finney Creek--all triggered by rain-on-snow storm events. The largest is about 20,000 CY and the smallest about 8,000 CY--all initiated in harvested areas.

During 1983, Deer Cr. and Finney Cr. had 37 significant slides in harvested areas triggered by rain-on-snow storm events.

Comment on delivery of landslide material to the channel:
Most landslide material reaches 3rd and 4th order channels due to the steepness of gradients.

What is the major source of landslides?

Natural: There have been five natural landslides associated with fault zones and rock type changes:

1. Nervous Bride Creek area
2. Gee Point/Upper Finney area
3. Clendenen Creek slide area

4. Hatchery Creek
5. Quartz Creek

(Ref. 1978 Geologic Map by Morrison)

In unit: Most are related to yarding road or landing failures from concentrated water near stream courses. There has been one major in-unit failure (Homestead Creek area).
Road related: There have been several small-sized sidecast road failures with one major event (Rd. #1721 which is known as Finney Cr. 9 Mile Slide). Also, there have been numerous road drainage structure failures due to inadequate sizes and/or upslope debris torrents.

Comments on observed changes in rate of occurrence:
Aerial photography was reviewed from 1940, 1956, 1964, 1972, 1979, & 1983. From studying these photos it has been determined that the rate of occurrence significantly increased after the mid-1970s. 34% of the National Forest acres were harvested between 1964 and 1983. This heavy harvest had no or very little apparent impact on downstream channel condition until rain-on-snow flood events in 1975,1977,1979, and 1980 (higher elevation). These flood events are documented by ERFO damage reports and changed channel conditions.

D. UNSTABLE SOILS:

24% of the tentatively suitable area is unstable as shown in the SRI.

Comments on distribution, extent and effect of unstable soils:
The lower north side and the entire south side of the drainage, as well as the west side of the headwaters are the main areas of unstable soils in the Finney Creek watershed

The potential for debris torrents and scouring due to management activity (harvesting and road construction) is greatly increased in the areas of unstable soils.

It should be noted that large management related landslides have occurred in areas not identified as unstable soils.

E. ABILITY OF LAND TO REVEGETATE:

Describe major areas not revegetated:
Major areas scoured to bedrock are limited for the most part to the 9 Mile Slide and stream sluice-out tracks. In addition, steep road cutbanks, and undercut channel banks along main stream channel.

Comments on Recovery Rate:
Where debris torrent activity is occurring, channel banks are not revegetating due to constant disturbance.

Natural revegetation occurs readily wherever denuded areas are mechanically stable.

Clearcut areas: Most harvested areas are well revegetated. Recovery of cutover areas occurred in 20 years (comparison of 1964 & 1984 aerial photos).

Note: Past prescribed broadcast burning practices have significantly contributed to soil loss, increased sedimentation, and delayed revegetation recovery in certain areas of the watershed.

III. OTHER CONSIDERATIONS

A. Comment on the expected effectiveness of new BMP's:
BMPs are identified as such things as: yarding methods, temporary and system road construction specifications/methods, landing construction control, riparian area protection, etc.

Effectiveness will be limited to the immediate area of application. BMPs will not be significantly effective due to the past widespread activity in the watershed

B. *Describe other mitigating measures needed to meet MR,s (sidecast pullback etc.):*
Sidecast pullback (landings & road fills), insloping, installation of waterbars on closed roads, installation of driveable waterbars on open, high clearance roads, addition of more drainage structures including dipped and hardened crossings, revegetation, in-channel stabilizing structures, have been identified in general as being needed. Detailed mitigation measures will be documented when the Finney Creek Inventory is completed.

C. Determine the location of mature saw timber in relation to streams and unstable soils:
Of the remaining mature saw timber, a large portion (approx. 50%) is located adjacent to streams or within unstable soil areas.

D. Determine future road needs:
Minimal new system road construction is identified as being needed. Construction of temporary roads will be minimal also and only as needed to obtain adequate deflection or better directional angle for yarding operations.

E. How many acres are to be helicopter logged? 400 acres
(Forest Plan review, 1988)

IV. SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Review of aerial photography revealed that past harvest activities up to 1975 (29% of N F. lands in the watershed) had little apparent impact on stream condition. Between 1976 and 1988 additional heavy harvesting in the upper watershed (20% of N F. lands), coupled with rain-on-snow flood events (1975,77,79, & 80) caused a large increase in sediment yield and transport through debris torrents & landslides. Dispersion of harvest was not provided for. Upper watershed, in-channel streambed and bank conditions are highly disturbed where debris torrents have occurred. This has affected 75% of the major 1st and 2nd order streams. Sediment from these events and other landslides has been deposited in the mainstem of Finney Cr. The ability to retain sediment in the side channels has been greatly reduced. Pools have been filled in and/or scoured which has severely impacted the resident trout habitat The main channel of Finney Creek has been scoured, widened, and straightened. Woody debris has been re-distributed and/or lost from the system. Because of these factors the ID team rated the condition of the AZ as unacceptable.

The average harvest rate in the 1960's, 70's and 80's was 3137 acres per decade on the AZ. This rate resulted in an unacceptable watershed condition. The Finney Creek watershed is still in an unacceptable condition This condition will not change until natural recovery and watershed restoration measures are completed in the first decade. The decline in watershed condition must be halted before any timber harvest and road construction activities can take place.

Watershed condition in 1976 was determined to be unacceptable based on observation of stream conditions in the lower WS. Considering that rooting strength deteriorated for 8 years, it is assumed this condition was triggered at the 1968 harvest level. This rate was 16% on NF land. In order to provide for adequate dispersion of harvest throughout the suitable acres, and for in-stream recovery to occur it is assumed that 15% disturbance in 30 years can be tolerated beginning in the third decade (5% / decade X 17,019 tent. suitable acres = 850 acres harvest per decade).

Minimal harvest activities of not more than 100 acres/decade for the first two decades may be possible provided that all watershed restoration measures are completed, the decline in watershed condition is halted, and the following best management practices are strictly adhered to: 1) harvest will be distributed throughout the watershed and not concentrated in any one sub-basin, 2) new long-term road construction will be restricted to gentle stable ground, 3) management activities must be no closer than 1/8 mile from unstable soil areas, 4) all materials will be yarded using full suspension methods, 5) there will be no harvest allowed in Class I, II, III and IV stream riparian areas, 6) all disturbed areas (including but not limited to temporary roads, skid trails, landings, fire lines) will be revegetated and drained prior to the current year fall/winter storm period, 7) all short-term roads must meet the preceding criteria, 8) emphasis will be placed on using KV generated dollars for watershed/fish restoration work, and 9) emphasis will be placed on using timber sale road reconstruction dollars for road drainage restoration.

It is assumed that by the 3rd decade (year 2010) the watershed (channel recovery, canopy closure, root strength) should be recovered sufficiently to allow a harvest rate of 850 acres/decade for the next two decades.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS:_ _ACCEPTABLE _XX_UNACCEPTABLE

1/ MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 100 acres
2: 100 acres
3: 850 acres
4: 850 acres

1/ This expression becomes the watershed constraint to meet water quality and riparian MR's; it will be considered in all alternatives in the FEIS.

Items Considered:

1. Past Harvest Rate/Condition of Watershed
2. Restoration Needs
3. Effectiveness of BMPs - Overall Watershed
4. Future Harvest/Road Needs - Helicopter v.s. Conventional
5. Acres Harvested/Acres Saw Timber Remaining/Proximity to Unstable Soil
6. Road Density

Recovery Rate References:

Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington; Reade E. Brown; Chapter Narratives Part 1, USDA Forest Service, Pacific Northwest Region, June 1985, Page 238.

Elk River Area Analysis Pilot Project; Siskiyou National Forest; 19__; cites OSU-PNW research.

Canyon Creek Cumulative Effects Study; Mt. Baker-Snoqualmie National Forest; R.A. Nichols; 1986.

Attachment 6

Summary Sheets for All Watersheds

Illabot Creek - AZ 2
(Includes: Illabot, Bluebell, Iron, Arrow, Otter, and Marten Creeks)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS IOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The following discussion of fisheries values are based on various surveys, reports, and observations which include: 1) Seattle City Light reports: "Development of Flow Recommendations for a Proposed Small Hydroelectric Project on Illabot Creek: Using the Instream Flow Incremental Methodology" (K. McDowell, March 1983) and "Skagit Valley Small Hydro Environmental Reconnaissance" (S. Ralph and C Hall, August 1981); 2) Washington Department of Fisheries: "A Catalog of Streams and Salmon Utilization", Volume 1. Puget Sound (R. Williams, R. Laramie and J. Ames, November 1975) including supplements; and 3) field reconnaissance by ID Team members and 4) personal conversations with other resource agency fisheries biologists.

Illabot Creek is an important tributary to the Skagit River with significant anadromous fisheries values throughout at least 10 miles of its length. It also has important resident fisheries values in upper portions of the drainage, including tributaries. The stream descends through a narrow canyon from RM 10 at Illabot Lake to RM 2.5 near the Forest Service boundary. The stream channel within this section contains numerous cascades and falls with large boulders and rubble. The tributaries are precipitous and drop off steep slopes which have been extensively logged in some areas.

Electro-fishing and spawning surveys were conducted in Illabot Creek by Seattle City Light in 1982. Adult steelhead trout were observed as high as RM 7.7 and juvenile rainbow trout (suspected to be the anadromous form) were sampled above Illabot Lakes at RM 10.5. Anadromous fish seen during these surveys included adult chum, coho, chinook salmon, steelhead trout and Dolly varden char. Resident fishes included rainbow trout, cutthroat trout, mountain whitefish and Dolly varden char. Major tributaries to Illabot Creek and their respective anadromous barrier RM include: Iron (RM .25), Bluebell (RM .25), Arrow (RM .25), Otter (RM .25).

Illabot Creek has a high level of natural instability that has been aggravated by past management activities. New activities that add more sediment or increase channel instability would reduce the amount of valuable anadromous fisheries and resident trout resources in Illabot Creek and its tributaries.

In channel stability in all channels is fair to good. Streambank stability is fair. Much of fragile stability in the watershed is due to the natural soil and geologic conditions. Pools are relatively medium to high in quality and quantity in most of the channels. Moderate amounts of LWD exist in most channels and the recruitment potential from adjacent riparian areas is moderate. This results in an acceptable watershed condition at the present time.

Allocation Zone 2 on Forest Service land consists of 13,134 acres in Illabot Creek, 2,147 acres in Jordan Creek and 241 acres in the middle Skagit River drainages. The Illabot Creek watershed also contains 13,703 acres in the Glacier Peak Wilderness, State and private lands. Over 35% of the tentatively suitable acres (3,088 acres) are in a pole-sized or clearcut stand condition which reduces harvest dispersion opportunities during the next 4 decades. Most of the remaining mature timber is on steep, marginally productive sites that are more difficult to access Consequently most of the future harvest would occur on the more sensitive areas.

Review of aerial photography (1956 to 1983) revealed that past harvest activities up to 1986 have generally been concentrated in the Iron Creek and upper reaches of Illabot Creek. The harvest rate over the last 3 decades has been approximately 620 acres/decade. This rate of timber harvest combined with the natural background instability of the channel have had some negative impacts on the Illabot Creek system. There have also been several road/harvest related failures in the past which have contributed sediment to the Illabot Creek system.

The ID team concluded that the watershed is in a delicate balance at this time considering the past rate of concentrated harvest and natural instability conditions. Based on the preceding factors, and assuming there is good dispersion of harvest, the ID Team recommends that the watershed could withstand a 425 acre (5% of 8466 acres tentatively suitable) harvest level *without sustaining adverse cumulative effects to the watershed and ultimately* to the fisheries resources.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 425 acres
2: 425 acres
3: 425 acres
4: 425 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Chilliwack - AZ 3

(Includes drainages: Liumchen, Quartz, and Damfino Creeks.)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS IOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINI:

Review of aerial photography revealed that past harvest activities up to 1986 had minimal impacts to the upslope and in-channel areas in the AZ except in Liumchen Creek. Plans have existed since 1982 to develop the Liumchen Creek Watershed as a main domestic water source for the City of Chilliwack, B.C.,

Canada (correspondence with Mike Currie, Hydrological Engineer, B.C. Ministry of Environment, Lower Mainland Region, Surrey, B.C., Canada). Plans are still on the books for construction 3 to 5 years in the future. The rest of the AZ (ie., Damfino and Quartz Creeks) has had to harvest activity. The AZ has been rated as acceptable because of the following:

Channel scouring due to management activity only evident in Liumchen Cr. Other scouring in 1st&2nd order channels due to natural causes. Overall channel stability is good.

Pool frequency in 1st&2nd order channels is at least 50/50 except in Liumchen Cr. Pools in 3rd & 4th order channels are of moderate to high quality.

Majority of 1st&2nd order channels exhibit some degree of exposed banks, most due to natural processes Bank stability along 3rd&4th channels is fair to good.

Large Woody Debris is in moderate to high abundance in all channels. High potential for LWD recruitment from adjacent riparian stands along all channels.

Adequate dispersion of future harvest is possible with helicopter logging which would keep the road density at a low level and would avoid the unstable soil areas. Since the past harvest rate has been low, about 230 acres (2%) of NF land, the upper watershed and instream conditions have not been significantly impacted by management activities. Therefore, the ID team concluded that the harvest could be increased somewhat without adverse impacts. The team recommends that 250 acres (10% of tentatively suitable) could be harvested per decade.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: XX ACCEPTABLE __ UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 250 acres
2: 250 acres
3: 250 acres
4: 250 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Canyon Creek - AZ 4

(Includes: Whistler, Kidney and mainstem Canyon Creeks.)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Anadromous fish can access Canyon Creek up to a cascades barrier formed by large boulders and LWD, located at RM 4.4 within the National Forest Boundary

(Roger Nichols personal observation, 1987). Anadromous fish that inhabit Canyon Creek include: spring chinook, coho, pink and chum salmon and steelhead, cutthroat and Dolly Varden trout. Depletion of wild spring chinook stocks in Puget Sound and the Columbia River basins have been a major concern of fisheries resource agencies (US Fish & Wildlife Service, WDF, National Marine Fisheries Service, Nooksack & Lummi Tribes). Since 1980 there has been an intensive effort by these agencies to improve the depleted spring chinook stocks in the Nooksack River basin. Canyon Creek, which is an important tributary to the North Fork Nooksack River, has been an important spawning area for spring chinook. Aggravation of unstable channel conditions in Canyon Creek has increased the concern for any further reduction in fish habitat and has emphasized the need for a stream/watershed rehabilitation program.

Above the barrier there are approximately 7 miles of resident trout (Dolly Varden, cutthroat and brook) habitat (based on FS stream surveys, personal communications with WDW fisheries biologists and conversations with local fishermen) in the mainstem Canyon Creek not including tributaries. There are plans to modify the barrier so that anadromous fish, especially steelhead trout, would then have access to an additional 7+ miles of Canyon Creek. Cooperative (FS, Nooksack Tribe, Fourth Corner Fly Fishers) stream/watershed rehabilitation projects have been completed annually in a number of reaches of Canyon Creek since 1986 (log/boulder/jersey barrier deflector erosion control structures, willow planting/grass seeding) to help reduce stream bank and channel instability.

Review of aerial photos, stream habitat/condition inventories (1982, `83, `84, `85,`86) by Forest Service and/or Lummi Fisheries Dept., and various studies (Lummi fisheries report 1984, USFWS and Lummi Fisheries Dept. report 1987 Cummulative effects Study for AC-1 timber Sale 1986) indicate that a substantial increase in sediment delivery has occurred in the Canyon Creek drainage. Other effects observed include: the inability of the stream to transport sediment, loss of LWD, loss of riparian vegetation, and loss of pools. Stream deposition and scouring was found to correspond to a general loss of pools, spawning gravels and an overall reduction in anadromous fish habitat in Canyon Creek. Timber harvest and road building activities that add to the existing channel instability conditions would reduce the fish habitat Because to these factors, the ID team rated this AZ unacceptable.

During the 1950's, 1960's and 1970's timber was harvested at a rate of 1327 acres per decade(7% of the total watershed per decade). However, this harvest was not dispersed over the entire watershed but was concentrated into an area of about 7000 acres or about a third of the AZ (primarily on the lower slopes adjacent to Canyon Creek). This rate of harvest activity combined with associated road construction and old management practices has resulted in the unacceptable stream conditions described above.

Degradation of the watershed began in the mid 1960s when the average rate of harvest was 1130 acres/decade when considering the portion of the watershed in which harvest was being concentrated, which was primarily that which was accessible by road. Based on this information we feel that a harvest rate of around 420 acres/decade would maintain the watershed at an acceptable level once recovery has occurred.

Ten percent of the remaining mature timber and approximately 700-800 acres of poles which will be mature during the 4th decade (a total of approximately 4200 acres) equates to 420 acres/decade harvest of tentatively suitable land.

Harvest during the first two decades would need to be reduced to allow for the recovery of the watershed. In the first decade harvest would be limited to about 100 acres. In the second decade that would increase to 200 acres. Beginning with decade 3 harvest would reach and be maintained at 420 acres which is 4.8% of the tentatively suitable.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: __ACCEPTABLE XX UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 100 acres
2: 200 acres
3: 420 acres
4: 420 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Lower Reach, North Fork Nooksack - AZ 5
(Includes Cornell, Gallop, Hurst, Coal, Deerhorn, Boyd, Lookout, Fossil, Cascade, and Deadhorse Creeks.)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

All of the NF Nooksack River (up tod the North Fork Falls) and most of the major tributaries (Cornell, Gallop, Boyd, Deadhorse Creeks) contain anadromous fish species including 5 species of salmon and 3 species of anadromous trout. Anadromous fish utilize portions of these streams for adult holding, spawning and juvenile rearing habitat in areas where stable channels, LWD and pools are located. Many of these streams, especially in reaches above barriers to anadromous fish, contain resident trout (including rainbow, cutthroat and Dolly varden).

Some unstable watershed conditions occur in areas of past concentrated disturbance (i.e., private land in the Cornell/Gallop Creek subwatersheds and *the National Forest land east of Deadhorse Creek, and Little Mountain. On the* remainder of the National Forest land, past harvest activities have been well dispersed throughout the tentatively suitable acres. The AZ was rated acceptable because of lower watershed conditions of very little downcutting, medium quantity and quality of pools, and moderate LWD. Past harvest rate has been variable over the past 4 decades but has averaged about 400 acres/decade. The team concluded that continuation of this rate through dispersion, helicopter, and BMPs will allow hydrological recovery to continue in those disturbed subwatersheds. The ID team concluded that this 400 acres/decade rate

(4.2% of tentatively suitable) can be sustained while maintaining an acceptable watershed condition. Any increased harvest rate will not sustain this condition considering the condition of private inholdings, and the need to sustain the anadromous and resident fisheries habitat described above.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ACCEPTABLE ___UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 400 acres
2: 400 acres
3: 400 acres
4: 400 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Glacier Creek/M.F. Nooksack, North - AZ 6

(Includes: Upper Clearwater Creek, Upper Rocky Creek, Thompson, Coal, Deep, Little, Davis, Smith, Balls and Glacier Creek.)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Based on stream survey data (Forest Service stream habitat surveys (1983), small hydro proposals. Nooksack Tribe Fisheries Dept., Lummi Fisheries Dept.) anadromous fish have been documented in Thompson Creek and Glacier Creek upstream to a cascade/barrier falls at R.M. 3.6. It is possible that steelhead and salmon can access upper portions of Glacier Creek depending upon stream flow conditions at the falls. Stream surveys indicate that the portion of Glacier Creek above the falls contain resident trout (rainbow and Dolly Varden trout).

It is suspected that resident trout utilize the National Forest portions of the Clearwater and Rocky Creek drainages as well as upper tributaries of Glacier Creek based on information from studies of adjacent drainages.

The ID team rated the AZ as marginally acceptable due to little downcutting, but loss of storage and transport capacity, and reduced pool quantity and quality.

Based on aerial photo review of past management activities it was determined that the rate of occurrence of landslide activity significantly increased after harvest and road building activities in the 1960's. This rate of harvest was 16% in the Rocky/Clearwater Creek part of the AZ, and 2% in the Glacier /Thompson Creek partion; these two rates involved approximately 860 acres of harvest in the 1960's. Harvest rate significantly decreased in the 1970's and 1980's. This decrease in management activity, coupled with a reasonable rate

of harvest with adequate dispersion, has been effective in maintaining a marginally acceptable upper watershed and instream condition.

Past harvesting over the last 3 decades has been very variable in the AZ; for example from 190 acres in Glacier/Thompson Creek area during the 1980's to 1528 acres in the Clearwater/Rocky Creek area during the 1960's. It was the judgement of the ID team that 1528 acres harvest rate in the 1960's was a rate that could not maintain an acceptable watershed condition because (1) past harvest activities on private lands, (2) reduced opportunity for harvest dispersion throughout the AZ, (3) concerns for water quality protection in the Middle Fork Nooksack River Municipal Watershed (ie., Rocky/Clearwater Creek watershed), (4) high anadromous fish habitat concerns in Thompson Creek, (5) concern for protection of domestic water use of Thompson Creek tributaries and (6) unstable soils evenly distributed throughout the remaining mature timber acres. Based on these factors it is recommended that a maximum of 280 acres or 4% of the tentatively suitable acres can be harvested per decade over the next 4 decades and still maintain an acceptable watershed condition.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 280 acres
2: 280 acres
3: 280 acres
4: 280 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Middle Fork Nooksack - AZ 8

(Includes tributaries that drain into the Middle Fork Nooksack River: Clearwater,
Rocky and Warm Creek.)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Review of aerial photography revealed that past harvest activities up to 1986 had some negative impacts on soil and water resources in the headwaters of Rocky and Clearwater Creeks, which are outside the AZ. There have not been any harvest activities in the AZ. The streams are in an acceptable condition because of relatively little downcutting, a high pool quality, and moderate amounts of LWD. All of the AZ is within the Middle Fork Nooksack River municipal watershed (City of Bellingham). A significant portion of the tentatively suitable acres are comprised of steep, rocky and wet soils of low productivity. Most streams in the area have not been surveyed or sampled to determine fish populations present. There are cutthroat trout in Warm Creek.

There is good opportunity to disperse harvest throughout the AZ. Harvest has not yet occurred within the Warm Creek headwaters on National Forest lands. Approximately 1/4 of the remaining mature timber in the AZ would be helicopter logged. Only 14 miles of new road construction (ie., mostly within the Warm Creek drainage) would be needed in the future, bringing the road density to 2.1 miles/sq. mile. Based on these factors, along with consideration of the impacts of the previously harvested areas upstream, it is recommended that a maximum of 250 acres/decade (4.4% of the tentatively suitable) could be harvested while maintaining an acceptable watershed condition.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 250 acres
2: 250 acres
3: 250 acres
4: 250 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Upper Reach, North Fork Nooksack - AZ 9

(Includes: mainstem NF Nooksack River and Wells, Barometer, Anderson, Swamp, Ruth,
Bagley, Razorhone, and White Salmon Creeks.)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS IOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINI:

Based on stream surveys and creel census information (small hydro and conversations with WDW biologists and local flyfishermen) there are healthy populations of resident trout (rainbow, cutthroat, brook) in many tributaries of the NF Nooksack River above Nooksack Falls at Wells Creek Trout habitat is below optimum levels in some areas including the mainstem NF Nooksack R. above Silver Fir Campground and in White Salmon Creek due to channel aggrayation, stability problems, and corresponding loss of habitat.

Review of aerial photography revealed that past harvest activities up to 1986 have generally been well distributed throughout the AZ. However, there are unstable watershed conditions in areas of past concentrated disturbance (ie., mainstem NF Nooksack R. above Silver Fir Campground, White Salmon, Wells and Anderson Creek areas). Overall, the distribution conditions, along with current BMP's, have been effective in maintaining acceptable upper watershed and instream conditions.

The watershed presently is in a acceptable hydrologic condition due to:

In-channel conditions: channel scouring in 1st and 2nd order channels due to management activities is evident in 2 tributaries (Wells & White Salmon Creeks), other scouring due to natural causes. Channel stability in the 3rd-4th order channels is fair to good.

Pool Condition: pools are usually less than 50% of the surface area in many 1st & 2nd order channels, but greater than 50% in the fish bearing 3rd-4th order channels.

Streambank Stability: over 30% of the 1st&2nd order channels exhibit exposed banks, most due to natural causes. Banks along 3rd&4th order channels are in stable condition.

LWD: adequate to moderate amounts of LWD in both 1st&2nd and 3rd&4th order channels. Moderate potential for recruitment of wood into these channels from the adjacent riparian areas.

Due to the relatively low amount of unstable soils in the National Forest portion of the watershed, the high percentage of helicopter logging in the future, and the low future road needs (ie., 7.5 miles) it is recommended that the past harvest rate of 500 acres/decade on Forest land , averaged over the 50's, 60's, 70's, and 80's, could be increased to 980 acres/decade (7% of tent suit). This increase would not change the present overall acceptable upper watershed and instream conditions provided that BMP's are strictly adhered to and dispersion of harvest continues. Increasing the harvest rate to above 980 acres/decade on National Forest land would result in concentrating harvest activities in the more sensitive areas.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: XX ACCEPTABLE ___ UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 980 acres
2: 980 acres
3: 980 acres
4: 980 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Middle Fork Nooksack, South - AZ 10

(Includes un-named trib. in Sec. 35, Sisters, Hildebrand, Ridley Creeks, main Middle Fork Nooksack River, Rankin and Wallace Creeks.)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors *Together and Logically Leads to Watershed Constraint*

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The City of Bellingham water supply diversion dam located at RM 7.2 prevents anadromous fish migration upstream into the AZ. However, there are plans being

considered to build fish passage structures at the diversion so that anadromous fish may access the upper Middle Fork Nooksack in the future. Presently there are resident trout species (rainbow, cutthroat and Dolly Varden trout) in most tributaries in the AZ.

Based on aerial photo review and on-the-ground observations, it is determined that past management activities in the Rankin Creek area on the north side of the Middle Fork Nooksack River have resulted in an unacceptable watershed condition for that portion of the AZ, although the overall condition of the AZ was rated as acceptable. Much of the AZ is in a less than desirable condition but this is due to a large degree to natural conditions. However, further degradation should not be allowed to occur. The most significant amount of this disturbance occurred in the early 1960s (primarily due to the salvage of extensive blowdown from a single storm event). Vegetative recovery is relatively good at this time.

Past harvest of NF acres in the AZ has varied from approximately 800 acres in the 60's to a total of 145 in the 70's and 80's. Although some soil instability exists east of Green Creek and in the Hildebrand Creek area, where some residual impacts are still left from the 60s, there is good opportunity to disperse harvest over the mature timber acres remaining in the tentatively suitable ground. Approximately one half of this mature timber would be harvested by helicopter. Because of this, the amount of future road construction needed for harvest activities would be quite low (i.e., about 7 miles of new system road). Also, the existing road density of 1.6 miles/sq. mi. is relatively low in comparison to other areas of the District. Even though this AZ is within the Middle Fork Nooksack Municipal Supply Watershed for the City of Bellingham, future harvest dispersion combined with strict attention to BMPs could increase harvest (increased compared to harvest rate during 70s and 80s) from 145 acres to 200 acres. This 200 acres/decade is also less than the 800 harvest rate of the 1960s, a rate that demonstrated unacceptable in-channel damage in certain parts of the AZ. This 200 acres/decade over the next four decades will maintain an acceptable watershed condition.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ **ACCEPTABLE** ___ **UNACCEPTABLE**

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 200 acres
2: 200 acres
3: 200 acres
4: 200 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

South Fork Nooksack - AZ 11
(This includes the following streams: Loomis Creek, Wanlick Creek, Bell Creek, Pine Creek, Heart Creek and the upper mainstem SF Nooksack.)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Review of aerial photos (1940, 1956, 1964, 1972, 1979, 1983 & 1986), on-site observations (personal observations by certain team members over past 20 years) and stream/fish habitat condition inventories (1983, 1986 & 1988 Forest Service and U.S. Fish & Wildlife Service) indicate that the upper watershed and instream conditions are unacceptable and in a declining condition in the South Fork Nooksack River and in the Wanlick Creek portion of this AZ. The yreceding information indicates that there is high background instability in the South Fork Nooksack River and Wanlick Creek drainages which contributed to the unstable instream conditions as described. Timber harvest and road construction have accelerated these in-channel processes, particularly in the Wanlick Creek drainage, resulting in an increase in sediment delivery to the South Fork Nooksack R./Wanlick Creek drainages. Other effects observed include: the inability of the stream to transport sediment, loss of LWD, loss of riparian vegetation, and loss of pools. Stream aggradation was found to correspond to a general increase in stream temperature, in-filling of pools and an overall reduction in anadromous and resident fish habitat. All of the above observations led to the determination of an overall rating of the AZ as unacceptable.

The U.S. Fish & Wildlife Service, Lummi and Nooksack Tribes report (Schuett-Hames, Wampler and Doughty October 1988. "An assessment of the availability and quality of spring chinook holding and spawning habitat in the South Fork Nooksack River", 1986) concludes that "The major freshwater limiting factors for South Fork spring chinook appear to be: adult mortality from poaching; predation and stress during holding due to lack of woody cover; lack of cool water temperatures and inadequate pool depth; and loss of eggs due to stream channel instability." Water quality surveys conducted by the U S. Fish & Wildlife Service as well as the Lummi and Nooksack Tribal Fisheries Departments since 1985 indicate that the South Fork Nooksack River frequently reaches water temperatures in the high 60's in late summer. High water temperatures (> 65 degrees F) can stress salmonids and increase their susceptibility to disease and even result in mortality. Based on data presented in the U.S. Fish & Wildlife Service, Lummi and Nooksack Tribe Report there were 10 days between August 7 and August 27, 1986 when the maximum daily water temperature was equal to or exceeded the 65 degrees F.

Stream surveys conducted by the Forest Service and volunteers during August and September, 1988, in Wanlick and Heart Creeks indicate that populations of rainbow and Dolly varden trout are in these streams. Although there are a series of 4 falls on the mainstem South Fork Nooksack River located between river miles (RM) 30 and 31, approximately 2 miles below the Forest Service Boundary, it is suspected that the rainbow trout in Wanlick Creek are juvenile steelhead trout based on available evidence (discussions with WDW and Nooksack Tribal fisheries biologists indicating that these barriers are only partial barriers to steelhead trout and surveys by the Nooksack Tribe that found adult steelhead above RM 33). Conversations with Washington Department of Wildlife

fisheries biologists and fishermen indicate that the Forest Service portion of the South Fork Nooksack River, particularly between RM 33 and 37, is an important trout fishing area. Resident trout in this area include rainbow, cutthroat and Dolly Varden trout. Anadromous fish species that potentially could be in the river include spring chinook, coho, chum, pink and sockeye salmon, summer and winter steelhead, cutthroat and Dolly Varden trout.

During the analysis of this AZ, the I.D.Team observed that past harvest took place, almost exclusively, on those acres that are being classed as tentatively suitable in the Forest Plan. Therefore, for this discussion all past harvest is expressed in terms of a percentage of tent. suitable in an effort to arrive at an equatable number to be used as as MR and expressed in terms of acres of harvest/decade.

Harvest began in the Wanlick Creek drainage in the 1960's and by 1964 significant stream channel impacts had occurred after approximately 322 acres of the watershed had been harvested (review of 1964 aerial photos). A rate of harvest of 373 acres occurred in the 1970's and 1180 acres in the 1980's. Wanlick Creek was analyzed separately and these rates of harvest apply to just that drainage which is only a part of the total AZ. Of the 1180 acres , approximately 1000 acres occurred on private land within the headwaters of a tributary to Wanlick Creek. This is a unique situation in that the drainage in which the heavy harvest took place has its headwaters on private land outside the N.F. boundary and then drains in a direction that flows inside the N.F. boundary before it joins main Wanlick Creek. The I.D.Team felt the impact of this past harvest activity on the entire Wanlick drainage was so significant that it was necessary to assess that impact when establishing the MR for the AZ. Presently, there is a high risk that continued harvest in the Wanlick Creek portion of the AZ will increase stream instability. Excessive sedimentation would further reduce habitat for the already tenuous summer steelhead populations. It is deemed necessary that the Wanlick drainage be allowed a recovery period (2 decades) before additional harvest take place just to protect the hydrologic integrity. The disturbance level in Wanlick Creek should not exceed 375 acres in 30 years (recovery based on canopy closure, channel stability, root strength, etc.) or an average of 125 acres/decade and watershed recovery should be complete before new harvesting begins. By 2015 some harvesting could occur in the 2nd half of decade 3. The full 125 acres could be harvested in decade 4.

Stream conditions in the South Fork Nooksack River are dominated by high natural sediment inputs from Pine and Heart Creeks and the headwaters of upper SF Nooksack River which drain the flanks of the Twin Sisters Mtn. (aerial photo review).

Past management activities were concentrated along the mainstem of the South Fork Nooksack River and have impacted watershed conditions (aerial photo review) The past harvest rate in the SF drainage, exclusive of Wanlick Creek was 260 acres in the 1960's, 801 acres in the 1970's and 63 acres in the 1980's. Approximately 2000 acres of the remaining mature timber would be helicopter logged and 4 miles of new road construction would be required in the future for the portion of the AZ exclusive of Wanlick Creek. This would allow for better dispersion of future harvest units throughout the AZ. However, there are significant fisheries habitat concerns (see above) as well as significant impacts from mining activities (olivine). Much of the remaining mature timber occurs on upper slope ground that is marginally stable (ie.,

steep, shallow, wet soils) and has a moderate to low productivity. Based on these conditions it is recommended that the harvest rate on tentatively suitable acres should be set at 325 acres.(5% x 6472 tent. suitable acres)

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: __ _ACCEPTABLE _XX_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

	S.F. Nooksack R.	Wanlick Creek	Total Acres
1:	325 acres	_ 0_	_325_
2:	325 acres	_ 0_	_325_
3:	325 acres	_ 65_	_390_
4:	325 acres	_125_	_450_

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Swift-Park Creeks Watershed - AZ 14
(Includes Swift Cr., Rainbow Cr., Shuksan Cr., Morovitz Cr., and Park Cr.)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The lower reaches of Swift and Park Creeks, below barriers located at RM 2 and RM 1.8, respectively, are utilized by chinook, coho and sockeye salmon and anadromous from Baker Lake and resident trout. Rainbow, Shuksan and Morovitz Creeks are all tributaries of Swift Creek and most likely contain resident trout. Morovitz Creek has been documented to contain coho salmon up to RM 1.75 (Beak Study for Puget Power & Light). There is a lack of LWD in many of these streams. Most pools are formed by boulders, bedrock outcrops and undercut banks. The pools are of medium quality and there is a moderate amount of them in these streams. There are extensive beaver pond areas in the Morovitz Creek area that are utilized by juvenile coho salmon. Reduction in LWD, and sedimentation that fills in pools or impacts spawning gravels would reduce the amount of available habitat for fish in these streams.

The AZ was rated acceptable because of lower watershed conditions of very little downcutting, moderate ability to store sediment, good ability to transport sediment, medium quantity and quality of pools, and moderate amount of LWD throughout.

Past harvest has been well distributed throughout the AZ. Although unstable soils have been generally avoided, there are two specific areas where watershed conditions have been impacted by management activities: 1) the Morovitz/Marten Lake area, and 2) the upper Shuksan Creek drainage. The past harvest rate on NF lands has been variable but has averaged about 410 acres per decade over the past 4 decades.

Even though future harvest could be dispersed, current road density is moderate (3.0 miles/sq. mi.), little new road construction would be required (approx. 2.0 miles), and some of the mature timber (roughly 200 acres) would be helicopter logged, it is concluded by the I.D. team that the 410 acres per decade rate could not be sustained and still maintain an acceptable watershed condition. While past harvest activities generally avoided unstable soil areas, much of the remaining mature timber is located in marginally stable, steep, shallow, and wet soil areas. There is a high risk that harvest activities could trigger mass wasting and stream sedimentation in these areas which would impact existing fish habitat. For these reasons the I.D. team recommends a harvest rate of 250 acres per decade (4.25% per decade) of the tentatively suitable acres over the next 4 decades.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 250 acres
2: 250 acres
3: 250 acres
4: 250 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the Final Forest Plan.

Baker Lake - AZ 15 & 16

(Includes Dillard, Sandy, Little Sandy, Boulder, Little Park, Shannon, Baker River,
Hidden, Lake, Noisy, Ermine, Silver, Four Mile, Welker, and Anderson Creeks.)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS IOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINI:

Based on various surveys and reports (WDF Stream Catalog, 1975, WDF and FS Stream Surveys, Beak & Assoc., Puget Power & Light Co.) chinook, sockeye and pink salmon utilize the Baker Lake basin Anadromous and resident forms of rainbow (steelhead), cutthroat and Dolly Varden trout also utilize the basin based on records of fish collected at the Puget Power & Light Co. fish collection facility at Concrete on lower Baker River. Important streams in the AZ that are utilized by anadromous fish and the river mile (RM) location of the barrier to anadromous fish include: Baker River (RM 9), Sandy (RM .75), Little Sandy (RM 1), Little Park (RM 1), Shannon (RM .5), Hidden (.25), Blum (.25), Lake (.25) Creeks. The upper reaches of these streams and most of the remaining streams in the AZ contain resident trout.

Overall pool quality and quantity is low in most streams. Exceptions are portions of Sandy, Noisy and Little Sandy Creeks. Much of the pool habitat is formed by boulders and bedrock outcrops. The majority of LWD has been removed from Anderson, Welker, and portions of Sandy Creeks. There are moderate

amounts of LWD remaining in portions of most of the other streams (ie., upper reaches of Welker, Silver, Noisy and Lake Creeks) in the AZ. Baker River and Boulder Creek, two of the largest streams in the basin are lacking in LWD due to natural conditions. Activities that reduce LWD, fill in pools or impact spawning habitat would further reduce the available fish habitat in the AZ.

To a large degree, past harvest has been well distributed throughout AZ #15. However, while unstable soils have generally been avoided, the following specific areas have been impacted from concentration of past harvest activities (Ref. 1964 & 1983 aerial photos): 1) the Sandy/Dillard Creek area, 2) Anderson Creek, and 3) Boulder Ridge. Effectiveness of new BMPs will be limited to the immediate area of application and will not be effective in improving upper watershed and in-stream conditions in the first decade in these impacted areas. For this reason and considering the fisheries resource in the Baker Lake basin the I.D. team recommends no harvest for the first decade in the three impacted areas described above.

Over the past four decades the harvest rate in AZ #15 on the west side of Baker Lake has been variable: 2061 acres in the '50s,452 acres in the '60s, 571 acres in the '70s, and 1026 acres in the '80s. The average rate overall has been 1278 acres over the past four decades. No harvesting has occurred in AZ #16 on the east side of Baker Lake. However, the average rate of past harvest for the eastside is 237 acres considering the past harvest in the Anderson Creek Drainage (AZ15).

A significant portion of the remaining mature saw timber in AZ #16 (approx. 1000 acres) is located in marginally stable, steep, wet soil areas along the east side of Baker Lake. Harvesting in these areas would create an unacceptable high risk of mass wasting and stream sedimentation.

The IDT concluded the overall rating for this watershed and these allocation zones should be acceptable. Even though the team felt pool quality in this drainage could be better and LWD is only available in moderate amounts, the condition of the stream channel and banks are generally satisfactory when considered with overall pool conditions and availablity of LWD.

Future Harvest Rate in AZ #15: Of the 16,102 acres of tentatively suitable land on the west side of Baker Lake, approximately 10,800 acres are located outside of the Sandy/Dillard Creek and Boulder Ridge areas. It is felt that these acres (10,800) could be harvested at the rate of 650 acres per decade starting in the first decade. Translating that average to the remaining suitable timber the IDT felt the harvest rate could be increased to 650 acres and maintain the acceptable hydrologic condition of the watershed. Therefore, by eliminating harvest in the first decade in the Sandy/Dillard Creek and Boulder Ridge areas on the west side, and the Anderson Creek Road area on the east side, the first decade harvest level would be 650 acres. When the tentatively suitable acres for Sandy/Dillard, Boulder Ridge, and Anderson Creek are added back in for decades two through four the total tentatively suitable in the AZ is 17,357 acres. For this period it is felt a harvest rate of 1025 acres/decade is sustainable in the AZ while maintaining an acceptable watershed condition.

Future Harvest Rate in AZ #16: In this AZ, it is felt that 4870 acres of the total 5870 acres of tentatively suitable is actually available for future harvest management after the 1000 acres of marginal ground mentioned above is

removed from consideration. It is felt this remaining 4870 acres could be harvested in decades one through 4 at a rate of 350 acres/decade, while maintaining an acceptable watershed condition in this AZ. A higher percentage for this AZ seems appropriate because of the large portion of the AZ that will undoubtedly be helicopter logged.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

	AZ #15	AZ #16
1:	650 acres	350
2:	1025 acres	350
3:	1025 acres	350
4:	1025 acres	350

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Lake Shannon - AZ 17

(Includes Rocky, Part Time, and Sulphur Creeks)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Rocky and Sulphur Creeks are major tributaries to Lake Shannon, a large reservoir located on Baker River north of Concrete, Washington. The following discussion of fish and fish habitat is based on information from various fish and aquatic habitat reports and surveys that have been completed on Rocky and Sulphur Creeks. Many are related to small hydro project proposals by Puget Power & Light Co. and other companies in these drainages (Koma Kulshan, Beak & Assoc., Washington Department of Fisheries etc.).

The lower portions of Sulphur and Rocky Creek, below RM .5 and RM 1.3, respectively, are suspected as being utilized by coho and sockeye/kokanee salmon (WDF Stream Catalogue, R.W. Williams and others, 1975) and anadromous and resident trout. Fish surveys (snorkel and electro-fishing) conducted related to the Koma Kulshan Small Hydro Project found some resident trout in intermediate reaches of both Sulphur and Rocky Creeks. These surveys indicate that there is habitat to support small resident trout populations. Pool quality and quantity in these streams is fair to good with most pools formed by boulders and bedrock outcrops; with few formed by LWD. Management activities that result in the filling in of these pools and/or scouring or burying spawning gravels would reduce this habitat being available to fish in these streams.

Some unstable watershed conditions occur in areas of past concentrated disturbance (i.e., Schrieber's Meadow and upper Rocky Creek areas).

Overall, the in-channel conditions are poor to fair in the 1st&2nd order channels, scouring is widespread in tributaries to Rocky and Sulphur Creeks, in the 3rd&4th order channels conditions are fair to good due in part to the armoring and bedrock nature of many of these channels. Streambank stability in the 1st&2nd order channels is only fair, half due to natural causes and the remaining related to land management activities. Bank stability in 3rd&4th order channels is generally good Large Woody Debris is generally lacking in the 1st&2nd order channels, but good in the 3th&4th order channels. The stability and distribution of LWD in these channels is only fair.

The past harvest rate (over past 40 years) on commercial Forest land within this AZ has averaged 8% per decade. The existing road density is high, at 4.0 miles/sqmi and the anticipated new road construction over the next decade (7.0 miles) would increase this density to 4.8 mi/sqmi. A moderate amount of unstable soil (14%) exists in the tentatively suitable acres. Steep sideslopes and shallow soils remain on most of the remaining suitable acres. Only 16% of the tentatively suitable acres can be helicopter logged.

For these reasons, the I.D. Team felt the past harvest rate of 8% per decade could not be sustained in the future while maintaining acceptable in-channel and fish habitat conditions.

A rate of 5% per decade of tentatively suitable acres is recommended for each of the next 4 decades; this would result in 300 acres per decade.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 300 acres
2: 300 acres
3: 300 acres
4: 300 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Lake Shannon - AZ 18

(Includes Thunder, Watson & Survey Creeks.)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The Thunder-Shannon Allocation Zone (AZ #18) includes the drainages that flow into Lake Shannon from the east, i.e. Thunder Creek. The Thunder Creek drainage includes Watson and Survey Creeks. Based on surveys and reports (WDF Stream Catalog, 1975; Thunder Creek Small Hydro Projects, Scott Paper Co. & Puget Power & Light Co.) anadromous fish (primarily coho salmon and sockeye)

utilize Thunder Creek up to RM 3.3 The upper reaches of Thunder, including the tributaries, Watson and Survey Creeks, would be expected to contain resident trout. Due to past timber harvest and road construction practices, primarily on private land within the Forest Service boundary, fish habitat is in poor condition due to the high channel instability which has resulted in most pools being filled in with sediment and spawning areas impacted due to scouring and aggradation. Activities that add more instability and consequently more sediment to the streams will further impact fish habitat.

Review of aerial photography revealed harvest activity began in the mid 1940's with road building and harvest on the private land adjacent to Thunder Creek. Within a period of 5 years a contiguous area that included about 1000 acres of private and 600 acres Forest Service was harvested on the north side of Thunder Creek (much of this was on steep sensitive soils). This intensive harvest and poor road construction caused massive soil movement into lower Thunder Creek and resulted in tremendous damage to the stream and fish habitat. Most of the 1st-2nd order channels exhibit evidence of channel scour in harvested portions of the watershed. Pool frequency in these small channels is less than 50%, especially in and downstream of harvest areas. Over 50% of these channels have exposed and unstable banks, again these are located in and downstream of harvest areas. LWD is lacking in these channels also, and there is little or no potential for LWD recruitment from the adjacent riparian areas. Heavy deposition has occurred in the lower channel areas (Thunder and Watson Creeks). This has resulted in little or no pools in these channels. These channels have little or no LWD. Because of these factors, the team rated the condition of the AZ an unacceptable. Much of this channel is still in a recovery mode. Harvest continued on private land through the 1950's in the lower watershed Only a minor amount of harvest (mainly Forest Service) has occurred since the 1950's The upper 2/3 of the Thunder Creek drainage has remained unroaded and unharvested. Some of this area, mainly in the stream draws, contains sensitive soils similar to those harvested in the lower watershed.

Past harvest is certainly not indicative of what future harvest will bring using BMP's in the upper 2/3 of Thunder creek but there is similarity in soil types that lead us to exercise caution when determining the harvest rate in this area. As we have observed, concentration of harvest can result in serious consequences in this drainage. Because past harvest was so intense and the effects significant, it is difficult to determine what harvest level the watershed could withstand based on this information alone. Information on other similar watersheds indicate that harvest levels of about 7-10% of the remaining suitable area is the rate of harvest that can be sustained while maintaining an overall acceptable watershed condition. The amount and location of sensitive soils in this area would lead us to use the low end of this range.

With the extent of negative effects and the nature of the in-channel recovery at the present time, the ID team recommends that harvest in the first two decades be 200 acres in the first decade and 300 acres in the 2nd decade to allow for further recovery of the stream's in-channel condition. By decade 3 and 4, the rate of cut could be increased to 400 tentatively suitable acres being harvest each decade.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: ____ACCEPTABLE _XX_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 200 acres
2: 300 acres
3: 400 acres
4: 400 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Jackson Creek - AZ 20
(Includes Jackman and Webber Creeks)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Fish habitat information is based on the following surveys and reports: WDF 1975 Stream Catalog, including Supplements; T. Williams-channel condition report for lower Jackman Creek, 1960's?; Jackman Creek small hydro project proposals-Puget Power & Light Co. and Scott Paper Co. Jackman Creek has a barrier to anadromous fish located at RM 1.5 below the Forest Service boundary. Upper reaches of Jackman Creek contain resident trout and receive some fishing pressure.

Reaches in Jackman Creek that have received heavy timber harvest and road construction activity have significant channel instability problems which have contributed to poor fish habitat conditions. Pool quantity and quality are poor in these reaches from sediment filling in pools and scouring and aggrading spawning gravels. In the harvested areas, streambank stability is unstable and the LWD is lacking and there is little or no potential existing for recruitment from the adjacent riparian areas. Generally these in-channel conditions exist for both 1st and 2nd order as well as for 3rd and 4th order channels Because of these in-channel impacts, the watershed is presently in an unacceptable condition. The headwater reaches of Jackman Creek, where no harvest activities have occurred, are in good condition except where natural avalanche conditions have contributed to unstable channel conditions. Activities that add more sediment to the channel could impact fish habitat. Jackman Creek has the potential to become good anadromous fish habitat (especially steelhead trout) providing upstream sediment sources are reduced, channel stability is increased and debris jam barriers are removed.

Limited harvest began in the Allocation Zone in the 1950's. The main harvest began in the 1960's when the road was built along the south side of Jackman Creek. 1722 acres of the private land and 230 acres of the Forest Service land was cut in the 1960's. It is no coincidence that this is the time period that we saw the most dramatic increase in sediment to Jackman Creek and a corresponding decrease in fish habitat. Sediment sources included road sidecast failures, stream debris torrents, and in unit slumping. Harvest continued in the 1970's and 1980's at the reduced rate of 370 acres/decade on private and

about 732 acres/decade on National Forest Land. Since the Forest Service cut has been concentrated on 2/3 of the total allocation zone the effective harvest rate has been about 490 acres. Some sedimentation has occurred even at these reduced rates which indicates that an acceptable harvest rate would be lower than 490 acres.

Based on past harvest rates the ID team feels that a harvest rate of about 325 acres/decade (7% of tentatively suitable) could be sustainable in this allocation zone without effecting the recovery of the watershed.

Harvest in the 1960's was so high that effects of it are still present in the Jackman stream system and fish habitat is being limited. It will take additional time for these effects to subside and for the upslope in-channel recovery to take place. Therefore, the ID team recommends that harvest be reduced in the first decade to 200 acres and limited to the previously uncut upper Jackman area

OVERALL MANAGEMENT REQUIREMENT RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: __ _ACCEPTABLE _XX_UNACCEPTABLE

MAXIMUM HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 200 acres (assumes harvest will be in upper Jackman Creek)
2: 325 acres
3: 325 acres
4: 325 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Middle Reach, Skagit - AZ 22

(Includes drainages: Barr (Bark), Sutter, Rocky, Patent, Corkindale, Backus Creeks)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Based on the following information [Forest Service Stream surveys (1983), WDF Stream Catalogue (1975) with new supplements, Percy Washington report "Fishery Enhancement Survey of Upper Skagit River Tributaries" (1984), and the Rocky Creek small hydro project proposal], Rocky Creek contains anadromous fish in the lower 2 miles and probably contains resident trout populations in the upper reaches. The lower 1/4-1/2 miles of Bark, Sutter and Corkindale Creeks are utilized by anadromous fish from the Skagit River. These streams contain adequate spawning habitat but are limited in rearing habitat for anadromous fish. Patent (a tributary to Rocky Creek) and Backus Creeks contain populations of resident trout. Lower Backus Creek has a significant population of cutthroat trout that is providing an excellent fishing opportunity.

Review of aerial photography revealed that past harvest activities up to 1986 had some negative impacts on soil and water resources in portions of the AZ. The generally southerly aspect of the several drainages that flow south and east to the Skagit River are subject to rain-on-snow events and debris torrent activity (Ref. Buggy and Olson timber sale EA's and analysis files).

The ID team rated the AZ as acceptable due to lower channel conditions of some downcutting, moderate to high ability to store and transport sediment, high pool quality and quantity, and moderate amounts of LWD. However, activities that contribute additional sediment to these streams would increase channel instability, fill in pools, scour or aggrade spawning gravels and result in a further reduction in fish habitat.

Only a minimal amount of timber harvest and road construction activity has occurred to date in this AZ, as indicated by the 0.3 miles/sq. mile road density and 21 acres harvest on National Forest land in the past 3 decades. Good opportunity would exist for future harvest dispersal except that only 2829 acres of mature timber exist out of 7,959 acres of tentatively suitable land. The remaining approximately 5000 acres are in pole-sized timber, which may not be available for harvest until after the 4th decade. As a result, harvest dispersion opportunities may be limited within the remaining 2829 acres of mature timber.

Much of the 5000 acres of pole-sized timber in the tentatively suitable land occurs on marginally stable and/or marginally productive land where soils are shallow, droughty and located on steep slopes. It is doubtful that some of these acres will ever be harvested. Based on the preceding factors, the ID Team recommends that about 625 acres per decade (approximately 8% of the tentatively suitable) could be harvested and still maintain acceptable upper watershed, instream and fish habitat conditions in drainages within this AZ.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ **ACCEPTABLE** ___ **UNACCEPTABLE**

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1. 625 acres
2. 625 acres
3. 625 acres
4. 625 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Upper Reach Skagit River - AZ 23
(Includes Olson, Diobsud, Falls, Bacon, Jumbo, Steelhead and Oakes Creeks.)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The following discussion of fish and fish habitat is based on various surveys and reports (WDF 1975 Stream Catalog, including supplements, WDF (annual spawner/redd counts) and FS Stream Surveys (1983), and the Percy Washington report (Fishery enhancement survey of upper Skagit River tributaries, 1984 for Univ. of Washington).
Chinook, coho, chum, sockeye and pink salmon and anadromous and resident forms of rainbow (steelhead), cutthroat and Dolly Varden trout utilize Bacon (up to RM 6) and Diobsud Creeks (up to RM 1.8) two of the most important tributaries to the Skagit River. Lower portions of Olson (RM 1.5), Falls, Jumbo, Steelhead and Oakes Creeks also are utilized by most species of salmon and anadromous trout.

Bacon Creek is a powerful stream that has a moderate to high amount of channel instability which has reduced pool and spawning habitat quality and quantity. Pools important for adult holding and juvenile rearing habitat have a moderate amount of filling in and spawning gravels are impacted at some times due to scouring and aggrading. This instability is primarily due to a combination of erratic stream flows and high bedload movement, primarily from natural conditions. Timber harvest and road construction activities have also contributed to this instability (ie., Jumbo, Steelhead and Oakes Creeks). Activities that increase sediment to the Bacon Creek drainage could further reduce fish habitat.

Diobsud Creek has an excellent pool/riffle ratio and spawning habitat up to the impassable falls. The stream channel is generally in a delicate balance with the natural instability contributing an adequate level of spawning gravel replacement but not too much that pool habitat is impacted.

Olson Creek has a high sediment load, primarily due to natural conditions, that has been contributing to a certain amount of instability and reduction in fish habitat.

Pool quantity and quality is decreasing and in a declining watershed condition in Bacon and Olson Creeks due mainly to natural conditions. Diobsud Creek upstream of the east Diobsud main tributary is in good condition but overall fish habitat is in a delicate balance. Any additional sediment entering the Diobsud, Bacon and Olson Creek drainages could reduce the available fish habitat as a result of moderate to high amounts of LWD existing in a majority of the 1st-2nd order channels and the recruitment potential from the adjacent riparian stands is good. In the 3th-4th order channels, moderate amounts of LWD is well anchored and distributed in the upper sections of these channels but is limiting in the lower portion of most of these channels especially in Bacon, Diobsud, and Olsen Creeks. After analysis of these factors, the ID team rated the AZs as acceptable.

AZ #23 occupies the roaded portions of the Bacon, east Diobsud and Olson Creek drainages. While unstable soils have generally been avoided during harvest and

road construction activities in these areas, three locations (i.e., east Diobsud, Oaks Peak and the lower Falls Creek areas) have been impacted from concentrated harvest activities. Effects of BMPs, during future harvest within and downslope of these areas, will be limited to the immediate area of application until more vegetation recovery occurs. Future harvest dispersion opportunities appear good in AZ 23, considering 1600 acres is helicopter logging. AZ #24 occupies the upper watershed, unroaded portions of Bacon (i.e., upper Falls Creek drainage on west side of watershed), Diobsud and Olson Creeks. Unstable soils are scattered throughout these areas, usually associated with 1st and 2nd order channels. 12 miles of road will be needed for future harvest.

Approximately 5500 acres of pole size timber occurs in these AZs, which may limit the opportunity for dispersion during the first 4 decades.

For purposes of looking at these two allocation zones on a watershed basis, the ID team combined them to assess the in-channel and upslope conditions, and then split them out into three watershed areas to determine the maximum acres available for harvest. The 3 watershed areas are: 1) the Bacon Creek drainage, 2) the Diobsud Creek drainage, and 3) the Olson Creek drainage.

In the Bacon Creek watershed area, the past harvest rate has averaged about 370 acres, since the 1950's The I.D. team determined this rate has been to high in this watershed and recommends a reduced harvest rate to 295 acres per decade to maintain acceptable upper watershed, instream and fish habitat conditions.

Of the remaining tentatively suitable acres (5,291) in the watershed, approximately half of the acres occur in the Diobsud watershed, and half in the Olson Creek watershed.

Since the Diobsud Creek channel is in a delicate balance, due primarily to natural conditions, and sustains a significant anadromous fisheries resource, the I.D. team has determined the Diobsud Creek watershed portion of the AZ's can only sustain a 50 acre harvest rate per decade.

The I.D. team concludes that the Olson Creek drainage can sustain a 210 acre harvest rate per decade and maintain an acceptable upper watershed and instream condition.

To maintain a acceptable in-channel condition, a 2% harvest rate in Diobsud, combined with a 4% harvest rate for Bacon creek and a 8% rate for Olsen Creek should bot be exceeded. AZ 23's share of this harvest would be 330 acres per decade and should be dispersed among the subwatersheds as follows:

Watersheds:	Olson Watershed	Diobsud Watershed	Bacon Watershed	AZ Total
AZ 23 Future harvest Per decade	70 ac.	15 ac.	245 ac.	330 ac.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 330 acres
2: 330 acres
3: 330 acres
4: 330 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Cascade River - AZ 26

(Includes: mainstem, South Fork and North Fork Cascade R., Day, Lookout, Monogram,
Marble, Irene, Sibley, East Fork Sibley, Hard, Swamp, Pincer, Sonny Boy, Barrett,
Kindy, Vee and Found Creeks)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The following fisheries discussion is based on various surveys, reports and observations including: Forest Service 1983 Stream Surveys, WDF 1975 Stream Catalog (including supplements), conversations with WDF and tribal fish biologists, fish electro-fishing associated with fish habitat improvement and timber sale related KV projects, and annual interagency salmon spawner/redd counts.

A wide variety of fish utilize the mainstem of the Cascade River. Chinook, coho, pink, and chum salmon and steelhead trout reportedly use the mainstem and the lower portions of many tributaries for transportation, spawning and rearing up to RM 16, however, there apparently is unrestricted access for anadromous fish up to RM 22.5. Anadromous forms of rainbow, cutthroat and Dolly Varden trout use the upper reaches of the mainstem Cascade River and many tributaries for transportation, spawning and rearing habitat. Above anadromous barriers many of the streams in the drainage contain resident trout. The mainstem Cascade River between Marble and Sibley Creeks has been described as providing excellent spawning and rearing habitat for salmon. Important tributaries for anadromous fish and their respective barriers (RM) include: Marble (RM .9), Sibley (RM .5), Found (RM .5), Kindy (RM .5), Sonny Boy (RM .25), and the North (RM .5) and South Forks (RM 4) of the Cascade River.

The Cascade River is a large tributary to the Skagit River. The channel capacity is inadequate, the lower banks are in poor shape, the upper banks are in fair shape and the channel is in good to excellent shape except in certain areas. Channel instability ratings are high for a specific reach starting immediately below Found Creek upstream in the mainstem to the South Fork. These conditions are due primarily to natural factors but management activities

have aggravated problems in a few specific locations (e.g., Vee Creek). Activities that aggravate the existing channel instability in those specific locations in the Cascade River and its tributaries could negatively impact existing fish habitat conditions. Pool/riffle ratios are less than 50/50 in the upper watershed but this is more a function of the natural gradient. Pool quality and quantity are good in the lower watershed. LWD exists in moderately good amounts. In-place debris is relatively stable and recruitment opportunities s are good. Upon summing up these conditions, the ID team concluded that the AZ condition was acceptable.

Allocation Zone 26 consists of 23,713 acres of National Forest in the Cascade River drainage. The watershed also contains 70,000 in Glacier Peak Wilderness and North Cascades National Park. There is an additional 25,000 acres of State and private for a total of 118,000 acres.

Review of aerial photography revealed that past harvest activities up to 1986 have generally been concentrated in the lowland portions of the Cascade River. There has been some dispersion upslope into Sibley and Irene Creeks. The past harvest rate over the last 4 decades has averaged about 530 acres/decade (including wildfire acres). This rate has impacted watershed and fish habitat conditions in heavily harvested areas which include: Sibley, Found, lower Kindy Creeks. There have been some road/harvest related failures in the past and a few of these have been significant contributors of sediment (particularly Kindy and Vee Creeks).

The Cascade River is a relatively stable watershed where dispersed harvest activity can occur (tentatively suitable). Past harvest has had little effect overall on watershed and fish habitat conditions except where mentioned above. The ID team concludes that harvest can occur, assuming good dispersion of harvest and new BMPs. An estimated 1100 acres (8% of the tentatively suitable)) acres could be harvested per decade without adverse cumulative effects.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ **ACCEPTABLE** ___ **UNACCEPTABLE**

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 1100 acres
2: 1100 acres
3: 1100 acres
4: 1100 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Lower Reach, Skagit River - AZ 27
(Includes Cumberland, Texas, and Wild Creeks.)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This allocation zone is made up of 4 small drainages: Texas Creek and Wild Creek (that flow into Cumberland Creek), upper Cumberland Creek, and an area that drains into the Skagit River to the north. No fish sampling has occurred in these streams on National Forest land.

Approximately 80% of the 1st and 2nd order channels are in an unstable condition, widespread channel scouring is evident, and most of these channels have unstable streambanks. Also,little or no LWD exist in these channels and there is little or no potential for recruitment of LWD from the adjacent riparian areas. Because to this the ID team rated the AZ as unacceptable.

Since 1960, 1620 acres of National Forest land (or approximately 45% of the AZ acres) has been harvested. This is an average of 15%/decade when considering the entire allocation zone. However, most of the harvest during that period was not dispersed over the entire allocation zone but was concentrated into only 60% (2130 acres) of this area. Therefore,the effective rate of harvest in this area was 540 acres/decade. It is these areas (namely Texas Creek and in general the north end of the allocation zone) that have experienced the greatest amount of stream debris torrents. Harvest at this rate of 540 acres/decade has led to unacceptable stream conditions.

Since past, heavy harvest in the Texas creek area has caused unacceptable stream conditions in that and other streams, the ID team concluded that this area needs a period of recovery of 20 years before any further harvest is scheduled. After that time the remaining 100+ acres of mature saw timber should be harvested in two entries, about 50 acres per entry with a recovery of 2 decades between entries.

Approximately 900 of the 1050 acres of mature saw timber is located in the southern end of the allocation zone in the Wild Creek and upper Cumberland creek areas.

The upper Cumberland Creek area has received considerable, recent harvest (200+ acres in 1980's). It too should be allowed to recover for a 20 year period before rescheduling harvest. After that period harvest could resume in that area at a rate of about 60 acres/decade.

The ID team concluded that since there has been little past harvest in Wild Creek, harvest could begin in that area and maintain adequate dispersion at the rate of 75 acres/decade. 6

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: ___ACCEPTABLE _XX_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 75 acres
2: 75 acres
3: 185 acres
4: 135 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Lower Reach, Skagit - AZ 28
(Includes: O'Toole, Boyd, Mill, and Pressentin Creeks.)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The streams in this area on National Forest land have not been sampled to determine fish populations present but based on available information form adjacent drainages resident trout species (rainbow, cutthroat and Dolly Varden) would be expected to occur in portions of these streams. Anadromous fish populations do occur in downstream areas off National Forest.

The ID team has rated the AZ as acceptable because of lower watershed conditions of some downcutting and deposition, moderate to high ability to store and transport sediment, high quantity and quality of pools, and moderate amount of LWD.

Review of aerial photography revealed that past harvest activities up to 1983,292 acres per decade on National Forest Land had little apparent impact on stream condition. Most of the harvest has been near ridge top locations except for some of the O'TOOLE SKYLINE T. S. harvest units. These units are adjacent to O'Toole Creek and unstable soils. Full suspension of yarded materials provided adequate protection of riparian areas and unstable soils in these areas

Many of the remaining mature timber areas (ie., 2200 acres) would be helicopter logged. This would allow better dispersion of harvest units throughout the tentatively suitable areas and lessen the risk of potential adverse impacts from road construction. The roads that would be required for future harvest would be on or near ridge tops. BMP's have been and would continue to be effective in protecting the soil and water resources in these areas.

Since past harvest in the AZ has been low and channels have not been adversely impacted it is recommended that a harvest rate of 550 acres/decade (8% of tentatively suitable acres) would maintain acceptable upslope and instream watershed conditions.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 550 acres
2: 550 acres
3: 550 acres
4: 550 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Deer Creek, Northwest - AZ 29
(Includes Little Deer, Day, and DeForest Creeks.)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS IOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINI:

Review of aerial photos, stream habitat/condition inventories, and the DeShazo Study has shown a substantial increase in sediment delivery to the Little Deer Creek drainage. Other effects observed include: the inability of the stream to transport sediment, loss of LWD, loss of riparian vegetation, and loss of pools due to timber harvest and road building activities. Stream aggradation was found to correspond to a general increase in stream temperature, filling in of pools and an overall reduction in anadromous fish habitat in Little Deer Creek. Stream temperature monitoring since 1983 has shown that temperatures frequently exceed 60 degrees F during the summer (Forest Service and Tulalip Tribe temperature monitoring) and indications are that Little Deer Creek has become temperature sensitive. Because of these conditions, the drainage condition is rated unacceptable.

An average timber harvest rate of 1070 acres per decade in the Little Deer Creek drainage during the 1950's, 1960's,and 1970's including FS and Private land. This combined with associated road construction and old management practices has resulted in these unacceptable stream conditions (poor future storage capacity, poor pool quality and quantity, and very little LWD). The major portions of past timber harvest activity in the drainage occurred by 1975. Dispersion of harvest was not provided for. It is estimated that these areas will have recovered in 30 years.

In Little Deer Creek in the first decade, there would be a high risk that additional timber harvest activities would continue the current degradation in watershed condition (even considering the use of current BMP's) and contribute to a worsening of instream conditions. These recommendations are based on the following factors: (1) the remaining tentatively suitable area is interspersed with many existing clearcuts, unidentified sensitive soils and steep, unproductive sites and (2) any additional sedimentation would further channel degradation and reduce habitat for the tenuous summer steelhead and salmon

populations in Little Deer Creek If no further harvest activities occur before 2005, it is expected that the watershed condition would become acceptable.

In the first decade 100 acres of timber is recommended in the Day Creek portion of the AZ without further degrading instream conditions. This is based on the following factors: (1) a substantial amount (approximately 345 acres) of mature timber is left in the upper elevations, (2) much of the area would be helicopter logged which has less impact on soils, and (3) there is very little road stacking.

Considering in-stream recovery in 2005 in the Little Deer and DeForest Creek drainages and adequate dispersion of harvest throughout the suitable acres the ID team concluded that 400 acres (3rd & 4th decade) can be harvested per decade with little or no risk of further stream degradation. This equates to 5% of the tentatively suitable acres. Since 2005 occurs in the middle of decade 2, 200 acres can be harvested in this decade. The ID team recommends that no harvest occur in the Little Deer Creek watershed in the first decade. Harvest of the full 400 acres in the AZ would occur in the third and fourth decades. This rate would allow for adequate dispersion of harvest throughout the suitable acres, and would still allow for instream recovery.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: ___ACCEPTABLE _XX_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 100 acres
2: 200 acres
3: 400 acres
4: 400 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Finney Creek - AZ 30

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Review of aerial photography revealed that past harvest activities up to 1975 (29% of N.F. lands in the watershed) had little apparent impact on stream condition. Between 1976 and 1988 additional heavy harvesting in the upper watershed (20% of N.F. lands), coupled with rain-on-snow flood events (1975,77,79, & 80) caused a large increase in sediment yield and transport through debris torrents & landslides. Dispersion of harvest was not provided for. Upper watershed, in-channel streambed and bank conditions are highly disturbed where debris torrents have occurred. This has affected 75% of the major 1st and 2nd order streams. Sediment from these events and other landslides has been deposited in the mainstem of Finney Cr. The ability to

retain sediment in the side channels has been greatly reduced. Pools have been filled in and/or scoured which has severely impacted the resident trout habitat. The main channel of Finney Creek has been scoured, widened, and straightened. Woody debris has been re-distributed and/or lost from the system. Because of these factors the ID team rated the condition of the AZ as unacceptable.

The average harvest rate in the 1960's, 70's and 80's was 3137 acres per decade on the AZ. This rate resulted in an unacceptable watershed condition. The Finney Creek watershed is still in an unacceptable condition. This condition will not change until natural recovery and watershed restoration measures are completed in the first decade. The decline in watershed condition must be halted before any timber harvest and road construction activities can take place.

Watershed condition in 1976 was determined to be unacceptable based on observation of stream conditions in the lower WS. Considering that rooting strength deteriorated for 8 years, it is assumed this condition was triggered at the 1968 harvest level. This rate was 16% on NF land. In order to provide for adequate dispersion of harvest throughout the suitable acres, and for in-stream recovery to occur it is assumed that 15% disturbance in 30 years can be tolerated beginning in the third decade (5% / decade X 17,019 tent. suitable acres = 850 acres harvest per decade). Minimal harvest activities of not more than 100 acres/decade for the first two decades may be possible provided that all watershed restoration measures are completed, the decline in watershed condition is halted, and the following best management practices are strictly adhered to: 1) harvest will be distributed throughout the watershed and not concentrated in any one sub-basin, 2) new long-term road construction will be restricted to gentle stable ground, 3) management activities must be no closer than 1/8 mile from unstable soil areas, 4) all materials will be yarded using full suspension methods, 5) there will be no harvest allowed in Class I, II, III and IV stream riparian areas, 6) all disturbed areas (including but not limited to temporary roads, skid trails, landings, fire lines) will be revegetated and drained prior to the current year fall/winter storm period, 7) all short-term roads must meet the preceding criteria, 8) emphasis will be placed on using KV generated dollars for watershed/fish restoration work, and 9) emphasis will be placed on using timber sale road reconstruction dollars for road drainage restoration

It is assumed that by the 3rd decade (year 2010) the watershed (channel recovery, canopy closure, root strength) should be recovered sufficiently to allow a harvest rate of 850 acres/decade for the next two decades.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: __ __ACCEPTABLE _XX_UNACCEPTABLE
MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 100 acres
2: 100 acres
3: 850 acres
4: 850 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Deer Creek, Southeast - AZ 31 & 32
(Includes Deer and Higgins Creeks.)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Review of aerial photos, stream habitat/condition inventories, and the DeShazo Study has shown a substantial increase in sediment delivery to the Deer Creek drainage. Other effects observed include: the inability of the stream to transport sediment, loss of LWD, loss of riparian vegetation, and loss of pools due to timber harvest and road building activities. Stream deposition and widening was found to correspond to a general increase in stream temperature, filling in of pools and an overall reduction in anadromous fish habitat. Based on stream temperature monitoring conducted by the Forest Service and Tulalip Tribe since 1983 temperatures frequently have exceeded 60 degrees F. Deer Creek is considered a temperature sensitive stream, a condition that is limiting to fish. Because of these factors, the AZ has been rated as unacceptable.

Since the 1960's approximately 2950 acres of AZs 31 and 32 have been harvested. This is an average harvest rate of 985 acres per decade for the 13,453 acre watershed. However, this harvest was not dispersed over the entire area but rather was concentrated into only about 5300 acres of AZ 31 (largely along Deer Creek and Higgins Creek). The effective rate of harvest in these concentrated areas was about 19% per decade overall (985 acres/5300 acres). This rate of harvest has led to serious degradation of Deer Creek and Higgins Creek and is unacceptable.

The ID team concludes that harvest in AZ 31 should be deferred for at least two decades to allow instream recovery. After that time harvest could continue at a rate of 262 acres/decade (5% of the tentatively suitable acres). Harvesting at this rate will maintain an overall disturbance level of 15% (Based on a 30 year stream channel recovery period). The ID team concludes a maximum 15% disturbance level in 30 years is appropriate for this area because of the inherent instability of the soils.

The 262 acres/decade rate (based on tentatively suitable lands) would also apply to AZ 32 due to the instability of the soils in this area. 5% of 4391 tentatively suitable acres is 220 acres/decade. However the first two decades would be reduced to 110 acres/decade to enable a quicker recovery of Deer Creek and Higgins Creek channel conditions.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: __ ACCEPTABLE _XX_ UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

	AZ 31	AZ 32
1:	0 acres	110
2:	0 acres	110
3:	262 acres	220
4:	262 acres	220

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Middle Reach, N. F. Stillaguamish - AZ 34
(Includes: Segelson and Swede Creeks)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Fish habitat is poor to fair overall in the confined channels of Swede and Segelson Creeks. Pools are generally shallow and small, and local areas of heavy deposition are common for both main channels. Habitat deficiencies are the result of extensive streamside logging on upper Segelson Creek, and unsupervised mining operations and road building in upper Swede Creek. Removal of LWD throughout accessible channel reaches both on and off-Forest have further deteriorated the ability of the watersheds to store sediments and alter stream power.

The ID team has concluded that this AZ is in an unacceptable condition. This rating is supported by upslope factors of numerous slides, heavy road stacking, channel scouring, raw stream banks, and minimal LWD. In the lower watershed channels there is heavy deposition, shallow and infrequent pools, inadequate and unstable LWD.

The harvest rate in this AZ over the last 3 decades has been 536 acres/decade on National Forest land. There is currently an estimated 1625 acres of mature saw timber on 3123 acres of tentatively suitable land. When evaluating the distribution of the available timber, the ID team concluded that in order to provide the dispersion necessary to provide adequate recovery and protect sensitive areas, the harvest should not exceed 200 acres per decade over the next 4 decades. This will be 6.4 percent of the tentatively suitable lands per decade.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: ___ACCEPTABLE _X_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1 200 ACRES
2: 200 ACRES
3: 200 ACRES
4: 200 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's to be considered in all alternatives in the FEIS.

Middle Reach, N. F. Stillaguamish South - AZ 35
(Includes Boulder River, French and Squire Creeks.)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Fish habitat is in good condition for the lower watersheds of Boulder River and Squire Creeks, and only fair for French Creek. This is based on the size and number of pools, stream bank stabilities, and amount, size and stability of LWD. Condition of fish habitat in the upper basins is not well documented, but appears to have been altered to a moderate degree in upper French Creek. LWD has been removed from upper French Creek and streambanks are severely disturbed. French Creek also has a marked reduction in pool capacity in the upper watershed. Upper Boulder River is pristine, and upper Squire Creek appears to have mostly recovered from streambank logging. The majority of sediment and mass movement in this allocation zone is the result of natural instability. The ID team concluded the overall watershed condition for this AZ is marginally acceptable

The majority of the management caused slides in this allocation zone occurred in the upper reaches of French and Squire Creeks as a result of intensive harvest (553 ac.) in the upper watershed in the 1960's. Average harvest rate in the AZ over the past 4 decades was 240 ac. per decade including both private and National Forest lands. In-stream conditions have slightly improved since intensive logging in the 1960's.

Future harvest activities can be well dispersed throughout the tentatively suitable acres due to the 500 acres of helicopter logging areas located primarily in the Jumbo Mtn and Whitehorse Ridge areas. Heavily impacted areas of the French Creek drainage have no mature timber that will be harvested in the 1st four decades. A large acreage of second growth poles occurs along the lower, generally stable slopes of Whitehorse Mtn. that silvicultural examinations indicate will be available for harvest in the 1st decade. For these reasons, the ID team concludes that 500 acres (9.5% of the tentatively suitable acres) can be harvested in decades 1 through 4.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE ___UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 500 ACRES
2: 500 ACRES
3: 500 ACRES
4: 500 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Upper Reach, N. F. Stillaguamish - AZ 37

(Includes: mainstem North fork Stillaguamish River, North, South, and Middle Branches, Crevice Creek, and the headwaters of a few drainages into the Sauk River)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Fish habitat in the North Fork Stillaguamish River is in an unacceptable condition, based on the widespread aggrading evident in the lower gradient reaches both on and off National Forest lands. The basin is also sensitive to increased summer temperatures some years. Heavy deposits of sand have reduced volume of pools, adversely affected spawning gravels, and diminished rearing habitat quality along the margins of the larger channels.

The North Fork Stillaguamish River System was in acceptable condition until the late 1970's and early 1980's. From the mid 1980's unacceptable watershed damage started to occur. The damage coincided with dramatic increases in harvest levels in the late 1970's and early 1980's to up to three times the prior rate.

The unacceptable rating of this watershed is supported by upslope factors of downcut or scoured streams on nearly half of the upslope area, numerous raw stream banks, unstable LWD, older failing roads on unstable soils, and many stacked roads. The lower watershed has heavy sediment deposition and poor quality pools.

The deteriorated condition of this watershed has resulted from an average harvest rate of 3296 acres per decade (11% based on 4 decades harvest). In order to provide for recovery and proper dispersion, a maximum rate of harvest of 1000 acres per decade is recommended. This rate will be 3.6% of the tentatively suitable acres. This harvest level can be accomplished by restricting harvest on sensitive ground, using BMP's, and good harvest dispersion.

This level of harvest over the next 40 years will provide for satisfactory watershed recovery. After the 4th decade, the previous harvest level of 2200 acres per decade that had maintained an acceptable watershed condition, could be re-established. (The 2200 acres was the harvest level prior to the '80's that had maintained an acceptable watershed condition.)

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: ___ACCEPTABLE _X_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 1000 ACRES
2: 1000 ACRES
3: 1000 ACRES
4: 1000 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Sauk River, Northeast - AZ 38
(Includes White and Hilt Creeks.)
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The following fish habitat description is based on the WDF Stream Catalog (1975 including supplements). Allocation Zone #38 consists of the Hilt and White Creek drainages. White Creek and Hilt Creek are tributaries to the lower Sauk River. White Creek has a falls that block anadromous fish at RM 0.65 and the upper 5 miles are on Forest Service land with the FS boundary located at RM 1.8. Hilt Creek has a falls located at RM .7 that block anadromous fish and the upper 2 miles are on FS land with the FS boundary located at RM 3.5. Based on knowledge of similar streams in adjacent drainages it is expected that resident trout inhabit the upper reaches of White and Hilt Creeks above the anadromous barriers.

Past harvest in the Hilt Creek portion of the AZ, over the past 4 decades has removed 96% of the mature timber, leaving only 50 acres of the 930 acres of tentatively suitable. This has resulted in degraded in-channel condition and an unacceptable watershed condition. This has caused significant impacts to resident fish habitat in the Hilt Creek portion of the AZ. Based on the preceding factors the I.D. team recommends that no further harvesting should occur in the Hilt Creek drainage over the next 4 decades.

In the White Creek portion of the AZ, 1770 acres have been harvested in the past 3 decades (an average of 590 acres per decade). This harvest has been concentrated within the drainage causing unacceptable upper watershed, instream and resident fish habitat conditions. There are limited dispersion opportunities during future harvest in White Creek and much of the remaining mature timber is located on steep, marginally stable ground. For these reasons, the I.D. team recommends that the White Creek drainage can sustain a 200 acre per decade harvest rate and still maintain acceptable watershed, instream and fish habitat conditions. For the first 2 decades this watershed will require additional recovery time to return to an acceptable condition. Therefore, we recommend that the 200 acre/decade harvest rate be cut in half during the first 2 decades. This is 100 acres per decade.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: ___ACCEPTABLE _XX_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 100 acres
2: 100 acres
3: 200 acres
4: 200 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Sauk River - AZ 39

(Includes: The mainstem Sauk River RM 25 to RM 40, and lower Clear, Falls and Helena Creeks, Murphy, Goodman, Dans, Decline, Conn, Gravel, Peek-a-boo, Brown, Burns, Skull, Lyle, Dutch, and Dubor Creeks.)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The analysis area for this AZ includes the Sauk (off National Forest lands) to the confluence with Prairie Cr. at RM 15.5. The lower gradient section of the river downstream of the NF lands shows the cumulative effects of sediment aggrading, which are not as evident in the moderate gradient reaches on NF lands. Much of the sediments come from the Sauk River and Dans Creek on NF lands.

Fish habitat in this AZ is moderately productive on NF lands, but appears to have been degraded down-river by widespread channel shifts, filled in pools and overall aggrading. Valley bottom tributaries and river side-channels provide most of the high quality anadromous fish habitat on NF land. Examples of streams which have maintained stable and productive fish habitat are Tiny Kitsutch Cr., Hyakchuck Cr., Dutch Cr., Falls Cr., and Early Coho Cr.

Historical cutting and road building in this watershed have resulted in degradation of individual drainages: Dans Cr. & Murphy Cr. in particular. The dispersed nature of activities geographically and over time, have resulted in marginally acceptable water quality and fish habitat in the anadromous zone in the Sauk River valley. Dans Creek and the Sauk downstream from the NF lands, however, are in an unacceptable condition at this time due to the Dec. 1980 flood that removed most of the LWD and removed the pool structure. There are also numerous slope failures along the Dans Cr. channel and its tributaries (Conn and Decline Creeks).

Average past harvest per decade over the past 4 decades in the AZ was 330 ac. on private land and 4513 ac. on National Forest. All private lands have been harvested at least once except for approximately 40 ac. of mining claims on Gold Hill. Due to current instream conditions and the reduced ability to disperse harvest, the ID team concluded that 1700 ac. could be harvested in the 1st decade, (5% of the tentatively suitable acres) while maintaining an acceptable watershed condition. Beginning with the 2nd decade, this harvest rate could be increased to 2500 acres/decade because of hydrologic recovery taking place, use of state-of-the-art BMP's, and the amount of helicopter logging. By the 3rd decade, some of the 2nd growth area cutover during the 1930's will become available for harvest. Some instream recovery will also have occurred by the start of the 3rd decade. By the 3rd and 4th decade, nearly all of the old cutover area will become available for harvest. (This is 3000 acres/decade, or 8% of the tentatively suitable area.) This increased harvest base will provide improved opportunities for harvest dispersion.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE ___UNACCEPTABLE

Unacceptable conditions in Dans Creek

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 1700 ACRES
2: 2500 ACRES
3: 3000 ACRES
4: 3000 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Suiattle River - AZ 40

(Includes: The mainstem Suiattle River RM 12.3 to 26.5, Tenas, Big, Grade, All, Conrad, Black, and Straight Creeks.)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Because of the large size of the Suiattle River watershed, the instream condition of the main river channel has not been adversely impacted by management activities. The lower channel reaches of Straight and Big Creeks have been impacted, however, and anadromous fish habitat has been slightly degraded. Pools are shallow and fewer in number; channels have become braided (resulting in upstream adult fish passage difficulties at low water), and some LWD has been washed out by flood flows.

Although some unacceptable watershed conditions exist within local areas (i.e., Straight, Tenas, and Big Creek drainages), the ID team concluded that the overall condition of the AZ is acceptable. In general, pool condition, sediment storage, and LWD supply and distribution are adequate for good fisheries habitat and other beneficial downstream water uses.

Past timber harvest within the AZ has been concentrated within the Straight, Tenas and Grade Creek drainages. Unacceptable upper watershed and instream conditions occur in these areas due to these harvest activities.

The past harvest rate since the 1950's in the entire AZ was 1709 acres per decade including both National Forest and private lands. The ID team has concluded that the harvest in the 1st decade can be increased to 2500 acres because: (1)Most of the unstable soil areas (6% of the tent. suitable acres in the AZ) can be avoided, (2)A previously unroaded area (i.e., Huckleberry Mtn.) will be entered, (3) Most of this unroaded area is stable, (4)BMP's will be effectively employed for better stream protection, and avoidance of unstable and marginally unstable areas in road construction and logging. These BMP's will maintain an acceptable watershed condition. The planned 2000 acres of helicopter harvest will also provide excellent harvest dispersion opportunities.

The ID team concluded that the 1st decade harvest rate of 2500 ac. (9% of the tentatively suitable) should be reduced in decades 2-4 to the historic rate of 1700 ac/decade (6% of the tent. suitable area). After the initial entry is

made into the large Huckleberry Mtn. unroaded area, harvest dispersion opportunities will be reduced.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _x_ACCEPTABLE ___UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 2500 ACRES
2: 1700 ACRES
3: 1700 ACRES
4: 1700 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Suiattle River - AZ 41

(Includes: Circle, Harriet, and Lime Creeks, and north facing tributaries to the upper Suiattle River.)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Fish habitat in this AZ is confined to streams in 3 upper basins: Circle, Lime, and Danny Boy Creeks. Resident trout habitat quality has diminished in the former two streams by excessive amounts of introduced sediment and little LWD remaining after floods. Anadromous fish habitat, located entirely within the downstream AZ, has been altered by aggrading, alluvial fans and new channels cut by floods on Circle and Lime Creeks. About 40% of the area of this AZ drains into 1st and 2nd order tributaries of the Suiattle River that have not been intensively logged.

Instream conditions are marginally acceptable along the entire lengths of Circle and Lime Creeks. Conditions in Danny Boy Creek and other tributaries and side channels of the Suiattle River, RM 18.4 to 27.6, are fully acceptable. Therefore, the ID team concluded that the overall condition of the AZ is acceptable

The past harvest rate has averaged 509 acres per decade for the last 3 decades. Most of this harvest has occurred in Circle and Lime Creek drainages.

Proposed future harvest is planned for a large block of stable unroaded area that drains north to the Suiattle River. The majority of the mature timber in the AZ occurs on these slopes. For these reasons, the ID team concluded that 750 ac. (13% of the tentatively suitable) can be harvested in the AZ in the 1st decade and provide adequate dispersion. In decades 2-4, harvest levels will be reduced to 350 acres (6% of the tentatively suitable). This harvest level will provide adequate dispersion and watershed protection while continuing to defer harvest in the heavily impacted portions of Lime and Circle Creeks.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE ___UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 750 ACRES
2. 350 ACRES
3: 350 ACRES
4: 350 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

White Chuck River - AZ 42

(Includes: The Whitechuck River, Black Oak, Rat Trap, Crystal, Meadow, Owl, Dead Duck, and Stujack Creeks.)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS IOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINI:

Anadromous fish habitat appears to be in nearly pristine condition in most of the AZ. This habitat is limited to mainly side channels and the short low gradient mouths of tributaries. The ample supply of woody debris and high quality pools are reasons for the good condition of this watershed. There are exceptions in Black Oak Creek and Rat Trap Creek. In Black Oak Creek the alluvial fan does not provide a single low flow channel for adult salmon passage upstream, and much of the instream LWD has been washed out of the active channel. Rat Trap Creek is another sub-basin that has been heavily impacted by road building and to a lesser extent by timber harvest. These exceptions account for less than 10% of the AZ. Due to the overall good instream conditions, the ID team concluded that the AZ should be rated as acceptable.

Past harvest rate has averaged 519 acres/decade over the past 4 decades. Due to the relatively low percentage (11%) of unstable soils in the AZ, the 500 acres of helicopter areas, harvest dispersion opportunities will be good. The ID team concluded that 650 acres (6% of the tentatively suitable acres) can be harvested in the decades 1-4 while maintaining an adequate watershed condition. In addition, fish habitat improvement and some watershed restoration work will be implemented on Black Oak Creek and on Rat Trap Creek subwatersheds. Harvesting will be deferred in already heavily impacted areas in Black Oak Cr. and Rat Trap Cr.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE ___UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 650 ACRES
2: 650 ACRES
3: 650 ACRES
4: 650 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Canyon Creek - AZ 44

(Includes: The mainstem Canyon Creek, the North and South Forks Canyon Creek, Meadow, Camp, Boundary, Saddle, and Sevenmile Creeks. A small portion of Jim Creek is also included.)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Review of aerial photos, various studies, and on-ground observations show that this AZ has been heavily impacted from previous management activities. Conditions upslope include scoured channels, some heavily stacked and failing roads, landslides throughout, and nearly half the tentatively suitable is in unstable soils. The lower watershed area is characterized by high sediment loads, unstable spawning gravels, poor pool conditions, sparse and unstable LWD, and a diminishing number of returning anadromous fish within recent decades. Because of these factors the ID team has rated the AZ as unacceptable.

Early 1960 photos show that a 1950's harvest rates of 553 ac./decade on NF lands in Canyon Cr. caused slight impacts to Canyon Cr. The impacts began to rapidly accumulate in the 60's when 2727 acres were harvested. In the last 3 decades, the harvest rate has been 1,887 acres/decade, with heavy impacts resulting.

The remaining mature timber in the AZ is located in the lower North Fork, the South Fork, and the portion of National Forest that is below the forks. The South Fork has already been heavily cutover and impacted in the 1980's. These conditions severely limit dispersion opportunities.

During the past 3 decades, the average harvest was 2097 acres/decade from National Forest lands. The ID team evaluated the effects of the 1950's rate of harvest, the effects of the accelerated harvest rate in the last 3 decades, the present condition of the drainage, recovery potential, and the limited options for dispersion , and concluded that the future harvest rates should be no more than 250 acres per decade (2.2% of the tentatively suitable land).

This harvest rate represents the amount that the Interdisciplinary Team believes can be harvested from the more stable areas that provide opportunities to implement Best Management Practices. This should result in a reduction in

harvest related failures and provided for improvement in watershed conditions by the end of the 4th decade.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: ___ACCEPTABLE _X_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 250 ACRES
2: 250 ACRES
3: 250 ACRES
4: 250 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Sauk River - AZ 45

(Includes: upper portions of Helena, Goodman, Falls, Murphy, Shake and Swift Creeks, and tributaries to Clear Creek.)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Anadromous fish habitat is generally in fair to poor condition. This assessment is based on the lack of high quality pools, high percentage of fine silt within many of the spawning gravels on the river and tributaries, and overall lack of stable LWD. Suspended sediment and bedload deposition has increased within the South Fork Stillaguamish basin in about the past two decades. This river has a naturally high bedload transport rate.

In this allocation zone, 30% of the tentatively suitable mature timber is located within unstable soil areas. Previous timber harvest and road construction in this area have resulted in degradation of the watershed resources - particularly Wiley Creek, Benson Creek, and their tributaries. There will continue to be problems associated with older road construction and timber harvest for some time

Based on the above identified conditions the ID team concludes that the watershed is in an unacceptable condition.

The past harvest rate on National Forest land and private land within the AZ is 1726 ac./decade for the last 4 decades. The proposed harvest rate of 350 acres per decade (3.9 % of the tentatively suitable) is below the historical average in order to allow the watershed to recover from the effects of previous management activity. Objectives of future management in this AZ are to maintain the ability to disperse harvest, to avoid additional watershed effects above the high natural rate, and to develop and implement a comprehensive watershed rehabilitation plan.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: ___ACCEPTABLE _X_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 350 ACRES
2: 350 ACRES
3: 350 ACRES
4: 350 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Sultan River - AZ 47

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Washington State Biologist Kramer has written that the lower reach of Williamson Creek is the primary spawning habitat for native cutthroat trout in the Spada system. This reach is downstream from the AZ. Habitat within the AZ is limited primarily by lack of pools and stable LWD. This is due to the sediment and bedload deposition that is occurring.

Williamson Creek is currently in a degraded condition and is gradually recovering. Large quantities of bedload have been transported into and deposited within the main reach of Williamson Creek. Channel widening has also occurred. The channel has also been redirected down the county road as a result of a debris jam. Bedload transport occurs within this drainage at relatively high levels from undisturbed areas, but the landslides from the 70's harvest on private lands also contributed significant quantities of bedload to the system.

Management activities, particularly the harvest on unstable soils in the 70's on private lands and lack of maintenance of the county road, have contributed to the current condition Timber harvest on all ownerships has occurred at moderate rates in previous decades Approximately 221 acres was harvested in the 50's, 814 acres in the 60's, and 571 acres in the 70's. The average rate of harvest for these three decades was 535 acres per decade.

The ID team considered this AZ to be in a marginally acceptable condition. The watershed is gradually recovering and restoration work would assist the recovery process. Much of the future harvest on National Forest lands will occur with the use of helicopter which will reduce further damage. Very little additional harvest on private lands is expected for several decades. In order to continue the recovery process, the ID team concluded that the harvest rate should be reduced from previous levels The team recommends a harvest level of 150 acres within the AZ during the first decade. 150 acres represents 20% of the tentatively suitable lands. The team recommends an increase in the harvest rates in the following decades to 200 acres per decade (27% of tentatively

suitable) due to expected recovery over the 2 decades of reduced activity. (includes the 80's decade when no activity occurred).

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE ___UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 150 ACRES
2: 200 ACRES
3: 200 ACRES
4: 200 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Upper Reach, S. F. Stillaguamish - AZ 48

(Includes: mainstem South Fork Stillaguamish River RM 53.3 to RM 70, Palmer, Perry, Coal, Beaver, Deer, Marten, Boardman, Mallardy, and Blackjack Creeks.)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The upper part of the AZ is characterized by shallow residual and colluvial soils on steep slopes particularly in the upstream reaches of Perry, Palmer, Coal, *Deer Creeks and the upper South Fork Stillaguamish. The lower reaches of* the AZ in the Blackjack, Mallardy and Boardman Creek areas are characterized by deep, generally unstable glacial terrace deposits.

The upper 1/3 of the South Fork Stillaguamish channel in the AZ, upstream of Perry Creek (and including the lower reaches of Palmer Creek), contains the best spawning habitat in the AZ. High quality pools are common, spawning gravels have a low percentage of fines, and LWD is abundant in these sections.

The instream conditions of the S.F. channel in the lower 2/3 of the AZ are much more unstable. High bedload deposition, few and shallow pools, and extensive raw stream banks occur below the confluence of Perry Creek. These conditions are the result of both timber harvest activities and failures of the unstable glacio-lacustrine materials. Based on instream conditions in the lower S.F. channel, the ID team recommends an overall unacceptable rating for the AZ.

Average timber harvest rate over the past 4 decades is 1575 acres/decade (all ownerships). The remaining mature saw timber is in areas characterized by irregular terrain and contains numerous small 1st and 2nd order streams. The ability to leave buffer strips on these streams may be difficult. Future harvesting should incorporate BMP's including helicopter and multispan logging

systems. In order to change the present unacceptable in-channel conditions to acceptable, the ID team recommends a future harvest rate of 500 acres per decade (3.7% of the tentatively suitable). This rate will allow hydrologic recovery, though both natural and management rehab activities. As with AZ 46, this AZ will require developing and implementing a comprehensive watershed rehabilitation plan.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: ___ACCEPTABLE _X_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 500 ACRES
2: 500 ACRES
3: 500 ACRES
4: 500 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Sauk River Forks - AZ 49

(Includes the North and South Forks Sauk River, Sloan, Elliot, and Cadet Creeks, and other tributaries to the upper Sauk River.)

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS IOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINI:

Anadromous fish habitat in the South Fork Sauk appears to have partly recovered from the December 1980 flood, although the river channel below Monte Cristo Lake is still deficient in high quality pools, stable LWD, and side channels with spawning gravels that are stable for only several months at a time. These conditions will be expected to improve slowly over several decades, barring additional major debris torrents from Bedal Creek or other tributaries.

The ID team concluded that the South Fork was in an unacceptable condition for fish habitat because of extensive channel braiding, few and shallow pools, channel bank failures, high sedimentation levels and recurrent debris torrents and debris flows from Bedal and Chokwich Creeks. These conditions are partially the result of the December 1980 flood. The major slide on the South Fork across from Bedal Creek continues to adversely affect spawning conditions in the downstream river system.

The ID team concluded that the North Fork and Sloan Creek were in an acceptable condition based on the number of high quality pools, minimal past harvest rate, and virtually undisturbed conditions in many tributaries.

The ID team concluded that the overall rating for the AZ was marginally acceptable.

The average harvest rate since the 1960's was 712 acres per decade in the AZ. Considering the unacceptable condition of the South Fork, the ID team concluded that the MR for the AZ should be reduced to 250 ac/decade, (3.8 % of tentatively suitable). Harvest in the 1st decade will primarily be in the North Fork drainage. This harvest level will allow adequate dispersion throughout the tentatively suitable acres in time and space and should provide for adequate recovery and maintenance of instream watershed conditions in the South Fork.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: X ACCEPTABLE __UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 250 ACRES
2: 250 ACRES
3: 250 ACRES
4: 250 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Sultan River - AZ 51

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

In this AZ, all the streams are either 1st or 2nd order channels. These channels support only a resident trout population, there is no anadromous fish habitat. Little current information exists on the resident trout population, but based on similar 1st - 2nd order channels in other Forest watersheds, the populations are probably small and sparsely located. The majority of fish are probably found in the upper S.F. and N. F. Sultan River and upper Elk Creek. The existing habitat is probably capable of supporting this existing population.

Even though most of the channels have scoured to bedrock, enough pools, formed by large boulders and LWD, exist to support these small fish populations. Adjacent riparian areas along these channels offer a moderate LWD potential to these channels. Based on these in-channel attributes, the ID team concluded that the AZ was in an acceptable watershed condition.

There has been no past timber harvesting in the AZ However, the ID team concluded that about 300 acres per decade (50% of the tentatively suited area) should be the maximum allowable acres for harvest.

Cause/effect relationships, in regards to timber harvest and road building, for establishing the watershed MR within this AZ are unavailable due to the lack of management activity within the area. Most of the timber is in the stream bottoms or near to riparian areas and avalanche chutes or the lower slopes. The removal of large blocks of timber would have a high localized impact on the streams. This would be kept within acceptable limits by cutting less than half of what is available within a decade. The team estimated that about 300 acres could be harvested without experiencing a significant decline in the watershed condition assuming that units were kept small and riparian areas would be protected, preserved, and state-of-the-art BMPs were applied.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 300 Acres
2: 300 Acres
3: 300 Acres
4: 300 Acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Sultan River - AZ 52

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

In this AZ, all the streams are either 1st or 2nd order channels. These channels support only a resident trout population, there is no anadromous fish habitat. Little or no current information exists on this resident trout population, but based on similar 1st and 2nd order channels in other Forest watersheds, the populations are probably small and sparsely located. The majority of fish are probably found in upper S.F. and N.F. Sultan River and upper Elk Creek. The existing habitat is probably capable of supporting this existing population. The Sultan Basin is used as a municipal water supply for the City of Everett and other communities.

Even though most of the channels have scoured to bedrock, enough pools, formed by large boulders and LWD, exist to support these small fish populations. Sediment from upslope areas and the unstable soils surrounding the reservoir have degraded many of these pools. In addition, the sediment has degraded water quality of the municipal watershed. Adjacent riparian areas along these channels offer a fair LWD potential to these channels. Because of the sediment input to the channels it is not considered stable. Based on these in-channel attributes, the ID team concluded that the AZ was presently rated as acceptable but only marginally.

Previous timber harvest on all ownerships within this AZ has averaged 1,970 acres/decade. Harvest was very high in the 1960's and 1970's in preparation for construction of the dam which created the reservoir. Harvest in the 80's was reduced to about 500 acres. About 550 acres of mature tentatively suitable acres remain on NF lands within this AZ. This remaining suitable acreage is either very difficult to access or relatively unstable. Considering the location of the remaining timber and the potential impacts on the Sultan Basin, the ID team determined that a maximum rate of 100 acres per decade (3% of the tentatively suitable) could be harvested within this AZ without substantially degrading the present watershed condition

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE ___UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 100 ACRES
2: 100 ACRES
3: 100 ACRES
4: 100 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

North Fork Skykomish River - AZ 53, 54, 55, 56
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The North Fork Skykomish River basin encompasses a large watershed area. The basin encompasses all the acres in AZ 43, 54, 55, and 56. The North Fork Skykomish River contains significant populations of coho and pink salmon as well as sea-run trout (steelhead, cutthroat, and Dolly Varden). Smaller numbers of spring and fall Chinook Salmon are also found. All of this anadromous fish production in the river is by natural means. Anadromous fish are known to migrate up to RM 18 on the river to spawn and rear. Many of the major tributary streams to the NF also contain valuable anadromous fish habitat in the lower gradient sections (West Cady, Goblin, Silver, Salmon, Howard, Trout, and Lost Creeks). Besides the anadromous fish presence and utilization of the North Fork, a substantial resident trout population exists in this large river system.

The upper watershed area which encompasses most of AZ 53, 54 and 56, contain many 1st and 2nd order channels that are either avalanche chutes or steep runoff channels that have scoured to bedrock. This scouring has resulted over recent time from numerous high flow storm events especially in the 1970,s and 1980,s. In addition, early railroad logging in the 1920-1930 period harvested both sides of the N.F. Skykomish. Harvesting involved yarding logs across the river in the riparian areas. This had additional impact on the river channel and banks. What pools exist in these channels are formed mainly by rocks and

boulders and little LWD. Potential recruitment of LWD from the adjacent riparian areas is fair. Overall, these channels are slowly recovering from past flood events. In the lower 3rd and 4th order channels, past high flow and flood events (70s and 80s) caused large amounts of in-channel and streambank instability. Additional in-channel and fish habitat impacts occurred following the massive flood repair and cleanup work within the main North Fork channel. Old aerial photos (1940 - 1970) show that most of these channels had moderate in-channel and bank stability. Presently, many of these channels and the fish habitat is recovering from the natural and management caused impacts of the 1970s and 1980s. Natural recovery is presently being supplemented with habitat improvement activities. In-channel and stream bank stability is improving, the quality and quantity of pools is increasing and recruitment of LWD is occurring from the adjacent riparian areas. Because of these improving conditions with the N.F. Skykomish River system, the ID team determined the watershed in an acceptable condition.

The past harvest rate on NF land in the four AZs has been variable. The harvest rate on 53 has averaged 25 acres/decade from 1950 through the 1970's. AZ 54 has averaged 103 acres/decade for the two cutting history decades of 1950's and 60's. AZ 55 has been heavily harvested int the 20's and 30's with an average of 3900 acres/decade. In subsequent decades, starting with the 1940's, the harvest has averaged 430 acres/decade. AZ 56 had 63 acres harvested in the 1960's.

Allowable harvest levels for the individual AZ's within the North Fork Drainage were determined based on specific site characteristics within each AZ and the probable resulting response of management on the watershed as a whole. The majority of available timber and, consequently, future harvest will occur along the lower slopes of side channels to the North Fork. New road construction will be needed to access many of these areas. Historical harvest levels have varied substantially within each AZ, but recent levels appear to be lower than necessary to continue the recovery and maintenance of a stable watershed condition.

Based on the observed condition resulting from past activity and the probable location of future harvest, the ID team determined that 12% of the tentatively suitable lands within each AZ would be maximum harvest rate that the North Fork could tolerate without adversely affecting the watershed condition.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

	AZ 53	AZ 54	AZ 55	AZ 56
1:	650	500	1060	310
2:	650	500	1060	310
3:	650	500	1060	310
4:	650	500	1060	310

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Skykomish River - AZ 57
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

In this AZ, all the streams are either 1st or 2nd order channels. These channels support only a resident trout population; there is no anadromous fish habitat. Little or no current information exists on this resident trout populations, but based on similar 1st and 2nd order channels in other similar Forest watersheds, the populations are probably small and sparsely located. The majority of fish are probably found in the upper Wallace Creek and May Creek areas. The existing habitat is probably capable of supporting this existing population.

Even though most of the channels have scoured to bedrock, enough pools, formed by large boulders and some LWD, exist to support these small fish populations. Adjacent riparian areas along these channels offer a moderate recruitment of LWD to these channels. In addition, these in-channel conditions on Wallace Creek provide for high water quality for use in a downstream (outside AZ) state salmon hatchery. Based on these in-channel attributes, the ID team concluded that the AZ is presently in an acceptable condition.

The ID team determined that a maximum of 350 acres (17% of tentatively suitable) could be logged within this AZ and retain acceptable stream channel conditions. No significant impact was observed as a result of approximately 75 acres harvested each decade in the 1950's and 60's. Substantial damage was noted as a result of railroad logging of 1,000 acres in the 1930's. The remaining tentatively suitable timber is located primarily along perennial streams and lower slopes. The lower slopes are highly dissected by avalanche chutes. The ID team also determined that the removal of the tentatively suitable in four decades (460 acres/decade) along with construction of the required transportation system to accommodate the harvest represented a significant risk to the watershed condition. 350 acres would be satisfactory if distributed with 230 acres in the Wallace drainage and 120 acres in the May Creek Drainage.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ ACCEPTABLE _ _ UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 350 acres
2: 350 acres
3: 350 acres
4: 350 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Tye River - AZ 59

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This small AZ is composed of the Martin Creek and Kelly Creek systems. No anadromous fish utilize these stream systems The streams do contain resident populations of cutthrout and rainbow trout. Martin and Kelly Creek probably support self-sustaining, small populations of both these trout species. Over time, these stream systems have developed habitat features to support these small populations. Channel and bank stability has been fair to moderate, the quantity and quality of the pools has been good, and the recruitment of LWD to these channels has been in balance. But recent heavy harvesting on the private land and the less intense harvesting on NF land has, and continues to have, impact on the channels and the fish habitat. These are fragile channels due to their location and elevation, and future timber harvesting will require that no further degradation or losses occur in channel stability or in the fish habitat capability. Presently the ID team determined the AZ to be in an acceptable condition.

Prior to the 1980's, only 219 acres of NF land had been harvested and none on private lands. As stated previously, the fragile channels within this AZ were not substantially altered with this level of activity.

Harvest rates in the 80's increased dramatically. An additional 283 acres were harvested on National Forest lands and 1,250 acres on private lands. This rate of harvest and the location of harvest (riparian areas and avalanche chutes) has resulted in degradation of stream channels and an accelerated rate of sedimentation. Due to the short time period since harvest, it is difficult to predict what the full impact will be of the recent activity. Monitoring activities are planned for further evaluation. Considering the observed existing condition, the anticipated harvest of an additional 350 acres of private land during the rest of 1989, and the uncertainty of future impacts, the ID team concluded that future harvest rates, at least for the short term, should be reduced from previous levels. The team proposed 100 acres for the for the 1st decade which represents 9% of the remaining mature tentatively suitable within the AZ. This harvest should occur within the Kelly Creek and West Fork of Martin Creek Only limited salvage harvest will be scheduled for Martin Creek due to little expected harvest on other ownerships and anticipated gradual recovery, the team increased the rate in future decades to 150 acres/decade. (about 12% of the tentatively suitable).

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: ~100 ACRES
2: ~150 ACRES
3: ~150 ACRES
4: ~150 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Beckler-Rapid Rivers - AZ 60
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The Beckler River contains more than 13 mainstem river miles plus 28 tributaries that total about 167 linear stream miles. The Beckler River is the major tributary of the S.F. Skykomish River. The Beckler River contains significant populations of coho and pink salmon as well as sea run trout (steelhead, cutthrout, Dolly Varden). Smaller, but important runs of spring chinook and chum salmon also can be found in the mainstem Beckler River. All of the anadromous fish production is natural production except for the steelhead trout that are outplanted from nearby hatchery production. Natural production in the Beckler River is possible due to fair to moderate amounts of spawning habitat existing, but only fair quality and quantity of rearing habitat is present. Much of the high quality rearing habitat in the Beckler and Rapid Rivers was lost or displaced following the floods in the late 70's and 80,s. In addition, the extensive flood control and prevention work following the floods (LWD removal and channelization) further damaged or destroyed this rearing habitat. Since the mid 80's to the present, natural channel recovery and fish habitat restoration management activities have steadily improved this rearing habitat capability. Rearing habitat capability is improving because the channels have become more stable, the number, size, and location of pools is increasing, and the recruitment of LWD is occurring. The present conditions of the 1st and 2nd order channels and the downstream 3rd and 4th order channels support viable populations of salmon and trout therefore the ID team determined that the Beckler River AZ is in an acceptable condition.

The past harvest rate (for past 2 decades) on both National Forest land and private land has averaged about 3500 acres per decade. The Rapid and lower Beckler River areas are in a process of recovery from past heavy harvest rates that employed poor management practices, and had roads constructed in unstable soil areas. In addition, this portion of the watershed is recovering from past wildfires like the Evergreen Mtn burn. Examination of aerial photos over the past 2 decades shows that hydrologic recovery is occurring on National Forest lands. This recovery is taking place in the watershed despite the presence of large, contiguous acres of harvesting on the upper slopes and in the riparian areas on private land.

The ID team concluded that the implementation of state-of-the-art BMPs and the amount of helicopter logging possible (which would decrease new road needs) in this AZ would allow the District to maintain and slightly increase the past 2 harvest rate of 3500 acres/decade. The ID team determined a slight increase of 100 acres to total 3600 acres could be the maximum harvested in the 1st decade. Hydrologic recovery is taking place on National Forest land as well as private land. Five of the seven parcels of other ownerships in the second growth along the bottomlands of Beckler River have been recently acquired as National Forest lands. These parcels will not be subject to extensive harvesting as they would have if they had remained in private ownership. The potential future impacts to the watershed from management activities, under N.F. administration, will be decreased. Upon consideration of the previous discussed factors, the ID team determined that the harvest rate could be increased on the AZ to 4000 acres/decade for decades 2,3, and 4. These rates, along with state-of-the-art BMPs, are expected to maintain the present acceptable watershed condition in this AZ.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: __X__ACCEPTABLE ____UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: _3,600 Acres
2: _4,000 Acres
3: _4,000 Acres
4: _4,000 Acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

South Fork Skykomish River - AZ 61

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This small AZ contains only resident fish habitat. The major stream system in the AZ is the upper sections of Barclay Creek and Barclay Lake. Resident rainbow or cutthroat trout populations in this creek are probably small and vulnerable to being depleted with any additional recreational fishing pressure. Creating additional access to upper Barclay Creek with more roads could lead to increased fishing pressure on these small populations. Presently, the habitat is supporting these populations. Channel and bank stability in most channels is fair to good, the pools are small, but still are providing food and cover; and Barclay Creek has a good supply of LWD along its entire channel length. Recruitment possibilities are also good. Because of these conditions, the ID team concluded the AZ to be in an acceptable condition.

Lacking previous cutting history in the immediate area to draw from for background information, the tentatively suitable lands were analyzed in three categories which are:

1. The avalanche chute area of about 600 acres
2. The upper basin area of 600 acres
3. The area below the end of the road of about 600 acres.

The avalanche chute area contains numerous, deeply incised chutes that highly dissect the area. Roading would not be economically feasible. Logging of the timber should leave buffer strips to protect the chutes from sedimentation. Because of the closeness of the chutes, there is very little, if any, timber that could be logged without incurring impacts on the watershed.

The area above the end of the road into the upper basin has many, small feeder streams that are 1st and 2nd order channels. Natural sedimentation of Barclay Lake is occurring. The harvest of more than a minor amount of timber would increase this sedimentation rate. Therefore, the ID team determined that the maximum rate of 60 acres per decade should be established when considering a slow rate of vegetation growth and a relatively long period for hydrologic recovery after impacts occur.

The area south of the end of the road has no severe problems. The private land adjacent to this area has been clear cut but has not full revegetated.

The ID team determined that 180 acres per decade could be harvested and still maintain the acceptable condition of the watershed.

The total harvest that can be harvested from this AZ is 240 acres/decade (about 14% of the tentatively suitable) and still maintain an acceptable watershed condition. Helicopter logging may be employed to harvest up to 2/3 of the area.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ ACCEPTABLE ___ UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 240 ACRES
2: 240 ACRES
3: 240 ACRES
4: 240 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

South Fork Skykomish River - AZ 62
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Barclay Creek is a major tributary that enters the S.F.Skykomish River in this AZ. Barclay Creek contains about 1/2 mile of spawning and rearing habitat for coho salmon and steelhead trout. The remaining portion of Barclay Creek contains good quality resident trout habitat. The S.F. Skykomish River channel that flows within this AZ serves as a migration area for salmon and sea-run trout moving upstream to spawn and rear. This channel area in addition has moderate amounts of spawning and rearing habitat. This habitat is in good condition at present. In-channel stability is moderate and streambank stability is moderate. In addition, a fair number of high quality pools exist in both Barclay Crek and the S.F. Skykomish River channel within this AZ. A moderate amount of LWD exists in almost all the channels. Based on these factors, the ID team determined that the present in-channel conditions in this AZ are acceptable.

Based on a past harvest rate of 364 acres of NF and private lands per decade over the past 4 decades, and the fact that the old railroad logging of the 1930's has hydrologically recovered, the ID team concluded that a maximum of 270 acres/decade (12% of tentatively suitable) rate of clearcutting could be conducted and still maintain the AZ in an acceptable watershed condition. This rate of future allowable harvest was influenced by the bulk of the area being in the scenic corridor along US highway 2. This requirement of meeting visual quality objectives places restrictions on timber management activities. The lower elevations of this AZ contains extensive acreage of second growth timber that is about 50 to 60 years old. Management of these stands will be by thinning to meet the visual quality management objectives. The maximum harvest acreage would be significantly increased in this situation. The exact figure would have to be evaluated on an individual project basis.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ ACCEPTABLE ___ UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 270 ACRES
2: 270 ACRES
3: 270 ACRES
4: 270 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Skykomish and Tolt Rivers - AZ 63
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS IOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The majority of the land in this AZ is in private ownership. Only 2195 acres out of 20,825 acres are NF land. This AZ also includes the Deer Creek subwatershed, on the north side of the S.F. Skykomish River, and the Proctor Creek subwatershed on the south side. In addition, this AZ straddles the ridge line separating the Skykomish and North Bend Ranger Districts. Many of the 1st and 2nd order channels in the south portion of this AZ are tributaries that feed into the N.F. Tolt River which is in a North Bend District AZ. In the middle portion of the AZ, Lake Cavanaugh drains both north to the S.F. Skykomish River and south to the N.F. Tolt River. In this AZ, only a resident trout fishery exists. The following description of the in-channel conditions apply to all channels in the AZ especially Proctor, Deer, and the N.F.Tolt. These channels contain populations of resident cutthroat and rainbow trout. In addition, the lower 1 mile channel sections of Proctor, and Deer Creek areas outside the NF boundary, contain anadromous fish habitat. Coho and pink salmon utilize these channel sections for spawning and rearing. Presently these channels (outside the AZ) contain only fair quality habitat for these salmon species. Bedload and sediment deposition, transported from upslope areas (inside the AZ) has displaced or degraded rearing and spawning habitat. The in-channel conditions of Proctor, Deer and the N.F. Tolt presently are in fair to good condition The 1st and 2nd order channels have only a fair ability to control the heavy bedload transport and deposition process that occurs in the downstream 3rd and 4th order channels. These 3rd and 4th order channels have fair stability, but only a small number of adequate size pools exist. With the future recruitment of LWD from the adjacent riparian stands, the number of high quality pools should increase. Based on the present in-channel conditions, the ID team rated this AZ in an acceptable condition.

The large areas of railroad logging in the watershed have made full hydrologic recovery. These stands are now second growth timber. On private lands they are being placed under intensive management. The DNR lands are being commercially thinned. On private lands these stands are being clearcut. This is expected to continue for the next few years until these stands have been all regenerated. The thinned stands will be regenerated in the next decade.

The ID team concluded that the maximum acreage that could be harvested and still maintain the current acceptable in-channel conditions is about 300 acres per decade. This amounts to about 14% of the tentatively suitable. No recent cutting records are available. This acreage is about what was cut in the last decade and this rate has maintained the AZ in an acceptable condition. With implementation of BMPs and the restrictions of TFW on private lands, the 300 acres should be an acceptable rate of harvest.

In the second decade the impacts of the present high level of private cutting will begin. The level of maximum acreage of NF lands should be reduced to about 200 acres to reduce the potential impact on the watershed. This should hold for the third decade and then increase in the fourth decade to 300 acres (same as decade 1). This is dependant upon the recovery of the private lands that are being cutover.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 300 ACRES
2: 200 ACRES
3: 200 ACRES
4: 300 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

South Fork Skykomish River - AZ 65
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This AZ has 3 main subwatershed areas that were analyzed for their in-channel conditions. Maloney and Money Creeks each have less than 1 mile of anadromous fish habitat. In this lower mile section, both creeks have spawning and rearing habitat for coho and pink salmon as well as for steelhead trout. The present habitat conditions in these channel areas are in fair to good shape. In-channel stability is fair, a fair number of high quality pools exists, and moderate amounts of LWD exist to contribute to pool formation in these channels. The S.F.Skykomish River channel contains moderate amounts of spawning and rearing habitat for coho, pink, and chum salmon. This habitat is in relatively good shape. In the upper sections of the Maloney and Money Creek channels, resident trout habitat exist. On Money Creek, little or no resident fish have been found in recent years. This is probably due to leaching from nearby mine tailings of toxic heavy metals (copper sulfate, arsenic, etc). Other smaller streams in the AZ (Index,Anderson Creeks) probably contain small isolated, self-sustaining populations of resident trout. Habitat conditions are probably capable of supporting these populations. Because of these current in-channel conditions throughout the AZ, the ID team rated the AZ in an acceptable condition.

Maloney Creek has three different situations. The west side of the upper 2/3 of the drainage has no history of timber harvesting. The land allocation is Dispersed Recreation. Therefore, there will be no timber management in the area. The east side of the upper drainage is in the General Forest Allocation. This area has had numerous entries for harvesting over the last two decades. The older cutting areas have nearly reached hydrologic recovery. The lower part of the drainage was clearcut in the early 30's and has revegetated with dense stands of conifers or hardwoods. This part of the drainage has completed its hydrologic recover. The ID team determined that the upper part of the drainage is the restrictive part of the drainage. The maximum level of harvest is low and is estimated at about 60 acres. This may be increased to about 100 acres if cutting is in the lower drainage.

The lands suitable for timber harvest in Money Creek are along the stream bottom and the lower slopes of the drainage. The land allocation is Scenic Forest for this timber. About 600 acres has been cutover in the last 4 decades in this watershed. Because of the natural instability of the stream and because of the location of the timber, the rate of cutting should not be significantly increased. The estimated maximum is 175 acres per decade on the long term basis. The restrictions that the partial retention objective poses makes this maximum practically unattainable.

The main south fork of the Skykomish in this AZ has about 2,000 acres of timber that is suitable and available for management. The lower parts were logged in the 30's and 40's. These areas have fully reached hydrologic recovery. The second growth timber is nearing or has reached culmination of mean annual increment and should be placed under management. This area is in the Scenic Corridor along US 2 and is subject to restrictions to meet the Retention and Partial Retention Objectives.

The background areas are allocated to General Forest and to Dispersed Recreation. The tentatively suitable NF land in the General Forest Allocation is about 2,000 acres. Only a minor amount of cutting has occurred in this area in recent decades. The impacts on hydrologic issues are none to insignificant. Private lands on the upper slopes have been clearcut within the last two decades. The ID team estimated that 200 acres/decade of clearcutting would be the maximum harvest that could be obtained without serious impacts on the hydrologic aspects of the areas.

The area from the north side of Money Creek north through the Lake serene and Anderson Creek drainage is allocated to the Mt Index Scenic Area. The Visual Quality Management is Preservation. No timber harvest is foreseen in this special area.

The total for the AZ is a maximum of 430 acres/decade (4% of tentatively suitable) that could be cut through a regeneration system such as clearcutting. The second growth stands along the bottoms may be managed through commercial thinnings to obtain the Retention and Partial Retention Objectives. The maximum acres cutover then would be significantly increased. The exact amount would be dependant upon many factors and would have to be evaluated on an individual project basis.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: _430 ACRES
2: _430 ACRES
3: _430 ACRES
4: _430 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Tye and Beckler Rivers - AZ 67
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The main watershed in this AZ is the Tye River. It also includes in their entirety the Tunnel, Sawyer, Carroll, Alpine, Anthracite, Bolt Creek subwatersheds. The lower reaches of the Beckler River, Foss River,and Deception Creek drainages are also included. The South Fork Skykomish from its junction with the Tye River to its junction with Beckler River is also included.

Anadromous fish utilize the SF Skykomish River up to Alpine Falls. Chinook, coho, and pink Salmon along with sea-run trout (steelhead and cutthroat) spawn and rear in the main-stem and the side channels. The present habitat conditions in this portion of the SF Skykomish River channel are capable of supporting these populations. Above Alpine Falls, the river becomes the Tye River and only supports a resident fish population for rainbow, cutthroaty and eastern brook trout. These trout populations exist in smaller numbers in the major tributaries to the Tye River. The habitat conditions in these tributaries are probably only in a fair condition given the amount of natural instability, and the amount of timber harvesting (past and present) on the private lands. The habitat conditions of NF lands are also only in fair condition. Future timber harvesting in the AZ will need to maintain or improve these habitat conditions. At this time the ID team determined this AZ to be in an acceptable condition.

The lower slopes along the main SF Skykomish and Tye Rivers were railroad logged in the 1910 -1930 period. Large areas on the adjoining slopes were also burned during this period. These areas have revegetated with conifer or hardwood stands. The hydrologic recovery is completed. These areas have hydrologically recovered.

Most of these lower lands are in private ownership, and second growth timber harvesting has begun. These private lands are either holdings within the AZ or on the AZ boundary. The recent harvesting started in the 50's and a large acreage was harvested in the 60' and 70's. 1306 acres were harvested in the 1960's and about 1194 acres were cut in the 70's. Presently, the areas harvested in the 1950's and 1960's have hydrologically recovered. Harvest areas from the 1970's are near almost full recovery.

About 3600 acres have been harvested on NF lands over the past 4 decades, or an average of 900 acres/decade. The Alpine and Carroll Creek Watersheds have been heavily cut. Alpine Creek has naturally unstable soils along its riparian area and lower slopes. Cutting has not been done in these unstable areas. Therefore, not much in-channel impacts have been noted on this stream or downstream in the Tye River channel.

Carroll Creek has had the heaviest harvesting,but most of the riparian areas have been left uncut. This is a steep gradient stream and the channel transports sediment quickly downstream. Sediment deposition downstream to the Tye River has not caused much impact, but any additional sediment deposition could lead to unacceptable levels of channel damage. This stream is in a delicate balance at the present time.

The remaining sub-watersheds in this AZ are in good condition. The potential harvesting of large tracts on private lands on the lower border of the AZ or adjacent to the AZ creates a potential for impacts to these sub-watersheds.

The ID team concluded that the AZ should be able to withstand a 1500 acres/decade. However, because of the potential impacts on several small watersheds and the forthcoming private land harvesting, this rate should be reduced until the recent and new cutover lands have recovered. Based on a past average harvest rate of 900 acres/decade, the ID concluded that during the 1st decade while hydrologic recovery is underway in the AZ, the harvest rate should be about 75% of the past harvest rate, or about 700 acres/ decade. the ID Team then determined that in the second decade, the rate could be increased to 1000 acres. This level could be held for another decade to compensate for the recovery of the large parcels of private lands that will be harvested. This 1000 acres is 10% of the tentatively suitable NF lands. In the following decade the maximum level of 1500 acres could be obtainable without impacting the watershed values. This represents 14% of the tentatively suitable NF lands.

The Alpine Lakes Land Management Plan provides allocation of land to all of this AZ. The Scenic Corridor along US Highway 2 follows the center of the AZ along the SF Skykomish River and The Tye River. This allocation requires the Visual Resource Management Objective of Retention be met for all the foreground area VRM Objective for middle ground area as Partial Retention. These allocations restrict the methods of cutting, sized of units and indirectly the amount of area that can be cut at one time. This has the overall effect of reducing the impacts on the watershed

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: _ 700 ACRES
2: 1,000 ACRES
3: 1,000 ACRES
4: 1,500 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Foss River - AZ 68

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

The AZ encompasses the entire Foss River watershed, a major tributary to the SF Skykomish River About 7 miles of the mainstem serves as habitat for chinook, pink and coho salmon a well as for sea-run trout (steelhead, cutthroat, and

Dolly Varden). The river contains significant areas of high quality spawning gravels and has many high quality rearing pools formed by LWD and boulders. Overall, the habitat conditions are capable of supporting the existing anadromous fish utilization. In addition, this section of the Foss River as well as in the upper, steeper gradient sections of the West and East Forks contain moderate populations of resident trout. The habitat in these channels also is in good condition. Overall the in-channel conditions in the Foss River *are presently in good shape. Because of this, the ID team rated this AZ in an* acceptable condition.

Timber harvest and associated activities that have occurred in recent decades within this AZ have not resulted in an observable deterioration in the condition of the watershed. Very few landslides have occurred and those that have are the result of sidecast construction and/or inadequate culvert side.

Harvest rates within this AZ have averaged about 350 acres/decade during the last 4 decades. This 350 acres represents 5% of the total AZ acreage. Decade harvest rates during the 4 decade period have ranged from 245 acres in the 70's to 553 acres in the 60's.

Considering the existing watershed condition and its apparent ability to absorb *the level of activity that has occurred during previous decades, the ID team* concluded that a harvest level of 500 acres could be sustained in future decades without deteriorating the watershed condition. No harvest is expected on other ownerships for several decades due to the lack of mature timber. This rate of harvest represents a 43% increase over the historic level. The 500 acre/decade harvest rate also represents 10% of the remaining tentatively suitable lands.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE _ _UNACCEPTABLE
MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: _500 ACRES
2: _500 ACRES
3: _500 ACRES
4: _500 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Miller River - AZ 69

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This AZ includes the entire Miller River watershed outside of wilderness. Six miles of the mainstem and almost 1 1/2 miles of the West Fork Miller contain spawning and rearing habitat for spring chinook, coho, and pink salmon. In addition, these channel sections are also habitat for steelhead trout and Dolly

Varden. The upper Miller River also contains habitat for resident trout populations. The majority of the resident and anadromous fish habitat is in good condition. The habitat is capable of supporting the existing salmon and trout populations.

In-channel and bank stability is fair to good, the number and quality of the pools is good, and the amount of LWD in the channel is fair. An exception to these good in-channel conditions, is the lower mile of the Miller River Channel. This section is experiencing substantial bedload deposition, causing pools to fill in and become unusable to salmon or trout. LWD is also either buried under this sediment or has been washed downstream. Overall, the Miller system is in good shape, and the ID team determined it to be in an acceptable condition.

Timber harvest activity within this AZ has averaged 214 acres per decade for the past 6 decades. Decade harvest has ranged from a high of 543 acres in the 30's to a low of 46 acres in the 80's. With the exception of the lower mile of the Miller in which deposition is filling some pools, relatively stable conditions exist within the drainage as a result of this harvest level. The remaining tentatively suitable acres are expected to have a greater impact on the watershed than previous harvest. This is because the remaining acres are located in steeper, less stable topography.

The ID team considered this AZ to be in an acceptable condition, and considered the historical average harvest rate as a reasonable rate to continue. The team recommends 200 acres of harvest per decade which represents 6% of the tentatively suitable land.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 200 ACRES
2: 200 ACRES
3: 200 ACRES
4: 200 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Tolt River - AZ 70

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This cumulative effects analysis has determined that a separate acceptance ratings, one for the South Tolt, and one for the North Fork, was essential to determine the future harvest prescription for the AZ. The logic for this decision was based on past forest management activities in the South Fork

drainage, while the entire North Fork system within the AZ remained unroaded and uncut.

A harvest rate of 452 acres/decade (NF and private) for 2 decades resulted in an unacceptable watershed condition for the South Fork Tolt. Excessive harvesting along the main channel and associated upstream tributaries led to an observed reduction in the quantity and quality of fish habitat. Declining amounts of LWD with inadequate recruitment, lack of riparian cover, channel scouring, and evidence of excessive peak flows were the observed conditions in this analysis. The present channel configurations suggests that fisheries habitat is continuing to deteriorate. Because of these attributes, the South Fork Tolt was rated unacceptable.

The North Fork was rated acceptable. No management activities have occurred within the North Fork Drainage. Fish habitat is fair to good according to onsite observations from district personnel. Pools are of moderate depth and adequate amounts of LWD exist along the North Fork Tolt channel. This LWD is stable and the adjacent riparian stands represent a good potential for future recruitment.

When considering the summation of the conditions throughout the AZ, the ID team concluded that the overall rating was marginally acceptable.

Based on the findings of this assessment, the harvest of 250 acres per decade (11% of tentatively suitable) could be harvested without experiencing unacceptable impacts to North Fork. This is assumed that BMP's will be implemented, particularly retention of riparian areas and minimal road construction. In addition, this rate of harvest will allow for recovery in the South Fork.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 250 acres
2: 250 acres
3: 250 acres
4: 250 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

North Fork Snoqualmie River - AZ 71

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This AZ comprises the upper watershed area of the North Fork Snoqualmie River and a major tributary, Lennox Creek. As with river systems in the Snoqualmie

River basin within the NF boundary, this AZ only supports populations of resident trout. These populations include rainbow, cutthroat, and eastern brook trout. Not much is known about the status of these populations but it is suspected that the current habitat conditions support these trout populations.

Overall the stream channels do not provide high quality fish habitat due to the frequency of high flows and steep channel gradients. Past management practices have not affected the stream characteristics nor has fish habitat decreased as a result of past activities. Because of the above conditions the ID team rated this AZ as acceptable.

Harvest rates over the past 4 decades has ranged from 412 to 1000 acres/decade. No significant hydrologic in-channel impacts were observed after examination of the aerial photos and using District knowledge about these channels. But because of the history of flash flows and peak runoff in this AZ and with on-going hydrologic recovery, the ID team determined that 70% of the maximum historic harvest rate could be harvested in this AZ without altering the current acceptable in-channel conditions. In addition, roughly 2900 acres have been identified in the timber sale planning process as being feasible for helicopter logging. In conclusion the ID team determined that 700 acres/decade would be the MR (This is 14% of the tentatively suitable area).

700 acres/decade of harvest is acceptable, based on past management activities. No significant hydrologic impacts occurred as a result of the 595 acres which were harvested in the 1960's. The extremely flashy flows that are characteristic of this drainage could be increased to an unacceptable rate which would create flooding and unstable channel conditions. 700 acres/decade is believed to be the maximum rate that can be harvested before flows are altered to this unacceptable degree.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ **ACCEPTABLE** ___ **UNACCEPTABLE**

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 700 acres
2: 700 acres
3: 700 acres
4: 700 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Taylor River - AZ 72
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This small AZ includes the 3rd and 4th order channels of the Taylor River and Quartz Creek. These stream systems support resident trout populations of rainbow and cutthroat. Habitat conditions in both systems probably are capable of supporting the existing populations. In-channel stability is fair, the quantity and quality of pools is moderate and the presence and stability of LWD is fair to good, especially in the upper reaches of these two systems. Based on these in-channel conditions, the ID team determined the watershed conditions in this AZ to be acceptable.

Management activities, beginning in the 1940's and continuing intermittently into the 1970's has resulted in 2700 acres of the total acreage within the AZ being harvested. Approximately 2000 acres were harvested during the 1940's for which associated effects are hard to detect at the present time.

A comprehensive comparison of aerial photos taken in 1970, 79, and 84, and comments gathered from district personnel with onsite observations of the AZ, suggests that the effects of road building, falling and yarding timber produced minimal changes to local and downstream conditions. Examination of the entire length of the Taylor River and Quartz Creek failed to show significant differences in channel patterns from upslope disturbances between a 14 year span observed from aerial photos. Two district personnel corroborate this assessment, in part, by commenting on the presence of quality pool habitat on the upper reaches of both channels.

It should be noted that regeneration problems have been experienced in at least two upslope units north of Quartz Creek. Hydrologic response (peak discharge) could be influenced if substantial additional acreage experiences revegetation difficulties after harvest.

Due to the lack of management activity during the past 15 years in Quartz Creek and 50 years in Taylor Creek, direct cause/effect watershed relationships are not available for this AZ. Until these relationships can be established, through monitoring of future activities, observed cause/effect relationships in adjacent drainages which have similar geologic and watershed characteristics have been used to assist in establishing an acceptable maximum rate of harvest for AZ 72.

The maximum decade harvest rate which was established for AZ 70 and AZ 71 represented 3.4% and 7.4% of the total AZ acreages respectively. The consideration of the existing conditions within AZ 72 in conjunction with the cause and effect relationships observed within adjacent drainages (AZ 70 & 71) led the ID team to conclude that a harvest level of 520 acres per decade would be a reasonable maximum harvest rate for this area.

Alpine Lakes Management Plans dispersed recreation category will concentrate future harvest into the Quartz Creek drainage area which contains approximately 3200 acres of the total AZ acreage. Harvest of the entire 520 acres/decade in Quartz Creek would increase stream discharge, soil erosion, bedload deposition,

and eventually decrease existing rearing habitat in the lower reaches of Quartz Creek. In order to avoid the anticipated effects of this level of concentrated harvest, the ID team concluded that a maximum harvest level of 250 acres should be established for AZ 72. Future monitoring of management activities and associated watershed response will provide the information necessary to adjust the harvest levels in future decades.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 250 acres
2: 250 acres
3: 250 acres
4: 250 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Middle Fork Snoqualmie River - AZ 73

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This small AZ encompasses a portion of the Middle Fork Snoqualmie River. This river supports low to moderate levels of resident trout populations (rainbow and cutthroat). Present habitat conditions to support these populations are fair. As the AZ further recovers, the in-channel conditions will also improve and habitat quality and quantity should increase. Presently what pools exist in the Middle Fork are moderate in quality. Quantity of such pools is lacking. Presence of LWD is lacking, but the recruitment from the adjacent riparian areas is good. Overall the ID team rated this AZ as in an acceptable condition, especially in light of the on-going hydrologic recovery.

Approximately 1750 acres of the AZ was harvested in the 1930's and 40's. These harvested areas have revegetated and are providing stable conditions within the AZ. Subsequent harvest in the 1970's and 80's has been negligible (approximately 400 acres). While these acres are not hydrologically recovered, their impact on the AZ as a whole is minimal due to the location of harvest in relation to the tributary and main stream channels within the AZ.

Unstable soils are minimal within the AZ, although extensive areas of clay textured soils exist throughout the valley bottom. This results in some turbidity reaching the Middle Fork.

350 acres of harvest per decade within this AZ has been determined to be an acceptable rate. This conclusion is based on the following observations:

Watershed conditions were not substantially impacted by harvesting 330 acres in the 1970's.

Landforms similar to that which was harvested in the 70's and 80's is available for the first decade at a harvest rate of 350 acres/decade.

2600 acres of helicopter logging would lessen ground disturbance from reduced road construction.

Harvest levels in the 2nd and future decades may be influence by inventories that are currently being conducted in order to update suitability information for several areas in this AZ.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 350 acres
2: 350 acres
3: 350 acres
4: 350 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Upper Reach, M.F. Snoqualmie River - AZ 74
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This AZ includes most of the Middle Fork of the Snoqualmie River. The State of Washington has designated the Middle Fork as quality water for management of resident fish populations. These resident trout populations include cutthroat, rainbow, and smaller populations of eastern brook trout. Fair to moderate fishing pressure presently exists on this special catch-and-release sport fishery. The habitat in the Middle Fork channel presently is capable of supporting fair to moderate numbers of cutthroat and rainbow trout. The channel is relatively stable. Overall pool quality and the quantity is good and there is moderate, stable amounts of LWD in the channel. Because of these attributes, the ID team concluded that the AZ is in an acceptable condition.

The majority of timber harvest (2000 acres) occurred in this AZ in the 1930's and 1940's. Harvest areas and stream channels associated with those harvested areas have fully recovered hydrologically. 255 acres of timber harvest occurred on private lands in the 1970's. This acreage is not fully reforested and minor accelerated discharge and associated scouring has occurred.

The Middle Fork Snoqualmie River transports large quantities of sediment and bedload Transport occurs primarily during peak flow events. Peak flows are

very flashy events (rapid discharge response to storm events) due to extensive areas of rock outcrops and ice fields.

Due to the lack of recent management activity within the area, direct cause/effect watershed relationships are not available. Until these relationships can be established, through monitoring of future activities, observed cause/effect relationships in adjacent drainages which have similar geologic and watershed characteristics have been used to assist in establishing an acceptable maximum rate of harvest for AZ 74.

The maximum decade harvest rate which was established for AZ 70 and AZ 71 represented 3.4% and 7.4% of the total AZ acreages respectively. The consideration of the existing conditions within AZ 74 in conjunction with the cause and effect relationships observed within adjacent drainages (AZ 70 & 71) led the ID team to conclude that a harvest level of 800 acres per decade (11% of tentatively suitable) would be a reasonable maximum harvest rate for this area. Approximately 90% of this harvest acreage will employ helicopter yarding which will substantially reduce access roading needs and associated ground disturbance and accelerated erosion. Unit size, dispersion, and silviculture treatments are prescribed within the scenic Forest component of the ALMP was considered during the development of the MR. Future monitoring of management activities and associated watershed response will provide the information necessary to adjust the harvest levels in future decades, if necessary.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: **_XX_ACCEPTABLE** **_ _UNACCEPTABLE**

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 800 acres
2: 800 acres
3: 800 acres
4: 800 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Pratt River - AZ 75

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This AZ comprises most of the Pratt River system, which is a major tributary to the Middle Fork Snoqualmie River. The habitat within the Pratt supports fair to moderate populations of cutthroat and rainbow trout. The upper channel sections are moderately stable, but in the lower 1/4 mile reach area the channel stability is poor to fair, due to the sediment deposition and excessive channel braiding. Pool quality and quantity is moderate in the upper reaches but limiting in the lower reach area. LWD is limiting along the entire channel

length. Except for this lower 1/4 mile reach, the Pratt River Channel and the smaller 1st and 2nd channels are considered to be in an acceptable condition.

Approximately 3,500 acres of timber were harvested within this AZ by railroad logging in the 1930's and 1940's. Evidence of impacts to the Pratt River from this harvest activity is difficult to identify do to very successful vegetative recovery. Pre-harvest photo's are not available, but the main channel of the Pratt appears to be unusually wide for a stream of its size and may have experienced widening as a result of harvest.

The Alpine Lakes Management Plan has designated approximately 1,700 acres of dispersed recreation within this AZ. Dispersed recreation acreage is located along the upper slope positions in the upper half of drainage. Approximately 2,400 acres of tentatively mature acres remain in the AZ if dispersed recreation acres are considered.

Available mature acres (2,400) are located in mid-slope positions (above 2,400 feet) and it extends from the Wilderness boundary down to the confluence of the Pratt with the Middle Fork Snoqualmie River. Immature stands occupy the main channel and lower slope areas.

Maximizing harvest levels during the initial entries will result in the need for extensive road construction. Mature stands of timber are distributed in blocks and narrow bands the entire length of the drainage. In order to disperse cutting units throughout these areas, significant road construction will be required. Potential impacts of both activities need to be considered, particularly during the initial entry.

Cause/effect relationships, in regards to timber harvest and road building, for establishing the watershed MR within this AZ are not available. Considering the extent of road building that will be necessary during the first entries (preliminary planning estimates approximately 15 miles), 650 acres per decade 10% of tentatively suitable) is believed to be a maximum rate of harvest that can be tolerated within each of the first two decades and retain acceptable channel conditions.

Road construction is expected to be substantially less and helicopter logging opportunities increased in the 3rd and 4th decades. This would allow an increase of harvest acreage to 800 acres and 1,000 acres for those decades respectively while providing for maintenance of acceptable in-channel conditions. These acres represent 12 and 15% of the tentatively suitable.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _XX_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 650 acres
2: 650 acres
3: 800 acres
4: 1,000 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

South Fork Snoqualmie River - AZ 77
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This AZ comprises most of the SF Snoqualmie River system. Resident fish populations of rainbow and cutthroat trout can be found in the SF Snoqualmie is presently managed as a high quality sport fishery by the State of Washington. The present capability of the habitat in this AZ to support these fish populations is in doubt.

Channel scouring and the frequency of debris torrents in many 1st and 2nd order channels plus the amount of sediment and bedload deposition in the lower 3rd and 4th order channels (mouths of tributaries and the SF Snoqualmie) have caused fish habitat degradation in these channel areas. This sediment and bedload deposition has caused a loss of pool quality and quantity. Much of the sedimentation presently seen on the South Fork channel may be attributed to forest fires that removed vegetation and consequently exposed soil surfaces. Because of these conditions, the ID team rated the AZ as unacceptable.

Since the 1930's approximately 14,000 acres of the AZ has been harvested and/or burned. In the last 3 decades an average of 1800 acres per decade were logged. As a result of these activities the South Fork channel and the majority of its southern tributaries have been impacted.

200 acres of harvest on National Forest in conjunction with approximately 440 acres of harvest on private ownerships in considered to be the maximum harvest that the AZ could accommodate within further deterioration of channel conditions.

Based on observed watershed conditions, the ID team concluded that this AZ is currently in an unacceptable condition. The concentration of mature NF timber within drainages which have been heavily impacted during past decades reduces the options of dispersing future harvest activity for mitigation purposes. The ID team concluded that a 60% reduction in the average historic harvest levels would be necessary in order to facilitate recovery of the watershed condition. 640 acres/decade is considered to be the maximum total allowable harvest rate. Considering the anticipated harvest of about 440 acres/decade on private ownership, the ID team concluded that 200 acres/decade (2% of tentatively suitable) would be the maximum harvest level on NF lands which would permit the desired recovery.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: ___ACCEPTABLE _X_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 200 ACRES
2: 200 ACRES
3: 200 ACRES
4: 200 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Upper Reach, Green River - AZ 81
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

High road density (4.53 mi./sq.mi.) in conjunction with intense timber harvest activity over the past 20 years has adversely impacted stream channels within this AZ due to increased erosion, sediment transport, and sediment deposition in fish rearing and spawning habitat. Stream surveys conducted in 1982 indicated poor pool/riffle ratios. The surveys also reported sediment deposition along stream channels which aerial photo examination supports. Deposition of sediments and bedload along lower reaches of channels has resulted in channel changes and braiding, particularly in the Green River. Because of these in-channel conditions, the ID team concluded that this AZ to be in unacceptable condition.

Approximately 49% of this AZ has been harvested within the past 3 decades. Harvest activity has been most intense within the upper two thirds of the AZ, extending from Tacoma and Pioneer Creeks in the south to the headwaters of Sunday and Snow Creeks in the north. The upper reaches of the Green River and the Twin Camps drainage have seen the least harvest activity. Average harvest rates over the last three decades have been approximately 1,250 acres/decade on National Forest lands and 4100 acres/decade on private land (5,320 acres/decade overall).

Presently 8,447 acres of mature timber is available for harvest on Forest Service lands and approximately 6,300 acres of mature timber remains on private lands. Based on recent harvest rates and stand age, we estimate that mature timber on private lands will be harvested within the next two decades. 3,500 acres of harvest on private lands is estimated for the first decade with the remaining acreage (2,800 acres) being harvested the following decade.

In order to initiate hydrologic recovery that is considered necessary within this AZ, a lower total harvest acreage/decade will be necessary. Harvest of private lands is expected to continue for at least the first decade at or near the historic average.

A reduced rate of 500 acres/decade during the first 2 decades on National Forest rather than the 3 decade (60's, 70's, & 80's) average of 1,250 acres would help promote the hydrologic recovery in the AZ. The remaining mature

timber on private land in the AZ will probably be completely harvested by the 3rd-4th decades. As these harvested private lands begin to become reforested and the in-channel conditions within the AZ gradually change from unacceptable to acceptable (through natural hydrologic recovery plus watershed rehabilitation activities), harvest rates on NF lands could be increased in the 3rd-4th decades. The ID Team determined that 1000 acres in the 3rd decade and 1500 acres in the 4th decade could be harvested.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: __ACCEPTABLE _X_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 500 ACRES
2: 500 ACRES
3: 1,000 ACRES
4: 1,500 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Green River - AZ 82

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This AZ is one of the three that comprise the upper Green River system. The in-channel conditions for the 1st and 2nd order channels on the north side of the Green River are only poor to fair in stability, pool frequency and the presence of LWD. The channel conditions in the Green River are generally in fair condition. Sediment storage is occurring and is affecting some of the pool quality and quantity. There is moderate channel braiding existing in this section of the Green. LWD is present for lacking in sufficient quantity and stability. These overall in-channel conditions probably have the ability to support the existing cutthroat trout populations. These populations are self sustaining populations that receive little or no recreational sport fishing harvest due to the limited access into the Green River Watershed. Because of these conditions, the ID team concluded that the AZ was in an acceptable condition at the present time.

Based on aerial photo examination and field observations, the harvest of 19,000 acres on the total AZ in the last 40 years in conjunction with extensive burned acreage has contributed to increased peak flows, erosion, and sediment transport within the majority of the drainages interior to this AZ. Riparian vegetation is becoming established in some 1st, 2nd, and upper 3rd order streams which had been scoured. This indicates that recovery of degraded channels may be relatively rapid in the area.

Based on current harvest activity and the age class of stands adjacent to that activity, approximately 5,000 acres of harvest/decade is projected within the AZ on other ownerships. Harvest is also occurring immediately adjacent the Green River (just outside the AZ boundary) at an extensive rate. This rate exceeds the 4 decade average harvest of 4750 acres.

1,921 acres of mature tentatively suitable are available. These acres are concentrated in the eastern portion of the AZ. The majority is located in two small tributaries to the Green River (McCain Cr. and Friday Cr.). Very little harvest is expected on private ownerships in this immediate area due to previous harvest.

Due to the concentration of mature timber and the evidence of damage sustained in adjacent stream channels from higher rates of harvest, the ID team concluded that 300 acres/decade (5% of tentatively suitable) is considered to be a maximum harvest rate during decades 1 and 2 that this AZ could tolerate while retaining acceptable watershed conditions.

2,106 acres are currently listed as tentatively suitable poles. Most of these "pole" stands will be available for harvest within two decades. As a result the ID team concluded that 800 acres (14% of tentatively suitable) could be harvested in decades 3 and 4 while protecting watershed integrity and fisheries habitat. The additional available acreage will be dispersed along the southern portion of the AZ in areas other than McCain and Friday Creeks.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE _ _UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1 : 300 ACRES
2 : 300 ACRES
3 : 800 ACRES
4 : 800 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Green River - AZ 83
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

Stream surveys were conducted in 1982-83 in Rock Cr., Champion Cr., and Wolfe Cr. According to the surveys, steep stream gradients and other associated channel conditions are the principal factors regulating fish density and distribution in these systems. Due to these naturally occurring conditions, good fish density and distribution was only observed in Rock Creek. Few small

fish were observed in Champion Creek and no fish were observed in Wolf Creek. The past harvest levels in the last 3 decades and associated activities has not substantially reduced fish numbers in Rock Creek and it is doubtful that activities had much influence on fish numbers in the other two streams surveyed.

Observed watershed conditions suggest that natural limiting factors have determined the overall fish habitat conditions existing within the AZ. Therefore, past forest management activities have produced marginal downstream effects to the watershed and fisheries habitat. Because of the above in-channel conditions, the ID team concluded the AZ is presently in an acceptable condition.

Harvest within this AZ has increased substantially within the last two decades. Total harvest in the 70's was 4,400 acres and approximately 3,500 acres in the 80's. Harvest in the next decade on other ownerships is expected to continue at near the 1980's rate of 3300 acres and decline there after.

Within the past 3 decades, harvest has been well distributed across approximately 10 varying sized tributary drainage areas within the AZ. Harvest has generally occurred in the more stable lower reaches of these drainages. Most headwater areas (1st order streams) are National Forest and have not been harvested.

The harvest level in the last two decades has averaged approximately 4000 acres in the AZ. The cumulative effects analysis suggests that future projected harvest could continue at this rate while maintaining quality fish habitat. Improved BMP's, particularly road location, design, and reduced road density, and retention of riparian vegetation, will further reduce potential harvest related impacts.

Approximately 1000 acres (10% of tentatively suitable) of harvest on National Forest land during the first decade is considered and acceptable rate, considering the projected harvest of 3000 acres of mature timber on private ownership during the same period. Harvest on other ownership is expected to liquidate the remaining mature stands of timber in the second decade, with an expected harvest of approximately 2500 acres. This would allow an increase in harvest on National Forest lands to 1500 acres per decade.

Reduced harvest rates in the 3rd and 4th decades on private ownerships offers an opportunity for an increased rate of channel recovery for the main reach of the Green River during this period. The proposed harvest of 2500 acres in the 3rd decade and 3000 acres (30% of the tentatively suitable) in the 4th decade on National Forest would be below the previous average harvest levels for all ownerships. Maintaining lower harvest rates during this period will assist in restoring stable channel conditions to the Green River.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE ___UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 1000 ACRES
2: 1500 ACRES
3: 2500 ACRES
4: 3000 ACRES

Tentatively suitable mature: 6,545 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Greenwater - AZ 84

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS IOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINI:

The current conditions have caused a severe reduction in quantity and quality of anadromous fish habitat. Lack of adequate holding water for adult fish is common along with an associated lack of rearing pools for juvenile fish. The heavy braiding causes isolated pockets of water in low flow which trap fish and increase mortality. Spawning success is limited due to the constant scour and deposition of gravel during each storm event.

Using the four primary criteria for evaluating watershed condition, the following summarizes the in-stream conditions in the AZ. The main channel of the Greenwater has been heavily aggraded from significant upstream materials being flushed downstream. Pools are described as poor in quantity and quality. They are regularly being filled in. Whenever there is high runoff, a significant amount of bank erosion takes place throughout the watershed because of existing instability. LWD has been almost absent in the main river channel until recently. A level of stable debris is being reintroduced artificially through cooperative habitat improvement projects in the AZ.

Heavy aggradation and braiding are present in all portions of the mainstem with the worst problems existing in those sections where the riparian zone was completely harvested. Past heavy roading and harvesting on Private and NF lands have contributed to this condition along with two major floods and the subsequent cleanout. Based on these factors the ID Team concluded that the Greenwater River and associated tributaries in the AZ are in an unacceptable condition.

POTENTIAL FUTURE IMPACTS:

A recovery process is underway but this will take at least 2 decades. Natural landslide and bank erosion will continue. Road failures and sedimentation will continue but at a reduced rate. Some of the timber remaining to be harvested and the few roads remaining to build are in very steep, unstable areas and hold a greater risk.

Instream structure work will continue. Most of the available private lands have been harvested so that these impacts will be reduced over time. Several roads will be put to bed and revegetation will occur. Several slides will be proposed for rehab work.

The recommended harvest level was developed after considering past harvest rates and current stream conditions. During the 1960's, 2400 acres of the private and NF land were harvested. Considering the effect of this harvest level on the mainstem, it was apparent the even at this level of harvest there was a detrimental effect on the Greenwater River. In addition, the factors mentioned above are still affecting the stream condition. For this reason, the ID team established an MR level at approximately one-half of the 60's historic level of harvest to provide for a recovery period, including the effects of significant private land harvest. This is approximately 650 acres or 4.4% of the tentatively suitable area. This is an appropriate level to project for the first decade because of the need for recovery.

The MR level can be increased after the 1st decade based on the assumption that private harvest is basically finished for the next 30 years in the drainage and the impact will be minimum. The only impact still to be realized from private logging could be from two units harvested in 1988 along the Greenwater River and in the upper watershed of Pyramid Creek, both of which are sensitive areas. We expect that there will be a partial recovery (within the overall Greenwater system) in the 1990's that would allow for some increase in harvest beginning in the second decade, because of using improved BMPs (such as no riparian area harvest), natural recovery, and stream rehabilitation. Based on these factor the ID team concluded that the 2nd decade harvest level of 880 acres could be sustained without resource damage.

Assuming that the recovery will be complete by the end of the second decade, the ID team concluded that harvest could be increased to 1320 (Approx. 9% of tentatively suitable) for the 3rd and 4th decades

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: ___ACCEPTABLE _X_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 650 ACRES
2: 880 ACRES
3: 1320 ACRES
4: 1320 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Lower Reach, White River - AZ 85
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

A small resident population of cutthroat trout resides in the lower reaches of the 2nd order stream channels in this AZ. Downstream, outside the AZ, Slippery Creek is the water supply for a small, private "u-fish" trout pond enterprise. The in-channel stability of the 1st and 2nd order channels of Slippery and East Twin Creeks is poor. There is a low number of pools present and only a few isolated pieces of LWD exist in these channels. These channels are unstable due to sediment and bedload deposition. At present, the ID Team concludes that Slippery and East Twin Creeks are in an unacceptable watershed condition. Past heavy roading and harvesting on Private and NF lands have contributed to this condition.

POTENTIAL FUTURE IMPACTS:

A recovery process is underway but is expected to be lengthy. The natural erosional processes will continue. Road failures and sedimentation will also continue, but at a reduced rate. Timber remaining to be harvested and the few roads remaining to build are in very steep, unstable areas and hold a greater risk of impact.

Instream structure work and watershed rehabilitation will be planned, but funding is not approved at this time. Most of the available private lands have been harvested so that these impacts will be reduced over time. Private roads will continue to recover and revegetation will occur, but at a very slow rate since active rehabilitation efforts are not anticipated.

During the 1960's, 100 acres of the AZ was harvested, (all private). No observable watershed impacts were apparent at this level of harvest. In the 1970's, the harvest rate increased to approximately 1100 acres on NF and private lands. This amounts to 25% of the entire AZ. It was apparent that this level of harvest had a severe detrimental effect on in-channel conditions in the AZ. Most of this observable impact came from roading. During the 1980's, the harvest rate increased to over 1600 acres which caused additional resource damage to occur. In consideration of these factors and the unacceptable rating of the AZ, the ID team recommends a NF harvest rate of 250 acres per decade (11.6% of the tentatively suitable) for the 4 decade period as the MR. To sustain this harvest level will require strict adherence to BMP's (for streamside protection and road construction), natural recovery, and continuation of instream structure work and watershed rehabilitation until the time that the AZ has reached a fully acceptable condition.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: ___ACCEPTABLE XX_UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 250 ACRES
2: 250 ACRES
3: 250 ACRES
4: 250 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Clearwater - AZ 86

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This small AZ covers the upper half of Milky Creek. Presently, this stream supports a small population of cutthroat trout. Due to the remoteness and access to this stream system, there is very little or no sport fishing pressure. The present habitat conditions support this existing population.

A chronology of events within the watershed was analyzed using a series of aerial photos starting in 1950 through 1985. The analysis weighs the impacts of past activities such as roads, timber cutting, naturally occurring debris avalanches and earth flows, on water quality within the planning area and downstream. Unstable areas which were observable on the 1952 aerial photos were monitored for change through time. Since this drainage was entered for the initial harvest in the late 1960's, it is possible to compare pre and post harvest photos in terms of impact from roads, and clearcut units. None of the observable slides or unstable areas have changed in size since activity began in the drainage. None of the roads or clearcuts units within the drainage are actively impacting the stream at this time and no evidence of historic impact is present.

There has been obvious downcutting and scouring in the past and it continues to present. However, this seems to be significant in short sections only. Quality of pools generally seems to be good. Frequency could be improved, but pool/riffle ratios can be rated as moderate. There are some serious streambank stability problems in certain areas such as reaches of Milky Creek. However, large amounts of woody debris exist throughout the system with almost all channels having ability for recruitment. The LWD that is in place is relatively stable. For these reasons, the ID team concluded that the AZ is in an acceptable condition.

The ID team wishes to qualify this acceptable rating. The main stem of Milky Creek has been severely degraded by natural events in the past but still maintains some habitat for resident fisheries. Therefore, we have given this AZ an acceptable rating because the impact of man's activities to the watershed seem to be minimal. However, this would require the practice of stringent protection measures along the streamside zones.

Four hundred and seven acres (12.3% of the AZ) were harvested on National Forest land during the 1960's in the AZ. This historic rate of harvest did not

have any detectable long-term impacts to the watershed. Private lands outside of the Forest boundary was harvested at a 20 to 30% rate per decade which has had a significant impact on the downstream sections of Milky Cr. and the Clearwater R. The ID team concluded that by using state-of-the-art BMP's, the harvest rate of 407 acres per decade can be sustained without degrading the acceptable level of the AZ.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE ___UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 407 ACRES
2: 407 ACRES
3: 407 ACRES
4: 407 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Huckleberry Creek - AZ 90

Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This drainage has had very little impact from road building and harvest efforts. Stability in general is fairly high even on steep slopes. Areas that are still to be harvested may have higher levels of unstable soil inclusions but are still stable overall. Future impacts are anticipated to be similar to past impacts and relatively insignificant. The major impact to Huckleberry Creek was the massive cleanout effort that occurred in the late 1970's after two major floods. This activity reduced the LWD in the system to almost nil. This in turn caused an initial aggradation in certain reaches and then an armoring of the substrate. The resultant habitat was and still is low in pool quantity and quality, backwater and quiet areas for juvenile rearing and a very limited amount of quality spawning gravels.

Since this flood cleanout work in the late 1970's, natural channel recovery in addition to intensive stream rehab and fish habitat improvement work has begun to restore the former high quality anadromous and resident fish habitat.

The past harvest levels ranged from 54 acres in the 1940's to 1257 acres in the 1980's. The effects of the 1960's harvest level of 1091 acres was not judged to have negatively impacted the watershed by the ID team. We made the assumption that the 1257 acres of harvest will not have a negative impact either. Because of these reasons plus the continued application of new BMPs, and additional emphasis on channel rehabilitation and fish habitat improvement, the ID team recommended a MR of 1300 acres/decade (14% of the tentatively suitable) as the

harvest rate and still maintain the acceptable watershed condition in the AZ. This would suffice through Decade 4.

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE ___UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 1300 ACRES
2: 1300 ACRES
3: 1300 ACRES
4: 1300 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

West Fork White River - AZ 91
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS IOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINI:

The West Fork of the White River and the lower reaches of a few of the tributaries serve as current or potential habitat for chinook, coho salmon, and steelhead trout. These channel areas also support populations of resident trout (rainbow/cutthroat). The habitat conditions to support these populations are improving from the past damage done by flood events and follow-up flood cleanup work. Natural recovery combined with past and future fish habitat rehabilitation work is restoring high quality pools, installing LWD structures, and stabilizing streambanks. Based on these improving in-channel conditions, the ID team determined the AZ to be in an acceptable condition.

Most of the roads exist that will be needed in this drainage although some of the future roads may be located in more unstable locations. Impacts from past harvest activities have been low with some exceptions. Heavy harvesting of the flood plain appears to have contributed to channel widening. The active channel width has been increasing as a percentage of the total floodplain width since 1970. The harvest rates of 2061 acres in the 1960's and 2242 acres in the 1970's seemed to be at or slightly above the level at which impacts to the watershed were discernible. Some of the impacts were due to a higher rate of harvesting in sub-basins such as, Jim Creek and Dinner Creek. For these reasons, the ID team concluded that the average harvest rate for the past 4 decades would be the MR for this AZ. The average per decade harvest since 1940 has been approximately 2000 ac. per decade, (13% of the tentatively suitable).

OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ACCEPTABLE ___UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 2000 ACRES
2: 2000 ACRES
3: 2000 ACRES
4: 2000 ACRES

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Carbon and Puyallup Rivers - AZ 93
Summary Statement That Ties the Evaluation of Instream and Upslope Factors Together and Logically Leads to Watershed Constraint

SUMMARY STATEMENT THAT TIES THE EVALUATION OF INSTREAM AND UPSLOPE FACTORS TOGETHER AND LOGICALLY LEADS TO WATERSHED CONSTRAINT:

This AZ includes a portion of the Carbon River and its major tributaries of Tolmie, Evans, Chenuis, and Cayada Creeks. The AZ also includes portions of South Prairie Creek. Anadromous fish habitat is only found within the Carbon River. The remaining streams in this AZ contain only resident trout. Fair to moderate numbers of rainbow and/or cutthroat trout exist in these streams. The present habitat is capable of supporting these populations. These trout populations receive only a low amount of recreational fishing pressure. The existing in-channel conditions in these streams, except for Tolmie Creek, have set up fair habitat conditions. Overall, a fair amount of pools exist in most streams and there are moderate amounts of LWD. Bedload deposition is fairly stable in some of these systems.

South Prairie, Evans, Cayada, and Tolmie Creeks have been severely impacted in the past. A large percentage of these areas were railroad logged and have recovered at least to the point of stream bank vegetation and having the potential for LWD input. At present, only Tolmie Cr. drainage would be considered unacceptable. Within 10 years, this area should be recovered to a point where it is also considered acceptable.

Only 30+ % of the remaining area has tentatively suitable mature sawtimber. The past levels of harvest within this AZ ranges from approximately 525 acres (3%) to 3862 acres (18%) per decade including private harvest. The impacts were primarily from railroad logging although subsequent harvest in the 1960's slowed down the recovery process.

The average harvest per decade since 1960 is 1210 acres (NF and Private). Based on past harvest and the overall acceptable conditions of the AZ, the ID team concluded that 1150 acres per decade (8% of tentatively suitable) would maintain the acceptable watershed condition and allow recovery to take place in Tolmie Creek.

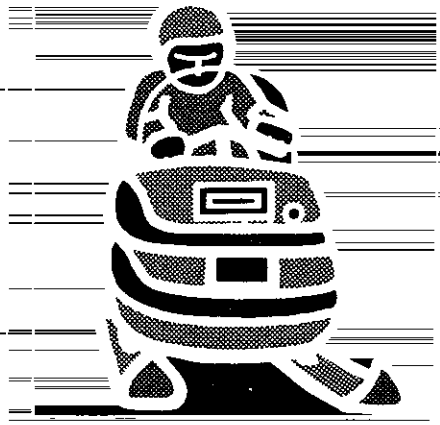
OVERALL RATING OF ALLOCATION ZONE BASED ON INSTREAM, UPSLOPE, AND ANY OTHER CONSIDERATIONS: _X_ ACCEPTABLE ___UNACCEPTABLE

MAXIMUM TENTATIVELY SUITABLE HARVEST OF NATIONAL FOREST ACRES FOR DECADES:

1: 1150 acres
2: 1150 acres
3: 1150 acres
4: 1150 acres

This expression becomes the watershed constraint to meet water quality and riparian MR's, to be considered in all alternatives in the FEIS.

Appendix



APPENDIX I

BEST MANAGEMENT PRACTICES (BMP's) FOR SOIL AND WATER PROTECTION

Soil and water are protected through the use of Best Management Practices (BMP's). **Best Management Practices** are defined as:

> "methods, measures, or practices selected by an agency to meet its nonpoint source control needs. BMP's include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMP's can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters." (40 CFR 130.2, EPA Water Quality Standards Regulation).

Usually BMP's are applied as a system of practices rather than as a single practice. BMP's are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility. (EPA Interagency Nonpoint Task Force, 1985).

BMP's are basically a preventative rather than an enforcement system. BMP's are a whole management and planning system in relation to sound water quality goals, including both broad policy and site-specific prescriptions.

Best Management Practices are the primary mechanism to enable the achievement of water quality standards (Environmental Protection Agency 1987). BMP's will be selected and tailored for site-specific conditions to arrive at the project level BMP's for the protection of water quality. The process for determining appropriate BMP's and for ensuring their implementation at both the Forest Plan and Project level is described. Following is a description of the methods and procedures that will be used to control or prevent nonpoint sources of pollution from resource management activities and to ensure compliance with the·

> **Clean Water Act of 1972, as amended (1977 and 1987). Section 319 of the Clean Water Act Amendments of 1987 requires that the States determine those waters that will not meet the goals of the Act. to determine those nonpoint source activities that are contributing pollution, and to develop a process of determining BMP's to reduce such pollution to the "maximum extent practicable." This Appendix is designed to fulfill the intent of the requirements of Section 319.**
>
> **Washington Administrative Code** (Chapter 173-201 and 202). Department of Ecology (DOE). Washington's Administrative code contains water requirements for protection of various classes of surface waters.
>
> > **Memorandum of Understanding:** The Washington Department of Ecology and U.S. Department of Agriculture, Forest Service (7/79), and "Attachment A" referred to in the MOU (Implementation Plan for Water Quality Planning on National Forest Lands in the Pacific Northwest 12/78).

The EPA has certified the Washington Forest Practices Rules and Regulations as BMP's. The State of Washington compared Forest Service practices with these State practices and concluded that Forest Service practices meet or exceed State requirements. As State practices change, comparisons are made to ascertain that Forest Service practices meet or exceed these changes. Monitoring and evaluation will determine the need for changes in BMP's and/or State standards.

Forest Service management practices will meet, as a minimum, the substantive State BMP requirements, and other considerations required by the National Forest Management Act (NFMA), and other authorities, for the protection of the soil and water.

The general BMP's described herein are action initiating mechanisms which call for the development of detailed, site-specific BMP prescriptions to protect beneficial uses and meet water quality objectives. They are developed as part of the NEPA process, with interdisciplinary involvement by a team of individuals that represent several areas of professional knowledge, learning, and/or skill appropriate for the issues and concerns identified. BMP's also include such requirements as Forest Service manual direction, contract provisions, environmental documents, and Forest Plan Standards and Guidelines. Inherent in prescribing project-level management requirements is recognition of specific water quality objectives which BMP's are designed to achieve.

BMP IMPLEMENTATION PROCESS

In cooperation with the State, the primary strategy for the prevention and control of nonpoint sources is based on the implementation of BMP's determined necessary for the protection of the identified beneficial uses.

The objective is to identify the most practical means of attaining water quality objectives Water quality objectives include water quality measures that adequately reflect the needs of identified beneficial uses.

The Forest Service Nonpoint Source Management System consists of:

1. Selection and design of BMP's that are based on site-specific conditions, technical, economic and institutional feasibility, and the water quality standards of those waters potentially impacted.

2. Implementation and enforcement of BMP's.

3. *Monitoring to ensure that practices are correctly applied as designed.*

4. Monitoring to determine the effectiveness of practices in meeting design expectations and in attaining water quality standards

5. Evaluation of monitoring results and mitigation where necessary to minimize impacts from activities where BMP's do not perform as expected.

6. Adjustment of BMP design standards and application when it is found that beneficial uses are not being protected and water quality standards are not being achieved to the desired level. Evaluation of the appropriateness of water quality criteria to reasonably assure protection of beneficial uses. Consideration of recommending adjustment of water quality standards.

BMP Selection and Design - Step 1

Scoping: Potential concerns are identified, e g , water quality, as part of the NEPA process for environmental analysis. Public notices are dispersed inviting comment and participation in the process. Alternatives

are developed to address potential problems and to accomplish project objectives.

Environmental Analysis: Each alternative is evaluated for its potential effect on different resources, including water. From this analysis, a preferred alternative is identified, along with the measures (BMP's) needed to reduce risk and increase the potential for success.

Documentation: An Environmental Assessment (EA) or Environmental Impact Statement (EIS) is developed with a decision notice or Record of Decision and includes required measures (BMP's).

Water quality standards are used as objectives towards which practices are designed to protect beneficial uses

Appropriate BMP's are selected for each project by an interdisciplinary team BMP selection and design are dictated by water quality objectives, soils, topography, geology, vegetation, climate, economics, institutional constraints, etc. Environmental effects and water quality protection options are evaluated and a range of practices is considered. A final set of practices is selected that not only protect benefical uses, but meet other resource needs. These final selected practices constitute the BMP's.

The selected BMP's, an estimate of their effectiveness, and a plan for monitoring them is included in the project EA or EIS. The site-specific BMP prescriptions are normally included in project implementation plans, but may also be included in the body or appendix of a project environmental document

BMP Implementation and Enforcement - Steps 2 and 3

The site-specific BMP prescriptions are taken from plan-to-ground by appropriate contract language and a combination of project layout and resource specialists (hydrology, fisheries, soil, geology, etc.). Final adjustments to fit the BMP prescriptions to the site are made before implementing the resource activity.

When the resource activity (e.g., timber harvest or road construction) begins, timber sale administrators, engineering representatives, resource specialists, and others ensure that the BMP's are implemented according to plan. A similar implementation process is used for other resource activities (range management, mining, etc) on National Forests.

BMP implementation monitoring is done before, during, and after resource activity implementation. This monitoring answers the question: Did we do what we said we were going to do? Some examples of implementation monitoring for a streamside management unit BMP prescription may be:

1. **Before project:** Checking Stream Management Units (SMUs) along streams to see if layout meets the objectives of the BMP prescription, or if the road crossing of a stream is properly located and designed per estimates made during the environmental analysis.

2. **During project:** During timber felling, the timber sale administrator checks to see if the timber fallers understand marking prescription for timber to be felled in the SMU. The timber sale administrator also observes on-going harvest operations to see if the activity meets the objectives defined in the project plan.

3. **After project:** Measuring canopy stream shading to see if the amount specified in the BMP prescription was retained, or monitoring a beneficial use of the water to determine a change or trend in use.

Enforcement is carried out primarily through internal project reviews and contractual enforcement e.g., timber sale contract, grazing or special use permit, etc.

Contract enforcement is a more formal method used to achieve desired results Normally, each project is assigned a person as a contracting officer. For timber sales, that person is called a timber sale administrator. The project is routinely monitored to ensure that practices are being carried out in the manner and method prescribed in the contract, permit, etc. When a contractor or permittee is not in compliance, they can be held in breech with penalties (e.g., bond forfeiture) until remedies are implemented.

Often during the course of an activity, adjustments are made if it is determined that unsatisfactory results are currently resulting or may occur. This can often mean that a contract modification may be necessary (as in the case of a timber sale)

BMP Monitoring - Step 4

Once BMP's have been implemented, further monitoring may be done to evaluate their effectiveness. BMP "effectiveness monitoring" answers the question· Are BMP's effectively meeting management objectives for protection of water quality?

Water quality standards are the "yardstick" against which the effectiveness is tested. If, through objective monitoring, BMP's do not meet prescribed objectives, then information is available to modify either the BMP's for future management, or the objectives, or both.

The natural variability of water quality under unmanaged conditions is an important factor that will be considered during the monitoring and evaluation. Additionally, effectiveness monitoring will include measurement against land management objectives as well as water quality objectives.

Some examples of the types of BMP effectiveness monitoring to be conducted are:

1. Measuring stream temperatures to see if the riparian prescriptions in a watershed are maintaining water temperature.

2. Storm period surveillance monitoring of a road system to see if road rocking is effectively preventing road surface erosion.

The monitoring and evaluation section of the Forest Plan, (Chapter 5), provides that monitoring of BMP's will be accomplished on an appropriate sample basis. Once a specific project is designed, a site-specific monitoring plan may be developed.

Results of monitoring should be shared with State and local agencies as well as available to the public. Monitoring design, sampling, and laboratory analyses will be coordinated.

BMP Evaluation and Adjustment - Step 5 and 6

The technical evaluation/monitoring described above will determine how effectively BMP's protect and/or improve water quality. If the evaluation indicates that water quality objectives are not being met and/or beneficial uses do not appear to be receiving adequate protection, corrective action will consider the following three components:

1. **The BMP:** Is it technically sound? Is it really best, or is there a better practice which is technically sound and feasible to implement?

2. **The implementation program or processes:** Was the BMP applied entirely as designed? Was it only partially implemented? Were personnel, equipment, funds, or training lacking which resulted in inadequate or incomplete implementation?

3. **The water quality standards:** The water quality standards are established to protect the beneficial uses of water. They include numeric and narrative criteria that, when exceeded, are assumed to indicate detrimental impacts on beneficial uses. They are intended to provide a benchmark for evaluating harm to beneficial uses.

Assessing the applicability of the standards is a responsibility of the State. The Forest Service will provide information to the State to address the following types of questions.

Do the standards describe the conditions necessary for protecting beneficial uses?

Are standards higher or lower than that necessary for protecting beneficial uses?

Do the standards reflect the natural variability occurring within the natural and human-affected ecosystem?

Do the parameters and criteria that constitute water quality standards adequately reflect (are they sensitive enough) human-induced changes to water quality and beneficial uses?

"Validation" monitoring may be needed to make this assessment. The purpose of validation monitoring is to answer the question whether standards, coefficients, requirements, and guidelines are appropriate to meet objectives, e.g., protect beneficial uses.

Examples: (1) Did the change in water temperature impact the fish population?

(2) Did the soil compaction effect tree growth?

Validation Monitoring will need to be closely coordinated with or, in some cases, conducted by research. It may require the establishment of permanent plots or administrative studies. This kind of monitoring will be very limited and will require coordination to select projects with broad application and to prevent duplication. Only those coefficients and standards that are not reasonably validated by existing research or documentation should be candidates for this monitoring.

Corrective action may be initiated once the reason for failing to achieve the management objectives is determined. The management practice may have to be changed, the water quality objectives modified, or both.

Training

National Forest personnel involved with project location, design, layout, administration, and maintenance activities will receive BMP training. The training will consist of BMP awareness, as well as on the more technical aspects such as planning, implementation, monitoring, and evaluation.

General Best Management Practices and Examples

Individual, general Best Management Practices are described in General Water Quality Best Management Practices, Pacific Northwest Region, 11/88 This provides guidance, but is not a direction document. Also included in this document is a description of the process, and limitations and use of these BMP's. Each BMP listed includes the Title, Objectives, Explanation, Implementation and Responsibility, and Monitoring. Evaluations of ability to implement and estimated effectiveness are made at the project level.

Not all of the general BMP's listed will normally apply to a given project, and there may be specific BMP's which are not represented by a general BMP in this document.

The sensitivity of the project determines whether the site-specific BMP prescriptions are included in the EA/EIS, or in the sale/project plan, or in the analysis files.

Following is an example of a general BMP, as described in this document, along with an example of a site-specific BMP which is developed at the project level.

GENERAL BMP EXAMPLE

T-5. Title: Limiting the Operating Period of Timber Sale Activities

Objective: To ensure that the Purchaser conducts operations in a timely manner, within the time period specified in the Timber Sale Contract (TSC).

Explanation: The TSC specifies a normal operating season, during which operations may be generally proceed without resource damage. Operations are permitted outside the normal operating season only when they can be conducted without damage to soil, water, and other resources. Where determined to be necessary through the environmental analysis, the TSC will limit operations to specific periods or weather conditions. Operations are not permitted to continue if damage will occur.

Implementation and Responsibility: Limited operating periods are identified and recommended during the Timber Sale Planning Process by the interdisciplinary team and followed through the life of the timber sale primarily by the Sale Administrator.

Ability to implement: Add at project level.

Effectiveness: Add at project level

Monitoring: During implementation of timber sale activities by the Sale Administrator, Forest Service Representatives (FSR), Engineers, and Watershed Specialists. Also see Forest Plan monitoring plan, Chapter V, monitoring plan item: Water Resource Monitoring

SPECIFIC MAP EXAMPLE

PT-5. Title: Limiting the Operating Period of Timber Sale Activities

Objective: To ensure that the Purchaser conducts operations in a timely manner, within the time period specified in the Timber Sale Contract (TSC).

Explanation: The Ship Mountain Timber Sale contains sensitive soils that are subject to soil compaction during tractor skidding, and a non-surfaced road that is not suitable for wet weather haul.

The normal operating season for the Forest will be enforced for the Ship Mountain Timber Sale. All operations off road FR 10 (non-surfaced) will be halted at the onset of wet weather to prevent erosion and damage to the road. Tractor skidding on units 1-5 will be restricted if soil moisture is above the level established by the soil scientist. Other operations can continue outside the normal operating season if they can be conducted without damage to soil, water, and other resources.

Implementation and Responsibility: For the Ship Mountain Timber Sale the normal operating season for the Forest will be enforced. All operations off or road FR 10 (non-surfaced) will be halted at the onset of wet weather to prevent erosion and damage to the road. Other operations can continue outside of the normal operating season if they can be conducted without damage to soil, water, and other resources. The forest watershed specialists will work with the timber sale administrators to evaluate the potential for resource damage if operating outside of the normal operating season.

Ability to implement: High.

Effectiveness: High.

Monitoring: During implementation of timber sale activities by the Sale Administrator, Forest Service Representatives (FSR), Engineers, and Watershed Specialists. Also see Forest Plan monitoring plan, Chapter V, monitoring plan item: Water Resource Monitoring

REFERENCES - APPENDIX I

USDA Forest Service, Pacific Northwest Region, General Water Quality Best Management Practices, November, 1988.

US Environmental Protection Agency. Nonpoint Source Controls and Water Quality Standards. Water Quality Standards Handbook, Chapter 2, General Program Guidance, Page 2-25, August 19, 1987.

US Environmental Protection Agency Final Report on the Federal/State/Local Nonpoint Source Task Force and Recommended National Nonpoint Source Policy. Office of Water, Washington, D C. Page 17.

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United States
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Agriculture

Forest Service

**Pacific
Northwest
Region**

June 1990

Appendix J

Final Environmental Impact Statement

Land and Resource Management Plan

Mt. Baker-Snoqualmie National Forest

APPENDIX J
Forest Service Response to Comments

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APPENDIX J
FOREST SERVICE RESPONSE TO COMMENTS

This appendix documents the efforts of the Mt Baker-Snoqualmie National Forest to involve and consult with the public during the review of its Proposed Forest Plan and Draft Environmental Impact Statement. Supplemented by Appendix A - which identifies the development of issues, concerns, and opportunities and the public involvement up to December, 1987 - this Appendix presents public participation activities since release of the draft plan. The sections of Appendix J are:

- a description of post-DEIS public participation activities;
- a summary of the analysis of public comments;
- a list of all those who commented on the draft plan and DEIS;
- the substantive comments received and the corresponding Forest Service responses;
- copies of the letters from elected officials and agencies.

SUMMARY OF PUBLIC PARTICIPATION ACTIVITIES

Availability Announcements - News Releases

The Forest began setting the stage for the release of the DEIS and Proposed Forest Plan in December, 1987 There were six separate news releases; the first (12/23/87) included notification of 11 open houses, to be held throughout the Puget Sound area. This was sent to our entire media distribution - about 300. Following the major media briefing on January 4, 1988 (see below), additional news releases were made prior to each Open House (also discussed below).

Three sets of Public Service Announcements were written, produced, and distributed to about eight radio stations prior to the open houses

Two "Forest Plan" reports, distributed to the entire mailing list (over 5,000), discussed the availability of the DEIS. Three additional announcements were mailed to 80 to 100 people.

Federal Register Notice

Published January 8, 1988 The original 90-day review period was extended to May 2, 1988 by the Regional Forester, for a total review period of 115 days.

Distribution of Documents

The complete set of documents included the Draft Environmental Impact Statement, Appendices, Proposed Land and Resource Management Plan, and Public Summary with a packet of Alternative Maps and Resource Maps. Additional packets consisting of only the 65-page Public Summary of the DEIS plus alternative and resource maps were printed. In January, 1988, an Execuyive Summary was prepared for Congressional staff and Forest Service in-service briefings A small brochure, "Forest Planning...A Blueprint for the Future" was also produced. This brochure was used as a handout at the reception offices at all Ranger Districts and the Supervisor's Office, and was also distributed to all employees.

Public Participation

Mailing List

The mailing list for Forest Planning grew from an initial 5,000+ names to 12,484 after the public review period.

Public Meetings

Eleven Open House meetings were held: February 1, 1988 in Everett, 2/3/99 in North Bend, 2/4/88 in Seattle, 2/5/88 in Olympia, 2/10 in Bellevue, 2/11 in Sedro Woolley, 2/12 in Bellingham, 2/17 in Skykomish, 2/18 in Enumclaw, 2/23 in Tacoma, and 2/26 in Darrington All were double sessions, running from 3:00 to 5:00 p.m. and from 6:00 to 9 00 p.m. Forest Service planning team members plus the District Ranger and/or Forest Supervisor, plus additional interdisciplinary team members (such as the wildlife biologist, minerals specialist, etc) were available for questions. There were large displays of the alternatives presented in the DEIS, with documents available to all attendees. The total attendance was over 1,000 people.

Employee Briefings

The Planning Team and Forest Management Team met with all employees, either at the Ranger District or Supervisor's Office during January, 1988. The Forest Management Team met for two full days to discuss the DEIS and Proposed Plan.

Media Briefings

On January 4, 1988, immediately following release of the DEIS, major news media were briefed in Seattle. On that same day, the following groups were briefed in separate meetings: local Congressional Staffs, members of the Liaison Groups (including environmental group leaders, timber industry representatives, and recreation liaison representatives), and Indian Tribal leaders.

During the month of January, one-to-one or small group briefings were held with the Seattle Post-Intelligencer, Seattle Times, Everett Herald, Skagit Valley Herald, Bellingham Herald, Tacoma News-Tribune, and the Daily Olympian.

For background information, a number of fact sheets were prepared, including "Background Facts About the Mt. Baker-Snoqualmie National Forest" and "Old Growth Timber Totals " These were distributed to the media and other key contacts.

Contacts and Presentations to Individuals, Government, and Organizations

Immediately following release of the DEIS, over 200 phone contacts were made

Congressional delegation staffers were briefed in Washington, D.C. January 11-15, 1988. Contacts were made with USDA Forest Service, Washington Office Planning and Legislative Affairs Staffs

Presentations were made to the national offices of the American Forestry Association, Society of American Foresters, and to representatives from the Wilderness Society, Sierra Club, and Natural Resource Defense Council in

Washington, D.C. at this same time. Draft documents, the Executive Summary and "Blueprint for the Future" brochures were distributed to these groups.

The Forest Supervisor and staff briefed representatives from the following State agencies in Olympia, February 5, 1988: Department of Ecology, Department of Natural Resources, the Governor's office, Department of Wildlife, Interagency Commission for Outdoor Recreation, Washington State Parks, Department of Commercial Development, and Department of Fisheries.

The Forest Supervisor and staff briefed several British Columbia (Canada) Provincial ministers and staffs in early March, 1988. Presentations were also made to faculty and campus representatives from University of British Columbia and Simon Fraser University, and to representatives from the Outdoor Recreation Council of B.C., March 1988.

During the course of mailing DEIS information, we used NW Indian Fisheries Commission contacts and mailing lists to directly distribute material for tribal groups.

Throughout 1988 and into 1989, numerous individual or small group meetings (formal and drop-in) were held. Persons briefed included foresters and scientists from the Soviet Union and Japan.

Information Distributed by Others

Flyers were printed and distributed by several organizations, including Washington Trails Association, Earth First!, Public Land Users' Society (a response form), and an 8-page news alert, sponsored by 24 organizations. Copies of these are available in the planning records.

Working Meetings, Post-Release of the DEIS

Working meetings were held with timber industry representatives regarding a series of technical issues raised in their response to the draft documents Meetings started in May, 1988 and were continued into 1989. The Regional Forester and his staff, the Forest Supervisor, Management Team members and the planning team from the MBS, and representatives from industry were involved in the efforts to resolve these timber technical issues. Refer to "Changes Between Draft and Final" in Chapter II, FEIS, FS responses to substantive comments later in this appendix, and to the planning records.

Meetings and presentations were made to Public Land Users Society, including a series of working meetings (February-March, 1989), where board members and specialists in trails, motorized recreation, timber, and wildlife worked to map management areas and identify tradeoffs. This information resulted in a mapped alternative, presented in this FEIS as Alternative I.

Another set of meetings were held with representatives of the Conservation Liaison Group, to clarify their comments to the DEIS and their suggested modifications to Alternative G, now displayed in this FEIS as Alternative G-Modified

In response to public and agency comments on wild and scenic rivers, especially the suitability and eligibility process, the Forest Management Team formed a committee, including representatives from the FS, river rafters, Washington

Public Participation

State Department of Fisheries, Washington Department of Parks and Recreation, and a retired timber industry representative. The committee redefined the eligibility criteria and then reviewed 51 potential rivers, finding 47 eligible. The group then identified the "outstandingly remarkable" values for each of the 47 rivers, and classified into wild, scenic, and recreational segments. More documentation of this work is noted in the planning records

Additional Meetings, Prior to Release of Final Documents

As the analysis for the FEIS neared completion, meetings were held with representatives of timber industry groups to explain the hydrologic cumulative effects analysis, developed as a method to meet water quality and riparian management requirements. Industry was given access to all documents related to the process and its application and feedback was requested. On this same issue, the Forest briefed various officials of the Washington State Department of Natural Resources, including Public Lands Commissioner Brian Boyle

The Forest also met with members of the scientific community and university faculty regarding our hydrologic cumulative effects analysis, in an effort to obtain their ideas on how the process used could be improved. The Center for Streamside Studies, University of Washington have shown a keen interest and generally support the concept.

In early 1990, the Forest also participated in two meetings sponsored by Pilchuck Audubon, discussing Forest Plan issues, the hydrologoic cumulative effects analysis, and Plan implementation.

A SUMMARY OF THE ANALYSIS OF PUBLIC COMMENTS RECEIVED

The Mt. Baker-Snoqualmie received a total of 11,718 inputs (letters, response forms, postcards, reports, etc.) commenting on the proposed plan and DEIS, signed by 12,827 people. This response to the draft plan came from a non-representative, self-selected sample of the public, primarily from five-county area in which the Forest lies.

All written input postmarked by May 2, 1988 was included in the in-depth analysis. The 68 responses received after that date were read and considered by the planning team, though those number are not reflected here.

This summary is taken from the 340-page "Analysis of Public Comment, Mt. Baker-Snoqualmie National Forest, January, 1989 " The larger document is available in the planning records, or as loaner copies, by request In addition, all original letters etc. are maintained in the planning files, Forest Supervisor's office in Seattle.

The Forest used a detailed content analysis process for coding and analyzing the input received. This allowed the team to report what the public said, in their words, using a systematic, objective, traceable, and retrieveable method of analyzing very large numbers of public response

The Forest team "coded" or reported what was said about all issues along with the reasons **why** the respondents felt that way; what people said about the DEIS alternatives and why; and how respondents wanted specific geographic sites (rivers, trails, areas) on the Forest managed.

The results of this analysis were very useful in moving from a draft to final plan and most of the major changes between the DEIS and FEIS are in response to public comment.

Two important points: analysis is not evaluation of public response The decision maker weighs the various comments; it is not a vote-counting process Secondly, public comment is only one factor to be considered in the final decision, along with resource capability, legal, technological, and fiscal considerations.

WHO RESPONDED	# of Inputs	% of Total
Individuals, Families	11,514	98.3 %
Federal Agencies	6	-
State Agencies	3	-
County, City, Local Agencies	4	-
Elected Officials	6	-
Indian Tribes	9	0.1
Environmental Organizations	31	0.3
Timber Industry Organizations	36	0.3
Motorized Recreation Organizations	5	-
Other Recreation Organizations	38	0.3
Chambers of Commerce, Other Groups	17	0.1
Unknown	49	0.4
TOTAL	11,718	99 8%

FORM OF RESPONSE	# Inputs	% of Total	# Signatures
Personal Letter, Postcard	3,484	29 7 %	3,989
Petition	22	0.2	562
Resolution	1	-	1
PLUS Response Form	7,831	66 8	7,883
"Mini" PLUS Form	85	0.7	85
Recreational Mining Questionnaire	43	0.4	39
Other Form Letters	252	2.2	268
TOTAL	11,718	100.0%	12,827

The emergence of the Public Land Users Society (PLUS) had a significant impact on the nature of the input received, especially compared to public involvement efforts of the past (where the majority of input was personal letters.) Nearly 67% of the input received were PLUS response forms. The PLUS form had boxes to check on over a dozen issues with space for comments after many of them

ORIGIN OF RESPONSE	# Inputs	% of Total
King County		
Seattle Metro Area	2,857	24 4%
Rest of County	976	8 3
Snohomish County		
Everett, Edmonds, Lynnwood Area	1,437	12.3
Rest of County (Darrington etc.)	1,220	10 4
Pierce County		
Tacoma Metro Area	619	5.3
Rest of County	620	5.3
Skagit County		
Mount Vernon, Burlington	234	2.0
Rest of County	368	3 1
Whatcom County		
Bellingham Area	536	4.6
Rest of County	205	1.7
Subtotal: I-5/Metro, 5-County Area	**5,683**	**48.6%**
Subtotal: Rural, 5-County Area	**3,389**	**28.8%**
Vancouver, BC	7	-
Rest of Western Washington	1,531	13.1
Eastern Washington	566	4.8
Oregon	277	2.4
Other States	163	1.4
Rest of Canada, Other Countries	4	-
Unknown	98	0.8
TOTAL	11,718	99 9%

Over 50% of the personal letters originated from the Seattle metropolitan area. PLUS response forms came primarily from from the I-5, metropolitan area (39%), the rural 5-county area (35%), and the rest of western Washington (16%).

The Alternatives

A majority of those responding had an opinion about the alternative plans for management of the Mt. Baker-Snoqualmie National Forest. Only 1,436 of the 11,718 inputs did not speak to at least one alternative.

Three alternatives generated the most comment: support for the PLUS Alternative, as outlined on the PLUS response form [and described in more detail in the PLUS organization response]; support for Alternative G [as presented in the DEIS, and also as modified by the conservation groups in a published flyer]; and opposition to Alternative H, the Forest Service preferred alternative in the DEIS. A number of people also supported Alternative C.

The PLUS response form included a box labeled "another alternative" which, although not defined, was supported by nearly 400 people. [The other alternative choices presented on the PLUS response form were the PLUS Alternative and Alternative H.] Few people commented on Alternatives NC (No Change), B (the RPA alternative), D, E, E-Departure, F, or H-Departure.

In developing a Preferred Alternative for the FEIS, the Forest Management Team was interested in why people felt the way they did - what their major concerns and desires were, rather than "counting votes." Refer to the January 1989 document.

As respondents often discussed more than one alternative, nothing can be tallied from the figures presented in the following table

OPINION ABOUT THE ALTERNATIVES

Alternative	Like, Support	Dislike	Needs Modification	2nd Choice	No Clear Opinion
NC (No Change)	12	11	0	1	6
A (No Action)	41	15	2	2	4
B (RPA)	18	11	6	0	2
C	264	8	68	14	4
D	9	15	4	3	5
E	7	8	3	0	1
E-Departure	4	6	0	0	1
F	6	11	2	0	1
G	1,711	18	120	28	7
H (Preferred)	360	1,683	31	3	19
H-Departure	2	8	1	0	2
All Alts (in DEIS)	1	33	1	0	5
All Except Alt. G	0	5	0	0	0
G-Modified	344	1	4	0	1
PLUS	6,723	24	35	1	5
PLUS-Modified	8	0	3	0	0
C-G Modified	44	0	0	0	0
Earth First!	21	0	0	0	0
Combine H & PLUS	16	0	1	0	0
"Another" Alt	382	0	2	0	1
A New Alt.	10	0	1	0	0

Summary of Analysis of Comments

The Major Issues

The heart of the analysis effort was coding and analyzing public opinion about issues and the reasons they felt that way. Comments such as "Build more roads" or "Protect the old growth" are opinions; reasons might be "for recreation" or "for wildlife habitat."

Recreation and trails generated the greatest volume of comments· over 68,000 comments. There were 15,000 comments in the general area of timber/vegetation, 14,000 on owls and wildlife; and 4,000 on old growth. The numbers for types of comments reflect, in part, the design of the PLUS response form. The "Recreation Opportunities" section of the form had boxes to check for "more" "less" or "the same amount" of various recreation activities However, even without these comments, there were over 32,000 comments on recreation and trails

Other issues generating considerable response included: roads, roadless areas, wild and scenic rivers; the Backcountry Area proposal; old growth, owl habitat, and wildlife; timber harvest level and jobs; deficit sales; log exports; and a wide variety of technical planning process comments.

Areas of Consensus

From the written comment received, two areas of general agreement stood out. first, recreation is a vitally important function of the Mt Baker-Snoqualmie National Forest. Second, we need more trails; opinion varied on who should use those trails.

Substantive Comments

An important note: the reader should review the substantive comments as well as the following list of opinions on major issues For example, cumulative effects of management activities and fisheries both appear as issues of major concern from State and Federal agencies and Indian Tribes. In addition, timber supply and technical issues have been raised as a major concern among timber industry and other respondents. The numbers reported below do not necessarily include the comments identified as substantive and responded to by the Forest Service.

A substantive comment, as defined in FSH 1909 15, is "factual information, professional opinion, or informed judgement " Every letter was screened for substantive comments prior to coding; additional comments were identified during coding/checking The substantive comments were entered, verbatim, into a separate data base - organized by issues or topics. Refer to the last section of this appendix for the substantive comments and Forest Service responses

Public Comment on the Issues

Included below are all of the comments made about issues, concerns, and other topics. The wording for each comment is that used by the respondents; if more than one way to stating an opinion was coded, it was included Refer to the January, 1989 document for selected reasons to support opinions.

GENERAL	Number of Inputs Mentioning This Opinion
Must preserve and protect the Mt Baker-Snoqualmie. Preserve forest for the sake of the earth itself. Preserve NF for non-consumptive uses. Preserve our remaining forest land.	793
Preserve and protect the scenery of the state.	118
Must change policies, natural resources are finite.	105
Stop over-development of public lands.	25
Tired of mismanagement of national forests. Forests don't need to be managed; do well on their own	98
Coordinate ecosystem mgt. between Park land and NF land. Consider the proximity of National Parks.	20
Management should be along ecosystems approach. Main focus of plan must be on ecological integrity of forest If delicate balance of forest disturbed, will set off a chain reaction that ultimately affects man. We don't own the earth!	250
Time to manage forest in a balanced way.	158
Manage forest using a balanced mix of conservation and recreation	129
Time to set an example of aggressive forest preservation for the world.	55
Moved here/live here for the scenic beauty, and the environment; don't destroy it	260
Forest vital to the state as a tourist attraction. Most important future values of this region are recreation, wildlife habitat, high water quality, and fisheries.	89
Leave land open to all of the people. Don't restrict access. Leave public lands open Let all people use the forest.	339
There is plenty of acreage set aside for the enjoyment of everyone.	18
Manage for the most benefit for the most people. Give priority to whatever uses benefit the most for the long run.	37
GENERAL - MULTIPLE USE	
Manage via the multiple use concept.	144
Make it all multiple use (timber emphasis).	26

GENERAL - MULTIPLE USE, continued	Number of Inputs Mentioning This Opinion
Save public land for multiple use; let timber companies rely on their own land.	12
FS doesn't know the meaning of multiple use-only timber harvest. Forest Service has lost sight of the true meaning of multiple use. Return to original mandate of multiple use of public lands - need to address the imbalance of budget, staff, & resources for timber/rds.	61
Nonwilderness lands should be released for multiple use	76
Nonwilderness lands should NOT be released for multiple use.	8
1984 Wilderness Act released these lands for multiple use; timber and mining companies are concerned nondevelopment will limit commodity production, have adverse effect on local communities, and lead to future wilderness.	51
Disagree with above statement.	12
Multiple use is OK but not all uses on every acre - segregate users. Not all sites are suitable for all mgt. activities; select best use for individual sites.	6
Timber harvest & recreation are of equal importance.	7
GENERAL USE	
17% of the Forest open to recreation use and full commodity production is not enough.	6,604
17% of the Forest open is enough.	723
17% *open is too much.*	29
25% open to recreation and full commodity production is (or should be) enough.	35
50% open to both is (should be) enough.	22
At least 50% should be open to both recreation and commodity production.	463
Keep 100% of the Forest open to recreation use, commodity production	50
Full commodity production destroys forests.	2
More emphasis on commodity production, less on recreation.	19
Leave 70% untouched, develop easiest 30% for access to areas of interest.	4
"VALUES"	
Values for resources other than timber are not considered Forest is more than timber.	146

"VALUES", continued	Number of Inputs Mentioning This Opinion
I understand the economy of the area depends somewhat on timber, but for most people, the value of the forest is greater if left intact.	
Recreation offsets loss of harvest.	16
Recreation value is undervalued. Recreation is a commodity too; treat it as such. Don't sacrifice recreation values to logging.	48
Roadless area values far outweigh commodity values.	7
What about fishing, why all the emphasis on timber? Fishing values have been overlooked. Commercial fishing is important to the NW economy. Fisheries should be a major ICO.	46
Don't road and log lands that are steep, expensive to road and have old growth, roadless recreation, wildlife, and Indian values just to log small areas that may be suitable.	1
Comparing tables of costs, the value of municipal water exceeds that of the timber sold.	1
RECREATION	
Recreation is an issue of concern to me (PLUS).	5,012
Focus of forest should be on recreation.	136
Consider recreation assets first, not timber More emphasis on recreation, less on commodity production.	202
Manage forest using a balanced mix of conservation & recreation	129
Recreation use is increasing greatly.	57
More dispersed recreation. Need backcountry recreation.	53
More recreation opportunities needed.	126
More motorized recreation opportunities needed. Not enough roaded recreation.	89
Enough roaded recreation already.	23
Enough recreation	14
Don't restrict recreational development. Keep roads, trails, and campgrounds open.	53
Don't need new campgrounds - maintain present ones. Angered and disgusted by the deterioration of recreation facilities Restore old campgrounds.	36

RECREATION, continued	Number of Inputs Mentioning This Opinion
More campgrounds needed. More developed recreation opportunities are needed.	159
Campsites along main roads with walk-in access only	7
Need greater areas for recreation in natural areas, primitive forest.	47
Disagree that there is enough roaded recreation lands to meet demand, but not enough land for unroaded, nonwilderness recreation.	44
Agree that there is enough roaded recreation lands to meet demand, but not enough land for unroaded, nonwilderness recreation.	26
Demand for roaded recreation will exceed capacity within 10 years.	48
Demand for roaded recreation will not exceeded capacity.	17
Willing to pay user fee to gain access to all NF lands.	37
Hikers should pay user fees, pay for use of trails.	18
Oppose a permit system for outdoor recreation	13
Favor use of permits for recreation.	9
Assess a stumpage surtax to fund recreation management.	1
Emphasize importance of education. Our kids need to see how the forest works on it's own.	42
FS should have a continuing program of public education for hiking, camping, etc.	18
Favor use of volunteers (or youths) for trails construction, fish and game projects, etc Expand the "adopt a _____" program.	66
More fishing	4,195
Less fishing.	118
Same amount of fishing.	2,321
More hunting.	3,291
Less hunting	443
Same amount of hunting.	2,652
No hunting.	6
More camping.	5,196
Less camping.	68

RECREATION, continued	Number of Inputs Mentioning This Opinion
Same amount camping.	1,525
More hiking.	4,174
Less hiking	229
Same amount hiking.	1,997
More skiing.	32
Enough ski areas. Amount of skiing available is fine.	3
More X-C skiing.	36
More trapping opportunities.	6
Favor (more) rockhounding opportunities.	66
More mountain bike opportunities.	23
Less mountain bikes/opportunities.	10
More climbing opportunities. Want climbing opportunities.	3
Recognize that winter recreation differs from summer recreation. Note that snowmobiling is different from ORV use	14
Provide and develop more opportunities for winter recreation.	30
More private recreation facilities/opportunities.	7
Discourage establishment of private resorts, organization camps.	5
Allow seaplane landings in high-elevation lakes.	1
Support signposts at trail junctions, trail mileages and registry at trailheads.	12
Support parking (at trails)	5
Preserve all existing fire lookouts	3
Maintain current opportunity levels for boating/rafting.	2
Manage campgrounds for "primitive" settings - lots of big trees.	6
Focus of Forest should be 85-90% on hiking because there are more hikers than people who use vehicles for recreation	4

Summary of Analysis of Comments

ORV's, MOTORBIKES or TRAIL BIKES, SNOWMOBILES	Number of Inputs Mentioning This Opinion
No ORV use. Ban ORV use on public land.	124
No ORV's on trails.	519
Support limiting motorized use on trails.	45
Less ORV use in general. Minimize ORV use.	758
No ORV's off paved roads.	12
Keep logging roads open after harvest for ORV use.	5
Restrict size and type of motorbikes.	3
Ban snowmobiles.	7
Segregate all users.	47
Build areas just for ORV's, away from hikers and environmentally sensitive areas.	59
Manage primitive travelways over 40" wide for 4WD.	4
Set up a few well-deliniated areas.	21
More areas for ORV's. More ORV use in general. ORV trails for 4 x 4.	3,389
Keep existing areas open to ORV's. Same amount ORV use.	1,773
Don't cut trail mileage for motorcycles.	9
More areas for motorbikes.	64
Less areas for motorbikes.	9
More snowmobile opportunities.	3,056
Less snowmobile opportunities.	485
Same snowmobile opportunities.	2,117
Draft Plan not consistent with existing snowmobile agreements.	40
Need effective controls on ORV use.	21
If ORV and 4x4 clubs want more facilities, they should bear the cost of construction and maintenance.	8
Permit snowmobile use in Mgt. Area 1B, semi-primitive nonmotorized.	6

ORV's, etc., continued	Number of Inputs Mentioning This Opinion
No ORV's in unroaded areas, RNA's, Botanical Areas.	2
No ORV's on trails leading to wilderness.	2
TRAILS	
More trails in general More areas need trail access	269
By the year 2000, restore the trail milage of the 1940's. 2000 miles of trails by the year 2000	15
More trails, not logging roads.	23
New trails should be developed and the old ones upgraded (to give access to greater number of people).	6,995
More non-wilderness trails.	17
More wilderness trails.	55
Need more low-elevation trails. High priority to the construction of lowland trails More close-in trails	38
Allow llamas on trails; their impact is minimal.	1
More trails for hikers only	80
More trails for horse use (hikers too) More horse / hiking trail access MOre horse use/ packing.	149
More multi-use trails. Don't limit trail use to only one group.	110
More trails, fewer roads.	27
High priority for maintaining present trail system. More maintenance of existing system.	117
Protect all existing trail miles/corridors.	35
No new trails, just maintain the existing system.	176
No new trails needed	735
Too many trails	1
Timber sales shouldn't obliterate trails. Detest hiking through clearcuts. Wouldn't need such a large trails program (spending taxpayer money) if if old trails weren't wiped out by logging and roads.	264

TRAILS, continued	Number of Inputs Mentioning This Opinion
More close-in, easily accessible trails for nonmotorized use only.	9
Use road money for trail building Transfer money from road building to trail development.	16
Willing to pay (like the sno-park system) for maintenance of trails and construction of new trails	8
Add to interpretive trails, to educate our young.	5
More trails in old growth.	12
Restore trails that are now roads Close roads and restore the trails that were there before.	11
No livestock on trails.	3
Less horse use on trails. Fewer trails open to horses.	3
Don't want any access to wilderness.	6
Reopen abandoned trails.	17
Build more primitive backcountry/roadless area trails.	2
ROADS, MOTORIZED ACCESS	
Build more roads. Not enough roads yet. More access Don't have too many roads	4,266
Fire roads essential	15
More motorized access should be provided to roadless areas to encourage recreation	6,324
Don't close roads, keep open.	111
Access developed through timber harvest allows more people to enjoy recreation	208
Build more roads, but no timber harvest	5
Build more roads, but use more road closures.	9
General: oppose roads.	43
Same [number of miles] roads.	14
No new roads. Already enough roads Already enough motorized access.	213

ROADS, MOTORIZED USE, continued	Number of Inputs Mentioning This Opinion
Too many roads. Fewer roads.	1,117
Must limit density of roads open to the public [to lessen impacts on wildlife.]	2
Road density of 2 5 miles/sq mile is too high; should be closer to 1 mile of road/sq. mile.	2
Greatly reduce the number of roads being built Reduce road building.	90
No new arterial or collector roads in roadless areas.	17
No motorized access to roadless areas to encourage recreation.	1,337
No new roads, just maintain the existing ones for cars and ORV's.	34
Spur road construction phased out after 15 yr. logging phase out.	2
Expansion of road system should be carefully controlled.	44
Less access to roadless areas.	9
Ban on new roads in roadless areas.	34
Put roads in the roadless areas as soon as possible: will spread out load on other roads, better for water quality	3
Roads/road construction contribute to siltation, stream degradation.	77
Existing roads need to be upgraded/maintained Reopen roads, logging roads.	59
Close/bar/remove logging roads upon completion of harvest, and revegetate the roadbed.	48
More pullouts on existing and new roads for camping, viewing, etc More loop roads with scenic opportunities, pull-outs for viewing, etc.	16
Close roads [for areas endangered by overuse - or to prevent wildlife harrassment.]	39
No new roads in riparian areas Consider closing roads in excellent riparian areas.	3
ROADLESS AREAS	
Save the roadless areas. Preserve existing roadless areas.	562
More wild areas needed. Expand roadless areas.	33

ROADLESS AREAS, continued	Number of Inputs Mentioning This Opinion
Want large contiguous blocks of roadless area.	17
Add these areas to wilderness.	11
Develop the existing roadless areas.	42
Too much roadless area now.	14
Roading backcountry areas increases pressure on wilderness, causing its deterioration.	39
Oppose any plan to reduce areas suitable for wilderness recreation to to such an extent that a permit system is needed. Don't restrict visitor access in backcountry.	32
I support the 16 roadless areas in Alternative G.	3
Don't enter any roadless area until complete study of old-growth dependent systems and future recreation demand/use is complete.	2
SPECIAL INTEREST AREAS	
More special interest areas. More special areas.	13
Protect special interest areas	23
Full acreage of all special use areas should be designated as such.	40
Protect botanically fragile areas/unique flora.	8
RESEARCH NATURAL AREAS	
All five potential RNA's should be recommended for designation	26
Full acreage of all RNA's should be designated as such	54
More RNA's.	13
RNA's are an important link to biological diversity	2
Keep present RNA's.	3
RNA's are not compatible with nonmotorized recreation	2
No timber harvest/salvage of any type in RNA; much can be gained studying natural regeneration following catastrophe.	2
WILDERNESS	
No more wilderness. No more wilderness additions. Have enough wilderness. Amount of wilderness should remain the same.	254

WILDERNESS, continued	Number of Inputs Mentioning This Opinion
Abandon wilderness areas. Repeal 1964 Wilderness Act.	7
Less wilderness. Too much wilderness	24
More wilderness. Keep more in wilderness. More sections of the National Forests should be placed in Wilderness.	88
Demand [for wilderness] will exceed capacity within 10 years.	37
Demand won't exceed capacity	18
More wilderness reduces rockhounding activities	62
More wilderness does not reduce rockhounding activities.	5
Preserve/maintain wilderness.	141
Wilderness capacity levels are way too low; let capacity expand or contract with demand	3
Dedicated Trailless areas are not needed. Dedicated trailless seems too restrictive. Zero disturbance seems unachieveable.	7
Capacity coefficients are in error. especially General Trailless.	4
Expand Dedicated Trailless. Protect/maintain Dedicated Trailless	15
Areas designated wilderness should be totally restricted from human use or entry.	3
Oppose Supplement 81. More development of wilderness for recreation (trails, roaded access, etc.)	7
Wilderness areas on the Forest are incomplete, they need low-elevation old growth forests to make them complete recreational experiences and ecological units.	10
Wilderness permit system needed	6
Allow way trails. Don't obliterate user-made trails.	8
Don't expand any of the adjacent national parks.	2
Keep wilderness group size at 12; any smaller will compromise safety Party size of 12 should be the maximum.	2
Limit visitors as a last resort - more/improved trails, advertise less-impacted areas, and employ user education instead	3

WILDERNESS, continued	Number of Inputs Mentioning This Opinion
Exclude outfitter guides/commercial use from off-trail areas. Tighten regulations on outfitter guides.	3
WILD AND SCENIC RIVERS	
Add more wild and scenic rivers in general. Too few rivers	151
Forest Service has mixed up eligibility and suitability process resulting in too few rivers eligible Suitability criteria used in making eligibility determination results in too few rivers	13
Add the wild and scenic rivers of Alt. G. Add to W & S the 47 rivers of the conservation alternative.	336
Designate all rivers with over 450 cfs. as wild and scenic.	2
Amount of land allocated to W&S rivers should remain the same.	69
No logging adjacent to wild and scenic rivers.	15
No more additions to W & S rivers - there are enough protected	23
No Wild and Scenic Rivers	2
All rivers of Alternative G should at least be studied, drop later if need be. All potential rivers should at least be studied	6
Don't break river systems up, tributary streams should be considered with the mainstream.	5
RIVERS, GENERAL	
Protect river systems	132
Reallocate more water to instream uses	1
WATER, WATERSHEDS	
Protect vital watersheds, is important, especially in times of drought	90
Timber, energy, mining development can occur and any adverse impacts to water supply/quality or fisheries can be mitigated	54
Disagree that the impacts on water from timber, mining, and energy can be mitigated.	10
Rockhounding is not detrimental to water quality.	8
Increased wildlife populations in watersheds will increase the risk to water quality	2

WATER, WATERSHEDS, continued	Number of Inputs Mentioning This Opinion
Maintain water quality above present levels.	5
Maintain current management direction of municipal watersheds.	4
Replace "other" municipal sources with subsurface systems (wells).	1
More emphasis on the value of water to the State and region	6
No new restrictions, just maintain what we're doing today.	3
Support limited recreation opportunities in watersheds.	1
SOIL, SOIL EROSION	
Increase efforts to control soil erosion.	28
Avoid roadbuilding and logging in areas with unstable soils, steep slopes	50
Roads/road construction contribute to siltation, stream degradation.	77
Harvesting depletes soil nutrients.	17
Protection of soil/topsoil and site productivity is of top importance.	3
OLD GROWTH	
Save the old growth Leave the old growth alone. Don't sacrifice the old growth. Prefer to see some old growth left in our forests	1,087
Stop all old growth logging. Save all remaining old growth Total ban on harvest of old growth	755
Need a moratorium on harvest of old growth.	62
Protect low-elevation old growth	332
No old growth harvest, harvest second growth instead. Retool mills to use second growth	81
Preserve old growth in sizeable, contiguous chunks. Manage for forests with large, high quality trees (long rotations, diversity of species)	145
Need to manage to increase the amount of old growth.	20
Continue the harvest of old growth.	44
Need to retain corridors of old growth Should be linked areas of old growth. Leave old growth areas connected to each other.	452

OLD GROWTH, continued	Number of Inputs Mentioning This Opinion
Need a valid definition of old growth. Old growth definition shouldn't be tied to tree size. Old growth needs 32" trees not 21" trees.	338
Don't change the definition of old growth'	1
Need an updated mapping of the old growth with field verification Old growth map is 10-15 years out of date.	258
Old growth inventory is flawed; less than 1/2 the acres are truly old growth. Acres of old growth are over-estimated. There is far less old growth than FS claims, FS acre figures include much that is not in old growth ecotype. Forest Service included much second growth as old growth, so public doesn't know just how little true old growth there is.	88
Less old growth harvesting will increase utilization and production of small woodlots.	5
Don't harvest old growth cedar.	4
We like 2nd growth: it provides oxygen, wildlife habitat, is pretty.	20
There is plenty of old growth in wilderness; we're not harvesting it all.	9
Need buffers around old growth stands to protect from blowdown.	4
All old growth and mature forest areas should be designated wilderness.	4
SPOTTED OWLS	
Less emphasis on owls. Less acres for owls. Don't lock up more areas for owls	68
More emphasis on owls and owl habitat. Protect spotted owl habitat. [No timber harvest in SOHA's.]	350
Same amount of emphasis on owls.	6
Enlarge SOHA's.	53
Enlarge SOHA's to at least 4,000 acres.	84
SOHA's should be at least 2200 acres in size, maybe up to 4000 acres	1
Should be 3800 acres in size	1
SOHA's should be enlarged to between 3,800-4,500 acres.	3
Enlarge SOHA's to 4,500 acres.	449

SPOTTED OWLS, continued	Number of Inputs Mentioning This Opinion
SOHA's should be larger than 4500 acres.	12
Increase number of spotted owl pairs.	12
More areas for old-growth dependent wildlife, above the MMR level; estimate 30% more needed for replacement areas (for falldown, fire loss etc.)	1
Continue studies, continue harvest until studies are conclusive. Study owls before deciding on a land allocation.	23
Current spotted owl MMR's are inadequate. SOHA's are inadequate due to location and elevation. SOHA's are misplaced.	77
Protect known SOHA's (currently occupied). Protect areas with nesting owls. Conserve trees with nesting owls.	72
Add spotted owl to the T&E list.	10
SOHA's need to be located below 4,000' but below timberline. Emphasize low-elevation SOHA's.	19
High elevation areas with no snags, downed logs, broken tops etc. and isolated areas of large trees can't qualify as habitat.	22
Designate 142 SOHA's averaging 2200 acres each.	2
SOHA's of about 220 acres, and a network of 82 SOHA's.	1
Should protect owl habitat using "managed" prescriptions rather than the dedicated area approach.	2
Be conservative in management, with current lack of knowledge, it is foolish to back any plan based on unfounded techniques like "managed old growth." Pleased to see the MBS used dedicated MMR habitats.	7
No livestock or ORV's in MA's 11 & 12.	1
WILDLIFE	
National Forest management should focus on wildlife. Manage the National Forest for all species Emphasis on wildlife protection. Maintain a high level of wildlife habitat.	330
Increase potential population levels for cavity nesters to at least 40-60%.	10
Need dedicated snags in every timber sale.	3
More emphasis on non-game species such as owls and woodpeckers.	1,190

WILDLIFE, continued	Number of Inputs Mentioning This Opinion
Less emphasis on non-game species such as owls and woodpeckers.	5,108
Same amount of emphasis on non-game species.	34
Need more game and fish enhancement projects. Work on habitat rehabilitation.	4,897
Need less game and fish enhancement projects.	647
Fish and game programs are adequate. Present wildlife programs are adequate.	27
Fish and game programs inadequate.	4
Fish and game enhancement benefits non-game species too.	2
Plan only pays lip-service to protecting/preserving grizzly habitat	9
Would like to see MMR's for grizzly, wolf, wolverine, bald eagle, fish	9
Reintroduce native species Manage to encourage recovery of all native plant and animal species to historic levels.	50
Encourage study of grizzly bear and wolf; don't preclude reintroduction.	1
Reintroduce wolves.	16
Reintroduce grizzly bear.	13
Do not reintroduce the grizzly bear.	2
Protect any areas that may be habitat for indicator species. More indicator species needed. Not enough indicator species.	16
There are no indicator species for wetland/riparian sites	11
Plenty of land's set aside to protect endangered wildlife, habitat.	13
Give more protection to T & E species. *Recover T & E populations.*	16
Timber harvest generates better game and wildlife habitat.	41
Timber harvest generates better game habitat only for a few years.	2
More management indicator species for management of wetlands, riparian areas.	3
Monitor species to ensure man's impact does not endanger their existence.	4
Don't kill bears to protect trees; Smokey will be angry!	3

WILDLIFE, continued	Number of Inputs Mentioning This Opinion
Manage wildlife for maximum biological potential.	23
Wildlife populations should be managed for maximum natural populations instead of reduced to MMR status to over-emphasize timber.	3
No trapping, predator control.	25
Trapping is an important sport but also a big income generator.	2
Deer and elk may prefer thermal cover, but research shows it is not a requirement. Extensive acres of old growth not needed to maintain viable populations for most species.	7
The pileated woodpecker is not an appropriate indicator species for old growth/mature forest dependent wildlife.	1
There is no biological justification for using owl, piliated woodpecker, marten, deer, elk, mountain goat, and primary cavity excavators for indicator species.	2
Protect winter habitat.	21
No harvest in mountain goat habitat.	2
Revegetate/improve habitat with native plants species, not exotics.	8
Use should not be restricted if an area is suspected mountain goat habitat, but no goats are present.	3
FISH, RIPARIAN HABITAT	
Increase natural salmon runs. Conserve and improve migratory fish populations.	32
More fish hatcheries.	10
No more hatchery fish!	3
Protect fisheries!	74
Potential value of in-stream fishing not recognized.	5
Impacts on sea-run trout and steelhead, which are considerable, are not addressed.	3
Nearly all salmon produced in Puget Sound are affected by water from the National Forest, not just 50%	6
Work on aquatic habitat rehabilitation.	17
More emphasis on non-degradation of habitat rather than restoration.	12

FISH, RIPARIAN HABITAT, continued	Number of Inputs Mentioning This Opinion
Rehabilitate all streams for natural anadromous fish passage.	15
Fully mitigate for wildlife and fisheries losses due to logging.	5
Phase out all logging, especially in sensitive areas (such as stream, creek drainages.)	15
In logging areas, leave a 200' buffer, or more, along trails and streams.	71
Timber, energy, mining development can occur and any adverse impacts to water supply and quality, and to fisheries, can be mitigated.	54
Protect, don't destroy riparian habitat.	82
More fish stocking.	20
Less fish stocking.	6
Existing fisheries data is too broad, out-of-date, inaccurate, doesn't tie to individual river systems. It is hard to draw conclusions from the Plan.	14
Plan does not take into account the effect of timber harvest level on fish populations.	13
More emphasis on resident fish.	3
More emphasis on wild fish.	4
There is no discussion of HOW fish habitat restoration and enhancement will be accomplished. Production is not simply a function of the amount of money spent. It is assumed that use of mitigation will offset fish habitat losses from forest activities This belief is contrary to commonly-held opinion among fisheries-management agencies. Disturbed that there is so much emphasis on artificial spawning techniques and habitat manipulation for anadromous fish - these are unproven methods.	18
No ORV's, livestock in riparian areas. Livestock has serious effects in riparian/wetlands.	1
SCENERY, VISUALS	
Give up scenery in viewsheds to protect larger old growth blocks.	11
Important to pay attention to both foreground and middleground of visually sensitive landscapes. More control must be exerted to prevent clearcutting in the view areas. Be extra-sensitive to visual quality in major travel corridors.	52
Eliminate harvest reductions based on visual classifications.	3

SCENERY, VISUALS, continued	Number of Inputs Mentioning This Opinion
Scenic viewsheds/visual corridors (2AB) seem designed to hide what's going on over the 1st ridge (a flattened moonscape).	28
Visual management only in foreground of major travel routes.	10
No created openings larger than 60 ac. without public consent, Regional Forester OK.	1
PLANTS	
Make more thorough inventory of plant communities/rare plant habitats.	19
Assess the real effects of Plan on sensitive native plant communities.	44
Develop a management and recovery plan for sensitive species.	1
More strict guidelines for commercial plant and mushroom gathering Document impacts of mushroom gathering, provide guidelines and limits before fungi become endangered.	14
Manage for undergrowth and trees. Manage for diverse plant communities (mushrooms,etc.).	29
Need more cedar. Plant cedar.	4
Preserve, don't cut/convert to conifers all significant stands of hardwoods.	1
Protect native plant species.	10
Protection of highly unique and important native plant communities and wild ecosystems of the MBS is an issue of national significance.	1
TIMBER	
More timber harvest.	153
Don't cut back on harvest levels. Harvest level has shrunk enough. Keep level as it is. Don't reduce ASQ.	207
Older forests are no longer growing; should be cut and replaced.	4
Timber harvest level is an issue of concern to me.	3,712
Realistic timber harvest levels provide and maintain jobs and recreation opportunities.	615
No declining flow on the Forest!	1

TIMBER, continued	Number of Inputs Mentioning This Opinion
NF are meant to be working forest. Resource producing lands should be utilized to the fullest. Timber is a crop, should be harvested when ripe.	75
More cedar sales needed.	4
Increase harvest in proportion to population growth. Set harvest level commensurate with anticipated demand.	12
Logging important to NW economy. Timber harvest important.	144
Keep harvest level the same; keep things as they are.	41
Concentrate on replanting. Land should be reforested.	176
Harvesting and replanting will provide for the needs of the future. Reforestation, cleaning up will provide forests for our children and their children	51
Less timber harvest. Timber is almost gone, must slow down harvesting. Current logging practices diminished.	427
No timber harvest	109
Phase out all timber harvest after 10-15 years	15
Keep logging in areas that are already developed. Limit harvest to tree farms and areas grown for harvest. Better utilization of existing harvest areas.	131
Reduce harvest by 30%.	3
Reduce harvest by 40-50%.	1
No logging on mountains, hill or ridge tops or within 1/2 mile of these areas. No logging on ridges.	23
Restrict all harvest in the high country.	18
Avoid intensive logging.	11
Intensively manage all suitable lands for timber production, maximum productivity.	1
Timber companies should not be allowed to take their land out of production for subdivisions or residential development.	17
Let the market determine the harvest level. Let demand determine timber supply.	54

TIMBER, continued	Number of Inputs Mentioning This Opinion
Demand exists and will be worse in coming years as private timber production declines. Demand for MBS timber will increase as other NF propose reductions.	6
Reduce harvest level to at least as low as 128 MMBF. Reduce ASQ to level of Alternative G: 128 MMBF.	504
Support ASQ of 140 MMBF.	3
Timber harvest at 200 MMBF	25
Timber harvest at 220 MMBF.	4,589
Timber harvest at 253 MMBF. (TSPQ)	2,273
Timber harvest at "179 MMBF, Forest Service's Alternative H, adjusted for spotted owl impacts" (PLUS)	428
Timber harvest level as in Alternative H.	2
Timber harvest below 120 MMBF.	14
Support an ASQ of 88 MMBF (Alternative C).	*14*
ASQ of 70 MMBF.	1
Gradually decrease the timber harvest (over 80 years) to 100 MMBF.	1
Oppose clearcutting when so poorly planned, causing damage to area. No clearcutting.	404
Use selective logging as much as possible Supportive selective harvest, leading to multi-species, and a multi-generation forest.	95
Favor selective logging by helicopter to reduce impacts on resources.	8
Oppose even-aged monoculture. More emphasis on planting mixed species, not exclusively Douglas fir.	36
Favor sustained yield. Harvest level should be based on sustained yield concept. Use FS idea of sustained yield - it's still good.	176
Forest should be managed on the "sustained yield" principle, unlike Forest Service's past practices of overharvesting. Industry has been greedy, could have had true sustained yield at one time with sustained industry and jobs.	60
Timber harvest more efficient in South & SE; should get timber there.	9
Limit logging adjacent to National Parks/wilderness.	2

TIMBER, continued	Number of Inputs Mentioning This Opinion
No logging adjacent to National Parks/wilderness.	47
No logging adjacent to wild and scenic rivers.	15
Need a sensible amount of timber harvest, not a radical position on either side.	34
Use timber harvest practices that are less wasteful.	37
Do more thinning.	2
Harvest level at the timber industry's last 10-year average rate.	3
Harvest as little timber as possible. Minimize timber harvest.	82
Harvest rotation must be no less than 125 years. Use longer rotations.	21
Avoid logging where upstream flooding is likely to occur.	6
Timber companies should bear the cost and responsibility for rehabilitation of logged areas: stream cleanout, erosion control, etc.	10
Areas for recreation and areas for timber should be larger and fewer rather than smaller and scattered throughout the Forest	4
Preserve lowlands, rivers, river valleys, and lakes for recreation; harvest sides and tops of surrounding hillsides.	3
Suitability of this Forest to produce timber is minimal at best. Too much non-suitable included in the "tentatively suitable" base. Plan assumes acres that have been cut are being returned to a condition suitable for future harvest - doesn't take into account poor past management.	29
More timber sale inspection to ensure compliance with environmental protection requirements and prescribed sale practices, requirements	17
Educate people on positive aspects of timber harvest; look past obvious visuals and promote positive attitudes.	9
Educate people about the environmental costs of wood products consumption.	1
MOUNTAIN HEMLOCK	
No logging in Mtn. Hemlock zone. Remove the Mtn. Hemlock zone from the suitable land base.	28
Stop the Mtn. Hemlock study.	19
Include mountain hemlock zone in the suitable land base.	14

MTN. HEMLOCK, continued	Number of Inputs Mentioning This Opinion
The environmental impacts of this study have not been analyzed under NEPA; need a full EIS.	2
Mtn. Hemlock study is a good idea.	3
RESIDUE, WOOD UTILIZATION	
Favor more effective use of wood. Recycle.	42
Encourage cellulose-bearing plants other than wood (trees) for pulp.	2
No PUM piles; leave it for soil erosion protection, wildlife. Maintain critical amounts of snags & course woody debris in clearcuts.	16
Don't limit activities outside wilderness to protect Class I airsheds; law says no buffers outside wilderness.	2
Chip logs and residue and leave it in place.	2
FIREWOOD	
More firewood cutting.	2,967
Less firewood cutting.	371
Same firewood cutting opportunities.	2,871
VEGETATION MANAGEMENT	
Oppose use of pesticides, herbicides, and other poisons.	35
See no problem with limited use of pesticides.	3
LOG EXPORTS	
Stop exporting of logs. Oppose exporting logs, adds little to the State economy. TOTAL ban on *exportation of raw lumber.*	235
Less exporting. Limit exporting of logs and lumber.	60
Exporting allows too many jobs to go overseas. Feel ill when I see logs and jobs being shipped to Japan. Mills are being shut down due to overseas shipments.	56
When logs are sold directly to other nations without first being milled and finished, it's economic suicide. Keep logs here to be processed by our mills.	109
Export fewer logs and save the large ones for home use, or leave them in the natural habitat.	13

LOG EXPORTS, continued	Number of Inputs Mentioning This Opinion
If demand for NW lumber is so great, why are we exporting logs?	25
Create tree farms with a tax on exported wood or logs.	3
Favor exporting of logs. It's one of the few exports we have left.	9
JOBS, THE ECONOMY	
Jobs are an issue of concern to me.	4,376
Emphasize creation of recreation jobs over timber jobs. Timber industry is dying out, consider recreation more important Importance of logging to economy is vastly overstated, give recreation jobs fair treatment. Recreation supports non-polluting non-destructive workforce State will be more positively affected by recreation than timber industry.	142
Recreation income exceeds timber income	34
Short-term sustenance of local timber companies and communities can't compare to long-term protection and survival of the earth.	95
Industries have come and gone, employees had to find other jobs. It isn't unique to the timber industry.	62
Balance timber jobs and recreation jobs. Logging, recreation and wilderness can all work together.	138
Consider jobs over all other values. Keep our jobs. Jobs depend on logging. Keep permanent logging jobs Jobs are most important.	152
Jobs are more important than owls.	9
Disappearing sawmill job have no relation to the timber supply; more jobs have vanished due to increased technology, mill efficiency Jobs have vanished due to lost surpluses, low demand, low cost, and overseas processing.	53
Find alternate resources for wood - technology can do it!	12
Use economics to make management decisions	14
Find other revenues for supporting schools	17
Wood should be more expensive. Old growth is valuable; price of wood should reflect this - willing to pay more for timber products	22
Create jobs by repairing/cleaning up forest environment.	12

JOBS, THE ECONOMY, continued	Number of Inputs Mentioning This Opinion
Small, local loggers and mills should get the first shot at what logging is allowed.	2
Recognize that the Forest supports a large number of non-timber industry jobs.	16
Many mills have already made the conversion to 2nd growth, are not dependent on old growth.	2
AMERICAN INDIAN RELIGIOUS AND CULTURAL USE	
It is wrong to disturb the scared sites of Native Americans	17
Complete protection for all spirit quest and legend sites, cedar areas, ceremonial flora, cemeteries. Complete protection to all remaining sites.	40
Protect all nondegraded spirit quest sites, cedar areas, flora area and cemeteries.	5
Protect all spirit quest sites.	1
Protect legendary sites.	1
Protect cedar areas.	5
Protect ceremonial flora areas.	2
Protect cemetery/archaeological sites.	1
Less emphasis on Indian cultural sites.	3
Indians allowed to over-harvest fish/game. Unfair advantage to Indians. Concerned that Indians are excluded from the law, can do anything on NF land.	37
Need to differentiate between Indian and non-Indian cultural uses and sites; SHPO doesn't always take into account Indian uses	1
Religious, Cultural Use Inventory is incomplete, out of date.	2
In suggesting 1 site is as good as another site, the FS fails to comprehend the meaning tribes attach to specific sites, can't mitigate loss by moving to another place.	2
Consider Native Americans foremost in the management of the forest; they are culturally and economically dependent upon the forest. It as theirs to begin with...	1
Protection of tribal treaty rights is law - don't lose sight of this in the concern for local citizens.	3

AMERICAN INDIAN RELIGIOUS USE, continued	Number of Inputs Mentioning This Opinion
Don't reduce amount of timber available due to Indian religious practices.	1
ARCHAEOLOGICAL AND HISTORIC RESOURCES	
Don't destroy any historic sites without full public involvement.	2
ENERGY, SMALL HYDROELECTRIC DEVELOPMENT	
No more dams.	38
Remove all dams on NF lands.	5
Oppose dams that will create only a small amount of power.	1
Need a better policy statement on hydro. project application process, and restrictions/environmental safeguards for these projects.	2
No geothermal drilling/facilities in roadless areas.	1
Carefully sited hydro, projects provide energy, recreation opportunities without adverse effects.	2
FIRE	
Pro let-burn policy. Fire is a natural part of ecosystem; leave natural fires to burn.	10
Man-made fires should be controlled.	1
More emphasis on fire protection.	6
No dangerous slash burns. No slash burning.	35
Scaling back on the amount of slash burning is OK; it's a useful tool, but don't overuse. Support reducing smoke from prescribed burning to reduce air contaminants.	5
MINERALS AND ROCKHOUNDING	
Recreational mining should be defined , used in the plan	67
Recreational mining should not be defined and used in the plan.	1
Rockhounding should be defined and used in the plan.	73
Rockhounding should not be defined and used in the plan	1
Implementation of some alternatives could make mineral access very difficult; Alt. NC and A are least restrictive, Alt. C is the most restrictive.	42

MINERALS AND ROCKHOUNDING, continued	Number of Inputs Mentioning This Opinion
I disagree that implementing some alternatives could make mineral access difficult.	10
Agree with Alpine Lakes Management Plan definition of recreational mining and rockhounding.	42
Disagree with ALPS definition of the above.	2
More prospecting opportunities	2,771
Less prospecting opportunities.	255
Same prospecting opportunities.	2,483
More mineral development.	7
No mining. No mining in wilderness/ roadless areas.	30
My rights as a miner are infringed upon.	6
Mining/prospecting is an issue of concern to me.	55
Favor (more) rockhounding opportunities.	66
More access for rockhounding (not necessarily any more for commercial mining.)	33
Include in the Plan "..Recreational mining preserves mineral *specimens from natural degradation.*"	8
Regulation of prospecting, rockhounding, and recreational mining is overly restrictive. Access is critical.	8
No further withdrawals from mineral entry (except for needed roads.)	1
Adopt stringent regulations on recreation mining.	1
LAND USES	
No permits for military use, over-flights of NF land.	9
Federal land adjacent to private development should be maintained for the good of the environment.	8
Intensify land acquisition/trading efforts for more contiguous National Forest land.	8
No land exchanges that would result in lessened quality/quantity of timber cut.	6
Retain all mineral rights in any land exchange.	6

Summary of Analysis of Comments

LAND USES, continued	Number of Inputs Mentioning This Opinion
Acquire more public timber lands.	1
Don't stop use of rock pits.	2
GRAZING	
Eliminate cows. Eliminate subsidized grazing on NF lands. Eliminate grazing.	18
Low level grazing OK if secondary to needs of native species.	1
No grazing in wilderness.	1
BUDGET, COSTS	
Forest budget needs changes; phase out timber sale planning, no more direct allocations for road building, increase budget for stream habitat rehabilitation. Budget has been predominately for lumber; this must change. While Reagan administration has cut funds for recreation and closed campgrounds, it spared funds for roads and decreased roadless areas; this must change.	69
Logging should pay costs of all roads, bridges, etc.	29
No deficit sales. Re-evaluate the role of timber production financially - nationwide, nearly half the sales lose money. Harvesting timber in a manner that doesn't cover costs is a criminal waste of resources Tired of hearing that the FS is selling timber below market costs.	132
Money for road building, timber admin. should be shunted to programs to assist affected communities with economic diversification and support schools	14
Use timber receipts to maintain existing trails and build new ones.	7
Increase trail construction/reconstruction and have logging contracts set aside money for this.	5
PLANNING PROCESS	
Why do we need a plan anyway?	4
Based on past action, I feel that regardless of what the public says, the FS will do as it damn well pleases.	6
Little publicity given; meetings not well advertised. Public unaware of impact of the plans until it's too late.	3
Method of getting public input is very limited.	8

PLANNING PROCESS, continued	Number of Inputs Mentioning This Opinion
Commend Forest Service for efforts to date. Awesome task, commend your efforts.	139
Appreciate soliciting public comments.	294
I feel poorly educated about forest management and PLUS. PLUS form is vague.	5
Not information to make a decision. I'm making a decision with very little information.	80
Not enough information on the current status of water quality.	2
Don't feel the FS should conduct polls as to best useage of the Forest.	8
Have a public referendum on the Plan - let the public decide by voting.	8
I need more time to study the plan/alternatives/ etc.	8
I don't like the FS consulting with special interest groups while drafting the plan	2
More hearings needed with loggers, timber folks represented to discuss the issues.	2
FS should work with conservation groups, Indian tribes, & fisheries folks to develop a measurable set of criteria to protect the environment while allowing some timber harvest.	4
Maps are exceptional! Readable and I like the use of color.	6
The documents are confusing, disorganized, and full of contradicting statements.	7
Range of alternatives is inadequate.	17
Range of alternatives in questionnaire is inadequate.	1
Consider alternatives suggested in "Weekly" article.	5
Serious flaws in analysis.	16
The true effects of timber harvesting/road building not disclosed.	10
Document ignores potential public health issues in watersheds.	1
Impacts of recreation in the watersheds are not discussed.	2
Include some discussion of the effects/cumulative effects on RNA's.	2
Effects of management activities on wilderness are not discussed.	1

PLANNING PROCESS, continued	Number of Inputs Mentioning This Opinion
Economic impacts aren't clearly addressed.	15
Economic costs and values are outdated, incorrectly derived.	2
Can't compare timber and recreation values because the use of "willingness to pay" reflects final value to customer.	2
Little discussion of employment/income effects/impacts on communities.	6
Plan doesn't consider impact a reduced ASQ will have on pulp/paper mills.	1
Not enough information on FORPLAN inputs & constraints.	3
Timber (and other) inventories are outdated.	10
Timber supply information inadequate; need a complete analysis.	4
There's no meaningful timber demand analysis.	2
Information Needs (Chap. 2, Plan) are top priority; make sure they're funded.	1
Should prepare an analysis based on different levels of funding.	7
Should look carefully at budgets for each alternative; I can't believe they'd decline as shown, based on the real world.	1
You have seriously underestimated the money it will take to enhance, rehabilitate, mitigate all streams on the Forest.	2
Benefits not clearly stated.	5
Do an honest cost/benefit analysis, taking into account all values, not just wood.	10
There is a lack of biological information in the documents.	3
Where is the data to back up your claims that the timber cut you say will be achieved can actually be done, with the environmental safeguards you say you will employ. Don't believe you have the data	12
Plan ignores proximity of NCNP (or National Parks in general).	7
Cooperation is mandated by law. Agency cooperation is needed to achieve wildlife/fish protection.	17
All landowners (including State) should cooperate to help timber-dependent communities.	7
City (of Seattle) looks forward to cooperating with the FS as it reevaluates its watershed management goals, including more emphasis on wildlife (old growth) habitat.	1
Cumulative effects analysis is done in generalities.	4

PLANNING PROCESS, continued	Number of Inputs Mentioning This Opinion
Plan doesn't coordinate with other landowners to examine cumulative effects of clearcutting in NW.	14
Cumulative effects on wildlife are not discussed nor is fragmentation of ecosystems.	3
Cumulative effects analysis for fish is inadequate.	7
Cumulative effects of forest activities on watersheds and water resources are NOT addressed.	10
Supplement must be issued to address Alpine Lakes Mgt. Unit, which was unfairly excluded from this study. Include some alternatives with differing management for Alpine Lakes.	11
MA prescriptions are not very specific; need at least a minimal level of specific guidance.	1
Need a more thorough, written prescription for educational concerns and enforcement of conservation practices	2
Vandalism is a problem - not mentioned in the DEIS.	3
Forest Service has mixed up Wild and Scenic River eligibility and suitability process resulting in too few rivers eligible. Suitability criteria used in making eligibility determination results in too few rivers	2
Need to evaluate supply/demand for trails occasionally.	3
Ignore/don't correct any technical flaws discovered by forestry consultants.	1
Correct technical flaws discovered by forestry consultants [to enable a sustainable volume of 220 MMBF]	20
Don't issue a FEIS until the discrepancies in timber supply base are resolved	1
Too many acres excluded from harvest consideration (excluded from the suitable land base); other valuable tree-growing property severely restricted. Plan should retain the largest possible suitable land base.	7
American Indian religious and cultural use issues not fully addressed.	6
Create a more meaningful and effective Indian consultation process.	6
Plan needs a more valid monitoring plan.	18
Plan must contain automatic revisions in land allocations to protect fish, other resources, if fish runs begin to be affected by roads/harvesting.	5

PLANNING PROCESS, continued	Number of Inputs Mentioning This Opinion
If final plan doesn't work in 5 years, it should be modified before irreversible damage occurs.	3
More MMR's for soils, watershed, recreation, wildlife.	3
Replace BMP's with MMR's for fish habitat & riparian; will provide better protection. BMP's are not adequate to protect fish habitat. Need to specifically discuss mitigation measures for fish.	5
Disagree with the MMR process; no public comment allowed, no discussion of how they should be developed.	7
MMR's should be eliminated and alternative resource protection methods developed.	4
MMR's are over-emphasized, too big; slack back if species found outside habitat. MMR's were applied in a way that far exceeds the intent of NFMA.	5
Water/riparian MMR's exceed the law.	2
Do not agree that deer and elk can maintain viability without MMR's.	2
EIS fails to reveal how MMR's affect resources such as timber.	3
Put MMR's where they won't impact the suitable land base.	2
Wildlife standards and guidelines are good - don't weaken them	1
Too much reliance on unproven/suspect mitigation measures.	19
Mitigation measure discussion for water is too general.	5
There's no worst case analysis; should do one	10
Management horizon of Plan is too short; should be managing for 50-100 yrs.	1
Question the validity of the indicator species approach to wildlife.	7
Need indicator species for larger, predatory mammals.	1
Roadless area evaluation is no better than RARE II.	2
Boundaries of MA 1AB seem to be located so as to minimize commercial forest lands, especially old growth.	2

Trails 2000

Support Trails 2000	529 Inputs
"2,000 miles of trails by the year 2000."	15 Inputs
Dislike Trails 2000	6 Inputs

In addition, the Alternative G-Modified included, as an integral part of the adjusted alternative, the Trails 2000 proposal. A total of 265 respondents supported Alt. G-Modified but did not specifically mention the Trails 2000 proposal (77 inputs did mention both)

Those 265 inputs have not been included in the above totals, although it could be assumed that they also supported Trails 2000.

Selected Reasons for Supporting Trails 2000:	**Number of Inputs**
Population of local area is exploding, recreation use is increasing.	61
Relieve overcrowding on trails.	19
I strongly support this proposal.	18
Provides interconnecting, loop trails.	10
Increases variety, quality of hiking experience.	9

Backcountry Areas

Support Backcountry Area Proposal (no sites named)	158 Inputs

Site Specific Comments (These figures are also reported in the Sites Section.)

Helen Butte	89 Inputs
Jackman Creek	87
Mt. Dickerman	97
Eagle Rock	27
Pratt River	95

In addition, Alternative G-Modified included this proposal. Respondents supporting Alt. G-Modified, but not specifically mentioning the Backcountry Areas are not included in the above figures.

Selected Reasons for Supporting Backcountry Area Proposal	**Number of Inputs**
Population of local area is exploding, recreation use is increasing. Population is increasing while recreation opportunities are decreasing.	14
Use roadless areas to relieve pressure on wilderness, National Parks.	8
I strongly support this proposal.	7

Site Specific Comments

The Forest also received comments about the management of specific, geographic sites on the MBS. The detailed analysis, by Ranger District, is available in the January, 1989 document, in the planning records.

A total of 1,977 inputs out of the 11,718 received mentioned specific geographic sites (or just under 17% of the total input.)

Form of input mentioning specific sites:		
	Personal Letters	1,804
	Petitions	9
	PLUS Response Forms	57
	"Mini" PLUS	1
	Other Form Letters	106

The majority of comments about specific sites stated that the respondent wanted the area protected from development, timber harvest, roads, etc. Very few site-specific comments favored development or timber harvesting. Protecting old-growth ecosystems, wildlife habitat, and recommendations for wild and scenic river status were also frequently mentioned.

The areas highlighted below are those mentioned most frequently:

Pratt River - 1,309
Monte Cristo - 981
Illabot Creek - 766
N.F. Nooksack River - 732
Cascade River - 700
Jackman Creek - 652
M.F. Snoqualmie River - 621
Canyon Creek (Mt. Baker RD) - 555
Rapid River - 535
Dickerman Mtn. - 529
White Chuck River - 516
Naches Pass - 506
White River - 501
Damfino Creek - 496
Taylor River - 494
Baker Lake - 471
Noisy Diobsud Roadless Area - 468
Greenwater River - 458
Foss River - 452
Cedar River - 451
Miller River - 436
Diobsud Creek - 435
Skykomish River - 420
Noisy Creek - 420
Baker River - 405
Mt Rainier Adjacent Areas - 402
Chenuis Creek - 401
Stillaguamish River - 397
S.F. Nooksack River - 394
Helen Butte - 390
S F Stillaguamish River - 379
Huckleberry Creek - 379
Higgins Mtn. - 373
M.F. Nooksack River - 371

What the Public Said About Specific Sites

In the following pages, we have highlighted some of the opinions given about management of specific, geographic sites. While this list looks huge, it is only about half of what everyone said!

The number of inputs mentioning specific sites: 1,977 (out of a total of 11,718) This is just under 17% of the total input received.

Form of input mentioned specific sites:		
	Personal Letters	1,804
	Petitions	9
	PLUS Response Forms	57
	"Mini" PLUS	1
	Other Form Letters	106

Not surprisingly, very few response forms mentioned specific sites. A number of form letters were prepared by snowmobile and horse clubs (and these groups are very interested in specific trails/sites.) The PLUS response form told folks that "A written, personal letter is the best way to comment.. " and a few did attach letters to their forms. Inputs from some of the major timber and motorized recreation organizations did give site-specific comments. But, most of the site specific comments came in letters, and from people who spoke - sometimes passionately - about their personal experiences on the trails of the Forest.

Most respondents speaking to specific sites can be characterized as environmentally-oriented, as opposed to commodity-oriented. This is typical of public response on past planning efforts. Accordingly, the most-often mentioned comments are "protect....." rather than "build a road here." The rivers and sites discussed in the flyer prepared by the coalition of environmental groups (and REI) generally got the most comment. Refer to the computer printouts for the complete list of site-specific comments.

How To Read The Numbers: After each site is the number of times it was mentioned. This is the **total** times an area was mentioned for some type of management. Thus, one person could want the Pratt River designated a wild and scenic river, a trail built there, and the area protected for its fisheries. This would be tallied as "3" in the times mentioned. HOWEVER, the majority of respondents mentioned only one "action" for each site.

While the actual numbers are a bit meaningless, they DO tell us the intensity of interest in an area. The areas highlighted below are those of most concern:

The Pratt River (mentioned 1,405 times - the highest amount of concern)

Monte Cristo - 976	Greenwater River - 458
Illabot Creek - 765	Cedar River - 452
N.F. Nooksack River - 732	Foss River - 452
Cascade River - 700	M.F. Nooksack River - 448
Jackman Creek - 651	Diobsud Creek - 435
M.F. Snoqualmie River - 621	Skykomish River - 419
Canyon Creek (Mt. Baker RD) - 556	Noisy Creek - 418
Rapid River - 535	Baker River -404
Dickerman Mtn. - 529	Chenius Creek - 401
White Chuck River - 517	Mt. Rainier Adjacent Areas - 401
Naches Pass - 505	Stillaguamish River - 396
White River - 502	S.F. Nooksack River - 394
Damfino Creek - 494	Helen Butte - 390

Summary of Analysis of Comments

Taylor River - 494
Baker Lake - 470
Noisy Diobsud Roadless Area - 467
S.F. Stillaguamish River - 379
Huckleberry Creek - 379
Higgens Mtn. - 373

List of Agencies, Organizations, and Individuals Responding to the DEIS

The number preceeding each name is the "input" number assigned to each letter, form, or report received. The original letters etc. are on file in the planning records.

Input #	Federal Agencies
427	Dept. of the Air Force, Regional Civil Engineer
10685	USDA Forest Service, Mt. Baker Ranger District
10664	U.S Environmental Protection Agency
453	USDA Forest Service, Forestry Sciences Laboratory
11934	USDI, Office of Environmental Project Review
9	USDT, Federal Highway Administration
	State, Regional, Local Agencies
258	Puget Sound Air Pollution Control Agency
10935	State of Washington, Office of the Governor
1410	Washington State Department of Transportation
10934	City of Seattle
11842	Tacoma Public Utilities
10668	Whatcom County Courthouse
	Elected Officials
10924	Tim Douglas, Mayor, City Of Bellingham
285	Rod Chandler, U.S. Congress, House of Representatives
1737	Brock Adams, U.S. Senator
11902	Mike Lowry, U.S. Congress, House of Representatives
2609	Grace Cole, State of Washington, House of Representatives
1078	Jolene Unsoeld, State of Washington, House of Representatives
11900	Lois North, Cynthia Sullivan, Audrey Gruger, King County Council
	Indian Tribes
10178	Lummi Tribal Fisheries Department
4842	Lummi Indian Business Council
10183	Lummi Indian Tribe
10700	Muckleshoot Indian Tribe
10707	Nooksack Indian Tribe
10844	Nooksack Indian Tribe
10669	Samish Indian Tribe
11806	Skagit System Cooperative
10191	Tulalip Tribes
	Other Organizations
1540	A-1 Builders
1536	Allen Logging Co
10663	Alpine Lakes Protection Society
11112	American Alpine Club
11823	American Alpine Club
3081	American Alpine Club Cascade Section
11777	American Alpine Club Cascade Section
10159	American Alpine Institute
2550	American Plywood Association
1638	American Rivers
78	Backcountry Horsemen of Washington, Whatcom Chapter
1068	Bicycle Adventures, Incorporated
2846	Blue Ribbon Coalition
542	Boulder River Protection Association

1653	Buse Timber & Sales, Incorporated
10541	Buse Timber & Sales, Incorporated
10195	Cascade Grotto National Speleological Society
11216	Cascadians
3368	Cedar River Watershed Advisory Committee
2220	Cedarville Timber & Logging, Incorporated
2840	Center for the Defense of Free Enterprise
10184	Church Council of Greater Seattle
2358	Citizens of Greenwater, Incorporated
1618	Civic Action on Redmond Environment
4789	Columbia Crest Mining Company
11193	Concerned Citizens for Western Lane County
4840	Crystal Mountain Resort
11100	Dunlap Towing Company
1988	Dyer Logging Company
10737	Economic Development Association of Skagit County, Incorporated
4367	FBT Incorporated
4882	Fourth Corner Fly Fishers
11266	Friends of the Skykomish
10677	Friends of the Snohomish River Delta
862	Goodyear Nelson Hardwood Lumber Company, Incorporated
2093	Hearthside Cabin Association
2645	Hurn Shingle Company, Incorporated
11265	Inter-Mountain Alpine Club
1896	Issaquah ALPS Trails Club
10543	King County Outdoor Sports Council
11050	Lake Chelan Snowmobilers
305	Lake Forest Park Gardend Club
4353	Larry Manke Logging Company
11936	Lipke Extreme Use Equipment
2957	Longview Fibre Company
2842	Lookout Preservation Coalition
10766	Lower Columbia Basin Audubon Society
2337	Marshall Logging, Incorporated
10363	MCMC Resources, Incorporated
2033	Merrill and Ring, Incorporated
4366	Michaelson Brothers Logging
90	Moss Adams - CPA'S
10925	Mount Rainier National Park Associates
11841	Mountain Media
1550	Mt. St. Helens Club
311	Mueller & Cameron Enterprises, Incorporated
11901	National Audubon Society
10192	North Cascades Conservation Council
10163	North Cascades Audubon Society
4830	North Sound Sea Kayaking Association
11307	Northwest Forest Resource Council
10166	Northwest Forestry Association
4807	Northwest Independent Forest Manufactures
2031	Northwest Office of Friends of the Earth
218	Northwest Paso Fino Owners & Breeders Association
10695	Northwest Public Lands Conservancy
57	Northwest Regional Council of the Federation of Fly Fishers
2150	Northwest Regional Council of the Federation of Fly Fishers
2022	Northwest Regional Council of the Federation of Fly Fishers
3083	Northwest Rivers Council
181	Northwest Rivers Council

11203	Northwest Wilderness Programs
4354	Olivek Petts, Incorporated
11937	Outward Bound USA, National Headquarters
10689	Pacific Lumber & Shipping Company
2834	Pacific Power & Light Company
6528	Paxport Mills, Incorporated
914	Peninsula Mudd Dawgs
10923	Pilchuck Audubon Society
1197	Pleasure Walking Horse Club of Washington
10417	Plum Creek Timber Company, Incorporated
11906	PNW 4-Wheel Drive Association
4821	Public Land Users' Society
10692	Puget Sound Power & Light Company
1641	Reachout Expeditions
107	Reddaway Truck Lines
10162	Scott Paper Company
10688	Seattle Audubon Society
4878	Sierra Club
10921	Simpson Timber Company
11857	Skykomish School District No. 404
10690	Society of American Foresters
10929	Southern Oregon Resources Alliance
3558	Stop Olympic Deforestation (S.O.D.)
1409	Tacoma Sportsmen's Club, Incorporated
699	Tahana Whitecrow Advocacy Alliance
63	Tahoma Audubon Society
11824	Tennessee Climbing Association
10544	The American Alpine Club
10922	The Bellingham Mountaineers
10936	The Mountaineers
10156	The National Outdoor Leadership School
10709	The Nature Conservancy
754	The Sierra Club of Western Canada
10926	The Washington State Mineral Council
10177	The Wilderness Society
4816	The Working Forest Alliance
10930	Timber Framer's Guild of North America
2994	Tuesday Trekkers
1508	Valley Outdoor Association
17	Virginia Four Wheel Drive Association
10168	Washington Environmental Council
2608	Washington Farm Forestry Association
2493	Washington Fly Fishing Club
10933	Washington Forest Protection Association
10680	Washington Native Plant Society
10694	Washington Native Plant Society
10691	Washington State Snowmobile Association
3367	Washington State Trappers Association
11907	Washington State Winter Recreation Commission
1375	Washington Trails Association
125	Washington Wilderness Coalition
4801	Western Forest Industries Association
3071	Weyerhaeuser Company
219	Whatcom County Team Roping Association
1619	Whatcom Environmental Coalition
3330	Woodinville Lumber, Incorporated
889	ZBW Logging Corporation

List of Individual Respondents (with Input Number)

10948 AAGAARD, ERIC
3971 AALMO, ARNOLD
4132 AALMO, ELAINE
6560 AALONA CLIFFORD K
10193 AANES, GREG
10876 ABBEY, WAYNE
8400 ABBOTT, B W
2480 ABBOTT, DEREK
4290 ABBOTT, GORDON
10586 ABBOTT JACQUELINE
82 ABBOTT, MARGI
184 ABBOTT, TERESA
3949 ABEL, THEODORE
3948 ABEL, TOBIAS
3986 ABEL, TOM
882 ABELSON, RUTH
5422 ABENROTH JOHN
5749 ABERCROMBIE, JAMES
890 ABRAHAMSON AL
10543 ACE, R F
1920 ACHESON, MARY E
657 ACKER, MARY R
9134 ACKERBAUER, KRIS
4905 ACKERMAN ANDREW
7462 ACKERMAN, JAMES
7941 ACKERMAN, JAMES A
5361 ACKLEY, BETTY L
3896 ACKLEY, CHUCK
8957 ACORD, DAVID
3727 ACOSTA, ANN
4071 ACOSTA, GARRETT
9362 ACOSTA, GEORGE
3903 ACOSTA, TONY
10221 ADAIR, DEBORAH
8762 ADAMS BILL
1737 ADAMS, BROCK
9936 ADAMS, DAVY
3693 ADAMS, L A
953 ADAMS, LEE F
4243 ADAMS, LELAND
2471 ADAMS, LIZ
4321 ADAMS, MARTY
3131 ADAMS, MARY A
8077 ADAMS, NIGEL
6552 ADAMS, RICHARD D
656 ADAMS, ROBERT
6551 ADAMS SUSAN
30 ADAMS THOMAS C
11501 ADAMS, TOM
7311 ADAMSON, BRENDA
7620 ADDICOTT, MART
1424 ADELBERGER, AUDRA
1774 ADELBERGER, ERIC
623 ADELMUND, MIKE T
6937 ADKERSON, LARRY

10238 GUTH, DON
3556 GUTHRIE BARBARA
8490 GUTHRIE, GERALD L
1458 GUTHRIE, LOUISE
7113 GUTSCH STEVE
4235 GUY, JAMES
4311 GUY RON
7203 GUYETTE, CECELIA
7202 GUYETTE, DOUG
6688 GUZMAN, CHONE
6687 GUZMAN JANIS
5794 HAAS CAROL
5747 HAAS, RICHARD
8824 HACKETT, DEAN & JEAN
10299 HACKLEY, JERRI
4594 HACKNEY, KATHY
3653 HACKNEY, LEE
3637 HACKNEY, LINDA
7879 HADALLER, DALE
584 HADDOCK, SANDY
10571 HADDOX, JEFFREY M
1941 HADFIELD, HOLLY M
9522 HADFORD RON
10044 HADLEY HEATHER
3985 HADO BILL
3411 HAGEMAN, SUSAN
10636 HAGEN CAROL
11161 HAGEN DAVID
11216 HAGEN DAVID C
11684 HAGEN ELLIS
6106 HAGEN, FRANK
2507 HAGEN HELEN
9343 HAGEN JON
4455 HAGEN LARRY
569 HAGEN, LES
3291 HAGEN MARVIN
2606 HAGEN MAXINE
4995 HAGEN MYRAN
8833 HAGEN NINA
4633 HAGEN RON
6078 HAGER E J
2558 HAGER LARRY D
5527 HAGERMAN ROBERT L
7252 HAGERUP BETTY
759 HAGERUP KARL
3468 HAGGERTY JULIE
9098 HAGGLAND, ELMA
9104 HAGGLUND CLARA
9105 HAGGLUND, MARIE
4057 HAGGSTROM E
8743 HAGGSTROM GEORGE N
4941 HAGINS, LYNDA
5513 HAGINS MIKE
3053 HAHN, JONNY
3895 HAHN, TORON

5146 PARKER LARRY
7071 PARKER LINDA G
7497 PARKER, RANDY
6912 PARKER, RICK
7108 PARKER, ROBERT
2459 PARKER, ROBERTA
8484 PARKER RON L
6085 PARKER RUTH
10087 PARKER, SHEILA K
3122 PARKER STANLEY
11349 PARKER, SUSAN
626 PARKER THOMAS
7072 PARKER WALTER R
10663 PARKS DONALD
10666 PARKS, SETH
6645 PARKS TOM
4643 PARMAN RICHARD
9701 PARMENTER LAVERN
8404 PARMETER DAVE
3712 PARMETER LOUISE
7649 PARRA MARY
10556 PARRINGTON SARAH
9969 PARRINGTON, TAD
4040 PARRIS, DONALD H
4041 PARRIS MARY R
3841 PARRIS SCOTT
11424 PARRIS WAYNE
2705 PARRIS WINNIFRED
3910 PARRIS JR DONALD
4468 PARSEL, MARLA
1262 PARSLOW WAYNE D
7010 PARSON, STEVEN
2274 PARSON WENDY
10798 PARSON, WILLIAM W
5791 PARSONS BILL
6515 PARSONS, DAVE
9971 PARSONS, HELEN
4398 PARSONS LINDA
5792 PARSONS POLLY
7003 PARSONS, ROBERT
6875 PARSONS, ROEANNA JOY
7851 PARTIN, EUGENE E
11194 PARTIN TOM
8239 PARTON, FRED L
2261 PARTON, HUGH
9807 PARTRIDGE, BOB
10377 PARTRIDGE EVELYN
8873 PARTRIDGE MIKE J
10965 PARTRIDGE, SUE
459 PARY SANDRA K
8938 PASCAL R F
1301 PASCHE, JEAN
6127 PASKA C
5530 PASKOVSKIS, CAROL
5525 PASKOVSKIS, ED

6581 ADKINS, BILL
4711 ADKINS, JULIE
8045 ADKINS, MARK
4709 ADKINS, VIRGINIA
3576 ADLER, GARY
639 ADLER, SUSAN
10808 AEGERTER, BOB
10925 AEGERTER, BOB
6851 AFFOLTER, RON
807 AGANEW, JESS
2799 AGNEN, DAVID
5367 AGUILLARD, BRYCE
1128 AHH, ABD
4465 AHLF, DONALD
9176 AHLF VERNON
1727 AHO, TIMOTHY
8056 AHOLA, MATTHEW J
8109 AIELLO, JACK A
8108 AIELLO, KATHRYN
11094 AIKEN, GIL
3997 AIKEN WILTON
7500 AIKERS JEFFREY
2642 AIKIN JOHN O
9576 AILE, ELFREDA
5190 AITEN, DONNA
5715 AKINS JAMES B
8580 AKLAND, DAN
7923 ALAAD, IDONNA
2379 ALBER DONNA M
11504 ALBER, MARK
2112 ALBERT, MARK T
7882 ALBRECHT, ARNOLD
1933 ALBRECHT, DEBBIE M
651 ALBRIGHT, CHARLOTTE F
10285 ALBRIGHT, GARY
1457 ALBRIGHT JOSEPH
4897 ALBRIGHT, MARK
458 ALCORN, GARRETT
3182 ALDEN, DANIEL C
829 ALDEN, DAVE M
101 ALDEN, DEBBIE
9739 ALDEN DEBBIE
5590 ALDER, CHARLES E
2852 ALDER, RALPH H
5532 ALDRICH, AL A
9928 ALDRICH, LORI
10546 ALDRICH, ROBERT
2390 ALDRICH, RON
7029 ALDRIDGE LINCOLN
1692 ALECK, LEVI
5160 ALEMAN, YVONNE
316 ALEXANDER, DALE L
9322 ALEXANDER, JOANNE
2786 ALEXANDER, JOHN R
7244 ALEXANDER, LOUISE
3488 ALEXANDER, PEGGY A
9348 ALEXANDER, RON
9133 HAHN, WALLY
8347 HAHNER, BYRON
5783 HAHOLCHIC, ROBERT
10246 HAIGHT, MICHAEL
7487 HAIN, MARTY
499 HAINES, KIM
498 HAINES, MARGARET
500 HAINES, ROGER R
3094 HAISHA, JEANNIE
11042 HAJNY FRANK
7421 HALBERT, AMBERLY
4966 HALBERT, BILL
7430 HALBERT, C R
7422 HALBERT, CATHIE
8218 HALBERT, JIM
6246 HALCOTT, GEORGE
339 HALEY, JIM
10132 HALEY SHIRLEY
3397 HALEY, TIMOTHY
5705 HALL, BYRON B
4349 HALL, CLAY E
4356 HALL, DALE
9050 HALL, DALE H
6648 HALL, DAN
4415 HALL, HERMAN V
7678 HALL, JEFF
1961 HALL, JOE O
11711 HALL, KATY
4218 HALL, LINDA
9593 HALL, MARNEY
11742 HALL, MONICA
8820 HALL, PETER
2002 HALL, RICH
7622 HALL, STEVEN
1194 HALL, WINNIE
7898 HALLAM, WARREN
10005 HALLAUER, JANET
1181 HALLER, RALPH
11164 HALLETT, MICHELL
7762 HALLGREN, DOUG
10987 HALLGREN, JILL
602 HALLGREN, RENEE B
10340 HALLIGAN, LOU
6457 HALSEKEN, WANDA
8509 HALSTEAD, CARAL
4976 HALTERMAN, RICK
7519 HALVERSON, AL
7928 HALVERSON, CHARLENE
2810 HALVERSON, INEZ
7520 HALVERSON, MARTHA
7927 HALVERSON, ROGER
2985 HALVORSEN, ANNE
1662 HALVORSEN, MRS HAROLD
6563 HALVORSON, CHARLOTTE
9678 HALVORSON, RONALD G
5292 HAMAKER, LAWRENCE E
5638 HAMBIDGE, BILL
836 PASSMORE, JAMES C
11406 PATAR, DEAN
6040 PATJENS, HINRICH
6043 PATJENS, KATHRYN
4921 PATNOE, MICHAEL
1682 PATRICK, ANITA
8692 PATRICK, DEBRA
10896 PATRICK, DIANNA
11660 PATRICK, JOANNE
7011 PATRICK, SALLIE
8152 PATTEN, HARRY W
1705 PATTEN W R
5114 PATTERSON, ANDY
8386 PATTERSON, DAVID
7563 PATTERSON, EDWARD
5113 PATTERSON, GARY
3683 PATTERSON, JEFF
8389 PATTERSON, LINDA
8388 PATTERSON, MIKE
2496 PATTERSON, MR & MRS D W.
6730 PATTERSON, STEVEN
8663 PATTIE, JODY
10926 PATTIE, ROBERT D
616 PATTON, G
5946 PAUFLER, NANCY E
8176 PAUL, ARDIE ZATRINE
4317 PAUL, GEORGE A
2671 PAUL, JACQUELINE
9802 PAUL, N ELLA
11123 PAUL, WARREN W
10655 PAULL, GARY
5980 PAULSEN, JUDITH
9320 PAULSEN, PAUL C
7663 PAULSON, DAN
2669 PAULSON, RICK
11801 PAVELCHEK, DAVID
4873 PAVLICH, GAIL
6794 PAYLOR, GUY
6859 PAYN, ALAN
11895 PAYNE, RANDALL
10614 PAYNE, ROBERT
8269 PAYNE, SHIRLEY
5185 PAYNE, STEVE
11859 PAYNE, SUSAN
2926 PAYOMCHUCK, STEPHEN W
817 PEACHER, JOHN T
7933 PEACOCK, DOUG
7935 PEACOCK, ELIZABETH
2232 PEACOCK, JEFF
239 PEARCE, CONSTANCE
1193 PEARCE, KENNETH
7372 PEARET, ROBERT
4738 PEARSON, ALVIN
6752 PEARSON, AUTUMN M
3664 PEARSON, EDWARD
6061 PEARSON, ELSIE
11208 PEARSON, EUGENE O

7243 ALEXANDER, THOMAS L
4464 ALEXANDER, VERNON
2016 ALEXANDRA, KATHRYN
2539 ALFORD, J KEITH
5535 ALFORD, JIM
4268 ALGIERI, ANGELO M
7444 ALLEGER, TERRY
9072 ALLEN, CAPRA
5693 ALLEN, CATHERINE
579 ALLEN CHARLES A
6981 ALLEN DONALD
5089 ALLEN, DOUG
2270 ALLEN, ELIZABETH M
6786 ALLEN, FRANK
5692 ALLEN HEATHER
4681 ALLEN, JAY
9073 ALLEN JEFFREY
6969 ALLEN, JOHN
6669 ALLEN KEN
11867 ALLEN, KENNETH
10574 ALLEN, KIMBERLEY
2227 ALLEN, LENNIS O
2257 ALLEN, LESTER C
2622 ALLEN, LIBBY
5691 ALLEN MELISSA
924 ALLEN MIKE
3271 ALLEN MIKE
5652 ALLEN, PAUL
8533 ALLEN RAY H
5694 ALLEN RICK
298 ALLEN ROGER
1866 ALLEN ROY
6968 ALLEN, SHELLY
6745 ALLEN, SUE C
10572 ALLEN, VIRGINIA
4215 ALLIS, JANET
4213 ALLIS RICHARD
3578 ALLISON, BOB
4347 ALLMAN, JOSEPH
5559 ALLRED, DEAN W
2282 ALLSOPP MR & MRS WM J
5103 ALLYN, J H
4106 ALM KEN
3907 ALSETH, COLLEEN
8787 ALSETH KEN
10129 ALTWEIN DIANE
9905 ALVENDIA, RAMON T
8 ALVERSON, ED
3156 ALVORD, BILL
4523 ALVORD DOUG
10608 ALVORD JOHN
7919 ALVORD, RICHARD
10231 AMADOR FRANZ G
2717 AMBERSON DALE E
3198 AMBUR DAVID
8423 AMBURGEY, REX
10974 AMDAHL, DREW

5584 HAMBIDGE, DAVID F
5599 HAMBIDGE JIM
5639 HAMBIDGE JULIA O
1893 HAMBLIN, MARY ELLEN
4688 HAMBRIDGE, SCOTT
3314 HAMBY, FLEET
3276 HAMBY, NADINE
3058 HAMBY, TRACY
55 HAMERLY, RUSSELL
4291 HAMILTON ALAN L
732 HAMILTON C J
10224 HAMILTON, DALE
731 HAMILTON, DOUGLAS M
11307 HAMILTON, GERALD
543 HAMILTON, MICHELLE
7020 HAMILTON, RANDY
1479 HAMILTON ROBERT
834 HAMLIN, DALE L
7112 HAMM JACKIE
8774 HAMM, JAMES W
1610 HAMMARLUND, MARK
7773 HAMMER, JERRY
9794 HAMMER JILL
8148 HAMMERSCHMITT, JOSEPH
2653 HAMMERSTROM, PATSY
6889 HAMMOND BETH
6210 HAMMOND, DIANA
2096 HAMMOND, FRANK R
6886 HAMMOND, JACK
6462 HAMMOND JAY
5112 HAMMOND, MIKE
10145 HANBEY, RUSSELL
7323 HANDERSON, KELLY
4355 HANDLY PAT
11756 HANDY, CHRIS
8589 HANDY, MARK E
2745 HANEL L STERLING
10393 HANER, BARB
11596 HANER, ROBERT
97 HANEY, DOROTHY
8061 HANEY STEVEN S
2329 HANHS MARY L
1460 HANIKA, RICK
11721 HANKS STEVE
8091 HANNA, ALLEN G
2624 HANNA DON
8150 HANNA, JONATHAN J
8093 HANNA LOYD E
2847 HANNEMAN, MARY
2834 HANNIGAN, SCOTT R
360 HANNITY, DONNA LEE
8181 HANOWELL, PATRICIA
8182 HANOWELL, RICHARD C
7650 HANRAHAN, GREG
7636 HANSEL, ROGER
9266 HANSEN, ARNOLD
11654 HANSEN, DAVID

6647 PEARSON, JASON
3018 PEARSON, MARY LOU
10534 PEARSON NG
2125 PEARSON, PHYLLIS T
6062 PEARSON, ROGER
2490 PEARSON RON
7235 PEASE, GARY
517 PEASE, MARY H
10049 PEASE, MICHAEL STUART
1750 PEASLEY, JAMIE
905 PECK, WILLIAM
4307 PECKHAM, JIM
402 PECKHAM, WALT
1803 PEDERSEN, DALE
3525 PEDERSEN E R
922 PEDERSEN, KEVIN ROCKY
11462 PEDERSEN LYNN
8829 PEDERSEN MIKE
7676 PEDERSEN, PAT
7680 PEDERSEN, PETE
6498 PEDERSEN ROBERT L
2683 PEDERSON, BRIAN
7478 PEDERSON, BRIAN
2714 PEDERSON, CARLA J
2713 PEDERSON, CHRIS
10864 PEDERSON, MARGARET
11280 PEDERSON, STEVE
9950 PEFFER, ROGER D
8458 PEGRAM, BILL
11923 PEIFFER ANTHONY
7658 PEIROLI, PAUL
5425 PEKOKE DEAN
7981 PELDEN, BRUCE
607 PELECH, WALTER
9788 PELLAND GREG
9779 PELLAND KENDRA
3694 PELLHAM, JACK D
11440 PELLOTA, BOB
963 PELTIER RON
6010 PELTON, BOBBIE
6012 PELTON W U
6011 PELTON, YVONNE
6865 PENDELL ERNEST
711 PENDERGRASS, GLENDA
4542 PENDERGRASS JERRY
2049 PENDERGRASS, JUDY
6623 PENFIELD STEVEN
9705 PENIX GERRY I
2561 PENNYLEGION, LAURIAN
10570 PENNYLEGION MARY
6805 PENROD, DAVID
2854 PENROSE, JULIAN
10491 PERALA, TOIVO
10313 PERCIVAL, W K
5044 PERCY, BRIAN
883 PERDUE, EARL V
6629 PEREZ JIMI

8317 AMEDEO PAT
10869 AMENDE, LARRY JOHN
5610 AMES, DAVID
11809 AMES, FRANK
11044 AMES, JUDITH
6973 AMMONS, MICHELLE
5217 AMMONS, MIKE
10457 AMSBURY, BETH
885 AMSLER, ROLF
2896 ANDERBERG, MARCI
2174 ANDERBERG, TOM
2310 ANDERSEN, BLAKE T
11870 ANDERSEN, PATTI
10863 ANDERSEN, R L
3352 ANDERSEN, ROGER
6809 ANDERSEN, SHARON
42 ANDERSEN, WAYNE & PATTI
5681 ANDERSON, ALBERT
7903 ANDERSON, ANN
6842 ANDERSON, C
5468 ANDERSON, CAROL
9623 ANDERSON, CHARLES R
1965 ANDERSON, CHERYL
4923 ANDERSON, CINDY
7385 ANDERSON, DAIL W
8689 ANDERSON, DARLENE
7885 ANDERSON, DAVID
7872 ANDERSON, DEBBIE
7813 ANDERSON, DERRYL
5764 ANDERSON, DONNA
7451 ANDERSON, ERIC
6671 ANDERSON, FRED
5761 ANDERSON, GARY
8193 ANDERSON, GLEN E
3900 ANDERSON, HERB
2243 ANDERSON, JAMES D
6595 ANDERSON, JAMES D
1691 ANDERSON JARED
8572 ANDERSON, JERRY
6911 ANDERSON, JOHN
9054 ANDERSON, JOHN O
8688 ANDERSON JOSEPH
3890 ANDERSON, KAREN
2993 ANDERSON, KARI
5679 ANDERSON, KEITH
10575 ANDERSON, KEITH
7107 ANDERSON, LINDA
3919 ANDERSON, LISA
11913 ANDERSON, LOREN
3254 ANDERSON, LUCILLE
9718 ANDERSON, MAE E
3891 ANDERSON, MARK
3608 ANDERSON, MARTHA
11043 ANDERSON, MARY
4199 ANDERSON, MELVIN
5684 ANDERSON, MICHAEL
11409 ANDERSON, MYRNE
2182 HANSEN, DONALD L
11638 HANSEN, DONNA
7593 HANSEN, ERIC
2888 HANSEN, JERI
10201 HANSEN, JOHN
2254 HANSEN, KATHRYN S
10434 HANSEN, MARGUERITE
8723 HANSEN, STUART R
7297 HANSEN, TAMMY
3419 HANSEN, TOM
6035 HANSEN, TOM
7368 HANSEN, JR , MARVIN E
11429 HANSEY, RICK
2791 HANSHAW, GREG
5216 HANSON, BRETT
8928 HANSON HAROLD B
9737 HANSON, JAMES D
819 HANSON, JIM
3381 HANSON, JO
7820 HANSON, JOHN
11338 HANSON, MARCI
2608 HANSON, NELS
8370 HANSON, NELS
497 HANSON, SELMAR L
9811 HANSON, STEVE
5229 HANVEY, DIANNE
130 HAPPEL, HENRY H
2738 HARBERD, JAMES W
1810 HARDER, CARL
7654 HARDERSEN, JENNIFER
8407 HARDERSEN LEO J
7547 HARDIE PAUL
7009 HARDIN CAROL
893 HARDIN, EARL
7026 HARDIN, JAMES
5853 HARDIN, LOGIA
11590 HARDIN ROBERT
2697 HARDING, BILL
6466 HARDING JR, FRANK
1574 HARDTKE, FAWNTELLA
9882 HARDY, RICHARD P
2259 HAREMAN, HOWARD A
11400 HARGROVE, JACK
646 HARGROVE, LORRAINE
10774 HARKER, GERALD R
8483 HARKNESS, DAVID E
6402 HARKRIDER, JERRY B
6893 HARLAN, HAROLD
11100 HARLAN, HAROLD (MIT)
7423 HARLAN, JOSEPH
3342 HARLEY, JOHN D
10871 HARLOW, PAMELA
11192 HARM, WALTER
8314 HARMAN, RON
3162 HARMON, AIMEE
4259 HARMON DON
9042 HARMON, RICHARD A
4678 PEREZ, JOHN A
11710 PEREZ, STEVEN
6171 PEREZ JR , JOSE
2734 PERKINS, ANDREA
5887 PERKINS, GERALD A
2953 PERKINS, HARLAN M
10966 PERKINS, LYNN
3052 PERKINS, MAIDA LEE
9470 PERKINS, SALLY M
4512 PERO, FRANCIS
7645 PEROVICH, KAREN
2079 PERRIGO, THOMAS P
5245 PERRY, BEATRICE
5768 PERRY, BOB
8691 PERRY, DICK
11181 PERSSON, IDA
1168 PERYIER, MRS EVAN
3214 PESCHONG, J C
9622 PESZYWSKI, RONALD
8385 PETCHNICK, RUDOLPH
2657 PETEELIN, CYNTHIA S
10189 PETER, MARK
5651 PETERS, DIANNE
6696 PETERS, E N
10414 PETERS, GREGORY
6120 PETERS JACK
4517 PETERS, JOHN
1323 PETERS, KIRK D
9226 PETERS, LARRY
6087 PETERS, LORNA COBB
484 PETERS, MARK
1513 PETERS THOM
9051 PETERS, TOM
4191 PETERSEN, ADA
4044 PETERSEN, ARNOLD L
10410 PETERSEN, ART
8313 PETERSEN, CARL
2372 PETERSEN, DALE R
11447 PETERSEN, JERRY
2136 PETERSEN, MIKE
2127 PETERSEN, NANCY
8114 PETERSEN, R H
8734 PETERSEN, RANDY
11442 PETERSEN, STEVE
4138 PETERSEN, THOMAS
6702 PETERSON, ALICIA
3943 PETERSON, BERTHA
7644 PETERSON, BRIAN
6473 PETERSON, CARY
6919 PETERSON, CHARLES
124 PETERSON, CHRIS
9375 PETERSON, CHRIS
2195 PETERSON, DAVE
4541 PETERSON, DAVE
10604 PETERSON, DAVID & JANE
4054 PETERSON, DEAN
3455 PETERSON, DOUG

7386 ANDERSON, NANCY
2910 ANDERSON, NEIL P
5682 ANDERSON, NORMAN
6950 ANDERSON, RALPH
1813 ANDERSON, RANDALL
4327 ANDERSON, RAYMOND L
4197 ANDERSON RICHARD
5427 ANDERSON ROBERT
6385 ANDERSON ROBERT
10702 ANDERSON, ROBERT H
3606 ANDERSON, RONALD
1902 ANDERSON STACY
4913 ANDERSON, THEODORE
5680 ANDERSON, YVONNE
8415 ANDERSON JR , R W
8408 ANDERSON JR , TOM M
477 ANDIS, JOHN L
2053 ANDRES, MARJORIE
276 ANDRESON, MARVIN
4539 ANDREW, BILL
6138 ANDREWS, CLAIRE
5335 ANDREWS, JOHN
9610 ANDREWS, MICHAEL
2446 ANDREWS, SHERYL A
11799 ANDREWS STEVE
11645 ANDREWS, TOM
7672 ANDRIST, CARRIE
7623 ANDRIST KENNETH
6194 ANGCOIN III, FORREST
992 ANGEL, RONALD W
8968 ANGEL VAUGHN
8758 ANGELA, GEORGE M
7344 ANKER, MARTY
586 ANSELL LOU
2213 ANSTENSEN, TED
10510 ANTRIM LIAM
10963 APRIL ELAINE H
4843 ARBOGAST DE
2571 ARDARY CHARLES T
11088 ARELLARO, MARGOT
5278 ARENDT ELIZABETH L
5221 ARENDT, HARRY P
5035 ARENDT, JOHN
10529 ARENDT KATHRYN
2081 ARENDT, LUCILE K
5313 ARKO JOHN
2061 ARMFIELD, WILLIAM R
9495 ARMISTEAD MARIAN A
9519 ARMSTRONG DAVID R
10031 ARMSTRONG, DICK
7090 ARMSTRONG, DON
11460 ARMSTRONG EVERETT
11446 ARMSTRONG GERALD
11713 ARMSTRONG, GORDON
7092 ARMSTRONG, HEIDI
3183 ARMSTRONG, HOWARD
7393 ARMSTRONG, JACK
7172 HARMON, WAYNE
692 HARMS, R G
970 HARN, ROBERT
2326 HARNEY DENIS F
6642 HARPER, MIKE
3668 HARPER, RONALD
2338 HARR, R DENNIS
3744 HARR, STEVE
8853 HARRELL THURA D
8932 HARRELL, TIMOTHY S
7916 HARRIGAN, THOMAS
1993 HARRINGTON, EILEEN
7223 HARRINGTON, JOHN
290 HARRINGTON, JOSEPH E
2968 HARRINGTON MARGARET
11685 HARRINGTON, RONALD
11360 HARRIS, ALEXANDRA
11131 HARRIS, BRUCE
7189 HARRIS, C GAYLE
10794 HARRIS, CRAIG
9584 HARRIS ED
3493 HARRIS, GARY
2297 HARRIS, HOWARD L
2089 HARRIS LARRY
11849 HARRIS LARRY/JUDY
7783 HARRIS MILDRED
2775 HARRIS PAT
10818 HARRIS RICHARD
595 HARRIS STAN
6474 HARRIS VAUGHN
6759 HARRIS YVONNE
5556 HARRISON, BOB
2414 HARRISON, BRUCE
10746 HARRISON CHERYL
6162 HARRISON J N
10959 HARRISON JR , MEREDITH
5565 HARROP WILLIAM G
10418 HARSHBARGER BILL
3207 HARSHMAN DARLE
2422 HART, LARRY
11843 HART PAUL
11582 HARTINGER HOWARD
2151 HARTLEY, JIM
3873 HARTLIEB, ROLF
6399 HARTMAN BEVERLY J
7828 HARTMAN, GLENN
6400 HARTMAN JACOB M
8744 HARTMAN JEAN
10411 HARTMAN LESLIE
2134 HARTMAN RICHARD
6397 HARTMAN, SHARON A
1013 HARTMAN WM E
10088 HARTMANN DENNIS L
8427 HARTNESS SHERRY K
11076 HARTWIG DAVID S
2359 HARTWIG, LOIS
10051 HARTZ, LAURIE
10409 PETERSON ERIKA
9797 PETERSON, G
9456 PETERSON, GARY W
6918 PETERSON, GERALDINE
8739 PETERSON, JACOB W
1611 PETERSON, JAN
6701 PETERSON, JAN
2367 PETERSON, JANET L
9493 PETERSON JASON
2165 PETERSON, JUDY
8492 PETERSON, KEITH
120 PETERSON KEVIN
5181 PETERSON LAWRENCE
7604 PETERSON, LOUISE
3566 PETERSON MARK
2813 PETERSON, OSCAR C
6683 PETERSON PHILIP
5552 PETERSON RAYMOND L
10100 PETERSON RICHARD E
9500 PETERSON ROCHELLE
968 PETERSON RUTH S
9376 PETERSON, STACY
3851 PETERSON TED
4737 PETERSON, THOMAS W
6703 PETERSON, TOM
7263 PETERSON, WILLIAM
10768 PETERSON, WILMA
3027 PETESCH, MARI
2311 PETESCH PETE
10396 PETESCH TINA
10440 PETITE, DALE
3520 PETRIE, WALDTROUT
387 PETROSKE, JOHN
9088 PETRUZZI KAREN
3454 PETTERSON AUDRY
5937 PETTERSON, DELBERT
10339 PETTIT LORETTA J
4354 PETTS OLIVEK
7427 PETTY C
2823 PETTY LARRY J
10642 PETTY, MARY
160 PETTY WILLIAM
5389 PFAFF, FRANCINE
11716 PFAFF, PEGGY
11718 PFAFF RANDY
5051 PFAFF, RICHARD
11738 PFAFF WALLACE
8931 PFAN MICHAEL E
3284 PFEIFER BOB
6578 PFEIFFER LYNN
10852 PFEIFFER PATTY
2883 PFEIFFER, SALLY
3552 PFEIFFER-HOYT, CINDY
3553 PFEIFFER-HOYT, RUSS
2402 PFENDER, JOHN
11835 PFLEGRATH, RON
2027 PFLUG, DAVID

7089 ARMSTRONG JAMES
7091 ARMSTRONG, JOHN
4721 ARMSTRONG, JOSEPHINE
11457 ARMSTRONG KATHERINE
11477 ARMSTRONG, VIOLA
6459 ARNDT, LINDA
1373 ARNDT THOMAS D
7209 ARNESON, D C
11200 ARNESON, JUDY
10194 ARNETT, JOSEPH
3785 ARNOLD, GILBERT
4565 ARNOLD JIM
5151 ARNOLD, JOHN
362 ARNOLD, LINDA
11880 ARNOLD RAY
2022 ARNOLD, ROBERT
2840 ARNOLD, RON
2849 ARNOLD, W J
11933 ARNOLD-RAUTMAN, LESLIE
8455 ARNZEN LORAN F
3414 ARONS, ARNOLD
4070 AROSTA, JOHN
8709 ARREY ALBERT A
9157 ARRINGTON, ALBERT
9198 ARRINGTON, NEIL
9158 ARRINGTON NORMA
1187 ARTHUR, D JAMES
9896 ARTHUR, SHARON
9897 ARTHUR, WILLIAM
8324 ARTZ, CHRIS
11078 ARUM, JOHN
6112 ASCOL, PATRICIA
8989 ASHBURN, EDWARD
2449 ASHE, DON
4032 ASHE, LOUIE
2397 ASHER, GIFFORD W
10674 ASHLEMAN JR, RUSSELL H
2541 ASHLEY, ELI D
5803 ASHLEY JR DON
3086 ASSELIN, K L
4508 ASTROP, LAWRENCE
5837 ATAMANCZYK CARL
11459 ATCHINSON, RAYMOND
6726 ATCHLEY, LEA ANNE M
3879 ATKINS, JERRY
10042 ATKINS JUDITH A
10947 ATKINS LINDA
969 ATKINS, PHILIP
8879 ATKINSON, KELLY
8123 ATRAN CHARLES H
10786 ATTWOOD, DENISE
3420 ATWOOD, JAMES
9231 ATWOOD LESLIE
718 AUCKLAND, CYNDY
717 AUCKLAND, MIKE
7013 AUDETTE, RANDY
3415 AULT, CHERI
11682 HARVARD IVAN
4742 HARVEY DAVID R
6611 HARVEY, DONALD
1585 HARVEY, GILBERT
7121 HARVEY, HARLAN
6823 HARVEY, RICK
7626 HARVEY, ROBERT
5751 HARWOOD, GREG
1555 HASH, BARBARA
2012 HASH, RONALD
1352 HASKELL, ROBERT E
11186 HASSE, C L
6225 HASTINGS, JIM
9915 HATCH, JOHN
275 HATCH PAUL
3391 HATHAWAY, JOHN
3194 HATHORN JOEL
9960 HATLEY, JESSIE L
3473 HAUG H J.
4084 HAUGE, DAVID
7359 HAUGEN, BILL
9559 HAUSEN ROBERT G
3286 HAUTALA SUSAN L
11361 HAVEN, KATHERINE
10741 HAVENS FRASER
10677 HAVENS LORENA
5673 HAVERFIELD, JAMES
5632 HAWK, DUANE
5594 HAWK, JAMIE
8632 HAWKINS, BRUCE
5784 HAWKINS, CARL
1805 HAWKINS, CHARLES
9131 HAWKINS JAMES
11702 HAWKINS, JUANITA
6312 HAWKINS, KENNETH
3138 HAWKINS, SARA
2975 HAWKINS THOMAS
5700 HAWKINS V A
138 HAWLEY, DALE A
11855 HAWLEY, HELEN
7598 HAWLEY, MRS DONALD
7824 HAWORTH, JOHN
300 HAYDEN, DOUG
8804 HAYDEN, KATHY
8886 HAYDEN MARCEE
753 HAYDEN, PATRICK M
8883 HAYDEN, PHIL
8881 HAYDEN, SCOTT L
8885 HAYDEN TODD
10185 HAYDON RICH
2288 HAYES, IRENE & DEE
2576 HAYES JOHN H
11233 HAYES, PATRICK
4526 HAYES ROBERT
3633 HAYNES, EVE
3672 HAYNES, KENNETH
3029 HAYNES, MICHAELENE
10644 PHALAN, LARRY
8551 PHALMER KRIS
6920 PHELPS, ANDREW
6781 PHELPS, DEL
6922 PHELPS, EILEEN
6921 PHELPS, F L
6924 PHELPS MARILYN
8724 PHILBIN, MIKE
839 PHILBRICK, CLAY
5820 PHILLIPE, KELLY
6896 PHILLIPPI, JENNIFER
10952 PHILLIPS CAROLYN
5312 PHILLIPS, CHRIS L
2769 PHILLIPS, DEBBIE
3669 PHILLIPS E J
2768 PHILLIPS, EUGENE
1858 PHILLIPS, GARY
6767 PHILLIPS, J W
2175 PHILLIPS JEAN
7 PHILLIPS, JOCELYN D
1853 PHILLIPS KELLY
322 PHILLIPS LAURA
1832 PHILLIPS, MARI
3444 PHILLIPS, ROBERT
8059 PHILLIPS, SCOTT A
4930 PHILLIPS, VIRGINIA
9349 PHILLIPS, WENDELL
10923 PHILLIPS-HOWARD BONNIE
11158 PHILLIPS-HOWARD, BONNIE
8664 PHILMON, DENNIS
8665 PHILMON JOAN
9807 PHILO MARILYN
690 PHILPOTT, BOB
3629 PHILPOTT JOE
10139 PHIPPS LYNNE
2575 PICCOLO, VALLANA M
5193 PICHE, CAROL
11020 PICKELL ELLEN
346 PICKENS, JAY J
3024 PICKERING, DEBBIE L
5255 PICKERING, JAMES C
5936 PICKERING, LISELLA
11199 PICQUELLE, SUSAN
2442 PIECHOWIAK, MICHAEL
1311 PIEL, MIKE
11548 PIELEMEIER JON
561 PIERCE, KIRK J
3609 PIERCE, LARRY
6323 PIERSON, DEBRA
9925 PIERSON, KATHRYN
7984 PIERSON, PATRICK
2383 PIERSON, R DOUGLAS
9783 PIERSON, RICHARD N
6322 PIERSON, ROBERT
8069 PIETRO, LUIGI D
11567 PIETRO MICHAEL
7326 PIKE, GREG

1481 AUROTH, J
295 AUSBAUM, JOHN F
1720 AUSTEN, ROY
11 AUSTIN, ALICE & GILBERT
7944 AUSTIN, BETTY J
6288 AUSTIN, CRAIG
5376 AUSTIN, DANIEL
3517 AUSTIN GARY
8081 AUSTIN, GEORGE P
3703 AUSTIN, KEN
5377 AUSTIN, LANI
4104 AUSTIN, MELISSA
7147 AUTILLA, DAVE
663 AUTRY, GREG
8800 AUVIL, TOM
2963 AVEHONER, MARCIA
5833 AVERILL, LINDA
5829 AVERILL, STEVE
10274 AVERY, ALLAN F
5343 AVERY, RICHARD T
10126 AXELROD SHIRLI
11348 AXLEY LISA
3574 AXT, DENNIS
1884 AYERS, DAN
1562 AYLWARD, FRANCINE
2058 AYRES, RODNEY G
5004 BABCOCK, GINA
4087 BABCOCK, RAY
10734 BACHMAN BENJAMIN
10920 BACHMAN, ED
7729 BACHMAN, RANDY
4795 BACHMANN DEBRA
4792 BACHMANN, JON
4791 BACHMANN, MIKE
3180 BACKLUND, MARK H
2764 BACKLUND, RONALD E
1841 BACKMAN, CHARLES
1590 BACKSTROM, JOHN
5293 BACKSTROM, RALPH V
3506 BACKUS CARRIE
10165 BACON, JEAN
4297 BAEK JANE
2950 BAGATELL CARRIE J
8360 BAGGER, DANIEL
5106 BAGGETT, BEATRICE
381 BAGLEY, CHARLES M
5824 BAHL, NORMAN
8060 BAHRKE STEPHEN
3659 BAIER, D
11077 BAILES AL
7695 BAILEY, CALVIN E
9859 BAILEY, CHARLES A
6536 BAILEY, DAVID
5256 BAILEY, DENNIS
9167 BAILEY, DENNIS
8004 BAILEY, DONNA A
2777 BAILEY, JASON C
5896 HAYTER CAROL A
5897 HAYTER, THOMAS J
317 HAYVAZ, JOHN
9861 HAYWARD, CLEONE
8830 HAYWARD, DENNIS
6123 HAYWORTH, ROSS
11585 HAZEL, TOM
4535 HAZEN, ROBERT
8038 HAZLEWOOD DANIEL P
10428 HEALD CHARLES
8341 HEARING, KENNETH
8342 HEARING LENORA
5840 HEATH MICHAEL
4713 HEBERT, AL
1743 HECKER JEFF
3955 HECKER, MARK
5529 HECLA C
11321 HEDEEN, PAUL
8896 HEDGES, ALFRED D
5759 HEDGES BOB
8893 HEDGES CAROL F
11191 HEDGPETH JESSIE
2426 HEDLUND JEFF
5223 HEDMAN DAN
9845 HEE, STEPHEN M
11113 HEEBNER CHARLES F
11908 HEEN, ROBERT
3507 HEER VALERIE L
2874 HEERDT BRADLEY T
11205 HEERDT BRIAN
10284 HEERDT MARTIN
3351 HEESACKER MARK
843 HEFFNER, GEORGE
8187 HEFFNER LORRAINE E
8168 HEFFNER RONDALL
8188 HEFFNER WILBERT E
6891 HEGDAL JAMES
1317 HEGLAND PAULINE F
7568 HEICHEL DANIEL A
7567 HEICHEL TERI
3290 HEIDECKER GREG
8854 HEIDLEBAUGH, GLENN
6888 HEIKKINEN DOROTHY
6887 HEIKKINEN, EARL
6848 HEIKKINEN JOHN
6847 HEIKKINEN MARIE
8294 HEILMAN JERRY
8784 HEIMER MICHAEL G
5329 HEINDEL BRIAN J
1139 HEINE KEN
10010 HEINECK JOE
1694 HEINZ BUD
2652 HEIRMAN BOB
1253 HEISERMAN ROBERT A
6213 HEISLER, LEAN
18 HEISTER, BARBARA LEE
7914 HEITKAMP, SHARON
10161 PILCHER PATRICK
1506 PILLITTERI SUSAN
7633 PINNEY KENNETH
10682 PINOGES, JOHN M
1911 PIRAK, JAMES D
10913 PIRNACK, PATRICIA
10627 PIRTLE, KARLOS
4825 PISKE, VERNON L
6044 PITMAN BARBARA
6034 PITMAN, JOAMES
320 PITMAN TINA A
4576 PITSTICK KIMBERLY L
4935 PITTARD KENT L
3376 PITTENGER, FRED
11110 PITTLE, LESTER
10551 PITTLE, RALPH
1465 PITTMAN, C C
6533 PITTMAN, JOHN
6178 PITTMAN RIDGE
7901 PITTS BETTY
7900 PITTS FLOYD
6143 PITTS, STEVE
10598 PLACE SANDRA
10039 PLACE TIM
11512 PLAKE, TERRI
8996 PLATA AL
5618 PLATT DEE
6677 PLATT, JERRY
6640 PLATT JIM
5617 PLATT KAREN J
5613 PLATT MARIA
3320 PLATZ BOB
4801 PLATZ, BOB
19 PLESKO MARGUERITE M
4784 PLILER DUVAL
4787 PLILER, MARY
10791 PLIMPTON JOHN M
3124 PLUMLEE KEITH
11798 PLUTE CHRISTINE
7173 POE GARY
10751 POEHLMAN BARBARA
10752 POEHLMAN, JOE
11646 POESCHEL, FIN
4729 POESCHEL, JUDSON J
11647 POESCHEL LINDA
4727 POESHCEL, JULIA
8034 POGORELC FLOYD
928 POHL, MR EARL D
10897 POHS KAREN M
635 POIER CHARLES M
6800 POLE CAROLYN
11934 POLITYKA, CHARLES S
48 POLL ELIZABETH
10384 POLLACK EDITH
5303 POLLACK, ERIC S
10495 POLLARD, JAN
4062 POLLARD, JOHN

7679 BAILEY, JIM
11794 BAILEY, MARIE
11893 BAILEY, MARK
7228 BAILEY, MICHAEL
3443 BAILEY, PAUL
395 BAILEY STEVE
11915 BAIN, PAUL
4796 BAIN, PHIL
3905 BAKER, BOB
1056 BAKER, CHARMAINE
673 BAKER, CHRISTINA
5101 BAKER, CLINTON
378 BAKER, CLYDE A
3831 BAKER, DANNY
3190 BAKER, DAVE
8737 BAKER, DAVID
2064 BAKER, DIANE
5331 BAKER, FRANK O
3749 BAKER GARY
3112 BAKER, GEORGE
9741 BAKER, J GARY
1971 BAKER, J H
4993 BAKER, JEFF
3113 BAKER, MARTA
6295 BAKER, RICHARD
8421 BAKER RICHARD J
6327 BAKER ROBERT
10482 BAKER, ROGER
4334 BAKER RONALD A
10978 BAKER RONALD A
6408 BAKER ROY
1868 BAKER, ROY E
678 BAKER, SCOTT
377 BAKER STEVE
3293 BAKER, WM E
8485 BAKER-JOHNSON MARY
9035 BAKKO LARRY
10282 BAKKE, KARAN LINS
9949 BAKKEN, AIMEE
9036 BAKKO, LYNDA
8425 BAKKO, STEVE
9721 BALAM DOUGLAS W
9693 BALAM LINDA
9695 BALAM, SARAH
1943 BALDWIN C A
8019 BALDWIN, DICK
3008 BALDWIN, DOUGLAS
11035 BALDWIN, E C
10397 BALDWIN, MICHAEL
3456 BALDWIN, ROGER
3438 BALDWIN, WILLIAM
8557 BALE, LANE
3439 BALE, SANDRA
8556 BALE, SANDRA
10717 BALENT, DR LAURA
3068 BALL, E L
10174 BALL, GREGORY D
6588 HEITZ, ZACHARY A
11397 HELF, SUSAN
4917 HELFERTY, M
9827 HELGESON, SHARI
10960 HELLER, A
11840 HELLER, META
9629 HELLING, DENNIS
9630 HELLING, KAREN
6361 HELM, BRAD
3217 HELM, HANS
2913 HELMS, SUZANNE L
4245 HEMBREE, BUELL
5990 HEMION, DAVID D
3640 HEMPHILL, DUANE
2942 HEMPSTEAD, CAROLYN
8247 HENDERSON, JAN C
6126 HENDERSON, PAUL
4750 HENDERSON, RICHARD L
2153 HENDERSON, THOMAS L
1029 HENDREN, BOB
8265 HENDRICKS, DOUGLAS
2308 HENDRICKS, HELEN
8473 HENDRICKS JOHN
8443 HENDRICKS, LEONE M
5204 HENDRICKSON, CHRIS
5152 HENDRICKSON, JO
8528 HENDRICKSON KURT
4740 HENDRICKSON, MICHAEL
3060 HENETT, MICHAEL K
136 HENKEL DENNY D
2825 HENLINE, WM H
1671 HENNEGEN, ROY
11565 HENNESSEY, STU
3066 HENNIG, RONALD D
2543 HENNING CHRIS
2429 HENNING, LLOYD E
2392 HENNING NANCY
4484 HENNINGER, A
7894 HENNINGSEN, PAT
9759 HENNINGSEN, R W
580 HENNUM, KARL I
7146 HENRICH CARL H
5609 HENRIOT, JOHN
8789 HENRY, BRYANT G
7469 HENRY, DORA
1741 HENRY, PATRICIA
10591 HENRY PETER
10687 HENRY SCOTT
9212 HENSEN, PAUL
1236 HENSLER, BERNICE
2778 HENSLER, DON
1259 HENSLER, ROY G
943 HENSON, ELAINE
6196 HENSON J S
6195 HENSON, JEANNI
9550 HENSON, ROYCE H.
2580 HEPBURN, MR & MRS MICHAEL
10204 POLLARD III, WILLIAM S
1158 POLLMAR, ALBERT M
11122 POLLOCK, CAROL
11289 POLLOCK, DON
9009 POLLOCK, JIM
8245 POLLOCK, NEIL J
11238 POLLOCK, SHERI
8249 POLLOCK, VIOLET M
7407 POLTS, ROBERT
3460 POMEROY, BETSY
4472 POMEROY, DON
501 POMEROY, LORENE
1360 POMRANKEY, DOUGLAS
242 PONCAR, DAN
2224 POND, ELFREDA
5273 POND, GARTH
5183 PONG, SKOOKS
11761 POOL, DONALD
8888 POOLE, EDWARD J
11766 POOLE, KENNETH
1026 POOLE, RICHARD
11826 POPE, ANNE
11359 POPE, ROBERT
3918 POPEIRALLI, MILO
5339 POPLAWSKI, DAVID
9722 POPLIN, SANDRA
8569 POPPE, STEPHEN
9239 POREMBSKI, FRANK
8563 PORLIER GARY
6686 PORTER, ALICE
1546 PORTER, AMY
9881 PORTER, CORBETT
8500 PORTER, DAVID
5785 PORTER, GENE
5528 PORTER, ROBERT W
2788 PORTER, RONALD J
5836 PORTER, TAD
6512 PORTMAN, DEBBIE
6513 PORTMAN, JIM
375 PORTUKALIAN, REBECCA A
7757 POSEY CHAR
7756 POSEY DALE
8911 POSTMA, FRANK E
9975 POTTER, BILL
5976 POTTER, CHRIS D
1690 POTTER, DAN
8578 POTTER, PAM
7686 POTTER, SHANNON
7685 POTTER, TONY
1576 POTTLE, ROY
2517 POTTS, BILL
2107 POTTS, KAREN
10264 POUSSON CATHERINE
4635 POWELL, ALAN
10401 POWELL, BERT
7597 POWELL, BLAINE
4306 POWELL DON

2589 BALL, ROBERT MICHAEL
1030 BALLARD, BARBARA
1031 BALLARD, JACK
5817 BALLARD, PATRICIA
5816 BALLARD, RAY
4955 BALLAS, DAVE
10327 BALLASH, HEATHER
9261 BALLER, DANIEL
3505 BALLER, IDA
2171 BALLEY, RICHARD T
3258 BALY, LANE
8842 BALZARINI JOHN
5250 BANDOCK JOSEPH
3649 BANGS, SUNNY
856 BANKERS, GARY
1826 BANKERT JUDD
1183 BANKO WINSTON
8773 BANKS, DENNIS W
9211 BANKS ROBERT
5524 BANNAN CYNTHIA
5523 BANNAN, P
7616 BANNING, MRS R E
7617 BANNING, R E
6047 BANNON, BRAD
6046 BANNON, MAXINE
10364 BARBAGALLO, FRANCES L
10459 BARBER, JERRY
1224 BARBER, LANA M
10463 BARBER, MELISSA
1230 BARBER MURLEN R
8376 BARBER SALLY
10370 BARBIERI, MARY KAY
2457 BARBORINAS JAMES
1725 BARCLAY, DAN
6334 BARCLAY, LENORE
8454 BARCLAY, MICHAEL D
5585 BARCLAY PATRICIA J
6331 BARCLAY RICHARD
1162 BARDEN, DONALD W
3055 BARDSLEY MARC
3479 BARE, KEITH
10700 BARGALA, SONNY D
1349 BARGELT JAMES C
891 BARKER BURKE G
2482 BARKER MARGARET
8769 BARKER, MARY
3824 BARKER TERRILL
8754 BARKER WAYNE
3787 BARKER, WILLIAM J
8780 BARKER, WILLIAM M
4775 BARKLEY, KENNETH
2731 BARKSTROM, MIKE
10816 BARLEY MICHAEL
10066 BARNARD, BOB
6532 BARNARD TONI
2489 BARNBALL, DONNA
4385 BARNES CHRISTOPHER
5470 HERDT GARY
11927 HERDT, J P
1140 HERENDEEN, ROGER
10772 HERMAN, TAWNYA
7581 HERMAN, W R
7775 HERNANDEZ, ANNIE
11482 HERRERA, KYSA
9363 HERRIN, BLAKE
9795 HERRIN, JAMES A
6746 HERRON LEONARD E
8916 HERSCHLIP, DELURN S
8918 HERSCHLIP, HELEN M
4025 HERSHAW DANIEL
10430 HERSTON, BILL
3496 HERSTON, ELIZABETH W
10855 HERSTON, JAMES
4944 HERSTON, TOM
6398 HERTMAN DAVID L
6379 HERTZ, ROGER
4200 HERZER, ROBERT
581 HESS, GEORGE H
1617 HESS, JENNIFER & BRIAN
6329 HESS, JIM
50 HESS, TERESA
9223 HESSETTINE PAM
11472 HETLAND, ERIC
5024 HETTICH, JOHN
5022 HETTICK KATHY
1284 HEUER, STEPHEN
6376 HEUSCHER, ERIC
7979 HEUSELER, A E
6339 HEYNER, ELONNA
6340 HEYNER, NORMAN
8749 HEYS G C
8001 HIATT MILDRED
7498 HIATT, ROBERT
8413 HIBBARD, MEL
6267 HICKAM GREGG
6522 HICKAM, WADE
4369 HICKMAN LOIS
7350 HICKS, DALE
8593 HICKS, JACKY
8587 HICKS JENNIFER
8592 HICKS JIM
7917 HICKS KAREN
9309 HIDENRICH EDNA
9307 HIDENRICH, HARRY A
6858 HIDENRICK, ERIC C
11739 HIETT, JEFF
9823 HIETT WILLIAM ROY
3946 HIGGINS GORDON
2362 HIGGINS, MARK
926 HIGHT, GARY L
1688 HIGMAN CHERI
3457 HILBORN DOUG
5446 HILD, BOB
5444 HILD MARCIA
5077 POWELL, DONALD
8287 POWELL, DOUG
1447 POWELL GERALD
11017 POWELL, GREGG
8285 POWELL, KATHY
5244 POWELL, MARY K
10762 POWELL NANCY ANNE
10595 POWELL TISHA
5465 POWELL TOM
1321 POWELL, WALTER R
1292 POWERS BRETT M
1293 POWERS BRUCE L
10961 POWERS, CLAIRE
11067 POWERS, PATRICK
6269 POWERS, ROBERT
8878 POWLICKI, MARK
3950 POWNER, CINDY
4010 POWNER, LES
4968 PRATHER, ED
7048 PRATHER, GERALDINE
8690 PRATT, DEBBIE
1833 PRATT, GEORGE
5081 PREDMORE, R
3279 PRENDERGAST, RICHARD
6754 PRENGEL, GERALD D
3430 PRESSENTIN EDWARD
4554 PRESSEY, CHARMAINE E
4553 PRESSEY, DINO R
7068 PRESSLEY, DAVID W
7067 PRESSLEY NELLIE
3942 PRESTON LYLE
7607 PRESTON MAURICE
3941 PRESTON, SHIRLEY
2340 PRESTRUD, STUART H
7192 PRETZ, MIKE
7193 PRETZ ROBIN
609 PREVOST MONICA
7865 PRIAMEAU, GAYLE
2269 PRICE, BETTY
11155 PRICE, CAROL
4929 PRICE, COLLEEN
4350 PRICE JEFF
7912 PRICE MICHAEL
1714 PRICE, MRS CLIFF
4836 PRICE STEVE
1025 PRICE THOMAS
3753 PRICE JR , CLAYMON
2516 PRICHARD, SUSAN
11064 PRIDEMORE, PHILIP
10380 PRIDES, LYLE
9908 PRIEETT TEX
9171 PRIEM, DAN
2283 PRINC LORETTA J
5205 PRINCE, CARL
8825 PRINCEHOUSE, D F
1381 PRINDLE RONALD W
2964 PRINTZ PEGGY J

11706 BARNES, CLAUDE
9841 BARNES, DARREL E
11700 BARNES, DAVID
11704 BARNES, DENNIS
2796 BARNES, J
9912 BARNES, JEFF
11599 BARNES, JEFF
8161 BARNES, JOHN R
3100 BARNES, KELSEY
151 BARNES, LEE F
1635 BARNES, NICHOLAS
5891 BARNES, ROBERT O
7375 BARNESS, LEONARD
7088 BARNEY, RAY
9119 BARNHART, A J
9109 BARNHART, ANN
6616 BARNHART, D C
4854 BARNHART, DAVID
7527 BARNHART, EARL
11610 BARNLER, JEFFRY
11356 BARON, THOMAS
3220 BARONE, ANTHONY
3039 BARONE, LAWRENCE
7552 BARONESS, EDNA
695 BARR, KENNETH J
11435 BARRETT, DANIEL
8847 BARRETT, DONALD
8947 BARRETT, GARY
385 BARRETT, JAMES A
3387 BARRETT, LOUIS
11804 BARRETT, STEVE
2443 BARRIBALL, JOHN
2144 BARRY, M VINCENT
9091 BARRY, MADELYN
7379 BARSNESS, DON
6957 BARSON, RICHARD
11010 BARSTAD, JENNIFER
4906 BARSUGLI, JOESPH
4336 BARTELLS, KENNETH J
2612 BARTER DOUG
10796 BARTER VERA
4922 BARTH MARY
11848 BARTH, PERRY
7126 BARTHOLOMEW, B G
1002 BARTHOLOMEW, DANIEL P
2412 BARTHOLOMEW, JAY
9533 BARTLEMAY, ZELDA J
10103 BARTLETT, ALICE
4677 BARTLETT, BARRY
92 BARTLETT, JOHN R
9961 BARTLETT, KAREN
10046 BARTLETT, RITA R
2873 BARTLEY, DAVID
11864 BARTOLAT, EDWARD
10386 BARTON, DON
6624 BARTON, JAMES
10525 BARTON, KAETHE
5445 HILD, ROB
8760 HILGER, FRANK
11686 HILL, ARCHIE
6353 HILL, BRENDA
927 HILL, BRUCE
10758 HILL, CARRIE
3426 HILL, EDMUND
3318 HILL, EDWIN W
3644 HILL, EVELYN
9716 HILL, GREG
10563 HILL, GREGORY
9321 HILL, JEANETTE
3798 HILL, JEFF M
6342 HILL, JONATHAN
510 HILL, MELVIN E
9628 HILL, PATTI
2637 HILL, STEVEN
9275 HILL, THOMAS G
3356 HILLEARY, ANNE
3010 HILLEARY, JANE K
650 HILLEARY, THOMAS K
5029 HILLESLAND, SCOTT
3240 HILLIS, BOYD
1032 HILLIS, MICHAEL
1203 HILLMAN, KEN
5006 HILLS, MYLES
9957 HILLS THEOR M
2800 HILLSTROM AJ
585 HILLSTROM, BEULAH
9204 HILMO, BERT
9205 HILMO, DOROTHY
11291 HILT, BOB
3307 HINCHEN KEVIN E.
4924 HINCKLEY, DAN
3201 HINDERAKER, DOROTHY
8675 HINES, AMBER
11594 HINES, BARRY
8677 HINES, DUSTEN
4636 HINES JR , ED
1353 HINGSTON JAMES A
654 HINKHOUSE JIMMY D
7582 HINKLE, BEN
376 HINKSON, KELLIS M
10547 HINRICHS, ROBERT
6447 HINSHAW, CHARLES
8618 HINT, BOB
4564 HINTZE, ANNE
1180 HIREMATH, VIVEK G
2295 HIRSCH SUSAN
10695 HIRSCHLER, GERALD
20 HIRSH, NORMAN D
6909 HIRST, DAN
7145 HIRZ, PAUL D
1607 HITE, ELIZABETH
2458 HJORT, TOM
10815 HO, DAVID
6409 HOA, DONG
11844 PRIOR, H R
698 PRITZL, PAMELA
77 PRIVETTE, GLORIA
9801 PRIVETTE, ROBERT L
7915 PROCTER, WALTER
1488 PROCTOR, KEVIN
10116 PROEHL THOMAS
5227 PROPER, RON
2094 PROPER, RONALD L
2631 PROUDFOOT, MARY
9656 PROULX, ALEXANDER (DON)
11018 PROUTY, BRET
4978 PROVISO, AUBREY
6063 PRUCZINSKI, RICHARD
6072 PRUCZINSKI, RITA
8397 PRUITT, CHRIS
9868 PRUITT, ELAINE
8098 PRUITT, JANET
10277 PRUITT, TIM
11147 PRYOR, MARGARET
6721 PRYSE TED
1407 PRYSZLAK, GINA
3157 PSARADELIS, SEAN
10894 PSYK, CHRISTINE
11461 PUCKETT JR DALLAS
8012 PUGH CINDY
7700 PUGH, HENRY JESSE
932 PUGH, LES
7701 PUGH, MRS HENRY
8008 PUGH, ROBERT E
4781 PUGIN, CAROLINE
4755 PUGSLEY BILL
8759 PUGSLEY, RON
342 PULLIAM TERRELL
5774 PULLUM, EARL
3197 PULSIFER, JANIE
3555 PURCELL, NANCY L
10632 PURDY ROLAND
3056 PURINTON, DARCY
4806 PURTTEMAN, JESTER
3193 PURTTEMAN, JOHN
4803 PURTTEMAN, JUDY
4804 PURTTEMAN, LINDA
4805 PURTTEMAN, LONN
11732 PURTZER, MARK
9032 PUTMAN, JIM
7417 PUTNAM, NORMAN
6082 PUTNAM, ROBERT
1798 PUTNAM SHOENA
5574 PYATTE, HAROLD
808 PYE, ALEXANDRA
8391 PYL JEFF
8998 PYL, KARL
6296 PYLES, LES
95 QUAIL, DANIEL R
6675 QUAL, ANN MARIE
3988 QUAL, DAVE

10368 BARTON, MICHAEL M
1260 BARTON, RUTH S
7810 BARTON, SHANE
9181 BARTSCH, WIN
11938 BARTSCH, WIN
10929 BASKER, ANNE
1010 BASKETT, ROBERT
5823 BASLER, DON
1364 BASS, ANNA
8436 BASS, GARY
3889 BASS, KEVIN
8435 BASS, MARIE
8871 BASS PERKINS B
10438 BASSETT, BEVERLY
8971 BASSETT, CHERYL
3648 BASSETT DONNA
8972 BASSETT LISA
5709 BASSETT, W E
11202 BASSLER THOMSON S
9346 BASTIAN, JOHN
4515 BATCHELOR,
6876 BATES, BRUCE
4446 BATES, CLIFF
374 BATES, DWIGHT W
3611 BATES JIM
2821 BATES, KATHRYN M
4445 BATES, MAVIS
230 BATES, MRS ELSIE
3412 BATES PATRICIA
7657 BATES, SCOTT
1076 BATIK, MD, MPH, ODETTE
7177 BATSON, KATHRYN
11802 BATTAGLIA ARTHUR PAUL
5374 BATTEY, RUSSELL
4909 BATTISTI, DAVID
7733 BAUDER, LEONARD
6463 BAUER, CAROL
9997 BAUER, CONNIE
8868 BAUER D A
8867 BAUER HERBERT E
9260 BAUER, MICHAEL
8834 BAUMAN HAROLD
10091 BAUMAN, JEFFREY S
2001 BAUMAN LARRY
2266 BAUNTON BRETT
9279 BAUSTIAN, MARTY N HWY 99
6298 BAXTER, ARTHUR
9556 BAXTER, CHRIS
10605 BAXTER, ED
2817 BAXTER MARIE L
3006 BAY, ANDREW
4571 BAYER S
2574 BEADLE, DON E
3492 BEAN, HAROLD C
9642 BEAN, RUSS
1772 BEAR GLASS LEE
11694 BEASLEY, MICHAEL
9135 HOARD, GREGORY
11810 HOBERTH, ROBERT
1992 HOBSON, HAROLD W
4644 HODGE, FRANK
1295 HODGE, PAUL
10524 HODGEMOORE, LAURA
7440 HODGES, EDWARD
7553 HOEKSTUA, STACY
11887 HOEY, MELYNDA
10439 HOFEDITZ, DAVE
9954 HOFEDITZ, JUDITH K
102 HOFER, JESSICA
6765 HOFER LUCILLE
8667 HOFFER, GERRY
4216 HOFFMAN, DENNIS
7456 HOFFMAN, KENNETH
3977 HOFFMAN LANCE K
6972 HOFFMAN, LINDA
8809 HOFFMAN NANCY
2831 HOFFMAN, RANDY
6477 HOFFMAN, ROBERT
8803 HOFFMAN RON
11369 HOFFMAN-NELSON MARI
10601 HOFFMANN, WALTER
8570 HOFFNER HARVEY
1019 HOFTELL, KAREN
1033 HOFTELL WARD
3370 HOFUTATTER BILL
3499 HOGAN, JAMES T
6105 HOGAN, JIM
809 HOGAN, JOHN
1313 HOGAN, PAUL J
9049 HOGE DON
2853 HOGEBOOM, WILLIAM & NUNCI
5659 HOGINS, WAYNE
4125 HOGLUND, CARL W
4126 HOGLUND MARJORIE
7819 HOGSETH, EARL
7821 HOGSETH VICKIE
10449 HOHINZ LEE
11771 HOHN, SUSAN
11410 HOKANSON CINDY
1764 HOLBROOK, DALE
8017 HOLCOMB ANNA MARIE
8016 HOLCOMB STEPHEN L
6638 HOLDEN JEFF
5669 HOLDEN, JOHN
8481 HOLDEN RICHARD F
788 HOLDER, J B
1489 HOLDERIED, PEGGY
1494 HOLDERIED, WILLIAM
6161 HOLDT RON
6861 HOLETS, STEVE
4624 HOLLAND, LARRY
4625 HOLLAND, NIKKI
6471 HOLLAND TERRY
5607 HOLLANGER, DONALD
6704 QUAL, DAVID
6719 QUAL, JANIS
6674 QUAL, LISA
6705 QUAL, MONTE
6630 QUAL, VERN
10919 QUAN, JEAN
5390 QUANTRILLE, DICK
367 QUESNEL, ROD
812 QUESTER, NIKI EIR
11339 QUICK, ROBERT
3348 QUIGLEY, BETH
3406 QUIGLEY KEVIN
11024 QUIGLEY SUZANNE
11720 QUILAN, TOM
10068 QUILLIN, TIM
6481 QUIMBY ALICE E
644 QUIMBY, WAYNE
9151 QUINBY EDWARD
5138 QUINDEN CHRIS
5135 QUINDEN COLLEEN
11727 QUINLAN, RICH
9554 QUINN, ASHLEY
11388 QUINN, CAROL
11296 QUINN, CORY
7891 QUINN EARL
156 QUINN, KEN
2427 QUINN, MICHAEL E
7893 QUINN PHYLLIS
11162 QUINN, THOMAS
7342 QUINT, DONALD A
185 QUINT, RICK
7332 QUINT, TRISH
3204 RABE, BRUCE W
8504 RABY, ELAINE
8503 RABY, JAMES
3085 RACE, RITA
9835 RACHOR, MARK
6792 RADCLIFF DALE
6244 RADCLIFF, MARY LOU
8429 RADCLIFF, WAYNE
7529 RADCLIFFE JOANNE
7505 RADCLIFFE, JOHN
10764 RADEBAUGH GEORGE
7653 RADEMACHER, THOMAS
6548 RADFORD, GEORGIA
2325 RADFORD, JEFF W
8564 RADFORD, ROBIN
9680 RADOWITZ STEVE V
10483 RADVEZY, MAYA
3017 RADY, B J
4902 RAGA, GRACIELA
4884 RAINES, CHARLES
3651 RAINS, DEBRA
4008 RAINWATER, LOIS
3987 RAINWATER MIKE
2699 RAINWATER, PEARL
5641 RAINWATER, WILBUR

10511 BEASLEY, THOMAS
3501 BEATON, DAVID
5007 BEATTY RAYMOND
2170 BEATY, GEORGE R
10302 BEATY, JAMES
4967 BEAUDETTE, FRED
10494 BEAUMON, FLO
10520 BEAUPAIN, PETE
388 BEAVON, FRED
6528 BECEY, MR
11604 BECHOID, DARRELL
8232 BECHTEL BOB
6125 BECHTRA, BOB
1907 BECK, MOLLY
2104 BECK, RONALD J
7236 BECKDOL, MARY LOU
7233 BECKDOL, RALPH
806 BECKER, BILL
3235 BECKER DUSTY
8622 BECKER, JIM
11644 BECKER, JOHN
11780 BECKER, LAWERENCE
3768 BECKER, LOUISE
597 BECKER, ROBERT E
9904 BECKLEY, PATRICK C
3617 BECKMAN, IRENE
4777 BECKMAN, SAM
9764 BECKSTROM KENNETH L
14 BEDARD, VAL
8301 BEDEN, JEFF
945 BEDENO, B
10272 BEDIRIAN, JESSE
11316 BEDNER, DAVID
588 BEE, DAMON
3509 BEEBE, CHARLES
2707 BEECH, DANNA
451 BEECH, DAVID
2704 BEECH, WAYNE J
7780 BEECHER, CAROLYN
9487 BEECHER, DAN
1749 BEED, LINDA
7683 BEEDLE CLIFFORD A
7684 BEEDLE MARJORIE A
356 BEEMAN, DOROTHY
401 BEENHER, CARMEN
4318 BEERBOWER, DALE
5821 BEERMAN, JEAN
7247 BEERMAN, JOHN N
1618 BEESON, BARBARA
5252 BEHME, SHERMAN E
11308 BEICH, DENNIS
11521 BEIGHLEY, RICHARD
11523 BEIGHLEY, WAYNE
3227 BEIL, KENNETH
7586 BEKINS, MARTIN L
599 BELCHER, SANDRA A
7477 BELFORD, CYNDIE
1656 HOLLENBECH, R CHIC
1142 HOLLENHORST, PHIL
193 HOLLINGER, CHRISTINE
838 HOLLISTER, ALICE S
518 HOLLISTER, GREG T
2766 HOLLO, VERN
894 HOLLOWAY, ANTHONY
5495 HOLLOWAY, CHARLES D
931 HOLLOWAY, ED
11500 HOLLOWED, JOHN
11488 HOLLY, JIM
11428 HOLMAN, JOHNNY
4561 HOLMES, JAMES T
11263 HOLMES, JENNIFER
1436 HOLMES, JUANITA E
11553 HOLMES, STEVE
9417 HOLSCHER, AARON
6458 HOLSCHER, CAROL
9418 HOLSCHER, CHRYSTAL
9415 HOLSCHER E B
6456 HOLSCHER, LEO
9414 HOLSCHER RONALD
5241 HOLSHOUSER, CHARLES K
9025 HOLT, GARY M
659 HOLT, KAREN
9027 HOLT, LINDA T
4870 HOLT, LORI
7634 HOLT TIM
9268 HOLTEN, GAY
4911 HOLTON JAMES
8399 HOLTTUM, JAMES
8395 HOLTTUM, TINA
5704 HOLWEG, DICK
4111 HOLZ, JOHN
5238 HOLZER, DAVID J
8513 HOMMEL, RAMONA
2841 HOOD, JAY
3713 HOOD JIM W
7260 HOOD, MARVEL
6355 HOOD RICHARD
6357 HOOD, VIRGINIA
1492 HOOK, DAVID
17 HOOK, DAVID L
7217 HOOKER ANGELA
268 HOOKER, GENE
6986 HOOKER, SCOTT
6985 HOOKER, STACI
7215 HOOKER, TOMMY
2038 HOOPER, CHARLES G
6118 HOOPER, D R
6119 HOOPER, RAMONA
5771 HOOVER, HANK
1195 HOOVER, JEFFREY
9952 HOOVER, KATHERINE
10984 HOOVER, MARY
10649 HOOVER THERESA
5139 HOPE, MARK
3657 RALEY, N S
621 RALLS ELIZABETH L
7647 RALO, ROBERT
2513 RAMBERG, JUDITH
2690 RAMBOW, CHARLES H
2567 RAMSEY, DEANNE E
9727 RAMSEY, GARY
2568 RAMSEY, RICHARD L
63 RAMSEY, ROBERT W
4779 RANCH, JOAN
4780 RANCH RICHARD
6874 RAND, DOUGLAS
8983 RANDALL, GAIL
8993 RANDALL, JIM
7214 RANDALL, MARILEE
7273 RANDALL, MICHAEL
6372 RANDEL, DOUGLAS
4669 RANGER, VIRGINIA M
493 RANKIN, BARRY
957 RANKIN, STEVE
4137 RANKIN TROY M
10944 RANNEY, GEORGENE
6631 RANSBOTTOM, GARY
6710 RANSBOTTOM JUDY
6709 RANSBOTTOM SHERYL
3178 RANSMEIER, DENIS S
1713 RANTZ, RICHARD
5830 RAOHIS CHRIS
7104 RAPER ROLLIE
8254 RASCHKO, ANNE
8255 RASCHKO, MARY
8259 RASCHKO, NANCY
9191 RASCKKO, TIMOTHY
3687 RASHOFF, KANEY
9694 RASMUSSEN, MARK
5426 RASMUSSEN, ROBERT
3228 RASMUSSEN, SHAREN
10976 RASMUSSEN, SUZY
4889 RASNUSSEN, TIM
1848 RATHBONE, JAMES
2803 RATHJEN, RODNEY A
1213 RATLIFF, HAZEL
1212 RATLIFF, TOM
7129 RATZLAFF GARY
1561 RATZMAN, HOWARD
8922 RAU, DAN
2306 RAUCH, PAUL
10106 RAUCHER STANLEY
9673 RAUTIO, TED
10255 RAWLES SUSAN
5296 RAWLINGS, ANITA
5300 RAWLINGS, BRENDA
5295 RAWLINGS, M H
8535 RAWLINS, ELIZABETH J
8534 RAWLINS, PAUL R
141 RAY DALE A & EILEEN
8154 RAY, DAN

9388 BELISLE, HOWARD
10503 BELL, BARBARA
5555 BELL, BOB
3367 BELL, DALE
5417 BELL J H T
8315 BELL RICH
2327 BELLAMA, LIVIA
10726 BELLAS, CHRISTINE
8619 BELOIT, JEFF
10676 BENDA LEE E
6555 BENDER JACK V
11912 BENDER LAURIE
236 BENE CHRISTOPHER
3114 BENEDICT, DORIS
3115 BENEDICT JOHN
9631 BENGERS, MYRON C
2647 BENGSTON, LISA
7241 BENHAM JAMES
784 BENHAM LORRAINE
7250 BENHAM JR BERT R
9310 BENI, GENE
1768 BENJAMIN BRIAN
4421 BENJAMIN DOROTHY
4412 BENJAMIN WESLEY
8944 BENJESTORF, SUNDANCE
3171 BENN MARTHA
11832 BENNETH JOHN
7997 BENNETT, AL
8653 BENNETT BRIAN
2137 BENNETT DAVID
8963 BENNETT DAVID
6870 BENNETT, JAMES E
8651 BENNETT JUDITH
2785 BENNETT MALINDA R
6333 BENNETT, MARILYN
2782 BENNETT, MICHAEL S
8652 BENNETT, N L
8970 BENNETT, PATTY
7281 BENNETT PAUL
4524 BENNETT, ROBERT
5923 BENNETT T
8657 BENNETT, VICTORIA
11037 BENNETT VICTORIA R
3070 BENNETT WESTLEY T
11677 BENSCH JON
2160 BENSON BERT
4595 BENSON HAROLD L
2521 BENT, JULIA
9505 BENTLEY, ELBERT D
11872 BENTLEY, J D
4602 BENTLEY, JUANITA E
2204 BENTLEY OLIVER V
6252 BENZING, RON
6830 BERG, BRETT
1437 BERG DARYL M
5949 BERG MARK L
8422 BERG, WEDELL
11326 HOPE (HORSEBACS), STEPHANIE
3610 HOPKINS, CARL
1835 HOPKINS H G
10472 HOPKINS, JOE
4817 HOPKINS, JOHN
323 HOPKINS, PAUL J
4502 HOPKINS ROB
69 HOPKINS DDS, ROBERT S
5629 HOPP, AMANDA L
6302 HOPP, BETHANY
5666 HOPP, JOHN
1406 HOPPE-LEONARD, JANET
1416 HOPPE-LEONARD, RENNY
10755 HOPPER, M L
6440 HOPSON RICH
8590 HORAT, JOANN
8591 HORAT MIKE
5478 HORDYK, HEIDI
5650 HORDYK LES
5480 HORDYK SONIA
2921 HORN, DEBORAH
9535 HORN JEAN
3845 HORN LEONARD
3930 HORN, PEGGY
1520 HORNBY, JAMES
8190 HORNER DENEL
860 HORNER WAYNE A
364 HORNGREN SCOTT
10835 HORNUNG, JACK
8680 HORST KATHY
1567 HORSWILL EMILY
10909 HORSWILL, STEVE
11422 HORT CHUCK
1722 HORTON BOB
1869 HORTON DEREK J
9551 HORTON DON
1879 HORTON, JUDI
5352 HOSFORD, JOHN A
2048 HOSHAW, TONY A
872 HOSKING, DANIEL
2931 HOSTETLER R BRENT
604 HOTLEN PHIL
10473 HOTTLE, CAROL
2548 HOUDEN CHRISTINE J
1328 HOUGARDY ARDYTH
5557 HOUGEN, SAMUEL E
2864 HOUGH BETTY J
8082 HOUGHAM, BILL
11455 HOUGHAM, DORAN
7156 HOUGHTALING, LLOYD L
6206 HOUSEMAN, JENNY
6207 HOUSEMAN, STEVE
5762 HOUSER, GARY
5342 HOUSER JERRY
7492 HOUSER, RON
10712 HOUSLEY, DAVID
11681 HOUSTON, ROY
4620 RAY, DONALD L
9143 RAY, HARRY E & CLAUDIA
4703 RAY, JOHN
11183 RAY, RICHARD
7292 RAY, VERNA
6114 RAYBURN, LARRY
7103 RAYL, BRIAN
2498 RAYMOND, CHARLES
11276 RAYMOND KAREN
4858 RAYROHL, MARTIN
10250 REA, JOEL
1665 READING, DR & MRS RODNEY
7665 REAGAN, RONALD
11904 REAY, BONNIE
3022 REBERS, JOHN
3547 RECTOR, JOHNATHAN L
8512 REDA, GARY
4208 REDDINGTON, T G
4221 REDFIELD TERESA
3698 REDIGER, BEN
9306 REDISKE, DON
5412 REDISKE EDWARD
9360 REDISKE MRS
6007 REDISKE, TINA
6500 REDLACZYK CARL H
11324 REDLICH LYNN
11622 REDLIN, MARK
5984 REDMOND NINA
8781 REECE, CLAYTON A
4119 REECE DENNIS
3931 REECE, JAMES
5541 REECE, JAMES L
3771 REECE JOE
3745 REECE, MARTIN
9577 REECE, MILDRED I
3924 REECE, STEVE
5460 REED BRENT
9023 REED DANIEL LEE
2906 REED, GAYLE
2991 REED GLEN
9026 REED KATHY TAYLOR
4977 REED, LAWRENCE
8310 REED, LLOYD
10197 REED, PHYLLIS
10086 REED RICHARD J
2860 REED SHARON
10884 REED, STEVE
10718 REED, WALDO
4344 REED, WILLIAM
11697 REED, WILLIAM
3048 REEDER, BEVERLY
6299 REEDY, STEVE
11527 REELER ROBERT
5012 REESE DAN
7533 REESE JON
7726 REESE, LYLE P
2355 REEVE, SALLY

8912 BERGAM DARRELL
9608 BERGE, DONALD A
4638 BERGE, KEN
9264 BERGE, MARIAN
5683 BERGE, TRUDY
2941 BERGEN, ANDREW A
1410 BERGER, ROBERT L
10336 BERGER, RUTH
1812 BERGER, TONY
3215 BERGGREN ELIZABETH
5481 BERGGREN MRS
9125 BERGIN BETTE
1948 BERGLUND CHRISTOPHER
1955 BERGLUND, MARK
1947 BERGLUND SANDRA
2932 BERGLUND, STEVEN M
10917 BERGMAN, FLOYD R
10696 BERGMAN, MARGARET
1942 BERGMAN, ROBERT
9572 BERGSTROM DON
2977 BERKOW, LUCILLE
76 BERMAN LEONARD
912 BERNDT RICHARD
2562 BERNDT, STAN
43 BERNHARDT, LIN
2997 BERNHEIM, STEPHEN A
4893 BERNICK, PAUL
9676 BERNSENG, MYRON
11640 BERNTHAL, CAROL
10358 BERQUIST, BO
10328 BERQUIST, KIM
1759 BERRETH TROY
11116 BERRY ALICE
9618 BERRY ARLENE
6952 BERRY, BARBARA
2549 BERRY, C M
5476 BERRY, HOWARD
8816 BERRY, JANET
9613 BERRY, LEROY
5433 BERRY, LINDA M
6951 BERRY RUSSELL
5432 BERRY STEVEN A
9076 BERSLEY GLEN
6230 BERTELSEN, CAROL
6231 BERTELSEN, HARRY
10229 BERTHELOTE, GUY
11834 BERTHELOTE T F
1092 BERTSCHI RUDOLPH L
5655 BERYN, RAYMOND
4722 BESS, RALEIGH
4720 BESS JR, CL
11557 BEST, LYNN
8295 BETTGER MARK
9643 BETTS, DON
6934 BEVEN, ROBERT
11628 BEVIS CARL
2938 BEYER, RICHARD S
9000 HOUTUM, PENNY
6790 HOVE, SHARON
2655 HOVEZAK, CYNTHIA
2641 HOVIS, MICHAEL T
3695 HOVLAND, CURTISS
7826 HOWARD, ARCHER H
4274 HOWARD BETH
9763 HOWARD, BILL
11182 HOWARD, CHRIS
10704 HOWARD, CURTISS E
3827 HOWARD, DENNIS
9229 HOWARD, FRED
4112 HOWARD, GERALD E
4167 HOWARD JAROLD
3748 HOWARD, JOHANNA
6332 HOWARD, MARGE
11696 HOWARD, SHERRY
4064 HOWARD, SUSAN
687 HOWARD THERESA A
9302 HOWARD VIRGIL
1733 HOWE BOB
4623 HOWE, MICHAEL
4074 HOWE ROBERT
9558 HOWELL ART
8576 HOWELL, BOB
5203 HOWELL COLIN
5192 HOWELL, DONNA
7812 HOWELL DOUG
5202 HOWELL, JESSE
5201 HOWELL, KATHY
5191 HOWELL, KELLY
5856 HOWELL, KEN
2024 HOWELL, LANCE
5199 HOWELL, MICHAEL
349 HOWELL, VICTOR
2453 HOWER, ARON
2456 HOWER, HERB
2455 HOWER NANCY
2454 HOWER, TIM
4256 HOWERTON, SHARON
2279 HOWISEY, MARGARET
6636 HOWLETT, JIM
2183 HOXIE, NORMAN
10594 HOYER, GAIL
10623 HOYT GARY
1248 HOYT, KENNETH L
1784 HOYT SANDRA
2381 HOYTE, ERIC W
2593 HOYTE, VIRGINIA
10443 HSIONG, CHOU
344 HUARD GREGORY P
8941 HUATARI SCOTT
1974 HUBBAND S K
11087 HUBBARD BRUCE
11749 HUBBARD KEVIN
5760 HUBBS, JOHN
555 HUBER CORA
10564 REEVES, CHRISTOPHER
11464 REEVES, GARY
11417 REEVES, KITTY
341 REFF, DAVE
3936 REGIMBAL CHERYL
9163 REHFIELD DEANNA
10954 REICHEL RON
1218 REICHMANN, CHRIS
1206 REICHMANN, LOYCE
10513 REID, BRIAN
10875 REID, BRIAN
11425 REID, CYNTHIA
3042 REIF, HERBERT & ANABEL
2073 REIMER, MICHAEL D
2430 REIN, CRISTY
913 REINHART, A TROY
10097 REINHEIMER JILL
2070 REINKE, HENRY
5397 REINKE, W D
11786 REINKE JR , ALBERT
1563 REINKING R H
11676 REINMUTH, KENNETH
1073 REISEN, CRAIG
8562 REITEN, MARK
4004 REITZ DONALD H
10612 REMICK, PETER
6992 REMINGTON, ROD
862 REMINGTON, ROD L
8089 REMITZ, DON R
9085 REMLEY, ANDREA
9086 REMLEY ANGELA
9084 REMLEY, BRIAN
6743 REMLEY, FRANK
6793 REMLEY, PAMELA
6454 RENCH, CHERIE
6451 RENCH, DENNIS
6453 RENCH, JEANINE
10640 RENEMAN, TRUDY
11146 RENFROW BRENT
529 RENNICK, MARY
2267 RENNIE, CLAYTON W
5420 REQUA, JOANN
5419 REQUA, LOUIS
3449 RERUCHE, NANCY
8184 RESIDE LYNDEN
7183 RESSLER, CAROLYN
7182 RESSLER, DAVID C
10320 RESTAD, BRUCE
845 RETHERFORD, FRANK
292 RETHERFORD KEN
259 RETHERFORD, SYLVIA E
4166 RETTENMIER ROSS
7580 REUBENS, JAMES A
10164 REUSSER, DAVID
3834 REUWSAAT, BUTCH
1136 REUWSAAT, CLARENCE
10266 REVEL, DYACK

10679 BEYERS WILLIAM B
11784 BI, DON
10857 BIALEZ, PETER
8417 BICKFORD, BURL
8414 BICKFORD, EARL
8929 BICKMORE, LARRY
3082 BIDDULPH, JOHN
6525 BIDWELL, BELDEN
6179 BIENDARA, P
244 BIERNE, JAN
243 BIERNE LARRY
3675 BIESECKER, ROB
2067 BIGAK, BERNARD
10720 BIGELOW, DENISE
361 BIGELOW, GRACE E
3359 BIGELOW, LOIS
3229 BIGELOW, TOM
10739 BIGELOW, VIRGINIA
11273 BIGGER, C M
7718 BIGGERSTAFF, KAREN
4584 BIGGERSTAFF, LINDA
10997 BIGLER, DORTHY
2287 BIGLEY, JENNIE
10641 BILDEN, KATHRYN
10471 BILDER, MEGAN
10599 BILLESBACK CAROL
336 BILLINGS, BRIAN
5746 BILLINGS, KANDY
3880 BILLINGSLEY BRETT
2077 BILLINGSLEY SCOTT
2076 BILLINGSLEY, SONIA
4128 BILLMAN JR , JACK R
5063 BINCKLEY TERESA
5067 BINCKLEY, WILLIAM
9653 BINDNER, LARRY
8246 BINGHAM, JIM
9518 BINKLEY, DON
10993 BINNIAN ANN
7366 BIRD, BOB
3325 BIRDT, ELEANOR & GEORGE
2621 BIRKEL, KEN
128 BIRKNER, DAVID
4509 BIRLEY DONN
4205 BIRLEY, REX
5324 BIRN MARTIN
3378 BIRNBAUM, HANK
2386 BISHOP, AUDRA J Y
9232 BISHOP, BRAD
2757 BISHOP DAN H
1636 BISHOP, IVY
10843 BISHOP, LORI
1949 BISHOP, ROBERT
2996 BISSELL NANCY
6433 BITTERLING, DON
7978 BITTERMANN, SCOTT
1857 BITTNER, NEAL
10213 BJORKLUND, CINDY
9220 HUBER, DALE
3368 HUBER, MARY KAY
3211 HUBER, NEIL
9612 HUBERT, FLORENCE E
9632 HUBERT, WILLIAM R
10287 HUDDLE JR , JERRY H
689 HUDSON, NANCY
10685 HUDSON, LARRY
3274 HUDSON, LEROY
9998 HUDSON, LYNN
2008 HUEFFED, TOM M
3571 HUEY, DAVID
11543 HUEY, DIANE
3270 HUEY, DIMA
8757 HUFF, STEVE
5868 HUGGINS DOROTHY
1715 HUGGINS, LES
5892 HUGGINS, ROLAND
8617 HUGHES CHRISTOPHER
2739 HUGHES, EMRYS
6558 HUGHES, EVAN
1982 HUGHES, IRENE
8772 HUISMAN, GARY
5473 HULBERT, RUSS
4810 HULBERT, TOM
5403 HULETT, VILMA
2376 HULING, DON
6804 HULL, BOBBY
7534 HULL BRADLEY
2080 HULL, FRANK M
6257 HULL, LLYOD
7532 HULL, S
8440 HULST ELWYN R
8489 HULST JO ANN
5162 HUMANN, EDITH
5161 HUMANN, KAY
4821 HUMANN, STANLEY
11906 HUMANN, STANLEY
9243 HUMANN, THOMAS
5163 HUMANN, WILLIAM
4660 HUMBARGER STEVE
11373 HUMMEL, TODD
911 HUMPHREY, BARBARA JO
6202 HUMPHREY, GLEN
9669 HUMPHREY, IDA M
908 HUMPHREY, MONTE RAY
6203 HUMPHREY, NORMA
9671 HUMPHREY, WALTON D
7086 HUMPHREYS, ROGER
7373 HUMPHRIES, JAY
11587 HUNDAHL, C
6132 HUNSAKER LEO
11715 HUNSUCKER, MARY
2665 HUNT, DEREK
1577 HUNT, GREGORY
3177 HUNT, R D
9221 HUNTINGTON, D
6421 REVIS, BERTHA
3689 REXROAD, CHARLES
4503 REXWOOD, BETY
4987 REYES, BRYAN
5048 REYES, DAVID
1402 REYKOAL, GORDON P
7866 REYNOLDS CAROLYNE
6604 REYNOLDS DAN
7864 REYNOLDS, ERNIE
8268 REYNOLDS MIKE
8267 REYNOLDS, SANDRA
6589 REYNOLDS, SCOTT
9955 REYNOLDS, STEVE
6880 RHOADES, CLYDE
4253 RHOADES EDWARD
6879 RHOADES, NANCY
6810 RHOADES, ROBERT
6478 RHOADS, DENNIS
4251 RHODES GWEN
3080 RHODES J
10372 RHODES, JONATHAN J
10761 RHODES, MARTHA
4248 RHODES, VAN
2344 RIAL, JAMES F
3041 RIBE, MALLY K
6289 RICCARDO, LAVERNE
6291 RICCARDO RAY
8523 RICE DENNIS P
11916 RICE, EMMITT
11782 RICE, JOAN
11288 RICE MIKE
7727 RICE RICHARD
8987 RICH, GERRY
8995 RICH, KAREN
9902 RICHARD, CLINT
4009 RICHARDS, BRENT
11748 RICHARDS BRIAN
4483 RICHARDS, CYNTHIA
3246 RICHARDS DAVE
9607 RICHARDS FRANCES
4670 RICHARDS, J L
6073 RICHARDS KEN
5822 RICHARDS M W
11734 RICHARDS, NANCY
5863 RICHARDS SCOTT O
2423 RICHARDSON, A C
2350 RICHARDSON, ALLAN
8524 RICHARDSON, BOBBY
183 RICHARDSON, DENNIS
5797 RICHARDSON, JOHN
182 RICHARDSON, NORMAN
3299 RICHARDSON, THOMAS M,
6356 RICHARDSON III THOMAS
3119 RICHE, BEN
3120 RICHE, KIM
2510 RICHTER MERLE R
5562 RICKAR, TODD M

2845 BJORKMAN, THOMAS
5772 BJORNSON, JOHN
7576 BJORNSTAD, DENNIS
6029 BJORNSTAD, GLORIA
6048 BJORNSTAD, MARLENE
8290 BJORNSTAD, MARTIN
3452 BLACKACIAR, SUE
3817 BLACKEN PERRY
4038 BLACKER, DORENE R
6678 BLACKER, LARRY
4031 BLACKER, ROBERT V
2441 BLACKMAN, JOHN
4428 BLADE, RITA
6970 BLADES, ORVILLE
11106 BLAELOCH, JANINE
3038 BLAINE, ELISABETH
5388 BLAIR, WAYNE
3327 BLAIR, WILLIAM H
3678 BLAKE, BONNIE
5569 BLAKE E D
3230 BLAKE, R D
5436 BLAKELEY, JULIE
4591 BLAKELY, CLYDE
9315 BLAKEMAN, KATHY
4427 BLAKESLEE, HAZEL
11085 BLAKEY, PATRICIA
10307 BLAKLEY, TIMOTHY J
10034 BLANCHARD, BILL
4707 BLANCHARD, JEFF
11709 BLANCHARD, MARK
5627 BLANCHARD, MAUREEN J
10077 BLAND, JEFFREY
6796 BLANKENSHIP, BETTY
7772 BLANKENSHIP CHARLES
6797 BLANKENSHIP, CHARLES T
1936 BLANSFIELD EARL M
8169 BLASDELL, CHARLIE
638 BLATTENBERGER, BETH
823 BLATTMAN, CYNTHIA
820 BLATTMAN, DALE J
369 BLATTMAN, ENA KAY
4 BLATTMAN, JOHN J
2380 BLEAM, DAVID
8078 BLECHSCHMIDT, DUGAN
10933 BLEDSOE STEWART J
8418 BLEICH, DORIAN F
9112 BLEVINS, CRAWFORD
7110 BLEVINS DONALD
9111 BLEVINS, ELSIE
5258 BLIFF, WADE
10196 BLILIE, JAMES
682 BLINDHEIM, ARNT J
8131 BLISS, TERRY R
8053 BLOCK, DAN
658 BLOCKER, MARGOT
10606 BLOCKNIA, RAYMOND
7643 BLODGETT, RICHARD
3308 HUNTINGTON, ELVAN
5306 HUNTINGTON, GARY
7945 HUNTINGTON, RANSOM
10365 HUNTINGTON, SARAH J
7847 HUPP, THEODORE R
6042 HUPPERT, JEAN
6041 HUPPERT, KEN
3090 HUPPUCH, CRIS
5208 HUPPUCH, KIPP
3868 HURD, CHERI
8482 HURD, DAVID N
8477 HURD, VICKI
6152 HURLBURT, KEN
5126 HURLEY, CHUCK
5210 HURN, DARREN
2645 HURN, LARRY
9544 HURN, MIKE
5196 HURN, SHELLEY
11652 HURST, CHRIS
2122 HURST, JAMES R
7859 HURT, VERN
6689 HUSBY, LEONARD
358 HUSCHMANN, BUNNY
10356 HUTCHIN, BETTY A
5148 HUTCHINSON, H H
260 HUTTO, DAVE
7719 HUWE, MARVIN
7578 HUXTABLE MELVIN E
7579 HUXTABLE, VIRGINIA
10865 HYATT ART
155 HYATT GARY
6637 HYATT, JAMES
6718 HYATT, PEGGY
9272 HYDE, KAREN
9242 HYDE, SANDRA
9285 HYDE, TOM
6665 HYELLE, JERRY
7351 HYITON, JOHN
434 HYLTON, SALLIE
6788 HYMAN, MARY
9004 HYMAN, ROY H
8283 HYNES, KEVIN
8289 HYNES, MIKE
4101 IBLINGS, JIM
254 ICE, JOAN E
6956 IDE, DOUGLAS
7253 IDEN, HERBERT
7443 IGARTA, TERESA
10972 IGE, HARRIET
7128 IHLY, SANDRA E
1431 IMBURGIA, DAVID V
5731 IMES, HUGH
2545 IMMERWAHR DON
4849 INCLAN, ERNESTO
10075 INGALLS, PAUL
5218 INGERSOLL, NEIL
3441 INGLIS, MARK
7280 RICKETER, KAREN
228 RICKETT, PETER W
2407 RICKEY, DOROTHY
8610 RICKEY, TOM
4830 RIDDELL, CAROL A
1184 RIDDELL, GILBERT
3821 RIDDLE, JERRY
6363 RIDDLE, KEVIN
5653 RIDDLE ROY
3822 RIDDLE, TERRY
4764 RIDER, FRED W
8863 RIDGE, BARBARA
11337 RIDGE, LAURIE
2662 RIDGELY, TIMOTHY M
11627 RIDGEWAY, JEANNE
6894 RIDGEWAY JOHN
5488 RIECKS ROBIN
11509 RIEDEL, JON
4747 RIEDEL PAUL
195 RIEHL, DEBORAH
1652 RIEMAN, BARBARA
7697 RIEMAN, GARY L
7696 RIEMAN, WANDA
7524 RIESE, DONALD
962 RIFKIN, JO ANN
2626 RIGGLEMAN, NIKI
1302 RIGGLES, RUTH ELFSTROM
9552 RIGGS H E
9866 RIGGS, WANDA
8581 RIGHT HUGH
9943 RILEY ALAN D
3269 RILEY, DANIEL
8658 RILEY, ED
5443 RILEY, JEFFREY
11079 RILEY, MARGEN
5235 RILEY ROBERT W
9093 RILEY, T G
1425 RIM, ROB
6829 RINARD, JULIE
7577 RINCY, SCOTT
7007 RINDAL, BARBARA
7006 RINDAL, LEE
2598 RINDAL, SHARON
11767 RINGER, LEE
11764 RINGER, MARLA
1274 RINGHOUSE, REBECCA A
11830 RINGMAN, DON
1278 RINTAMAKI, MYRA
4675 RIOS, CARLOS
4359 RIOUX, RALPH
2019 RIPLEY, ADRIAN H
4239 RIPLEY, MERLIN
1660 RIPPEY, CLAYTON
6698 RIPPLINGER BERNICE
5727 RIPPLINGER, PETER
5706 RIRIC, TONY
6239 RISDON, GERTRUDE

5314 BLOEMERS, MARK
10969 BLOMBERG, GEORGE
5399 BLOMQUIST, JOHN
6407 BLONDIN, MICHAEL L
5712 BLOOD BRUCE H
10527 BLOOD ROBERT
5121 BLOOM EARL D
10639 BLOOM JAMES
2164 BLOOM MARY
938 BLOOM SHARON L
3265 BLOOMFIELD JANINE
10018 BLOOMFIELD, VICTOR
2952 BLOSSOM ALICE
3623 BLOUIN, TERRY
11907 BLUECHEL ALAN
4442 BLUM SR , JACK
7954 BLUMBENS, BRAD
7959 BLUMBERG DARLA
1664 BLUMENFELD, RENE
6468 BLUNCK, ROBERT
7460 BLUNCK, TERESA
7489 BLY JOANNE
7488 BLY, TIM
3248 BOATMAN BRIAN
5963 BOATMAN, JANICE
5961 BOATMAN ROBERTA
5957 BOATZ, MICHAEL H
10775 BOBBITT VAN
8453 BOBO ALISA ANNE
6949 BOCK JOHN
10350 BOCK RICHARD
8087 BOCK JR GEORGE E
454 BOD CURTIS H
6036 BOD RYLISS
10748 BODE, EMILY
1508 BODEGOM VOLKER
11140 BODENBERG, DAVID
4789 BODT CURT H
6005 BOERGER, HAROLD
4799 BOERGER MARGARET
9305 BOERGER, VICTORIA
4915 BOERSMA P DEE
2394 BOESCHEN ARTHUR
10771 BOESE, GERALD W
2029 BOESENBERG, KURT
304 BOETTNER, FRED
9588 BOGAR ED
5442 BOGART, DONNA
3725 BOGART EDDY
5440 BOGART FRANK
5657 BOGART, FRED
5439 BOGART GEORGIA M
4734 BOGART, KENNETH
4735 BOGART KIM
5687 BOGART NORMAN
7523 BOGGS, RUSS
8980 BOHAN, MIKE
4283 INGRAM, GERALD
11007 INGRAM, J B
8359 INGRAM, JACKIE
6293 INKPEN, WILLIAM
4614 INMAN, MIKE
3646 IRBY, JOHN A
10050 IRBY, STEVE
611 IRELAND, DAVID
8387 IRISH, ZETA
10968 IRVIN, MICHAEL J
3250 IRVINE IAN
11211 IRVING GRACE
11114 IRVING, MICHAEL J
10883 IRVING, STEVE
10311 IRVING, W GRIGGS
10220 IRWIN, WARD
7973 ISAACSON, GARY
7972 ISAACSON SANDY J
7974 ISACCSON DAVE
11036 ISSAEFF KATUSHA
1975 ITTNER RUTH
3390 IVERSEN CADE
9386 IVERSEN, PAT
2515 IVERSON M J
9473 IVERSON, TERRY
2664 IVERSON, THOM
11473 IYALL ROB
8042 JABAAY, ANTHONY H
8043 JABAAY DELORES
8465 JABE, BETTY M
11556 JABERSCH LESLIE
4563 JACK BILL
1771 JACK RAND & DANA
2258 JACKETS MIKE
270 JACKLOVICH BARBARA
2150 JACKSON ALEC
8171 JACKSON ARTHUR G
1958 JACKSON E M
6097 JACKSON EDWIN
2650 JACKSON JUDY
247 JACKSON MARTIN
1862 JACKSON MRS HELEN A
6098 JACKSON, PATTY
5810 JACKSON ROBERT
11914 JACKSON ROBERT
2597 JACKSON ROGER W
8905 JACOBS, BILL
93 JACOBS ELLEN
4220 JACOBS JIM
5153 JACOBS, JIM
10291 JACOBS NANCY
11819 JACOBS NANCY
6711 JACOBS TAMMY
10389 JACOBSEN, BARB
2315 JACOBSEN CRAIG K
6173 JACOBSEN DOUG
6420 JACOBSON, DARYL
7269 RISDON, HOWARD
6240 RISDON IVAN
1661 RISLEY, AREE & DUDLEY
5072 RISOVI, TIMOTHY
1335 RISSE, JEAN
3023 RISSE, STEVEN
1787 RISSER JOHN
7703 RISTINE RONNIE R
10830 RITCHIE, MARJORIE
6110 RITZ DARRELL
6111 RITZ, NORMA
3874 RITZMAN, MIKE
4352 RIVAS, MAGDALENA
2856 RIZEK, STEVE
7446 ROACH, JIM
7282 ROACH KEVIN
7453 ROACH MIKE
2451 ROAL, WILLIAM P
146 ROBART JAMES L
460 ROBB MARSHA GARY
5586 ROBBERT CARL
11343 ROBBI MARC & TINA
3719 ROBBINS MICHAEL
2131 ROBBINS TRAPPER J
5690 ROBBINSON, D L
5550 ROBERSON, BRITT L
2184 ROBERTS ALBERT T
4471 ROBERTS, BERNIE
5123 ROBERTS, BILLY
6826 ROBERTS CHRISTINE
8865 ROBERTS CURT
11868 ROBERTS DON
2284 ROBERTS DOROTHY
446 ROBERTS GAIL
9703 ROBERTS GARY L
6265 ROBERTS JAMES
3199 ROBERTS JO
9590 ROBERTS JOYCE
6039 ROBERTS KRISTEE
5129 ROBERTS LLOYD
6030 ROBERTS MARTY
4012 ROBERTS MICHAEL F
1944 ROBERTS, MICHEAL T
10844 ROBERTS MICKEY
5540 ROBERTS MIKE
11439 ROBERTS MIKE
10893 ROBERTS PAUL
1951 ROBERTS RAY A
11576 ROBERTS RUTH
10451 ROBERTS STEVE
3587 ROBERTS, VHANESTA
7049 ROBERTSON ARCHIE
447 ROBERTSON, CAMILLE
10344 ROBERTSON CAROL
345 ROBERTSON, DAVE
11593 ROBERTSON, DIANNE
4716 ROBERTSON, DONNA

7491 BOHL, DEBORAH
7490 BOHL, TIM
8559 BOHNER, TAMARA
10464 BOIN, BRUNO
5522 BOLAND, J'JENE
9817 BOLAND, JANIE
9776 BOLAND, JERRY
4845 BOLES INGA
8541 BOLIN, GALE A
1232 BOLIN, JAMES
8550 BOLIN, JIM L
4596 BOLING, JAMES D
11028 BOLIVAR, JOHN
11174 BOLLES, DAVID
8241 BOLLMAN, DAVID H
10437 BOLME, AMANDA
8162 BOLSON, BILL
105 BOMMARITO, CHARLES
10383 BONAMY, CAROLYN
4719 BONHAM, DANIEL J
2371 BONIFACI, LEONARD P
2219 BONNELL, ROBERT W
7409 BONNER, BLAKE
7408 BONNER, LISA
7117 BONNER, ROBERT D
2098 BONNEY, JOE
3696 BOOKER, GARY
8788 BOOKER, HAROLD
10724 BOOKER, SUZANNE
4065 BOONE, CHARLES
10135 BOOTH, BEATRICE
7303 BOOTH, DENISE
7302 BOOTH, LARRY
11539 BOOTH, T
1310 BOOTHBY, MIMI T
3333 BOOZE, GEORGE
3383 BOOZE THOMAS
2336 BORBELY LOUIS & BARBARA
3632 BORCHARDT, JOEL
6121 BORCHERS, LENA
6102 BORCHERS, MIKE
2159 BORDEN, PEARL
2167 BORDEN RAY A
10862 BORGESEN, WENDY
8984 BORGESS, BLAIN
3464 BORNSTEDT, JUDITH
11001 BORROMEO, CICERO D
10999 BORROMEO JR CESAR
7858 BORSHENI, DAVID
3232 BORTLE, KATHRYN
10633 BORTLE, KENNETH
4486 BOSLAUGH, R K
2460 BOSLEY, JAMES L
3486 BOSLEY, KEITH
407 BOSNICK, DONALD
6929 BOSTON, BILL
6927 BOSTON, LORETTA
6437 JACOBSON, DAVE
5144 JACOBSON DEB
10470 JACOBSON, ELDON
3667 JACOBSON, JAN
10 JACOBSON, LAWRENCE
11387 JACOBSON, WILBER
170 JACOBUS, DEAN A
10366 JACOBY, ROBERT
61 JACOT, KATHLEEN
9948 JACOVICH, DONALD
7132 JAEGER, GENE A
2185 JAEGER, JIM
10626 JAEGER, TIM
5107 JAEGER, TROY
11540 JAHREN, R L
8547 JAKSHA, DAN L
1433 JALI, RICK
4195 JAMES, CHUCK
707 JAMES DARRELL
3677 JAMES, EDMOND
11322 JAMES, FRANK
10232 JAMES, JEFFERSON B
4842 JAMES, JEWELL
1472 JAMES, JOHN
410 JAMES, ROBERT L
6401 JAMES ROBIN B
8420 JAMES WAYNE E
7471 JAMES, WILLIAM
2205 JAMESON, KEITH
7054 JANICKI, ANN
6998 JANICKI, CATHERINE
7033 JANICKI, LISA
6999 JANICKI MARIAN
6997 JANICKI, MARO
7032 JANICKI, MIKE
7046 JANICKI, ROBERT
6994 JANICKI, STEVE
6996 JANICKI, TOM
6977 JANICKI, WALTER
9194 JANICKI JR , STANLEY
3467 JANKOWSKI LAUREEN
7087 JARMIN, KEVIN
907 JARRELT, BRUCE O
8439 JARVIS FRED
10144 JARVIS, JAMES
8891 JARVIS, JOHN C
11671 JARVIS, RON
1977 JASMER GAY A
8823 JASMER STEVE
10515 JASNIEWSKI, SUSAN
3057 JASPER, BARBARA & DANIEL
1320 JAUCH, CAROLINE
1560 JAY, SHARON
4566 JEANNOT, LOUIS G
10178 JEFFERSON, MERLE
9931 JEFFERSON, PATTI
5543 JEFFERSON, SCOTT J
10819 ROBERTSON, HELEN
11592 ROBERTSON, JAMES
11368 ROBERTSON, JIM
7666 ROBERTSON, LEE
4715 ROBERTSON, LOYD
615 ROBERTSON, SUSAN
2806 ROBINS, TOM
3835 ROBINSON, BARRY
2666 ROBINSON, BETH
6822 ROBINSON, BILL
947 ROBINSON, BUD
11629 ROBINSON, DAN
3764 ROBINSON, KATHLEEN
7181 ROBINSON, LEWIS J
7778 ROBINSON, MAX
7118 ROBINSON, MICHAEL A
7179 ROBINSON, PAULINE
397 ROBINSON, RALPH K
2907 ROBINSON, RANDON W
3407 ROBINSON RANDY
71 ROBINSON, RON, MARTHA
2724 ROBINSON, ROY
1511 ROBINSON, RUSSELL
2957 ROBINSON, W LEE
8361 ROBINSON W LEE
3959 ROBINSON WALT
3833 ROBINSON WALTER
3036 ROBISCH, PAUL A
535 ROBISON ANNE
999 ROBISON, BEVERLY J
152 ROBISON, MARIAN MAE
2550 ROBISON, W T
998 ROBISON WM E
2772 ROCHESTER, KELLIE
5579 ROCHON, CAROLYN
10080 ROCK ROBERT
7777 ROCK, THOMAS
3660 ROCKWELL, BOYD
3676 ROCKWOOD, DEAN
241 RODENHIZER, DAVID W
6341 RODGERS, BERNICE
8297 RODGERS, BRYAN
6352 RODGERS, JAMES
9917 RODLAND, DAVE
9771 RODLAND, SUZANNE
5237 RODRIGUEZ, ANN
6562 RODRIGUEZ, RODNEY
5236 RODRIGUEZ, SUZETTE
4936 ROE, MICHAEL
758 ROEDELL, MICHAEL
903 ROEHL, GARY A
10190 ROENING, MARCUS
3277 ROESLER, COLLIN
8711 ROESLER, MAUREEN M
8710 ROESLER, OLIVER J
8712 ROESLER, RICHARD
5267 ROETCISOENDER, MARK H

3123 BOTHAM, ZANE
11551 BOTHE, BILL
6427 BOTHELL, JAMES
2354 BOTTEMILLER, LISA
21 BOTTMAN JEFF
11383 BOUCHET, LARRY
11128 BOUCHET SUSAN
9726 BOURY ALLEN
9724 BOURY PAM
9772 BOUSH THOMAS B
3212 BOUSQUET DENIS
4530 BOWEN SAM
9248 BOWERS DAN
11889 BOWERS PAT
5140 BOWERS RICK
11483 BOWERS TARA
3179 BOWIE, MARK J
8052 BOWIN, DAN
818 BOWINGTON, TERRY
1507 BOWLER, GAIL
6300 BOWLER RICK
5310 BOWMAN ALFRED C
11657 BOWMAN CHERYL
1501 BOWMAN, DOROTHY
7304 BOWMAN KIMBERLY
11374 BOWMAN MIKE
9508 BOWMAN NEIL
157 BOWMAN, ROBERT A
11746 BOWMAN, RODGER
11670 BOWMAN TIM
1863 BOWSER, DAVID E
7635 BOWSER, FRED
2203 BOWYER CHESTER M
3538 BOWYER, PATRICIA
11173 BOX, JALAIR
2316 BOYAR MARK
2712 BOYCE ALTON R
4131 BOYCE, GREGORY C
6564 BOYCE STEVE
2268 BOYD GLADYS R
2436 BOYD J S
3093 BOYD JAMES C
4142 BOYD LARRY
3731 BOYD, ROBERT
2188 BOYER GARY
10023 BOYER, JEFFREY
5200 BOYER JIM
9986 BOYLE BARBARA
3498 BOYLE GINGER
1757 BOYLE JAMES
3025 BOYLE KATHRYN A R
2994 BOYLE LUCILLE F
7420 BOYLE, PATRICK
6900 BOYLES LOREN
6899 BOYLES PATRICIA
11453 BOZUNG, R A
7594 BRADBERRY CHRIS
3095 JELINEK, BARBARA
9117 JELINEK, DORIS
9118 JELINEK, LOUIS
9668 JELOSKI, SHIRLEY A
9601 JELVIK SR , ROBERT M
2787 JENKINS, B H
39 JENKINS, GORDON
5935 JENKINS JIM
4379 JENKINS LINDA
1365 JENKINS, PHILIP H
3002 JENNINGS, CAROLE
7939 JENNINGS, DAVE
7940 JENNINGS, GERRI
4416 JENNINGS, J F
645 JENNINGS, MARK
353 JENNINGS, VIRGINIA
5538 JENNY, ROGER D
9300 JENSEN, CAROL
8921 JENSEN, DARRYL
8672 JENSEN, DON
7097 JENSEN, FRANCIS
472 JENSEN, JAMES
3888 JENSEN JAMES
1769 JENSEN, MARILYN
3533 JENSEN MATT
2727 JENSEN RICHARD
8673 JENSEN TRISHA
7133 JENSEN, WALT
4710 JENSON, ERIC
10273 JENSSEN, ED W
3216 JENSSEN, ELAINE
11658 JERNS, GUNNAR
11668 JERNS NINA
5017 JESMER, TOM
4851 JESSECINI OEN
8945 JEVONS, CECIL
2228 JEWELL, MARTIN E
9633 JEWELLEN-KOSKI BRIDGET
2880 JEWETT DON
418 JEWETT JOHN T
2973 JEWETT MEREDITH
1672 JIMENEZ ANN
9648 JIMMINEZ, TROY S
398 JINKENS, ALBERT J
271 JOBA MARK
9681 JOBE, BRENDA
8442 JOBE, KENNETH N
11398 JOERGER SUE
2130 JOHANNESSEN, JIM
1800 JOHANSON JESSIE
5872 JOHANSON, TOM
1776 JOHNS, DAVID
9325 JOHNS, HENRY
9324 JOHNS MARGARET J
11272 JOHNSON, ADELAIDE
2178 JOHNSON, ANITA
7831 JOHNSON, ARTHUR
8555 ROETEMEYER, KARRIE
6313 ROETHLER CLAIRE
6318 ROETHLER, GARY
6314 ROETHLER, STEVE
1241 ROGALSKI, RAY
8306 ROGERS, CHUCK
613 ROGERS, CYNTHIA
6908 ROGERS DALE
1824 ROGERS, DEAN
11458 ROGERS, ED
6220 ROGERS, GRANT
11083 ROGERS, JOEL
9318 ROGERS, WM
5100 ROGGE, BONNIE
5207 ROGGE EDDIE
7074 ROGGE PAUL
3511 ROGOL, E
4985 ROGOWSKI, BETTIE
5334 ROGOWSKI, LEONARD
2563 ROHLFS, W MITCHELL
11577 ROHLOFF CHRIS
8350 ROHN, DALE
942 ROHN DOUG
898 ROHN, SUSAN
11372 ROHNER, DICK
7544 ROHR ARLENE
2956 ROHR, ELF
7543 ROHR, LESLIE
6758 ROHRER, DAVID M
7166 ROHRER, DAVID R
6755 ROHRER, WENDY L
436 ROHWEDER, ARLIE
590 ROHWER, RICHARD W
9126 ROLAND DOUG
881 ROLFES LEONARD J
2984 ROLLINS, GLENN D
8438 ROLPH, JAMES
8437 ROLPH, LYLE
7628 ROMAINE MOLLY
10382 ROMANELLI, NORAH
7725 ROMANOFF LENIN
7734 ROMANS DAVID J
2937 ROMBERG HARRY
4506 ROMO VICTOR
5634 RONNING, IVOR
5831 ROOBIS, MARGARET
10149 ROOD, PAUL
9484 ROOK, DENNIS A
255 ROOS DONALD A
1502 ROOSMA CALVIN
1503 ROOSMA, JOHANNA
1504 ROOSMA, PETE
474 ROPER, M D JOHN W
5766 ROPPO, CATHY
3836 ROSE, ANDREW
10376 ROSE, BONNIE J
6866 ROSE, DANA

2349 BRADLEE, DAVID G
5844 BRADLEY, BOB
2512 BRADLEY, CYNTHIA M
6873 BRADLEY, DAVID
3940 BRADLEY, DOUG
3839 BRADLEY, GARY
3850 BRADLEY, JOHN
2554 BRADLEY, JOHN H
3404 BRADLEY, KATE
3809 BRADLEY, KELLY
11853 BRADLEY, MARGARET
5753 BRADLEY, MARILYN
65 BRADLEY, MIKE
218 BRADLEY, ROBERTA
4182 BRADLEY SHARON D
3807 BRADLEY, STEPHANIE
1408 BRADLEY, VICTOR E
1779 BRADSHAW RON
3078 BRADY, CAROL
5467 BRADY, MABEL D
3405 BRAEDT, GARY
8579 BRAGER, BILL
9425 BRAND DAVID
9428 BRAND WILLIAM C
9510 BRANDEALD, DUANE
594 BRANDSTOETTNER EDWARD P
2742 BRANDT, BRICE L
7111 BRANDT, ROBERT
9854 BRANDT, SANDY
5008 BRANNEN CHEV
8392 BRASS HAB
10288 BRASSEUR, FRANCOISE
2672 BRASTOW, DAVE
2752 BRATHOVDE, RICK
5777 BRATTON, SHIRLEY
8714 BRATTON, STAN
8293 BRAUER DON
9241 BRAULT, PAULA
403 BRAUN, MARK J
412 BRAUN, TINA A
3490 BRAUNER, KALMAN
11494 BRAUTIGAM, JACK
11833 BRAXLING SANDRA
10198 BRAY, MARTHA
7791 BRAY, PAMELA
1908 BRAYTON, LOIS
7353 BRAZER, GEORGE
7801 BRAZER, MILDRED
9356 BRECKSTROM, HOWARD
8682 BREDESON, DIANE
8681 BREDESON JR , JACK
8904 BREDSTRAND, RON
5383 BREECE, ELLEN
5384 BREECE, JAMES
1994 BREED, JOSEPH R
2431 BREIDENBACH, M
5781 BREITHAUPT, TERRY

10391 JOHNSON, BECKY
6422 JOHNSON, BLAINE
925 JOHNSON, BOB
2201 JOHNSON, BRIAN
1446 JOHNSON, BRYAN L
2914 JOHNSON, CAROL L
1418 JOHNSON, CATHERINE
7194 JOHNSON, CHARLES H
9469 JOHNSON, CHRIS
11852 JOHNSON, CURTIS
8135 JOHNSON, CY
1005 JOHNSON, DALE D
10047 JOHNSON, DAVID E
8920 JOHNSON, DENNIS M
487 JOHNSON, DON
483 JOHNSON, DOUG
8914 JOHNSON, ELAINE
815 JOHNSON, ERIC
526 JOHNSON, FLORISE W
8917 JOHNSON, FRANK
3436 JOHNSON, GARY
7592 JOHNSON GARY
1200 JOHNSON GARY L
5911 JOHNSON, GAWAIN
10743 JOHNSON, GE
1186 JOHNSON GEORGIA
9687 JOHNSON, GLADYS D
9605 JOHNSON, HENRY
1419 JOHNSON, HOWARD
7950 JOHNSON, IRENE
2891 JOHNSON, ISKRA
7503 JOHNSON, J K
5369 JOHNSON, J M
4892 JOHNSON, JAMES
8486 JOHNSON, JAMES L
8992 JOHNSON, JO
3917 JOHNSON, JOHN
5182 JOHNSON, JUDY
10293 JOHNSON JUDY
677 JOHNSON KATHERINE
1118 JOHNSON KATHY J
7479 JOHNSON, KEN
7966 JOHNSON, KENNETH
4603 JOHNSON, KENNETH R
2684 JOHNSON, KEVIN
4094 JOHNSON, KEVIN
4343 JOHNSON, KEVIN
2675 JOHNSON, LARRY
7380 JOHNSON, LARRY
5154 JOHNSON, LAURA
4522 JOHNSON, LEON
6844 JOHNSON, LEROY
9659 JOHNSON, LEROY C.
10848 JOHNSON, LESLIE
7085 JOHNSON, LLYOD D
6902 JOHNSON, LOUISE
2365 JOHNSON, MARK

2133 ROSE, KEITH A
7850 ROSE, NORMAN
10778 ROSE, RAY V
7284 ROSE, ROBERT
11336 ROSE, SHAWNA
11816 ROSE-PERRINE, ANITA
11347 ROSEN, ALAN
139 ROSENBLATT, ROGER A
1595 ROSENBLUME, JOSEPH
8380 ROSENDAHL, GENE
2970 ROSENTHAL, ANN T
4204 ROSETH, RALPH
1297 ROSS ADRIENNE
1739 ROSS BETTY
280 ROSS, BILLIE
10392 ROSS, GLEN
1658 ROSS, LEONARD
983 ROSS, MARLENE
10146 ROSS, SARAH
10898 ROSS, SKIP
3104 ROSS, ZEKE
10446 ROSSI, BETH
5243 ROSSI RIC
8406 ROSSMAN, PAUL F
1533 ROTECKI, FRANK
9099 ROTH, RONALD
2969 ROTH, SUZANNE
10107 ROTHLIND, DALE P
7908 ROTMAN, HARVEY
22 ROUNDY, JACK AND PAT
4302 ROUNDY, LYNDEN
11862 ROUNSLEY, GORDIE
6116 ROUNTREE, JACK
6115 ROUNTREE, KAREN
532 ROUSE, PHILIP
10362 ROWAN, JOHN ASHLEY
3011 ROWAN MARK
3357 ROWE, LINDA
11452 ROWE, TOM
9810 ROWL, DAVID M
3423 ROWLAND, IVAN
10579 ROWLAND, MELANIE J
4797 ROY, EDWIN
1315 ROY, MARION F
6328 ROYCE, STEPHEN & DELLA
10934 ROYER, CHARLES
4820 ROYSTON, RICH
9345 RUA, BOB
821 RUBADO, JIM
2437 RUBIN, JONATHAN
10312 RUBSAN, RANDY
4358 RUBY, FLOYD
4642 RUBY, JANICE
226 RUCK, JIM
9354 RUDD, DANIEL
5294 RUDD, PAT
9244 RUDD, ROBERT

3418 BREMER, EUGENE
3442 BRENEL, KENNETH
6065 BRENGLE, WANDA
10769 BRENNER, HOWARD
1048 BRENNER, MD, S A
6100 BRENT ALFRED
3662 BREWER, BRUCE
68 BREWER, SHARI
8907 BREWER, WANE
7716 BREWICK, DANIEL
10804 BREYLAR, PALMER
6905 BRICKA, DAVID
4363 BRICKMAN, ROY
10325 BRIDGE DOUGLAS A
4103 BRIDGE, R M
2173 BRIDGEMAN, KELLY
7454 BRIDGES KEVIN
11031 BRIDWELL, BETSY
11416 BRIGAIN, SHIRLEY
1649 BRIGGER, DONNA
9165 BRIGGS, DAVE
10269 BRIGGS, GEOFF
256 BRIGGS, HOWARD
9166 BRIGGS JOANNE
11800 BRIGGS, LILLIAN
11605 BRIGGS RICHARD
9168 BRIGGS RON
7021 BRIGHAM, ALLEN
7030 BRIGHAM ARNIE
7023 BRIGHAM, LARRY
7022 BRIGHAM, STEVE
4736 BRIGHT, CLARENCE
4898 BRIGHT, DAVID
1542 BRIGHTON, JAMES
4838 BRILL, GAY
4580 BRILL KIMBERLY M
4581 BRILL, RUDY A
11095 BRINCKERHOFF, ROBERT
3266 BRINKERFIELD TIMOTHY
11701 BRISCOE, STEWART
8046 BRISKEY, WILLIAM G
3721 BRITT, DENISE
4748 BRITT, LYLE
3779 BRITT, LYNN
984 BRITT, MATT
6726 BRITT ROGER
2533 BRITTAIN, ROBERT E
5895 BRITTEN, DAVID
11765 BRITTON GEORGE
4767 BRITTON LOIS
3139 BRITTS, WANDA M
8411 BRITZ ROGER
5676 BRIX, VICKI
10690 BROCARD, NORM
8390 BROCK, SCOTT
10421 BROCK, STEPHEN
3434 BRODE, SHERON
1865 JOHNSON, MARTIN R
7502 JOHNSON, MARY
5894 JOHNSON, MICHAEL D
1823 JOHNSON, MITCHELL
560 JOHNSON, OWEN L
380 JOHNSON, PAMELA G
10007 JOHNSON PAULA
2168 JOHNSON, PHILIP E
8298 JOHNSON, PHILLIP
1712 JOHNSON PRISCILLA
9446 JOHNSON, R L
5206 JOHNSON, RACHEL ANN
1196 JOHNSON, RICHARD
1756 JOHNSON, RICHARD
8371 JOHNSON, RICHARD
171 JOHNSON, ROBERT E
2418 JOHNSON, ROBERT L
1718 JOHNSON, ROBERT N
933 JOHNSON, RON V
2413 JOHNSON, RONALD E
3714 JOHNSON, RORY L
223 JOHNSON, RUTH B
3643 JOHNSON, SHARON
6159 JOHNSON, SHAWA
5214 JOHNSON SHEILA
2807 JOHNSON, STANLEY B
5156 JOHNSON, STEVE
333 JOHNSON, STEVEN J
165 JOHNSON, STUART W
11271 JOHNSON TED
5213 JOHNSON, VAN
10092 JOHNSON, VERNON L
1050 JOHNSON, VIRGINIA C
8892 JOHNSON WALTER E
6923 JOHNSON WILLIAM
5905 JOHNSON, WILLIAM A
6273 JOHNSON WILLIAM DAN
6480 JOHNSON, WYNONA
47 JOHNSON II, REX V
1959 JOHNSON, JR BOB
747 JOHNSON, M D , DAVID L
3005 JOHNSTON CHRISTOPHER & ANN
10671 JOHNSTON, ELMER E
6486 JOHNSTON, HELEN
8514 JOHNSTON, JOHN
849 JOHNSTON, JOHN W
11707 JOHNSTON, LARRY
2838 JOHNSTON, MARCUS E
850 JOHNSTON, MARIAN R
2302 JOHNSTON, MARK R
3091 JOHNSTON, REDMOND
10424 JOHNSTON ROBERT
6487 JOHNSTON, RUBEN S
6006 JOHNSTON, TIAN
3409 JOHNSTONE, BARBARA
1867 JOHNSTONE, JACK M
8821 JOHNSTONE, ROBERT
7301 RUDD, SHEILA
11655 RUDD, TED
5262 RUDE, DEL RAY
11813 RUDIS, DEBORAH
10891 RUDOLPH, JAN
7274 RUDOLPH, KATHY
2324 RUDOLPH, MARK
1016 RUFFIN, HOLT
422 RUFFIN, RICK
2886 RUGG, RON
7985 RUH, TRACY
3428 RUMPFF, RICK
10427 RUNDALL, CHRISTINE & WILL
10276 RUNDALL, JOHN
9596 RUPE, CURTIS
8614 RUPLINGER, LINDA
11274 RUSCHE, ARTHUR
8199 RUSE, CRYSTAL
8200 RUSE, DANIEL
8630 RUSE, DARRELL
8637 RUSE, GARY
8649 RUSE SCOTT
7698 RUSH, DON
11803 RUSH, HEATHER
1453 RUSH, JULIE M
1022 RUSHE, GLENN E
2481 RUSHMEIR, C LLOYD
158 RUSNAK, ALETHA M
8345 RUSS, GINGER
9517 RUSS KIM
5754 RUSSELL, BOB
4639 RUSSELL, C A
3887 RUSSELL, DAVE
5755 RUSSELL GAIL
6867 RUSSELL, JEFF
4500 RUSSELL JIM
2393 RUSSELL, JUDE
9150 RUSSELL TOM
2045 RUSSELL, WALT
1346 RUST RICHARD J
7388 RUST, RUTH
11166 RUST, STEVE
6281 RUTH, EDWARD
10275 RUTH, RICK
1891 RUTHERFORD, J A
8286 RUTHERFORD, RANDY
81 RUTTEN, E LOWELL
10657 RUTZ RICHARD
10678 RUUSKA, DANIEL R
6982 RUYLE, DONNIE
6987 RUYLE SANDRA J
7165 RYAN, DOUG
8517 RYAN, DWAINE
8457 RYAN, GESYKA
11405 RYAN, JOHNNIC
10932 RYBOCK, SHIRLEY
5299 RYDBERG, DONN

10458 BRODE, STEVE
5423 BRODICK, DON
6791 BRODIE, SHARON
10072 BRODMERKEL, CHRISTINE
231 BROGREN, ELLIOTT W
1987 BROKOFSKY, JANETTE
9746 BROKOFSKY, LEO
5456 BROM, PAM
7574 BROMLEY, DEBBIE
10672 BRONDI, MICHAEL
11751 BRONN, MICHAEL
6682 BRONSON, JOHN
10278 BRONSTAD, CHRISTOPHER
11821 BRONSTEIN STEVE
10912 BROOK, RANDALL H
6233 BROOKE, RON
3866 BROOKS, ALBERT
8693 BROOKS, ARLENE
5688 BROOKS, CHARLES
10659 BROOKS, DAVID
467 BROOKS, ELLEN GRACE
6147 BROOKS, F R
6148 BROOKS, J
8790 BROOKS, JACK W
2301 BROOKS, KERRY R
6149 BROOKS, L R
951 BROOKS, R J
5492 BROOKS, RICK
8694 BROOKS, ROBERT
5516 BROOKS STACEY
6644 BROOKS TERRY
10436 BROOME SHERRY
1917 BROSEL, PAMELA
8448 BROSSEAU TOM
4588 BROTHERS GERALD E
9496 BROTHERS, SUSAN
9494 BROTHERS, WILLIAM G
4589 BROTHERS, WINIFRED R
1290 BROTHERTON KRISTINE
1970 BROWN, AL
4751 BROWN ALBERT E
5197 BROWN ALISSA
5065 BROWN BARRY
11513 BROWN BETSY
11080 BROWN, BRUCE
5561 BROWN, BURL
7320 BROWN CARL & DORIS
3645 BROWN, CHARLES
8624 BROWN, DALE
8165 BROWN, DARRELL E
2411 BROWN, DAVID
10849 BROWN DEANNA
5353 BROWN, DON C
5531 BROWN, E F
1261 BROWN, EDITH M
6021 BROWN, EVADA
4146 BROWN, GARY
389 JOHUS, WILSON
6237 JOKI, JUDY
519 JOLLY, MARGARET
8233 JONASON, NELS
10854 JONES, BOB
5545 JONES, BRIAN
7632 JONES, BRUCE
11335 JONES, BUCK
6773 JONES, DARLENE M
10499 JONES, DEBBIE
4695 JONES, DONALD
9342 JONES, ELMER
790 JONES, GARY E
1141 JONES, GLEN
9898 JONES, JACK J
4694 JONES, JACQUELINE
7336 JONES, JEAN
7080 JONES, JEFFREY L
6185 JONES, JIM
3964 JONES, JOHANNA
4666 JONES, JOHN
8192 JONES, JOHN E
8666 JONES, JONATHAN
5094 JONES, KAREN
5474 JONES, KEN
4139 JONES, KURTIS
1840 JONES, LANE
4023 JONES, LESLIE
1100 JONES, LEWIS
7530 JONES, LORRAINE
3837 JONES, LOUIS
11251 JONES MARIAN
9879 JONES, MARY ELLEN
5364 JONES NOREEN
6501 JONES PAMELA J
6509 JONES, PAT
9900 JONES, PEARL
4049 JONES, RANDY
7331 JONES RANDY A
3788 JONES, RICHARD
3922 JONES RICK
956 JONES ROBERT S
3801 JONES RUSS
6184 JONES RUTH
6915 JONES, SHARRON
789 JONES, STEVEN L
9880 JONES SUZANE
1442 JONES WALTON H
4265 JONES, WILLIAM
1189 JONES, YVONNE M
9190 JORA, CB
9654 JORDAN, ARNOLD
4362 JORDAN, J RANDAL
4361 JORDAN, PATRICIA
9709 JORDAN, STEVE
4266 JORDEN, DENNIS
7501 JORDEN, EMMETTE
11179 RYDER, CARL
9489 RYDER, PATRICK A
6258 RYLE, COLLEEN
3071 RYON, RICHARD A
1046 RYSAVY, PETER
4405 SAAD, JOYCE
4406 SAAD, VICTOR
2348 SAAL, STEVEN
9107 SABIN, MARIE
1325 SABINSKY, BRYAN L
9486 SACHSEHMAIER, M
3487 SAEMMER L
9077 SAFFORD, RON
404 SAGER, HUBERT B
188 SAGER, JOHN
251 SAILER JANET M
2417 SAILING, JEFFREY A
7038 SAKSHAUG, MARREN
4783 SALA JR , VICTOR
6863 SALICK, JOHN
10308 SALIZ, CRISTINE
10802 SALLEE STEPHEN
8035 SALLSTROM, CHARLES
8033 SALLSTROM CONNIE
1101 SALMON DAVID
3154 SALONEN, STEVE
6939 SALSBERY, LINDA
6940 SALSBERY, ROBERT
8175 SALSTROM ESTHER
4339 SALVATI, MARTY
9683 SALVESBURY, PAUL
8990 SAMPLE, KELLY
8325 SAMSON, BILL
10468 SANBORN ANNE
10730 SANBORN GERALD
11569 SANBURN, PETER
6057 SAND ANNE
6058 SAND FRANK
3630 SANDAGE LANCE
10469 SANDALL, SUZANNE
8527 SANDBERG KEVIN M
8058 SANDBERG RICHARD D.
9913 SANDERS CRISTI
6031 SANDERS, DON
198 SANDERS, DOUGLAS G
3724 SANDERS, EULA
10908 SANDERS, G H
11237 SANDERS JUDY
11244 SANDERS MICHELLE
1045 SANDERS MURIEL
1978 SANDERS NICHOLAS J
6910 SANDERS, RANDY
4046 SANDERS, RONNIE L
1123 SANDERS, RONNIE T
3213 SANDERS, SANDY
10234 SANDERS, TAMARA
5198 SANDERSON, BARBARA

444 BROWN, GEORGEANNE
1972 BROWN, JACK R
3916 BROWN, JANICE
11572 BROWN, JEFF
3871 BROWN, JEFFREY
7101 BROWN, JIM
5014 BROWN JOAN M
3740 BROWN, JOANN
5195 BROWN JOE
8164 BROWN JUDY E
5542 BROWN, LARRY A
5827 BROWN, LLOYD
9114 BROWN, MARCALINE
9015 BROWN, MERIC
3465 BROWN, MICHAEL
7873 BROWN MICHAEL
3902 BROWN MILDRED
899 BROWN, MRS ROLAND
9658 BROWN, MURLE J
8031 BROWN, PAM
4914 BROWN, R A
4113 BROWN RICH
8090 BROWN, RICHARD
10125 BROWN, SHARON
430 BROWN, STEPHEN M
5472 BROWN STUART
9016 BROWN TERRY R
10902 BROWN, THOMAS
3722 BROWN, TOM
6020 BROWN TYLER
8451 BROWN, VERLYN
6716 BROWN, WAYNE
5062 BROWN, WILLIAM
9976 BROWN, WILLIAM
3878 BROWN, WINFIELD
3901 BROWN JR, HENRY
7429 BROWNE, SCOTT
10754 BROWNE T
10858 BROWNER, MICHAEL
5699 BROXSON, DAVID
5503 BROZENT, GERALD A
7005 BRUCE, JAMES
6242 BRUCE KATHY
6243 BRUCE KEVIN
7004 BRUCE MARGIE
3150 BRUCE, MARY R
10763 BRUCE, PADDY
2878 BRUCH, JOHN
2798 BRUCKART, JOHN R
5703 BRUGGENHARF, J L
4378 BRUHN MARLENE
3953 BRUMBAUGH, LARRY
3952 BRUMBAUGH SUSAN
4314 BRUNEAU, JUDY C
5301 BRUNEAU, PIERRE
7299 BRUNELL, DON
3519 BRUNER, DAN
4254 JORDON, RILEY
8173 JORGENSEN, CANDY L
9760 JORGENSEN, KEN
2976 JORGENSEN, MARGARET
5575 JORGENSEN, R S.
8174 JORGENSEN, RON
11726 JORGENSEN, SHIRLEY
3050 JOSENDAL VICTOR
4919 JOSSE, SUE
3876 JOVANOVICH, ROD
9728 JOY, MICHAEL
9067 JOY, RONNIE
11528 JOYNER, JUDITH
3470 JOZEFIAK ANITA
10151 JUDD, SUVIA T
3599 JUDSON, RANDY
7704 JULES, JEFF
1493 JULESBERG, ARTHUR
7699 JULIAN, RICH
4497 JUMP, BOB
6602 JUSTESEN, RENAE
2179 JUSTESEN VERL R
3639 JUSTICE, HOWARD
6980 JUSTICE, SCOTT
4377 JUTTE, VERA
6914 KAALAND BOB
9422 KACHER BRIAN J
1602 KACZKA JOHN
11753 KAECH, TYRONE
5865 KAESS, MELBA J
4682 KAGER, PAUL
10425 KAHLE, BEATRICE
11546 KAHLEN, KRISTEN
2979 KAHN MATTHEW
10785 KAHN, STUART
9789 KAHNE, KELLY
9790 KAHNE, TAMMY
5169 KAISER, VERNA
5170 KAISER SR , DAVID
7619 KALES, STANLEY
7135 KALIN, JOHN
4330 KALLBERG, BRET
9280 KALLECK, HAROLD J
5471 KALLIO, JIM
1170 KAMBAK, KENDRA
1564 KAMM RAY
6294 KAMP, JEFF
6290 KAMP, TAMMY
8491 KANDLE GENE
9848 KANE, DEBBIE
10558 KANE HELEN
10419 KANE, JOHN
9371 KANE, LYNN D
9755 KANE, MICHAEL W.
7895 KANE, RICHARD
10622 KANE, TIMOTHY
6488 KANTON, NINA
6697 SANDS, HERB
4698 SANDS, KIM
2176 SANDS, WALLACE C
4144 SANDSTROM DONALD F
10318 SANDVIG, CHRIS J
3674 SANFORD, BILL
7970 SANFORD, CHARLES
7322 SANFORD, DANIEL L
2082 SANFORD, JIM
2709 SANFORD MORRIS B
3711 SANTEE, POLLY
2145 SANTIAGO ARMANDO G
1648 SANTRUIRE, ARDIS
11225 SAPERSTEIN ROSE
11249 SAPERSTEIN, SYLVIA
199 SAPP, CHARLEEN
10949 SARDESON, JAY
10950 SARDESON, RACHELL
328 SARGENT, DAVID E
2000 SARGENT, DENNY
1510 SARGENT, EDWARD
1434 SARTORE, STEVE
9329 SARVER, BUD
9328 SARVER, GERRI
4151 SATIA, FARESA U
4925 SATIA LILLY S
1231 SATO EDDIE T
10104 SATZ, JAY A
10647 SAUER TIM
2553 SAUL SUSAN
548 SAUNDERS IOLA
4862 SAUNDERS, KATE
2374 SAUNDERS, PATRICIA
6975 SAUNDERS SHARON
10956 SAUTER, HANS J
6188 SAVAGE, BERT
10074 SAVAGE, CATHY
11255 SAVAGE CHERRI
6187 SAVAGE JO ANN
6186 SAVAGE, NATHAN
10127 SAVAGE THOMAS
8151 SAVAGE, WILLIAM
11597 SAVATGY, CIERRA
10429 SAVATGY, MICHAEL
3040 SAVATGY, PAT
7191 SAWYER CHARLONA
7558 SAWYER, DALE
7559 SAWYER, IRMA
2828 SAWYER, JAMES H
6666 SAWYER, STEVEN
2117 SAX, LINDA J
7199 SAXTON, CARL H
7198 SAXTON, GAIL M
366 SAY, JACK DONALD
10886 SAYLOR, MARY
1211 SCAIRPON, RIK
1043 SCANES, CAROLE

372 BRUNHAVER, KURT W
3619 BRUNK, MICHAEL
11203 BRUNT, GARY
3261 BRUTON, PAMELA
5325 BRYAN, GARRY E
2698 BRYAN, GARY
4273 BRYAN, GAYLEN
10497 BRYANT, ALAN
3989 BRYANT, BRIAN
10113 BRYANT, EILEEN
1545 BRYANT, JERRY & LINDA
4299 BRYANT, ROBERT T
9426 BRYDGES, THERESA
2870 BRYER, ELIZABETH
3758 BRYSON, BEN L
4075 BRYSON, BENNY
4116 BRYSON, D GALE
976 BRYSON, GEORGE M
5499 BRYSON, JERRY W
7737 BRYSON, LYNNE
3999 BRYSON, MARY
11292 BRYSON ROY
9939 BUCCHIERE THOMAS M
4963 BUCCI VINCENT
3938 BUCHANAN, CURTIS
8713 BUCHANAN, LEWIS
9245 BUCHANAN, VICTOR
1134 BUCHANON CURTIS
1829 BUCHANON I GARY
8775 BUCHNER JAMIE ALLEN
11419 BUCHNER, SCOTT
10945 BUCK, JOAN
10946 BUCK, RICHARD
10812 BUCK, ROBYN M
10813 BUCK, TAMARA E
5302 BUCKLEY, DELRENE K
7119 BUCKLEY, MONTY J
8940 BUCKLEY, SHAUN
3631 BUCKMASTER, DUANE
2317 BUDDINGTON ANDREW
11695 BUDDINGTON MARDELLA
4771 BUDIG, MARJARIE
4761 BUDIG ROBERT L
8530 BUENO, CHRIS
6369 BUENTEMEIER, BARBARA
8222 BUESWELL, JOE
5028 BUFFUM, SHANNON
5825 BUHR, M E
2169 BUKER, GARY L
163 BULLENE, GREG
207 BULLENE, JOHN
234 BULLENE, NANCY
3857 BULLER, PAT
4086 BULTMAN, DONALD
11571 BUMGARDNER, TIM
11708 BUNKER, DELBERT
2771 BUNKER, KRIS

278 KARASEK, T J
7400 KARBOSKI, LARRY
5714 KARINEN, KEN
1570 KARLBERG PAT
3260 KARLSEN, ERIC
3820 KARSCHNER, JAMES
3729 KART, WILLIAM
9889 KARUZA, BOB
6798 KARY, BRIAN
6749 KARY, CRAIG P
9080 KASEMEIER, DONNA
9863 KASEY, SHARON
7137 KASH, MARC
8009 KASPERSON, RICHARD
2522 KASTNER, JOAN
6436 KAUFMAN ROB
2132 KAUFMAN, STAN
10233 KAWAMURA PAM
7706 KAY, DAMON
11631 KAYDA STEVE
11550 KAYTON, ROBERT
2087 KEAN RANDY
262 KEANE MICHAEL
10202 KEARNEY, ALAN
5253 KEARNS, SHANE
9813 KEE, TERRY N
694 KEEFE SARA
3175 KEEL DANNY
7480 KEEL DENNIS
10744 KEELEY PAM
11025 KEENAN PAULA
4338 KEENER JAMES P
9537 KEESEE CLAIRE
8501 KEEZER RICHARD
10653 KEFFER THOMAS
1991 KEIFFER, MIRIAM G
4619 KEIL ARTHUR D
327 KEITGES, KATHY
9019 KEITH JOYCE
9252 KEITH, MARVIN
2191 KELETO DORIS J
1582 KELL, ME
8930 KELLER DON J
1036 KELLER, M B
11760 KELLER, PATRICK
868 KELLER, ROBERT
8561 KELLER, ROLLAN
1706 KELLEY BETTY
2804 KELLEY, DAVID L
11740 KELLEY, DONALD
1719 KELLEY, FRANK
2682 KELLEY, HARLAN
11499 KELLEY, JOYCE
1566 KELLEY, JUDY
3757 KELLEY, KENNETH
1308 KELLEY, KEVIN
5159 KELLEY, KIM

1534 SCANLAN, S K
25 SCHAAD, DOUGLAS C
11143 SCHAAD, SANDRE
10955 SCHAEFER, C THOMAS
1021 SCHAEFER, PHILIP A
10398 SCHAEFER, SUSIE
5073 SCHAEFFER, KAREN
5402 SCHAFER, D B
9994 SCHAFER, FRANCIS W
7093 SCHAFER, MICHAEL
5404 SCHAFER, R L
4986 SCHAFER, RAYMOND
7517 SCHAFFER, DARYL G
7710 SCHAFFER, MICHAEL
7514 SCHAFFER, SHARON
10035 SCHAFFER, STEVEN
1163 SCHAIRBAUM, HERB
10516 SCHAKEL, MARK
9506 SCHALER GARY L
5093 SCHALLER, JEFF
3551 SCHALLER, MARJORIE
8348 SCHAMP BARBARA
8353 SCHAMP, FRANK
6388 SCHANKEL TERESA
7291 SCHAUB, GARY
2858 SCHAUER, BRUCE
8627 SCHEI, TAD
2837 SCHEIN, ED
6510 SCHELLINKHOUT, CAREL
7227 SCHEMMER MARK
2028 SCHENK JOHN
9877 SCHERMERHORN, KEITH
2351 SCHEULEN, BOB
3374 SCHIERHOLTZ, JERRY
10420 SCHIESS H L
3885 SCHIFERL, CRAIG
3702 SCHIFERL PATRICIA
8047 SCHIFFER, DAVID L
4992 SCHILLING, ARTHUR
4991 SCHILLING, DEBRA
10335 SCHIMANDLE, KATHLEEN M
8934 SCHINDLER, JACKIE
8933 SCHINDLER, R A
6600 SCHIPPMANN, EDWARD D
2557 SCHLACHTER, MARK
512 SCHLARB, ADAM
502 SCHLARB, KANDY
514 SCHLARB, MIKE
550 SCHLEGEL JANE
11674 SCHLOTMAN, DON
741 SCHLOTZHAUER, DALE L.
10686 SCHMALTZ, DAVID M
8848 SCHMAUDER, CYNDY
10514 SCHMID, CHARLES
421 SCHMIDT, BREAN L
4607 SCHMIDT, GARY
11606 SCHMIDT, JAMES

4663 BUNNEY, JOE
1753 BUNT KEN
9903 BUONPANE ELENA
9750 BUONPANE FRANK J
11885 BURASS, BRAD
1786 BURBRIDGE, RALPH
11384 BURCH, JOHN
570 BURCH, RUTH
10664 BURD, ROBERT
6586 BURDYSHAW, BRAD
6811 BURDYSHAW, GARY
11845 BURG JIM
1063 BURGDORFER, RAINER
1478 BURGER RUSSELL
10172 BURGES, SYLVIA E
1366 BURGESS BILL
8994 BURGESS GREG
10519 BURGESS JEFF
1927 BURGESS TRACIE R
2735 BURGHARD RUSSELL
10979 BURHANS BRUCE
2556 BURKE, BILL
9137 BURKE BOB
2152 BURKE ELIZABETH
5484 BURKE HENRIETTA
6717 BURKE JERRY
6199 BURKE JOHN
147 BURKE KELLY G
6200 BURKE LAURI
2949 BURKE, WILLIAM
4102 BURKEY KAMMY
4098 BURKEY, TRACY
11897 BURKHART, DON
4705 BURKHEIMER BILL
6539 BURKOSTER WARREN
8997 BURKS SHERI
5010 BURLEY STEVEN
4237 BURLEY WILLIAM
3170 BURLING KOREN
9172 BURLINGAME HOLLY
10128 BURNARD ROGER
4447 BURNETT ADAM
5346 BURNETT DICK
1177 BURNETT JOHN S
520 BURNETT MARTHA G
6925 BURNETT ROBERT
6932 BURNETT SANDRA
9090 BURNHAM, HAROLD
10105 BURNHAM PEGGY
10387 BURNS, DEBBIE
5611 BURNS GARY
2147 BURNS JANEEN
5908 BURNS JOAN
8072 BURNSIDE, BRUCE
5055 BURNSIDE, SCOTT
6424 BURRELL, JACK JAY
10811 BURRESON, ROBERT E
1565 KELLEY, RAY
9814 KELLN, KARI
64 KELLOG GENE RAMONA
1674 KELLY BRIANNE
10461 KELLY, DAN
8818 KELLY GARY
7153 KELLY, JAMES M
5224 KELLY, JUDY
419 KELLY KAREN L
11503 KELLY KATHY
11115 KELLY, KEITH M
4228 KELLY, LLOYD
8144 KELLY MIKE
4320 KELLY ORVILLE
8812 KELLY PEGGY
405 KELLY, ROD
4209 KELLY, TERRY
5507 KELM CLARENCE
4134 KELM EDNA
2569 KELMAN LLOYD
11626 KELSEY, LISA
1855 KELSEY, TODD
9773 KEMP RICHARD R
8212 KEMPER THOMAS
1643 KEMPLIN, KEITH
5090 KEMPTON, ROJEAN
5798 KENDALL MIKE
11861 KENDRICK LARRY
463 KENFIELD STEVE
4077 KENNAMER MICHAEL
9853 KENNAUGH DARLENE
9860 KENNAUGH MICHAEL W
1275 KENNEDY, ANNIE
2962 KENNEDY BETTY
194 KENNEDY, BRUCE R
8545 KENNEDY DAVE
8402 KENNEDY DOUG
2504 KENNEDY, MARJORIE
9713 KENNEDY NED
9666 KENNEDY, PAT
6898 KENNELL, ED
7473 KENNEY, PAUL
5670 KENNEY, ROGER
11837 KENNING, BETH
5458 KENSINGER JAMES
5434 KENSINGER MAGGIE
6215 KENT, CARRIE
6216 KENT, DAVID
2465 KENWORTHY MAX S
11240 KENY, DENNIS
8202 KEONPS PAT E
5405 KEOUGH, DUANE L
8237 KEOUGH, L J
3588 KEOUGH LOU ANN
8670 KEOUGH, MARTIN
2639 KEPLEY, MICHAEL C
10530 KEPPEL DAVID
11743 SCHMIDT JOE
854 SCHMIDT, MICHAEL A
11642 SCHMIDT, RACHEL
406 SCHMIDT ROHAN D
11792 SCHMIDT, RUTH
6622 SCHMIDT TIM
2139 SCHMITT, CHRISTIAN J
1207 SCHMITZ, JOHN A
4617 SCHMITZ, RICHARD L.
2290 SCHNARRE HAROLD & BETH
3031 SCHNARRE, MARK
2900 SCHNEBELE, LISA
8961 SCHNEER, CLINTON M
8960 SCHNEER DOROTHY H
5322 SCHNEIDER BARBARA
4380 SCHNEIDER, FLORENCE
8362 SCHNEIDER NICK
7802 SCHNEIDER, STEVE
10024 SCHNEIDER, STEVE
10326 SCHNELL, PEGGY
490 SCHNIEER CLINTON M
7511 SCHOCK IMOGENE
7510 SCHOCK WALT
347 SCHOELER PAUL H
2006 SCHOEN, MARK
3341 SCHOENFIELD MITCHEL
8231 SCHOENWALD, TIM E
5319 SCHOFIELD SYD
3084 SCHOOF RENEE
6261 SCHOOLCRAFT RANDY
11678 SCHOOLEY LOREN
10214 SCHOONOVER MARK T
7082 SCHORNO, DAVID
7081 SCHORNO JANET
10607 SCHOTT JOSEPH
11451 SCHRADER BRUCE
5155 SCHRADER FRANK
9457 SCHREEDER JEREMY
6835 SCHREEDER KARLA
6833 SCHREEDER KEITH
9454 SCHREEDER KEN
6832 SCHREEDER, KEVIN
6831 SCHREEDER, RAY
6834 SCHREEDER, WINONA
9453 SCHREEDER JR , KENNETH
5011 SCHREIER TOM
6663 SCHREIFELS DIANE
6664 SCHREIFELS ROY
6128 SCHRODER RON
3020 SCHROEDER DORIS L
1456 SCHROEDER GAYLORD
1968 SCHROEDER, MARY
11009 SCHRUDER AUDREY
10719 SCHRUM DEANNA
1523 SCHUCHARDT DAVID
1145 SCHUGT, DIETER
8478 SCHUHOW CONNIE

2922 BURROUGHS, JOHN
2095 BURROWS, BETH ELPERN
8099 BURROWS, ED
1062 BURROWS, EDWIN G
8100 BURROWS, M
2296 BURRUS, MARTHA JEAN
11300 BURSBARK, JOHN
5851 BURSELL, GEORGE
1148 BURSER, WILLIAM M
2591 BURTON JOAN
4547 BURTON KEITH E
995 BURTON KIM
10914 BURTON, PHILIP G
1314 *BURTON, ROB*
4494 BURWELL, BILL
4493 BURWELL LANA
1085 BURY GARY
2634 BUSCHER DAVID
9557 BUSE, B J
10541 BUSE, DAVID
3259 BUSE, KEVIN
3991 BUSE MIKE
10784 BUSH, CAROLINE
2859 BUSH KELLY
3108 BUSH, LEONA
11538 BUSHNELL P
3524 BUSINGER, FERDI
7537 BUSSART TAMARA
7538 BUSSART, TERRY
7793 BUSSING, JAMES
617 BUSTAD, J R
1796 BUTENKO CON
6692 BUTENKO, GEORGE
1875 BUTENKO, TAMARA
2599 BUTLER EILEEN E
5846 BUTLER, JOHN
11846 BUTLER, JOHN
10688 BUTLER, RICHARD L
3196 BUTLER, THOMAS E
5 BUTLER WANDA L
8549 BUTNER RICCI
5838 BUTTERFIELD, JOHN
5509 BUTTERFIELD, JOSH
5510 BUTTERFIELD, RAY
2264 BUTZ, DANIELLE
2693 BUZZARD, R J
9289 BYARS, NICOLE
9516 BYER, BRYAN
5722 BYERLEY, J M
920 BYERS, JOHN R
9326 BYERS, LYALL
8396 BYERS PETE
9775 BYERS, RINDA M
10475 BYHAM, RICHARD
187 BYHRE, HELGA
6287 BYLIN, MARK
9499 BYRD CINDY

10492 KERKOF, KATHLEEN
11252 KERN, LINCOLN
10567 KERR, CORRINE
5553 KERR, DONALD O
9611 KERR, SURVANTES M
8577 KERSEHNER, RON
2919 KERSTING JOHN
6693 KERWIN, KEN
5132 KERZIC, GERALDINE
5131 KERZIC, RONALD
4178 KESINGER, ALLEN
8223 KESSEL, JOHN
9562 KESSLER, DON
5685 KETCHUM, KRIS
4348 KETTER, JEFF
4572 KHEEN, LINDA D
5242 KIBBEY, G E
11059 KIBBLE, CAROL
2066 KIBLER, MARGARET E
1332 KIDD, MARTY
8625 KIDWELL, DAVEY
8626 KIDWELL, SUZANNE
4487 KIEFFER JAMES
3143 KIEPKE, BEN
3144 KIEPKE CRAIG
3142 KIEPKE MARY
3141 KIEPKE SHEILA
544 KIERAS, DAVID M
8540 KIERDEN BRUCE
4674 KIESSER DONALD
6003 KIEST HELEN
3600 KIEST, ROGER
2406 KIISKILA CARLA
4374 KILEN CLIFF
3536 KILLARZOAC TRISTA
10078 KILLEBREW, DONNA
10283 KILLEN RONALD
4990 KILLGORE, DAVID
8939 KILLHAM PHILIP
4278 KIM, HEE YOUNG
6577 KIM, JAMES C
7722 KIM YEONG
11690 KIMBALL, DON
2667 KIMBALL JANET
5577 KIMBALL MIKE
9041 KIMBALL, T
1747 KIMERY, PHILIP
9092 KIMMBERLY, MARY
11443 KIMMEL, DALE
1729 KINCAID, JILL
6277 KINCAID, WILLIAM
6232 KINDLE, ROGER
5074 KINDSFATHER, NICK
9433 KING AMY
2464 KING, ARTHUR
9434 KING, BARBARA
11125 KING, BOB

8476 SCHUHOW, TERRY
4033 SCHULBERG, CHRIS
4117 SCHULBERG, DAN
3596 SCHULER, GEORGE
9222 SCHULER, LYNDA
6930 SCHULER, RALPH
149 SCHULT, DENNIS T
16 SCHULTZ, DON
2119 SCHULTZ, ERIC
1509 SCHULTZ, HERMAN
8170 SCHULTZ, JEANETTE
8594 SCHULTZ, LYNN
8595 SCHULTZ, THOMAS H
6234 SCHUMAN AUGUST
2405 SCHUMAN, LAURA
11613 SCHURR J MICHAEL
11625 SCHURR, KAREN
11197 SCHUSTER, JOSEPH A
9053 SCHUTE, JOHN
9059 SCHUTE, LINDA
696 SCHWAB, JOHN H
8499 SCHWAGER, CALLIE
4762 SCHWAGER, LES R
224 SCHWARB, GALE
11201 SCHWARTZ ANNE
9566 SCHWARTZ SUE D
827 SCHWEIKL, BERNADETTE
824 SCHWEIKL, JACK
10528 SCHWENK DANIEL
6124 SCHWENKE MATT
2857 SCHWENKE ROBERT
11465 SCHWIND, DAVID
6027 SCOBEE LOUIS
7154 SCOBY JACQUELINE
10133 SCOFIELD, VIRGINIA
7763 SCOLER, JOSEPH
2121 SCOTT AMY
2829 SCOTT BILL
670 SCOTT BONNIE
745 SCOTT, BRYAN C
8023 SCOTT, DENISE L
2444 SCOTT, HAROLD W
866 SCOTT, JERRY
8005 SCOTT, RANDY
8022 SCOTT, ROBERT G
4082 SCOTT, RON
9958 SCOTT, STEVEN
11808 SCRANTON, CHRISTOPHER
8452 SCRIVNER, TIM
8080 SEABROOK, HARVEY E
4605 SEABURG, STEVEN M
2603 SEAFORTH SHARON
8910 SEALUND, FRED W
8866 SEALUND, JOANNE
4381 SEAMAN, JERE
8026 SEARLES, MIKE
8024 SEARLES SHEILA

9498 BYRD, RICHARD L
6495 BYRNE, MARIE T
1041 BYRNES, CAROL JEANNE
587 BYRNES, GERRY
3399 CABA, JERLYN
7474 CABE, BETH
3755 CABE, DENNY
3742 CABE MICHAEL
3756 CABE ROCKY G
4158 CABE, WALLY
11012 CABLES CHARLES M
11313 CABRIAN, KATHY
281 CADIGAN, MARY E
6419 CADY, GREGORY
7127 CAGLE, LEE
33 CAHIR, JOSEPH M
176 CAHIR, MARIAN
11480 CAIN MARK
4875 CAINES, PAULA
2723 CAIRNS, WILLIAM C
7313 CALBINI, LLYOD
10980 CALBUS, LAURENCE
5005 CALDWELL, CHARLES
3913 CALDWELL, JOE
1015 CALDWELL, K C
10251 CALEN, TERRY
1065 CALES, OSWALD
11687 CALHOUN, BOB
6412 CALHOUN, PHILIP A
2566 CALLAHAN, JOHN
5921 CALLAHAN, TOM
4157 CALLENDER JR , JOE D
282 CALLERY, NANCY
8814 CALLIHAN, JUNE L
8815 CALLIHAN, MEL
7585 CALLOWAY, BILL
8783 CALNON, JAMES T
5003 CALOREN NANCY
5002 CALOREN, WILLIAM
934 CAMBRON, SANDI
7255 CAMIERE, DAVID
11111 CAMINITI BENELLA
5951 CAMPBELL, CARMEN G
1417 CAMPBELL, CAYL
6607 CAMPBELL, DAVID
396 CAMPBELL, DELBERT O
1390 CAMPBELL, DOUGLAS C
4683 CAMPBELL, ED
5686 CAMPBELL, EDWARD
10747 CAMPBELL, ELIZABETH H
400 CAMPBELL, GLORIA L
5933 CAMPBELL, IRONA M.
7493 CAMPBELL, LEON
1763 CAMPBELL, LEROY
5674 CAMPBELL, LLYOD
1229 CAMPBELL, LOIS J
6137 CAMPBELL, MARTHA
2388 KING CARROLL
3781 KING, CHARLES
8836 KING, COLLEEN
8845 KING, DAVE
1806 KING, DEBORAH
5477 KING, ERNEST
636 KING, JACK
9436 KING, JENNY ANNE
1347 KING, JERRY W
11193 KING, KAY
10040 KING, KEN
2783 KING, KENNETH
9435 KING, KERRY
1819 KING, LEONORA
1847 KING LUKE
2526 KING, MICHAEL
10033 KING, NOGIE
1345 KING, RENE A
3433 KING, RON
4615 KINGERY, BRUCE
2534 KINGMA DAVID
6266 KINH NGUYEN
3222 KINLEY, MILDRED
10853 KINNEY, DOUGLAS
1287 KINNEY, FORREST
2093 KINNEY, JACK E
4850 KINNEY, RICHARD
11107 KINNEY JR J DANIEL
348 KINNISH DOROTHY
2560 KINSEL, WILLIAM & AMY
5938 KINSMAN, DOUGLAS D
5939 KINSMAN, PHYLLIS
10560 KINZEBACH, ROBERT
2628 KINZEL, CHARLES H
1279 KIPPEN, DEBOREH
392 KIRBY, FLOYD M
4618 KIRBY, GORDON E
10029 KIRCHHOFF, ELAINE
2123 KIRCHHOFF RICHARD T
6464 KIRKLEY, MERLE
886 KIRKMAN J C
3322 KIRKMIRE, NICHOLAS
10435 KIRKNESS, PAT
8092 KIRKPATRICK, DAN
10673 KIRKPATRICK, DANIEL M
7880 KIRKPATRICK, JOYCE
166 KIRKPATRICK, KIM A
1216 KIRKWOOD, ROBERT L
9141 KIRKWOOD JR , ANDREW
3044 KIRSHCER CORINE
2892 KIRSIS, VALDIS I
8330 KIRTH, DAVID
8186 KIRTLEY, MIKE
10341 KITCHELL, MARGARET
3945 KITTELSEN, ERIC
2263 KITTILA, EDWIN A
37 KITTLESON ALBERTA R
1330 SEARLS, ELMER N
3377 SEASHOLES CRAIG
8118 SEASTONE, APRIL
8120 SEASTONE, BONNIE
8119 SEASTONE, JAMES V
8117 SEASTONE, JEREMY
8676 SEBASTIAN, DAN
8684 SEBASTIAN, DARLENE
148 SEBASTIAN, ROBERT F
287 SECOR, LEANNE
4450 SECOR, RON
8487 SECRIST, CHRISTOPHER
593 SEEFELDT, FRANKLIN C
11744 SEIBERT, DEBBIE
11724 SEIBERT KEN
7506 SEIBERT MARION
4420 SELBY, H A
9585 SELENE, GERALD
7061 SELF, HELEN
8768 SELF, JERRY H
9372 SELF, KEVIN L
7055 SELF, LEWIS
3416 SELF ROBERT
4756 SELF STEVEN
6045 SELFORS DEBBIE
10951 SELIGMANN, JUTTA
750 SELIVANOFF, DOUG
9065 SELL, DONALD
6771 SELL MELISSA
3481 SELTERS, ANDY
4425 SEMRAU, DON
4433 SEMRAU JANET
4389 SEMRAU, JOHN
4434 SEMRAU, MARGARET
4436 SEMRAU MARK
4435 SEMRAU VICKI
10536 SENGER, ROCKS
5597 SENNETT, WALT
10247 SENOUR DAN A
4983 SEPTON RAYOLA
4984 SEPTON JR , ARTHUR
6014 SEROSKY, DOROTHY
6325 SEROSKY, JACKIE
6326 SEROSKY JR, EARL
6013 SEROSKY SR , LE ROY
3915 SERREY LLOYD
10550 SERVAIS, JOHN
8044 SERVEN FRANK P
3482 SETLERFIELD, DULCE
4826 SETO, MATTHEW
3877 SETTZ, ANDY
10828 SETZER, BEV
2616 SETZER DARLENE
2620 SETZER, DONALD N
2618 SETZER, KEN
10373 SEVERINGHAUS, EDWIN C
3268 SEVERSON PEGGY

6391 CAMPBELL, MARY
5950 CAMPBELL, ROBERT O
5382 CAMPBELL, SUSAN
5955 CAMPBELL, WALTER E
6395 CAMPBELL, WALTER J
6394 CAMPBELL, WALTER M
5381 CAMPBELL, WILLIAM
5745 CAMPBELL, WILLIAM TERRY
10652 CAMPION, TOM
391 CANN, MIKE
11058 CANNADAY, INA
11056 CANNADAY, SHERIDAN
1188 CANNIFF RUSSELL
8057 CANNON CHARLES J
2792 CANNON, DAVID L
11023 CANNON, MARGARET
8908 CANTERBURY, FRAN
11084 CANTIENI, PIERO
7056 CARBARY BETTY E
7057 CARBARY, RONALD K
4543 CARBAUGH, EARL
10216 CARDARELLI, CHRISTINA M
10716 CARDARELLI, LISA
11581 CARDENAS JAMES
6448 CARDEY JAMES
5564 CARDIN, CLAYTON J
6370 CAREY, MARY
6374 CAREY, RON
1159 CAREY, ROSEMARY
4226 CARLESON, JACK
9736 CARLILE DOUG
2445 CARLILE ROBERT L
7535 CARLIN, HENRY
6542 CARLISLE, IAN
6541 CARLISLE, ROXANNE
293 CARLQUIST, BRAD
767 CARLSEN, HERBERT M
7249 CARLSEN, JANE
11573 CARLSON AMY
7753 CARLSON, CLAUDIA
10241 CARLSON ELIZIBETH S
7755 CARLSON, EVELYN
2501 CARLSON, GLEN
2686 CARLSON, GREG M
6860 CARLSON, JIM
1452 CARLSON JON
8216 CARLSON, LEE
248 CARLSON, MARIANNE
7754 CARLSON, MARVIN
3282 CARLSON MRS A J
7758 CARLSON RICK
4641 CARLSON, ROY
5116 CARLSON, RUTH E
2309 CARLSON, TED W
10289 CARLSON, TINA
6744 CARLSON, TODD
8097 CARLSON, TRACY
3475 KITTO, CATHERINE
8732 KJALLIN, GORDON
4414 KLAAR, OSCAR
9910 KLANDER, STACY
7285 KLASELL, JOHN
7781 KLASSE GENE
9423 KLASSE JEANETTE
9257 KLEEKE RAY
6772 KLEIN, BOB K
5307 KLEIN, CLEMENS
11242 KLEIN, COLLEEN
2961 KLEIN, DAVE
3344 KLEIN, DEBORAH
5656 KLEIN, GEORGE
5631 KLEIN, LESLIE J
13 KLEINMAN, IRWIN & LUDMILLA
2951 KLEINMAN, JESSE
2915 KLEKOTKA, JOSEPH M
4549 KLEVEN ARNOLD
4548 KLEVEN, LYLA
8220 KLINE, BOB
4371 KLINE ROBERT
9875 KLINE WILLIAM T
5517 KLINGER, DAVID
2111 KLISTER, JOHN
173 KLOPP, DANIEL D
172 KLOPP JANET
5050 KLOPP, LESTER
598 KLOSTERMAN, BARB
8720 KNAPP, ALICE M
7361 KNAPP, CHARLES E
2809 KNAPP CHUCK
8263 KNAPP RICHARD
7362 KNAPP RUBY
258 KNECHTEL, K BOYD
11089 KNEE, JOE
2811 KNIERT GEORGE B
606 KNIGHT, DAVID M
1758 KNIGHT, GARY
9565 KNIGHT, ROBERT
10800 KNIGHT, ROGER
8054 KNIGHTS, ELLIS
2988 KNISELY, GAIL
1289 KNOBLAUCH, MARYETTE S
6871 KNODEL, DAVID
10661 KNOLL, CRAIG
10157 KNOLL, VICTORIA
11588 KNOPF, HERMAN
3855 KNOWLES DON
3830 KNOWLES, KENNETH
9685 KNOWLTON, HOWARD
11121 KNOWLTON SUSAN
755 KNOX, B
2212 KNOX, GEORGE
10171 KNOX, LORI ANN
11269 KNOX WALTER
1173 KNUDTSON, THOMAS
8741 SEVEY, PAT
6431 SEWARD JR, PHILLIP
1901 SEWELL, RAGEN
8966 SEXTON, JAMES W.
8965 SEXTON, ROBERTA L
1880 SEYMOUR, JIM
6868 SEYMOUR K
7728 SHADE, MIKE
1052 SHADLEY, LINCOLN J
9800 SHAFER, AL
393 SHAFFER, BECKY
394 SHAFFER, ROD
1432 SHAFFER, SUSAN L
1059 SHAIN, HENRY
4811 SHAKE, CAPE HORN
11928 SHAMBO, WM
6836 SHAMES CHERYL
1811 SHANAHAN, TIM
11090 SHANK, DONALD R
4668 SHANKLIN, JOHN S
7370 SHARDELMAN, MERLE
515 SHARP MISCHELLE
5068 SHARP R C.
386 SHARPE, FRED
1571 SHARPE, ROSEMARY
9246 SHATLUCK, LINDA
4759 SHATTUCK DENNIS A
4739 SHATTUCK, LOLA
10004 SHAUL, WILLIAM
1765 SHAW, BOB
7109 SHAW, DIANE
719 SHAW, JOHN W
3195 SHAW, MATTIE
10625 SHAW RONALD
2239 SHAW RONALD T
11854 SHAY, ED
10432 SHEA CAMILLE
1724 SHEAFF R
10821 SHEAHAN, MARSHA
11791 SHEARER JANINA
5026 SHECTON, ALAN
3663 SHEETS, THOMAS
1037 SHEFFIELD, JANE
8857 SHEHOUN, MARK
8037 SHELDEN, JAMES
4280 SHELDON, KATHY
7610 SHELINE, ALVIN
11370 SHELLEY, PHYLLIS
2987 SHELTON, CATHERINE K
4961 SHELTON, HARRY
10095 SHELTON, IRA
215 SHELTON, JAMES L
8900 SHELTON, STANLEY W
4962 SHELTON, STEVE
9287 SHEPHERD, DAN
709 SHEPHERD, DOUG
11817 SHEPHERD, JUDITH

250 CARLSSON CHARLES E.
6502 CARMICHAEL, LINDA
2272 CARNAHAN, CAROL
8140 CARNES, BERNARD
4392 CARNEY, ANNE
4396 CARNEY, CATHLEEN
4395 CARNEY COLLEEN
4393 CARNEY MARY
1530 CARNEY WILLIAM
9720 CARO JOE
9624 CARO, LINDA
6248 CARPENTER, ALICE
3315 CARPENTER BONNIE J
455 CARPENTER, BRYAN
6516 CARPENTER, DANIEL
1282 CARPENTER, ELAINE
9512 CARPENTER, FRED
6617 CARPENTER, LORA
7031 CARPENTER, SUSAN
7125 CARPER, CHARLOTTE
2537 CARR, LINDA A
1342 CARR, PAUL
266 CARRICK, CHUCK
267 CARRICK, FEETIE
1093 CARRIER, GLENN
8565 CARRUTHERS JOHN
1745 CARSON, JERRY
2250 CARSON, KIM
1752 CARSON, PAULA
85 CARSON R J
3233 CARTAUGH, W L
11502 CARTER ALAN
7300 CARTER BILL
10001 CARTER GEORGE
2780 CARTER, JAMES A
11790 CARTER, JOHN
1329 CARTER, MARILYN
5901 CARTER RAY
904 CARTER TIM
299 CARTWELL, SHARON
3185 CARVER CLAIRE L
6236 CARVO, PAT
6217 CARVO, SANDY
10585 CARY, DAVE J,
603 CARY JEFFREY A
1060 CASALE ROBERT
1586 CASE, BRIAN
688 CASE, EARL
8409 CASE, L
5158 CASE, LEONARD
9664 CASE, MELVIN J
3427 CASE, ROD
9665 CASE, RUTH L
6452 CASEY, DEBBIE
5696 CASEY, GLORIA
3502 CASEY, SUSAN
6455 CASEY, TED
8584 KNUTSEN LYNN
7017 KNUTZEN LAURA
5519 KOBBERSTAD H E SUSAN
6626 KOBBERSTAD RICHARD
624 KOCH, BENJY
625 KOCH MAXINE
5120 KOCHIS, JOSEPH D
11603 KODEN, GARY
11788 KODER SHARON
7572 KOEHEN, ELAINE
5573 KOEHLER, BRUCE
1526 KOEHLER, JOHN
4058 KOELNE, CHUCK
11669 KOENIG BURTON
11723 KOENIG, DIANE
11717 KOENIG, DON
8156 KOENIG, GEORGE D
11656 KOENIG, KENNETH
11667 KOENIG, MICHAEL
8456 KOENIG SANDRA I
1689 KOENIGS MATTHEW
8264 KOETJE, JIM
4141 KOETJE, MATTHEW
6064 KOGER, DON
6070 KOGER, KAREN
6059 KOGER R LEE
6060 KOGER, SHIRLEY
8273 KOGER, T B
8274 KOGER, VELMA
7608 KOHL STEVEN
2128 KOHLER, DWAYNE
6107 KOHLIEBER CECIL
9122 KOHLMEIR WALTER
5260 KOHN, KURT
9528 KOHN, OLA
5254 KOHN, PETER
9520 KOLBECK, STEPHEN
11362 KOLEY LORI
1548 KOLFF HELEN
1794 KOLIN, LEROY
2399 KOLLOEN BRENDA
3484 KONO, ROBERT H
6349 KOOISTRA, DAVID C
53 KOON, SWANSON HEATHER, LIEF
9184 KOPLITZ, JACK
830 KORNISH BRAD
9012 KORNISH, JERRY
4118 KOROVAAR DOUG
3864 KORR, DENNIS
3784 KORR, DONALD R
2529 KORRY RICHARD
9225 KORVELL SUE
7803 KOSEL BOB
2062 KOSELKE, GENE
4176 KOSIK, WAYNE
9634 KOSKI, W L
7094 KOSKI SR, GARY
7641 SHEPHERD, MICHAEL
7638 SHEPHERD, TERI
9540 SHEPPARD, GEORGE R
5086 SHERBONDY JR , FLOYD A
3842 SHERMAN, CHERYL
209 SHERMAN, DAVE
1322 SHERMAN DAVID
2615 SHERMAN, DAVID
3446 SHERMAN, JAMES
1337 SHERMAN JILL
2546 SHERMAN KENNETH J
1172 SHERMAN MARY S
4013 SHERMAN, REX
8819 SHERPINSKI, CHARLES
7702 SHERRILL JACK L
1319 SHERTZ KATHY
11060 SHERWIN STACEY
10760 SHERWOOD CLARK G
991 SHERWOOD DEBBIE
1309 SHERWOOD DENNIS
990 SHERWOOD KEITH
4662 SHERWOOD KENT W
6439 SHERWOOD III, TRUMAN
7721 SHESLIN, SANDY
8538 SHEWFEET, CATHY P
1578 SHIFLETT, EARL
8410 SHINCKE, RON
10860 SHINN MR & MRS GARRY
1985 SHIRG, RON
3069 SHIVES, FLETCHER G
9460 SHOCKLEY JERRY W
7606 SHOEMAKER, CLAUDIA
8603 SHOEMAKER CLYDE
6904 SHOEMAKER, FORREST
8219 SHOEMAKER, JOHN
6901 SHOEMAKER, LINDY
1914 SHOEMAKER, RANDY
5240 SHOENBERGER, PHILLIP C
11570 SHONKA, BETTY RAE
2703 SHOPE ALMA
2749 SHOPE, JOHN
2748 SHOPE RICK LEE
11838 SHORT CHRIS
1909 SHORT, CONSTANCE B
2109 SHORTS, HARRIET
8511 SHORTSLEEVE, TOM
10166 SHOTTS, CHARLES
5315 SHRIVER, JOHN EDWARD
4153 SHROUT, DENNY
6818 SHUBERT CATHERINE
6817 SHUBERT, FRANK
3432 SHUBERT, STEVE
10645 SHUCK, MARVIN
5330 SHULDA, ED
3763 SHULER, BLANTON G
3762 SHULER, GEORGINE
3761 SHULER, KAY

5698 CASEY, THOMAS
10360 CASHMAN, HAROLD J
9769 CASON, DAVID ALAN
2761 CASSELLA, CHARLES
2011 CASTELLE ANDREW J
5605 CASTLE, ROGER
1892 CASTLEMAN, JOHN
10210 CASTOR-PECK, STEVE
4661 CASWELL, CURT
1515 CATE, SARA
10184 CATE WILLIAM B
1167 CATELLANI, JOSEPH E
6569 CATES, MARY
661 CATEY, DOUG
1462 CATHCART, MARION
6285 CATHER, BRIAN
11212 CATLIN ROBERT
1243 CATRON, BONNIE
1245 CATRON, TOM
11187 CAVE, CHRISTINE
9563 CAVELTI, MICHAEL
9530 CAVIEZEL, ALICE
11699 CAWLEY, MIKE
9762 CAWLEY, WILLIS A
3892 CECCANTI, DAVID
10441 CERTES, JIM
5045 CERYS K L
8636 CHACE FRED
8372 CHACER RUDY
8374 CHACER, SHARI
2186 CHADWICK GARY
7605 CHADWICK, JEANNE
2770 CHAMBERLAIN BOB
697 CHAMBERS, COLLEEN S
7953 CHAMBERS, KATHY
11041 CHAMBERS, PATRICE
7952 CHAMBERS, RICK
8445 CHAMBERS SUSI
7969 CHAMBERS, WILLIE
4308 CHAMP, DOSS S
9228 CHAMPAGNE, DENNIS
7494 CHAMPEAUX, DON
7495 CHAMPEAUX TINA
285 CHANDLER, ROD
11665 CHANZERA MIKE
10539 CHAPANIS, ROGER
1371 CHAPEL, BURDETTE A
2528 CHAPIN, DAVID M
9751 CHAPMAN, DAVID
4856 CHAPMAN, DEBRA
5372 CHAPMAN, DOLORES
5371 CHAPMAN, FRED
3163 CHAPMAN, JACOB
2570 CHAPMAN, JAMES L
9725 CHAPMAN, RICHARD
4229 CHAPMAN, RON
8352 CHAPPELL, EUGENE
804 KOSTKA, STANLEY
7711 KOTH JAMES
3088 KOURY JR , ALFRED
7000 KOVAC ANNIE
6976 KOVAC, JAMES
7164 KOVACEVICH, PAUL F
9186 KOYKKA, BUTCH
6479 KRACHT, TAMRA
220 KRAFT, KIETH
1579 KRAFT, MARLENE
5373 KRAHENBUHL, JAKE
5930 KRAHENBUHL, LORRAINE
1894 KRAL, HENRY
2303 KRANENDONK, ANNE
1129 KRATZER, JEFF
1699 KRAUS, CHRISTEL
9295 KRAUSE, DAVID
9294 KRAUSE, SHIRLEY
181 KRAUSE TIMOTHY
1537 KRAUSE, TIMOTHY
4047 KRAUSE, WILLIAM R
1150 KRAUSHAR, JOLENE
9745 KRAUSS, LEW
1903 KREHS, PATTY
8841 KREIDE AARON
7271 KREKEHOUSE JOE
1707 KRENZ, MIKE
7496 KREPS, ED
0899 KRESSBACH, JAMES
2189 KRIEG, JIM
2187 KRIEG, KARLYNE
6993 KRIEGEL, PAUL
2237 KRIEGEL, TOM
7306 KRISOLOGO, MARIAN
961 KRIZAN KELLY J
6657 KROEGER SHERYL
5394 KROFFT, RONALD
0298 KROHN, MICHAEL
7875 KROKENES, DONNA
5658 KROLGER, STANLEY
5636 KRON, ARUTHER
5598 KRON, BILL
2670 KROOEL, CARL
5052 KROPP, BEVERLY
2601 KRUCKEBERG A R
4099 KRUEGER, CLAIRE
3710 KRUEGER, JEFF
653 KRUEGER, ROBERT J
10019 KRUG JONATHON
8335 KRUG, WAYNE
9115 KRUGER ALBERT
4945 KRUGER CHARLES L
3572 KRUGER, DANNIELLA
3570 KRUGER, DONALD
9108 KRUGER, ERNA
6406 KRUMWEIDE, DENNIS L
6405 KRUMWIEDE, JUDY
11003 SHULL, R P
9587 SHUMAKE, LORETTA
3134 SHUMAN, HOWARD
2897 SHURGOT, MICHAEL W
6493 SIBREL GISELA
8786 SICKLOVAN, KENNETH A
5118 SIDLE, SCOTT
11341 SIEBERT LEE
10517 SIEBERT, M L
1090 SIEGENTHALER, FRED
1088 SIEGENTHALER, MARY ANN
4346 SIEHL, DOUGLAS
3577 SIGGS, PATRICIA
5266 SIGLIN, JUDITH
8583 SIGMAN, CLAUDE
4954 SIGMAN, JOHN
296 SILBAUGH, ELBERT E
10814 SILER, KAREN F
9711 SILVA CINDY
6572 SILVA, DAVID M
10416 SILVERNALE, GRANT
8521 SILVES, KIRK
8946 SIMACEK RICHARD
4156 SIMENSON BILL
211 SIMERKA, ROGER F
10324 SIMMONS, CARYN
4440 SIMMONS, GLENN
1687 SIMMONS, JACOB
6960 SIMMONS, JERRY
9301 SIMMONS, LUTHER
11318 SIMMONS, MICHAEL / STACIE
9829 SIMMONS, MICHAEL M
312 SIMMONS, ROBERT
6585 SIMMS, DAVID
6747 SIMON DWAYNE RAY
4088 SIMON, JOHN
1043 SIMON, PHILY
3485 SIMON, RON
8793 SIMON TERESA
2744 SIMONEAU, TANYA
1731 SIMONS, MARK
877 SIMONSEN, GLENN
9005 SIMONSON, B
9684 SIMONSON, BOB
1027 SIMONSON, STEVEN D
319 SIMPLOT, MICHAEL B
5958 SIMPSON, JIM
1160 SIMPSON, KOREYNE
9869 SIMPSON LEONARD M
2983 SIMPSON PATRICIA S
917 SIMPSON, TERRY R
6519 SIMS, STEVEN
2209 SIMSON, TODD
5819 SINCLAIR, GEORGE
3908 SINCLAIR RANDY
10119 SINCLAIR-NIXON, PAM
167 SINCOCK, EDWARD D

4109 CHARBONNEAU, RON
7844 CHARNELL, NANCY
3395 CHARTRAND, A
2202 CHASE KEITH E
2004 CHASE, MRS L W
935 CHASE RICH
6362 CHASE RICHARD
9066 CHAUDIERE, DALE
841 CHAWLA, LUCILLE S
1709 CHELDELIN, LYLE
2564 CHEN, CLINTON
4505 CHESLEY, DANIEL
1748 CHESLOCK, JOHN
4882 CHESMORE, RICHARD
7290 CHESNES DAVID
1842 CHESNUTT, BARBARA
3321 CHEYNER, SANDRA
7449 CHIARO GEORGE
1591 CHILDRESS, JAN
9179 CHILDRESS, OSBY
11818 CHILDS, COLLEEN
11437 CHILTON, MARK
3105 CHINK F J
2439 CHOATE, CAVARD
8051 CHONG, CHONG SU
754 CHOW, SHARON F
7639 CHRISMAN, ANDY
2508 CHRISMAN, EDWARD L
5493 CHRISMAN, JOHN
3225 CHRISTEN LEONARD
4970 CHRISTENSEN BRAD
8646 CHRISTENSEN, JASON
8647 CHRISTENSEN, JERRY
888 CHRISTIAN, MONA
5778 CHRISTIAN, WILLIAM
409 CHRISTIAN, WILLIAM J
5918 CHRISTIANSEN CHRIS
3557 CHRISTIANSEN JANET S
5882 CHRISTIANSEN M
9818 CHRISTIANSON, CINDY
9534 CHRISTIANSON DAVE
9723 CHRISTIANSON DON L
6411 CHRISTIANSON, KATHY D
778 CHRISTIANSON, MARYJANE
6410 CHRISTIANSON, RONALD L
246 CHRISTIANSON, TURPIN E
8003 CHRISTIE, LEONARD F
3979 CHRISTIE, MATTHEW J
4891 CHRISTIE PATRICIA
3236 CHRISTIE, STAN
11414 CHRISTIE M D DAVID
9677 CHRISTINS, DALE E
1291 CHRISTOFFEL TODD
6051 CHRISTOPHER, DONALD
10589 CHRISTOPHERSON, LISA
5728 CHROSTOWSKI, CAIL
4592 CHURCH, JERRY L
9018 KRUSE, ED H
6155 KRYMINS ROBERTS
4823 KUBERG, E K
106 KUBIAK, ARNIE
2920 KUBIC, JENNIFER & PAU
3958 KUCERA, RICH
4017 KUECHENMEISTER, STEVE
4814 KUEHNE, L V
4815 KUEHNE M J
7591 KUEHNOEL FAE
8596 KUEHNOEL GARY
8597 KUEHNOEL MARVIN R
3546 KUFTA, CORENE M
5340 KUHLMAN, CANDIS
2273 KUHNS, RANDALL
8697 KULP, ROGER
5866 KULTY, VIRGIL
10041 KUNIN, WILLIAM E
2419 KUNKEL, DAVID K
2375 KUNKEL, NORMAN C
10112 KUNTZE A J
1625 KUO ALEXIS
2369 KURATH, DEAN
6766 KURE, DAN
1609 KURE LINDA
8943 KUROWSKI ABEL
8942 KUROWSKI ROBIN
2918 KURP HERTA
1455 KURP, K
622 KURPIUS NANCY
7382 KURSCHNER, JIM
1250 KURTH JEROME
2668 KURTZ RUSS
4324 KURY JAMES
3012 KUTA NANCY A
734 KUTOB, RJ
9445 KUTSCH, IRENE
9443 KUTSCH, JACK
9448 KUTSCH, KEVIN
4578 KUTSCH SCOTT
9447 KUTSCH, TERRESA B
9442 KUTSCH TODD M
1633 KUTZ, JOHN
5643 KUTZER, DAVID
5520 KUTZER SHARON E
5391 KUYPER, PIETER
2746 KUZMAN GENE
5429 KVAM, ERIK
2848 KWIATKOWSKI THOMAS
2314 KWIECINSKI THERESA & JOHN
2242 KYLE CARMEN D
9983 KYLE, KATHY
1643 KYRISS, IVAN
1762 LABBE JIM
2946 LABELLE, THOMAS H
4067 LABORN, CARL
9932 LABREE EMILO E
4701 SIPE, ROBERT
2519 SISSON, JULI
10115 SISSON, PAUL
1521 SIVERTSON, DOROTHY
1017 SIZER, DORCAS L
1018 SIZER, GEORGE R
965 SJERVEN, RAYMOND H
1732 SKAGEN, BRAD
11536 SKAN PAUL
791 SKEAN BONNIE
6592 SKEWIS, ROY
4323 SKIEENS, STEVE
7024 SKINNER, JAMES
8761 SKJELET, TIM
3077 SKOOG, LOWELL
5889 SKORICK WILLIAM E
6366 SKREDSVIG, JANET
9606 SKURLOCK, SHARON
11005 SKURLOCK, WADE
2514 SKYE AZURE MORGAN
4164 SLACK, JOHN
1736 SLADE CLIFFORD
2332 SLANINKA, LAUREL L
10124 SLATE, ROBERT C
10729 SLATER DAVID
6382 SLAVEN MICKI
212 SLEE THOMAS
11875 SLEEPER DORIAN
11463 SLEEPER, JUSTIN
11874 SLEEPER R G
3458 SLEIGHT ANN
7664 SLETTEVOLD BRANDON
1086 SLEZAK, MARK
4485 SLICK HAROLD
9472 SLOAN, EVELYN D
7990 SLOAN JANET
4319 SLOAN, LENNY
11353 SLOAN STEVEN
11824 SLOAN III, PAUL
7588 SLOANE, H W
10533 SLONIMM, DEBBIE
2876 SLOTEMAKER LEIGH
305 SLOTNICK, MARY H
863 SLOVER MARTHA
10584 SLUSSER, GEORGE F
8320 SLUTZ PATRICIA
8468 SMALL DUANE W
8469 SMALL, JOHN D
1254 SMALLEY JOE
577 SMALLEY LORRAINE
9906 SMALLIDGE CELIA ANN
8552 SMALLIDGE, F E
8102 SMALLIDGE GERTRUDE R
9907 SMALLIDGE, JERALD E
5969 SMART, DERMA
1498 SMART, E THOMAS
7902 SMATHERS, EUGENE

9485 CHURCH, LEON J
4399 CHURCHILL, LANORA
775 CHURCHMAN, JOANN
200 CHYTIL, ALICE L
201 CHYTIL, JOHN
2904 CICCHILLO, HUBERT M
5137 CIEPLIK, FRANK
2265 CIJARROA MELISSA R
1306 CIVEY, JAMES P
7355 CLABOUGH RW
7356 CLABOUGH, SANDRA
11564 CLAKIS, MARGUERITE
5898 CLAMPITT, DUANE F
6133 CLANCY, PAT
9045 CLAPP LAWRENCE M
7161 CLARDY, JAMES M
54 CLAREY, MARY LOU
8048 CLARI, KENNETH T
596 CLARK, BETTY
1068 CLARK, BOB
5620 CLARK, CORY
6168 CLARK, DAVID
8831 CLARK, F J
6165 CLARK, FRANK
6278 CLARK, GERALD
6505 CLARK, H
8332 CLARK JERRY
4048 CLARK KEITH W
6167 CLARK, KERRY
9267 CLARK, KIM
3099 CLARK KRISTI M
3292 CLARK, LESLIE
833 CLARK MADRENE E
8613 CLARK MARCIA
4664 CLARK MICHAEL L
686 CLARK, PAUL E
8217 CLARK, RICHARD
9580 CLARK, RICHARD
9833 CLARK, RICHARD
11929 CLARK, SALLY ANN
8615 CLARK, SCOTT
4583 CLARK, STEPHEN M
4333 CLARK, STEVE
2026 CLARK, STUART
6506 CLARK, SUSIE R
5619 CLARK, TINA
5621 CLARK, TODD
9831 CLARK, TROY D
948 CLARKE, DANIEL B
9708 CLARKE, JERRY
1066 CLARKE LEE
853 CLARKE, MARIANNE
2086 CLARKE MICHAEL D
814 CLARKSON, JOHN
283 CLAUDE, RAY
2321 CLAUSEN, CATHERINE
6377 CLAUSEN, JERRY
9933 LABREE, RUTH E
9921 LABREE TERRY
2795 LACHAPELLE, MARY E
4908 LACKMANN, GARY
10002 LACKMANN, JEANNE
5789 LACTAOEN, TONY
2773 LADNER, MICHAEL P
3939 LADOUCEUR, TRUDY
4812 LADOUX, TED J
4807 LADOUX, TED J
11857 LAES GENE
7609 LAFEEN, BOB
2166 LAFOND, J L
2039 LAGASA, E H
6869 LAGERQUIST, KENNETH E
6897 LAGRA, VIRGINIA
7827 LAHR, BRUCE
2499 LAHTI, DAWNA L
2943 LAIKEN STEVEN G
11519 LAINE KRISTEN
4657 LAIRD DENHOLM M
4673 LAMARCHE, GARY D
10153 LAMATRY, H M
11484 LAMB, BOB
9804 LAMB ED
9865 LAMB GERTRUDE
5795 LAMB RONNA
4940 LAMBERT, BYRON
2305 LAMBERT, GORDON
8955 LAMBERTSEN MICHAEL
8958 LAMBERTSEN STEPHANIE
6732 LAMBETH TONY
5222 LAMBORN, DON
3983 LAMIE, CHARLES
4014 LAMIE, DAN
3993 LAMIE TERRY
427 LAMMI PHILLIP E
5801 LAMPITT, HELEN
5800 LAMPITT ROGER
10618 LAMPSHIRE KENT
7025 LANATA, BRIAN
10930 LANDAU, CHARLES
10911 LANDER, PAUL
6778 LANDIS, DAN
4453 LANDON, WILLIAM
3133 LANDRUD, LEE
5947 LANDWEHR JAMES R
1427 LANDWEHR, TOM S
1536 LANE, GARY
3783 LANE MILT
10317 LANE PAGE
4513 LANE, PATRICK
1883 LANE RICHARD
1898 LANE, RICHARD
10329 LANE, RONALD
8155 LANE, TERRY L
2040 LANG JONATHAN
9646 SMITH, ARTHUR W
11663 SMITH, AUDREY
6250 SMITH, BERNIE
8770 SMITH BETTY L
11831 SMITH, BILLIE
2054 SMITH, BOB
4001 SMITH, BRUCE T
1581 SMITH C J
7561 SMITH, CAMI
10006 SMITH, CAROL
5407 SMITH, CHAD
4410 SMITH, CHAR
3825 SMITH, CLIFFORD
6724 SMITH, CLIFFORD
7856 SMITH, CONRAD
3285 SMITH, COREY
5689 SMITH, COURTNEY
5410 SMITH, CRAIG
2590 SMITH, CRAIG D
2231 SMITH, CRAIG G
3132 SMITH, D E
5355 SMITH, DALE E
1592 SMITH, DAN
6727 SMITH, DAVID
9398 SMITH, DAVID
10559 SMITH DAVID
10592 SMITH, DAVID
11371 SMITH, DAVID
450 SMITH DAVID W
7439 SMITH, DEBBIE
2644 SMITH, DENNIS
6297 SMITH, DERALD
5327 SMITH, DICK
7363 SMITH DIXIE
6565 SMITH, DON
1385 SMITH, DONALD W
5483 SMITH, DOROTHY
799 SMITH, DUANE
9416 SMITH, DUANE
914 SMITH, ED
7174 SMITH ED
4272 SMITH EILEEN
10715 SMITH, ERIC
8568 SMITH, GARY
703 SMITH, GARY A
7437 SMITH, GAYLOR
9483 SMITH, GEORGE A
3550 SMITH, GERALD
2244 SMITH, GREG
7967 SMITH, GREG
2583 SMITH, GRETCHEN M
4757 SMITH, GUY W
5832 SMITH, H
3789 SMITH, HERMAN
2720 SMITH, J A
7512 SMITH, J A
5649 SMITH, JACK

1379 CLAUSEN, LANA
1614 CLAUSEN, MELISSA
8655 CLAUSING, CYNDI
5108 CLAY, CAROLYN
8641 CLEARBROOK, DONALD
7143 CLEARMAN, JOHN F
415 CLEARWATERS, W D
11257 CLEARY, JOHN
8251 CLEAVE, DAVID B
8262 CLEAVE, KELLI
4456 CLEAVER WILLIS
3518 CLELAND, MARY
3354 CLELAND, ROBERT
6307 CLEMENTS, BOB
735 CLEMENTS, GAREY L
7846 CLEMENTS, RICHARD
8634 CLENDANIEL, MARK
8228 CLEVELAND RICK
4206 CLEVENGER, KENNETH
3302 CLEVENGER, RON
10881 CLIFFORD, DIANE L
10226 CLINTON, MADGE
3844 CLOER, GARY
5975 CLOER, L J
4177 CLOER, PATSY
5209 CLOER, RON
3963 CLOER, TED
9138 CLOOSE, C C
6756 CLOSE, GEORGE A
5662 CLOSE JIM
559 CLOUGH, THOMAS G
7472 CLOUTZ, DAVID
7938 CLOVINGER A J
7937 CLOVINGER RON
10692 CLUBB, PH D , R W
4848 CLUNN, SAUK
9096 CLYDE, HELEN
9100 CLYDE, REO
7047 COBB, CINDI
9046 COBB, JIM
2497 COBB, MR & MRS V B
6390 COBB, ROBIN
8461 COBLE, JUDITH T
5912 COBLE ROBERT D
637 COBLEIGH KENNETH A
11811 COBLENTZ, ROBERT
1637 COCCOLI, HOLLY
5546 COCHINELLA, WILLIAM G
7590 COCHRAN, MARJORIE
7562 COCHRAN, MICHAEL
2438 CODD, GREG
11055 COFFIN, AARON
3098 COGGINS, CHRISTINA
8736 COGGINS DALE L
3425 COGGINS, DARRELL
4115 COGGINS, GARY
2711 COGGON, GRANT G
3161 LANGABEER, JULIE
10158 LANGDON, SPENCER
8266 LANGE, CAROLYN
4832 LANGER, WILLIAM
3478 LANGEVELD, HOWARD
8178 LANGLEY, DORIS
8464 LANGLEY, JERRY
2805 LANGLEY, MELVA
8179 LANGLEY, MICHAEL
8180 LANGLEY, VERDE L
7983 LANGMACK, PAUL
2154 LANGSDALE, GARY W
9210 LANGSTAFF, MARION
857 LANGSTAFF, RUSSELL O
1627 LANLCHAAN, KEN
1623 LANLCHAAN, SANDY
3707 LANNIC, DON
7459 LANPHIER, LISA
2753 LANSDON, C D
7096 LANTZ STEVEN
721 LANTZER BILLIE
680 LANTZER, LARRY
9738 LANZ, ROBERT J
10940 LAPORE, RICHARD
2592 LAPORTE, MARIE LISE
1742 LAPP, BONNIE
10610 LAPPENBURCH SR CHARLES
4448 LAPSANSKY JOHN
2835 LARABEE TERRII F
10577 LARCHER GARY
11418 LARICAN CORAZON
8571 LARKIN BRIAN
7404 LAROCHE PHIL
3429 LARONE VIRGINIA
6971 LARRABEE ROBERT
7713 LARREW, DOUG
9824 LARSEN BOB
7330 LARSEN CAROLE
7920 LARSEN CLYDE
3760 LARSEN, DAVE
7784 LARSEN, DEREK
2719 LARSEN LAWRENCE G
3121 LARSEN MICHAEL
11876 LARSEN MICHAEL
7785 LARSEN MRS MATTHEW
8506 LARSEN ROBERT
6827 LARSEN, STAN
7335 LARSEN WARD O
3328 LARSEN WES
8633 LARSON, CHRIS
11103 LARSON CHRISTINE
8095 LARSON, DAVID
6768 LARSON DEBBIE
4370 LARSON, GRANT
5549 LARSON KENNETH M
2911 LARSON, MILT
9838 LARSON OWEN
11436 SMITH JAMIE
7625 SMITH, JERILYN
4949 SMITH JERROLD W
5009 SMITH, JERRY
4860 SMITH, JILL
2217 SMITH, JIM
6249 SMITH JO
4696 SMITH JOANNE
1281 SMITH JOSHUA
5964 SMITH JUDY
9399 SMITH JULIE
1634 SMITH, K E
5409 SMITH, KATHY
7401 SMITH, KERRY
6430 SMITH LARRY
9402 SMITH LARRY
442 SMITH LARRY J
10709 SMITH, LAURA
6142 SMITH LEIGH
9401 SMITH LYLE
3448 SMITH MACKENZIE
1789 SMITH MARSHALL
9400 SMITH, MATT
610 SMITH MCLELLAND J
699 SMITH, MELANIE
1604 SMITH, MICHAEL
12 SMITH MIKE
8554 SMITH MYREL
10839 SMITH NEIL
643 SMITH NORMA
9397 SMITH PAM
10889 SMITH, PETER L
3111 SMITH, R
5512 SMITH R DEAN
5466 SMITH, RALPH F
7951 SMITH RAMONA
1554 SMITH RAY
11666 SMITH RAY
3848 SMITH RAYMOND
7708 SMITH RICHARD
3765 SMITH, RICHARD F
8393 SMITH RICKIE
10154 SMITH RIK
10834 SMITH RIKHARD
3118 SMITH, ROBERT
10555 SMITH ROBERT
2463 SMITH ROBERT E
8887 SMITH, ROBIN RICE
4232 SMITH ROGER
4693 SMITH ROGER
1653 SMITH RON
4816 SMITH RON
11220 SMITH, RON
4203 SMITH RONALD
8096 SMITH, RONALD D
1220 SMITH, SANDRA
8355 SMITH SANDY

2602 COHAN, RICHARD C
11082 COHEE, JOAN
1931 COHEN, TINA
5354 COHN, LEAH A
1924 COHRS, VERN R
10089 COHRS, VICTOR W
11531 COKER, CINDY
8067 COLARUSSO, JOHN
3510 COLBY, APRIL
5042 COLBY, DAN
2452 COLBY DAVID J
11858 COLBY, HELOISE
7869 COLE, ALLEN
9480 COLE, BOB
2609 COLE, GRACE
11752 COLE, JASON
4092 COLE, JIM
8351 COLE, JOE
4089 COLE, JULIE
4409 COLE N C
4384 COLE, PHILLIS
11132 COLE, ROGER
11754 COLE, TED
6524 COLEGATE DOUG
2551 COLEMAN CASEY
9583 COLEMAN, COATES
3972 COLEMAN, GARY
2197 COLEMAN, GROVER
5171 COLEMAN, JOHN
9956 COLEMAN, JOHN T
4413 COLEMAN, KATHY
4121 COLEMAN, LARRY R
3995 COLEMAN MARK
7403 COLEMAN, RICHARD
3642 COLEMAN, RICK
2581 COLEMAN, SUSAN
425 COLEMAN, THERESA A
1775 COLEMAN, TIMOTHY
426 COLEMEN THOMAS
7364 COLES F
5049 COLESTOCK, KEVIN
1420 COLLARD, KEVIN J
11641 COLLEGEMAN ALAN
7287 COLLENTINE, T J
6561 COLLETT, RENAY
9710 COLLETT, ROBERT J
4981 COLLEY, MICHAEL
1995 COLLEY, NANCY
11856 COLLIER, MIKE
6228 COLLINS BERTHA
8358 COLLINS, CLARK
2846 COLLINS, CLARK L
9699 COLLINS, DOROTHY M
4534 COLLINS, ED
6019 COLLINS, ESTHER
118 COLLINS, GARY E
2277 COLLINS, GERALDINE
6618 LARSON, ROBERT
7759 LARSON, SUE
5748 LARSON, WALLY
4876 LARSON, WILLIAM
269 LARUE, LAURENCE
10537 LASATER, CYNTHIA
708 LASCHEID, JEFF
706 LASCHEID, KAREN
9439 LASEE, TIFFANY
7387 LASHBROOK, RON
10583 LASHLEY, JACQUIE
5600 LASLEY, GLENN A
5602 LASLEY, JULIE M
4685 LASLEY, MICHAEL
5601 LASLEY, RHONDA
5603 LASLEY, RICHARD
5604 LASLEY, SALLY
8791 LATHAM, MICHELE
5230 LATHROP, DOUG
1298 LATHROP, ELIZABETH L
3334 LATHROP JARED
5228 LATHROP, SCOTT
5239 LATHROP, SUZY
5231 LATHROP, TY
795 LATIMER, THOMAS D
3294 LATLIP, ANDREW
7640 LATO, ERIC
4264 LATOUNELL, PAUL
8214 LAUGHLEN, K D
7542 LAUNDRY, EDWARD
9056 LAURENT, BUD
9057 LAURENT, MARK
3109 LAURIE, CHRISTINE
2118 LAURIE, MICHAEL
3110 LAURIE WILLARD
9240 LAUTERBACH, GERALD
1740 LAVENDER, EROLYN
2884 LAVIGNE, A B
11144 LAW, MONI
4878 LAWLER, MARK
8493 LAWNES, GARY
6936 LAWRANCE, LUKE
2789 LAWRENCE, GEORGE
11728 LAWRENCE, KRIS
2148 LAWRENCE, PATRICIA
2844 LAWS, E HAROLD
2923 LAWS, MARILOU K
11776 LAWSON GEORGE
5979 LAWSON, PATTI
10016 LAWTON, ROY
5097 LAYCOCK, ANDREW J
5078 LAYCOCK, SHIRLEY RAE
7897 LAYMAN, JAMES
9747 LAYMAN, NORMAN
9604 LAYTON, LAWRENCE J
3476 LAZZARI, MIKE
9368 LE DUC, VIRGIL
11050 SMITH, SHAUN
1426 SMITH, SHAUN D
2334 SMITH, STAFFORD L
6713 SMITH, STAN
3665 SMITH, STANLEY
1355 SMITH, STANLEY E
5057 SMITH, STEVE
5408 SMITH STEVE
94 SMITH, T G
5671 SMITH, TANYA
10079 SMITH TED
3927 SMITH, TERRY
4996 SMITH, THOMAS
2042 SMITH, TIM
3954 SMITH, TIM
7397 SMITH, TIMOTHY
1984 SMITH, TRACY H
5485 SMITH, TRUE MARIE
11930 SMITH, VALERIE
5437 SMITH VICTORIA
3928 SMITH WANDA
8608 SMITH, WAYNE
7549 SMITH, WILLIAM
11731 SMITHAM, DENNIS
11735 SMITHAM, JULIE
2710 SMITHAM MATTHEW D
3558 SMITHLAND, R
6877 SMOTHERMAN, JIM
2743 SMUD, PAUL
7904 SMULL ZEAN
2678 SMYTHE, STUART L
4091 SNELL, ROGER
4147 SNELSER, RUSSELL
11254 SNOW DONALD
1014 SNOW, HENRY
9290 SNOWDEN, PAM
6337 SNYDER BENJAMIN
5734 SNYDER, CLAYTON
6846 SNYDER, ELIZABETH L
8369 SNYDER, PHYLLIS
10989 SNYDER, ROBERT
7138 SNYDER RONALD D
9296 SNYDER RUBY
28 SNYDER, TOM
3621 SOBANIA, CHARLES
5226 SOBATE, DIRK
11039 SOBIERALSKI, GWEN S
10693 SOBIERALSKI, WILLIAM
6916 SODERBERG, ARNOLD
6917 SODERBERG, DARLENE
11334 SODERBERG, PAUL
9106 SODERBLAM, DAWN
4582 SODERBLOM ED
9113 SODERBLOM, GWENDOLYN
9120 SODERBLOM, LARRY
8766 SODERGREN, DAVID L
8763 SODERGREN, LYNN W

6450 COLLINS, JACK
4298 COLLINS, JOHN E
2318 COLLINS, JUDY
117 COLLINS, KAREN K
11507 COLLINS, LAUREN
9308 COLLINS LLOYD
2415 COLLINS MICHAEL L
6591 COLLMAN JIM
330 COLON, JEFF
3000 COLOROS, TIANA
3681 COLSON, KARLA
162 COLTER, CAROLEE
2506 COLTON, MRS GEORGE
10801 COLVIN, LUCY J
5668 COLVIN, SAM
204 COLWELL, DAVID G
203 COLWELL, SUSAN A
4219 COMPTON, BYRON
9063 COMPTON, HOWARD
4499 COMPTON MARY
6068 COMPTON STEPHEN
1983 COMSTOCK, MEL
9409 CONDIT, BOB
9413 CONDIT, BUD
9411 CONDIT, CINDY
9412 CONDIT, ERIC
9410 CONDIT, RACHEL
6135 CONDO, DICK
6136 CONDO SHIRLEY
5286 CONDON, SHIRLEY
10793 CONGDON, CELIA
3666 CONKLIN, GLENN
3613 CONKLIN JOYCE
3392 CONLEE, JOHN
2850 CONLEY HOLLY & CLIFF
3514 CONN, ANNE
1008 CONN GRANT J
1009 CONN, SANDRA
11583 CONNELL, JAMES
8700 CONNER DOUG
4061 CONNER, JAMES
3155 CONNER, JAMES R
8698 CONNER, KELLY
10199 CONNER, TOM
2885 CONNOLLY KATHY
8802 CONNOR, MARK
8801 CONNOR MICHAEL J
6959 CONNORS, RICHARD
7131 CONSTANTINO F J
3400 CONSTANTINO, FRANK
10242 CONTOR ROGER J
5991 CONTRATTO, JOLENE
5985 CONTRATTO RONALD
5675 CONWAY HELEN
10939 CONWAY, KATHLEEN
10545 COOELT, DAVID
5736 COOK, ADENA
2135 LEA, JANE
1900 LEA, KATHY
9743 LEACH, BRADLEY A
8339 LEACH, C E
8309 LEACH, K A
6373 LEACH, RENNIE
8272 LEACH TERENCE
4702 LEADER, BOB
7270 LEAMAN, VIRGIL
4257 LEAN, MICHAEL
1898 LEAO, GERALD
6722 LEASY, SHANE
4818 LEATHERMAN PHIL
1622 LEATHERWOOD, DON
10766 LEAUMONT RICHARD
2691 LEAVITT, AL
8543 LEAVITT, JOHN K
11034 LEAVITT-BALDWIN ALLYSON
11568 LEBENS KAREN
10222 LEBER LISA
10699 LEBER, TIA M
9985 LEBER WILLIAM
2100 LEBERG, MARY ANN
9311 LEBERT, PLATT J
966 LEBERT STEVEN
1539 LEBLOND, MRS E K
3806 LEDFORD, ANDY
3808 LEDFORD, ANN
3838 LEDFORD GARY
3805 LEDFORD, KIMBERLY
289 LEDFORD, WAYNE
3244 LEDGERWOOD, LANE
3245 LEDGERWOOD, SHERRY
9177 LEDGERWOOD TOM
9369 LEDUC NORMA
5996 LEE BARRY
5983 LEE CHANDRA
10385 LEE DAN
6526 LEE DAVID
9620 LEE DEBBIE
5992 LEE GARY
7398 LEE, JEFF
4881 LEE JOHN
4110 LEE LARRY
8079 LEE, MIKE
6582 LEE PAUL
5430 LEE, RANDY
5270 LEE RICHARD J
9670 LEE RODNEY A
5994 LEE, SHEILA
5942 LEE, T
10245 LEE-HAIGHT CATHY
2794 LEEBERG BOB
5336 LEEDY, HELEN
6303 LEEDY, WESLEY
4920 LEET ROB
10833 LEFFEW OLVERA, MELFORD &
11608 SODERLIND, LAWRENCE
9765 SODERMAN, EARLE A
2730 SOIKE, HANK
4841 SOKAL, DAVID
4527 SOKOL, BRAD
1669 SOLARO, DAVID & SALLY
1913 SOLBERG, HAROLD A
8598 SOLBERG L M
8599 SOLBERG, REIDAR
620 SOLHEY, BRIAN
5750 SOLI DENISE
5040 SOLIE, LILAH
4951 SOLIE, RAYMOND
3149 SOLIZ JEAN
11016 SOLLER SUSAN
9482 SOLO, ROY
46 SOLOMON, ASHLIE
5133 SOLOMON, L J
10809 SOLON JERI
2483 SOLWOLD, RICHARD
9217 SOMERVILLE PEG
9218 SOMERVILLE RICHARD
10684 SOMMARSTROM, ALLAN
168 SOMMERFELD MARK W
1885 SOMOLL, IRENE
10706 SONNESON, DELMIS L
4659 SOPER, NEIL E
2023 SOREL, JULIEN
11438 SOREM GARY
11449 SOREM, MONTI
11448 SOREM PATRICIA
6966 SOREN SR, RICHARD
5568 SORENSEN, GARY
10531 SORENSEN JAYNE
9033 SORENSON, HERBERT
9034 SORENSON, MARIE
6777 SORENSON, MIKE
3398 SORRENSEN, KRISTIN
9201 SORUM, KARLA
72 SOSNOVE NANCY
11648 SOULE, CARMEL
1828 SOULE, DELORES
3777 SOULE, DENNIS
1852 SOULE, HERBERT
2408 SOUND DINNA LOU
1414 SOUTH, NANCY
11367 SOUTHWARD VERN & JIN
8460 SOUTHWORTH, ELMO
8137 SOUTHWORTH, MARTY
8134 SOUTHWORTH, MEL
8139 SOUTHWORTH, MELVIN L
8133 SOUTHWORTH, MICHELLE
8138 SOUTHWORTH, ROSEMARIE
6553 SOWERBY, JEANNE
11350 SOWERS, LINDA
7986 SPACCAROTCKI, DAVE
9481 SPADA, JIM

7169 COOK, BURRELL J
32 COOK, CHRISTINE M
3494 COOK, DIANE
11899 COOK, DOROTHY
5087 COOK ED
4163 COOK, FRANCES
10859 COOK, GEORGE
5839 COOK, J F
9655 COOK, JAMES M
4160 COOK MACK J
4152 COOK, MERLIN
11896 COOK ROBERT
5308 COOK, ROBERT JAY
8862 COOK, ROD
7158 COOK, TERRY A
1881 COOK, TOM H
2307 COOK, VALERIE
8258 COOKE, H
9101 COOL, DOROTHY
1222 COOL KEITH DAVID
1255 COOL, MRS SUE
2030 COOLEY, MICHAEL
7102 COONC K C
5194 COONC, KENNY
6197 COONTS, DONNA
9044 COONTS, ED
6108 COOPER, CLINTON
4325 COOPER DEAN
896 COOPER, GERRY
429 COOPER LEMUEL B
978 COOPER LESLIE R
6884 COOPER, MYENA
1528 COOPER, NANCY
11475 COOPER RICK
3865 COOPER, THOMAS
5393 COOPER, WALTER
5085 COOTSONA NICK
9553 COPELAND R W
1754 COPHER, RICK
11027 COPPER, LINDA
10456 CORBIN, KURT
2015 CORBIN NOELLE
3978 CORBITT, DAN
8640 CORCORAN, GAIL
8282 CORDER, BRUCE
10878 CORDERO, ROBERTA R
8962 CORFATH, CHARLES F
1244 CORKINS HAZEL
5744 CORKINS, RICHARD
6634 CORLEY, RANDY
5697 CORLEY, VICKIE
7396 CORLISS, SCOTT
4647 CORMACK, BRYAN
4648 CORMACK, GENA
4136 CORNELL, RON
274 CORNER, TIMOTHY G
4829 CORNING, RUTH
9803 LEGAULT, JEROME
4212 LEHMAN, DOUG
1120 LEHR, CHAD
3181 LEHWALDER, JANET
1657 LEIBRANT, DAN
1336 LEIBSOHN, RONALD
2928 LEIFHEIT, STEVEN
4341 LEIGHTY, CHUCK
5998 LEMANINGO, IRRARACO
7842 LEMIEUX, WILLIAM
10885 LEMLEY, LESLIE
9564 LEMLEY, SHIRLEY
1882 LEMMUNS, DON
4782 LEMOINE, EVA
752 LEMOINE, NORMAN
4794 LEMOINE, RAY
9253 LEMON, DELANEY
9255 LEMON, ROBERT
592 LEMON ROGER A
1886 LENDERMAN, BRENDA
2999 LENDY, MR & MRS ERNEST
7482 LENHART, MIKE
3288 LENHEN, KATRINA M
4022 LENKER, DOUGLAS R
3769 LENKER, ROSEMARY
3860 LENKER, SHANNON
11196 LENNON, DAN
7926 LENTZ PAMELA L
7881 LENTZ JR , DONALD
1228 LENZ, MIKE
7277 LENZ, WILLIAM
10938 LENZ-HACKETT CHERIE
264 LEONARD, ANN C
229 LEONARD GEORGE D
2998 LEONARD, JOSEPH R
11247 LEONARD, LYNN
10602 LEONARD MICHAEL
335 LEONARD, SUE
2425 LEONARD, T L
4840 LEONARD, TOM
11226 LEONARD, WAYNE
11137 LEONE, MARJORIE
5215 LEOPARD, ERNIE
10504 LEOPOLD ESTELLA
1685 LESCHKE, MIKE
612 LESH, WILLIAM
5571 LESLIE, MICHAEL
5463 LESOING, MITCH
11395 LESOURD, BRUCE
6093 LESSORD JOE
6092 LESSORD K
1986 LESTER, BRUCE W
6508 LESTER, TANYA
1438 LETH, DORTHE
6371 LETT, C L
6134 LEVENS, JIM
2377 LEVENSKY, MARK
9733 SPADAFORA, KIM
481 SPAHR, MARY ANN
11141 SPANGENBERG, ERIC
11275 SPANN, JEFF
8271 SPANSKI, HAROLD
2105 SPARER, CAROL
2737 SPARKS JERRY G
3301 SPATH, RONALD
1790 SPAUDE, THERESE
1001 SPAULDING, JOHN
11787 SPAUN, CHRISTOPHER
1702 SPEAMIN, ROBERT
4895 SPEEG WIL
10689 SPENCE, ROBERT L
6720 SPENCER, CHRIS JAMES
4972 SPENCER, JEANNINE
8248 SPENCER, JULIA A
4975 SPENCER, KRISTOPHER
2059 SPENCER, STEVE
10054 SPENCER, TERRI
7148 SPENNY, ROBERT
2971 SPENS, MARY M
5808 SPERRING, CARL
11675 SPHULER, MICHAEL
1894 SPILSBURY, BRENT
8707 SPIVEY, JAMES R
1174 SPIZMAN, HARRY
5317 SPOELSTRA, JEFF
1166 SPOHN, A THOMAS
11365 SPOOKSTENER DONALD
8870 SPORCIC RAYMOND W
4021 SPORKOF, DELBERT D
1400 SPRAGUE BRUCE
7936 SPRAGUE, GARY
634 SPRAGUE, J R
11563 SPRAGUE, WESLEY
371 SPRAY, SHANE
5701 SPRIGGER, ROBERT
4802 SPRING, IRA
8621 SPRINGER NANCY
8620 SPRINGER, SCOTT
5176 SPRINGER, TODD
6024 SPRY DALE
6025 SPRY, MARJORIE JUNE
9524 SPUNAUGLE, JON M
6229 SQUIRES, TERI
6319 ST LOUISE JOAN
10337 ST AUBIN, EARL
11283 ST CLAIR, FRANK
272 ST CYR, CLIFF
7860 ST LUISE, MARK
6801 ST LUISE NORMAN
9389 ST PETER, HAROLD
11075 STAATZ, EVE
9970 STAATZ, KAY
11074 STAATZ, PETER K
5115 STABEROW, DOROTHY

10714 CORNISH, SAM
1044 CORRIGAN, M D , THOMAS F
2872 CORROONE R MICHAEL
4372 CORRY, JERRY
9064 CORSKIE, IRENE
9061 CORSKIE, PAUL
538 CORWIN SUSAN
3984 CORY DON
308 COSAND GERALD R
10448 COSARY BOB
11412 COSTELLO, GARY
6945 COSTELLO MANUEL
7909 COTTRELL, D
7910 COTTRELL LEE
4011 COUCH, ALAN
11769 COUFIERREN, J
10967 COUGHLAN, GLENN B
7673 COULBOURN, GEORGE
7624 COULBOURN, LESLEY
5186 COUNSELLOR RON
2674 COUNTRYMAN, KEN
7740 COURSEY RAYJEANE
9316 COUSINO, HOWARD
5534 COVEN SAM
665 COVERT DAVID S
1512 COVERT, MARY ELLEN
1550 COVERT, MARY ELLEN
822 COVEY, EDGAR
4959 COVY FRECI
4964 COVY, LISA
11068 COWAN TED
6274 COWAN W P
1967 COWGILL, SARAH
9815 COWIN WAYNE
10637 COWLIN WILLIE
4214 COX BILL
1825 COX, CHARLES
5276 COX CHERYL E
190 COX SUSAN E
5616 COX TAMMY
3188 COXLEY BRUCE
9609 COY MAURICE T
1596 COYB, MIKE
7294 COYNE DAN
416 COZENS, THORA B
4026 CRABTREE JIM J
8296 CRABTREE, KENNETH
196 CRABTREE, RONALD C
8631 CRAIG CONNI
8629 CRAIG DAVID
9347 CRAIGER JAMES
10648 CRAINE KELLIE
202 CRAM LORI S
7892 CRAM, RICHARD
10167 CRAMER, GARY
1199 CRANDALL, DERRICK
1629 CRANDALL, PAUL

11393 LEVEUGLE, MACHELLE
10406 LEVINE, HOWARD
1341 LEVINE, MOSHE
1467 LEVINE RAZEL
1459 LEVINE, SARRA
1340 LEVINE, TIO
7770 LEVINS, BOBBI
6625 LEVINS DAVID
546 LEVINSON, SAM L
7735 LEVTZOW PAULA
10043 LEWELLEN, RICHARD
9873 LEWIS ALFRED G
7871 LEWIS, BRUCE
9370 LEWIS DONNA
2836 LEWIS, EVELYN & BRIAN
997 LEWIS, FRANK E
7276 LEWIS, GARY
8194 LEWIS HELEN
7340 LEWIS JACK E
494 LEWIS JAMES
6076 LEWIS, JIM
5447 LEWIS, KEVIN
4773 LEWIS MOLLY
11378 LEWIS, NILE
4776 LEWIS, PENNY
5031 LEWIS, SCOTT
6821 LEWIS SHARON
11282 LEWIS THELA
1201 LEWIS, WILLIAM C
11673 LEWIS WINDLE
1647 LEWIS-HART KAREN
9761 LEYDE, DAWN
8525 LEYENDECKER FRANK
7823 LIDOVITCH SILVAN
2025 LIEBERMANN JERRY
10936 LIEN, CARSTEN
7569 LIEN GARTH
5136 LIEN, KATHY
9089 LIEN, KEN
2708 LIEN, LARRY R
8643 LIEN SHANNON
8050 LIERMANN RANDY
6056 LIGHTFOOT RICHARD
8149 LIGHTFOOT W A
710 LIGHTNER, JOHN L
7693 LIGTENBERG, ARNOLD R
7694 LIGTENBERG NANCY R
7876 LILJA BETTY
7878 LILJA, JAMES AN
3733 LILLOREN DENZEL
3867 LILLOREN GENEVIE
3870 LIMPERT, RICHARD
1861 LIND, EARL C
5775 LIND ROBERT
5776 LIND RONALD
5919 LINDBERG TOM
4667 LINDELL ARTHUR R

4931 STADIG, ERIC R
6193 STADIG, PAULA
2271 STAFFORD NANCY
2233 STAHL DONALD P
5265 STAHL, JACK S
9298 STAHL, KARRI
5264 STAHL, LISA
9359 STAHLHUT W H
8432 STAKKELAND, LINDA
8434 STAKKELAND TOM
9688 STALL PAUL R
10348 STALLINGS DAVID
6825 STALNAKER, LOUIS
3500 STAM JERRY
5986 STAMBEK, CLARENCE B
1802 STAMM LEE
5518 STAMPF, H R
11327 STAN, MARILYN
2793 STANFEL, JOE
1116 STANGER, HAROLD
4183 STANGER HAROLD
3140 STANN DVM, SUSAN E
1762 STANSBY B
2530 STANTON, BRENDA
5128 STANTON BRUCE C
6651 STANTON TRAVIS
2980 STANTON-WYMAN, PAM
9639 STAPAG, STEVEN
3347 STAPP DOROTHY
10776 STAPP, MARY AUGUSTA
10407 STARCHER ANDREW
3743 STARK EDWARD
3130 STARK GREG
6537 STARK LOREN
6559 STARK PATRICIA J
324 STARKENBURG JEFF
84 STARMER DALE H
302 STARR EDWARD R
479 STARR MRS MIKE
10433 STARRY ALLAN
1258 STARTMAN JEFF
787 STAUFFER, MIKE T
8674 STAVAS, RON
1080 STAVELFIELD, DEVIN
115 STAVIG CHRISTINE
121 STAVIG, PAUL
1219 STEARNS DANIEL A
9490 STEARNS EARL
303 STEARNS IRIS V
9488 STEARNS JOYCE E
7389 STEARNS, PAULA
3369 STEBES, LARRY
9809 STEBLY, MIKE
4732 STECHER MIKE
9855 STECKEL GARY J
9523 STECKELBERG, DALE
5886 STECKELBERG, LEILA

869 CRANDALL, PERRY C
9102 CRANMER, BERNARD
9103 CRANMER, FERN
6094 CRANSTON, JIM
9237 CRAVEN MARK
11796 CRAVY DAVID
4458 CRAWFORD, DALE
11030 CRAWFORD, DONNA
4169 CRAWFORD, JACK
7225 CRAWFORD, JOHN C
4894 CRAWFORD, KRISTEN
9227 CRAWFORD, RON
11705 CRAWFORD SR , BARTIS
6841 CREAGER, MARILE
4725 CREASEY KATHY
4730 CREASEY TERRY
2389 CREBBIN CORY J
1934 CRECELIUS, CARLYLE A
3242 CREIGHTON, JUDY
2632 CREMEENS, GARY
5046 CRESAP KENNY
10304 CRIAL, RICHARD
2579 CRIMI STEVEN J
9979 CRIMINALE ULRIKE
3096 CRINKEAU MILDRED
9786 CRIPPEN, ELMER
10807 CRIPPS AUDRY
3184 CRISP, THOMAS B
2503 CRISTIANSEN, WENDY
73 CROAN GREGG
7083 CROCKER, VINCE
4201 CROMWELL JOHN
485 CROSBY ERV
10130 CROSBY, LISA
9549 CROSHAW-HADFORD, GINNY
10523 CROSMAN, JANET
5788 CROSS, CAGE
11053 CROSSMAN CHAR
8722 CROUCH GEORGE F
6738 CROUCH JANICE
11145 CROWDER, ELIZABETH
4869 CROWDER, KEVIN
4340 CROWE JOE
10257 CROWELL, BARBARA A
11698 CROWELL, ROBERT
2017 CROYLE CURTIS
11070 CRUIKSHANK CATHERINE
10781 CRUIKSHANK TOM
1827 CRUNKILTON, ROBERT
10319 CUCULLO DIEDRE
11544 CUHRY ALVIN
11545 CUHRY, TINNA
448 CULBERT, BETTY
6154 CULLEY, DARRYL
6153 CULLEY, DAVE
11364 CULP, FLORENCE
3909 CULP JAMES
7414 LINDELL, CAROLYN
3996 LINDELL, DAVID
8895 LINDELL, TERRY
4105 LINDEN, ROGER
7431 LINDER, LOREN
1476 LINDER, LUCILE
8518 LINDGREN, DAN
8982 LINDLEY, DAVE
4085 LINDLEY, STEVE
7525 LINDNER, HARLAND
7504 LINDNER LUCILE
1179 LINDOW, TERRI A
6712 LINDQUIST, CLAUDIA
6635 LINDQUIST, FRANK
10187 LINDQUIST, REESE
9387 LINDQUIST, ROSS
1874 LINDQUIST JR , RALPH A
424 LINDSAY, DELORES D
414 LINDSAY, L E
1807 LINDSAY, W H
5083 LINDSEY, EMMA I
9503 LINDSEY GLEN
9567 LINDSEY, KURT
5082 LINDSEY RENEE M
5248 LINDSEY, ROBERT J
3914 LINDSTRAND MILTON
11138 LINDSTROM, HAL & GLORIA
3324 LINDVALL, MARIAN P
2472 LINEHAN THOMAS P
1197 LINGENFELTER, V P DAVI
11310 LINNETT, BARRY
8811 LINNVILLE RICH
6280 LINTON, JAMES
3897 LIPINSKI, DAVID
792 LIPSEY ED
6954 LISHERNESS, MANDY
5633 LISIUS, DON
10235 LISTER CLIVE R B
9842 LISTON, HOWARD C
6575 LITTLE, JAMES
7315 LITTLE JERRY
5441 LITTLE, MELINDA
4364 LITTLEJOHN, DAVE
11086 LITTLETON DENNIS C
6393 LITTRELL, JIM
6728 LIVELY DAVID
6725 LIVELY, GARY
6218 LLAPITAN, RON
6219 LLAPITAN, SUE
7149 LLEWELLYN, DEBRA J
7883 LLOYD, BOB
2007 LLOYD, CONNIE
6054 LLOYD, DALE
6053 LLOYD KAY
10691 LLOYD, KAY
4482 LLOYD, LYLE
4481 LLOYD, MRS L
10069 STECKER, SUDDUTH
11526 STEEL, ROBT
2477 STEELE, HELEN
2401 STEELE, MRS FRED
11827 STEELE, TIMOTHY
2013 STEELE, WILLIAM K
1626 STEENSMA, KAREN & JOHN
1666 STEENSTRA, CATHY
1916 STEFANO, STEVE
6974 STEFFENSON, LARRY
5547 STEFFES, B J
6872 STEGMAN, W CARL
8470 STEHR, RON
2869 STEIN, JENNIFER
8585 STEINBACH, GLEN L
8687 STEINBOCK, DAVID
8686 STEINBOCK, SANDRA
10799 STEINHAUER LOREN C
1663 STEINWEG LASHA & ED
6174 STENBAKKEN, LARRY
4640 STENLUND JANE
2544 STENLUND, LINDA
4637 STENLUND MALCOLM
1233 STENNETT, P E DALE
3275 STENSETH, AMY
11099 STENSRUD CHARLES A
4649 STEPAN, MARTIN
6396 STEPHENS, B J
3898 STEPHENS, DICK
10587 STEPHENS, GRETCHEN
2812 STEPHENS, J C
3361 STEPHENS JACK
2718 STEPHENS, JOHN J
3541 STEPHENS KEN
11829 STEPHENS PAUL
11836 STEPHENS THOMAS
2065 STEPHENSON, BILLY J
11478 STEPHENSON, CECIL
4329 STEPHSON, JEFF
9235 STERLEY, ANNE
6256 STERLING, DAVE
1350 STERLING, WALLY
1667 STERN, DAVID
10067 STERRETT, GALE
10474 STERRY, JUDY
2037 STETZ, T FRANK
5924 STEVENS, ALLEN D
11301 STEVENS, CARL
9269 STEVENS DAN
2523 STEVENS, ELIZABETH
8006 STEVENS, SCOTT
6260 STEVENS, TAE HUI
8639 STEVENS, TAMARA
2293 STEVENS, WARD A
1804 STEVENSON, JAMES
3540 STEVENSON, MARK
1799 STEVENSON, MARY

8785 CULP, KATHLEEN E.
11235 CULP, M DIANE
4488 CULUN, LESLIE
5953 CULVER, CLAYTON D
2286 CULVER HARRIETT K
5954 CULVER, MARGIE
4491 CULVER, R B
8752 CUMMING, MARK
11492 CUMMINGS, PETER
6612 CUNDIFF, MIKE
3379 CUNINGHAM BARBARA
8844 CUNNINGHAM, SHAWN
4545 CUNNINGHAM THOMAS P
748 CUPPLES JACK R
3992 CURLEY, SUSAN
5567 CURNUTT, CHARLES
9568 CURNUTT, LORETTA C
10759 CURRAN JAMES P
10521 CURRAN JANET
10315 CURRAN, MAUREEN
10710 CURRENCE, NED
9581 CURRIE, DICK
9995 CURRIN MARK
713 CURRY, BOBBIE
3001 CURRY, FREELAN M
3007 CURRY, MATHABE
712 CURRY, SAM
10904 CURTIN, LIENEKE
10840 CURTIS, ANNE
4855 CURTIS, DAVID
6088 CURTISS CANDICE
6095 CURTISS, F C
11884 CURTZ ELIAS
6192 CUSHING RAEANN
10749 CUSHMAN, BETSY
5667 CUSHMAN DENNIS
88 CUSHMAN, GLEN P
3973 CUSHMAN, JOHN
9293 CUSTER JOHN
3051 CUTLER, LINDA
10803 CYRA, DAVID
10656 CYRA, KEITH
11209 CYRA, THOMAS A
11214 D'ARIENZO LARRY
810 D'ASARO, ERIC A.
10217 DABROSHI DAVID
1367 DAGNIE DAVID L
5337 DAGSING, ANDREW E
6596 DAHL BARBARA
3884 DAHL BRIAN
3883 DAHL JUDY
7816 DAHL, RANDALL
6597 DAHL RICK
7814 DAHL, RUTH
7615 DAHL, STEVE
6151 DAHLEN, JERRY
6158 DAHLEN, KEVIN
4449 LLOYD, WENDY
3554 LOBDELL, R MARTIN
4288 LOBE, LEE
11168 LOCH ANDREW
7888 LOCKART, MICHAEL
11712 LOCKEN, BRYAN/ANITA
3316 LOCKHART STEVE
7513 LOCKHEAD, J R
8403 LOCKWOOD MICHAEL G
6485 LODEN BETTY J
6482 LODEN R L
10170 LOE, P R
3125 LOEUHAL, CAROL
5358 LOFGRON DON
3661 LOFTON GARY
6576 LOGAN, JOHN
11239 LOGAN, LEO
3403 LOGAN, MARK
11328 LOGAN, MARK
3463 LOGAN PATRICIA
11286 LOGAN PHYLLIS
4284 LOGAN SCOTT
11248 LOHMAN R
6428 LOKOVSEK, DENNIS
6429 LOKOVSEK, MARI
1954 LOLCAMA, TERRI
8447 LOMBARD C I
2696 LOMBARDY TONY
7052 LONDON JAMES E
4051 LONG BERNIE
6824 LONG CLARENCE
3247 LONG DARRELL
301 LONG, W J
10375 LONGABAUGH WILLIAM J R
11623 LONGACRE CATHERINE
7248 LONGANECKER, BERNICE
3422 LONGANECKER, JOHN
7196 LONGFELLOW, CAROL G
7197 LONGFELLOW ROBERT M
8110 LONGFIELD BETTY G
1558 LONGRAN, GAIL
964 LONGWORTH, POLLY
3253 LOOMER JAMES
9555 LOOMIG M
1296 LOOMIS, ROBERT
10629 LOONEY WILLIAM
8073 LOPEMAN, TODD
7675 LOPER, DEBBIE
1910 LOPRESTI JAMES
11404 LORANGER RAYNARD
8839 LORD DARREN
8835 LORD JOHN
8837 LORD, LINDA
9449 LORENTSON ROBERT
671 LORENZ SARAH
5350 LORESCH HENRY
5351 LORESCH, KAY M
2347 STEVENSON, MRS LISHA
11127 STEVENSON, W E
7565 STEWART, CONNIE
7190 STEWART, GARY
8235 STEWART, J B
1950 STEWART, JAMES A
3560 STEWART, JIM
8243 STEWART, JOHN
10643 STEWART, JOHN
1624 STEWART, KEN
1952 STEWART, NANCY
8260 STEWART, R C
4599 STEWART, ROBERT
9189 STEWART, ROBERT
6241 STEWART, UNA
7157 STEWART, WILLIAM
1930 STEWART M D , RICHARD H
7560 STICKELL, MICHAEL
7832 STICKELL SHERRY
7867 STIDD R A
4095 STIDHAM, TRAVIS
1388 STILES JAMES
2395 STILL MRS A TERRY
8986 STILLWELL, MIKE
11071 STIMSON DONALD K
9575 STINER, LAWRENCE E
1147 STITSEL, BILL
3929 STITSEL SANDRA
3961 STITSEL, WILLIAM C
4305 STOCKDALE, TIM
4680 STODDARD STEPHEN M
2895 STOEVE, JANET
8548 STOHL, LEIF
6609 STOKES, LLYOD
3530 STOKES, PATRICK
7141 STOLL, GEORGE
3167 STOLTENBERG JOHN
2009 STOLTZFUS, JIM
3343 STONACK DON
5469 STONE DOUG
6853 STONE FRANCO
3451 STONE, JAMES
7822 STONE, LOIS
5344 STONE MAXWELL L
6854 STONE, ROY
6590 STONEBACK, NANCY L
6593 STONEBACK NEAL C
10535 STONER MICHAEL
11302 STONEX, RICHARD
74 STONEY ROBERT
746 STOOKEY ROBERT B
1877 STOPPLES, RON
10942 STOREY, M MELISSA
5482 STORK, DON
4510 STORM BILL
6535 STORMENT, MICHAEL
11797 STORMO, EMMET

5015 DAHLEN, RONALD L
5184 DAHLEN, SANDRA
8261 DAHLGREN, ED
3920 DAHLGREN, ERNIE
9870 DAHLGREN, PAUL E
7760 DAHLQUIST, D L
2936 DAINES, DIANNE C
10767 DALBERA, MICHAEL
9474 DALE, DAVID WJ
10654 DALE, ENDRA
357 DALE, MARK S
3926 DALLAS, DOLORES
3829 DALLAS, WILLIAM
3618 DALLMAN, GLEN
4211 DALLMAN, LINDA
4403 DALTON, BRAD
11227 DALTON, BRIAN
11130 DALTON, DEBBIE L
9373 DAMAN, R R
11011 DAMM, ESTHER
10988 DAMM, TERRY
11522 DAMMANN, ERLE
2935 DAMON, PAM
2934 DAMON, STEVEN M
5536 DANIEL, DONALD G
6953 DANIELS, AMANDA
7390 DANIELS, DEAN
7964 DANIELS, DEREK J
5234 DANIELS, EDNA A
7947 DANIELS, HOWARD P
6931 DANIELS, JESSE
2890 DANIELSON BRUCE
6205 DANIELSON, BUTCH
7848 DANIELSON, DAVID L
9256 DANKLER, DENNIS
7962 DANNER, JOHN
8826 DANTINNE, RENA
3249 DANZER, ED
11474 DARAY, JACK
8520 DARBY, B L
11774 DARLEY, BRIAN
3508 DARNELL, JEAN M
9367 DARROW MAUREEN
4590 DARROW, NORMAN R
7065 DARSCH, CORY
7066 DARSCH, JULIA J
7064 DARSCH, TOM
5318 DARUMEL, BRIAN
655 DARVILL, FRED
2842 DARVILL, VIRGINIA
1303 DASKAL, NEAL
10261 DASSOW, ETHEL M
10262 DASSOW, JOHN A
10228 DAUBERT, KAREN
1003 DAUDET, JOSEPH
8318 DAVENPORT, MICHAEL
10493 DAVES, RONALD
9011 LORING, GILBERT A
5647 LORLEY, GERALD
5448 LORY, MIKE
10508 LOSH, DAVID
1210 LOSO, KEVIN
1035 LOTH, HUGH
8537 LOTH, JEFF
8536 LOTH, SHERRY T
307 LOTTINVILLE, JANA
1358 LOUDERBACK, DAVID
1351 LOUDERBACK, DOROTHY
10867 LOUGHEED, CLINT
1205 LOUGHNAN, DELANE
3774 LOUGHNAN, RICHARD D
4188 LOUGREEN, MARVIN L
1838 LOUMAN, LOCH
7341 LOUWS, CINDY
11467 LOV, BENNY
10225 LOVE, C P
9230 LOVE, DOUGLAS
9259 LOVE, W E
4763 LOVELAND, CHERYL L
2313 LOVELAND, PATRICIA
3998 LOVELL, BARRY
9039 LOVELL, FRAN
9058 LOVELL, MIKE
3854 LOVGREEN, ANGELA
4187 LOVGREEN, CHERYL
3856 LOVGREEN, CHRIS
3853 LOVGREEN, JENNIFER
3852 LOVGREEN, SHELLIE
4452 LOW RICHARD
1421 LOWE FELICITY
2887 LOWE, G
9637 LOWE HOMER E
221 LOWEN, JAN
2467 LOWERY VERA I
7575 LOWMA, DAVID
5560 LOWMAN, DANIEL L
11902 LOWRY, MIKE
7612 LOWRY, RUBY
5917 LOYD, GARY V
10975 LUBISCHER, JOSEPH
6554 LUCAS, RANDY
878 LUCAS, THOMAS J
6008 LUCE, JACK
7337 LUCERNE, JAMES C.
104 LUCIANNA, MARK A
11778 LUCIANO, NORMA
8111 LUCK, RONALD W.
3656 LUCKY, JOYCE
4943 LUDIKER, JERRY
1441 LUDIN, IRWIN
2815 LUDTKE, LLOYD A
6579 LUDWIG, ROD
6052 LUECK, COYZET
4765 LUECK, STEVEN R
8909 STORY, NORM
6584 STOUFFER, JAMES
1198 STOUT, BECKY
11262 STOUT, HELEN
3680 STOUT, JANI
9383 STOUT, K GEORGE
9195 STOUT, KARL
832 STOVER, SCOTT W
9079 STOVES, WALLY
6662 STOWELL, R M
11659 STRACHILA, CATHY
7051 STRAHIN, DEANNA LYNN
7050 STRAHIN, STEVEN
7018 STRAIGHT, STEPHEN
66 STRAIN, LOREN S
11558 STRAKA, MICHAEL
6227 STRAND, BRYCE
6222 STRAND, DEBBIE
3160 STRAND, JAN
491 STRAND, JERRY
11917 STRAND, KURT
6226 STRAND, TOM
8648 STRANDBERG RYAN
8650 STRANDBERG, SUE
6938 STRANSKY, GEORGE
2020 STRATE, NORA
1631 STRAUB, BARBARA
9187 STRAUSKY, DAN
11323 STRAWHECKER, DONALD
1834 STRECKER STEVE
7309 STREETER, ANSEL
720 STREHLEIN, CAROLYN
365 STREHLER, W
10723 STREIB, DAROL
813 STREIFFERT, DAN
3516 STREISSGUTH, MARK
2967 STRICKER, PAUL
7767 STRIECK, FRED
6360 STRIECK, JERRY
6359 STRIECK, KEVIN
7768 STRIECK, MARGIE
7764 STRIECK, STEVE
6358 STRIECK, VIVIAN
206 STRIEGEL, DIANE
4194 STRINGER, PRICE
11215 STRIP, MICHAEL P
5047 STRODE, GARY
6855 STROESSER, DAVE
10412 STROH, DAN
3859 STRONG, JEFF
714 STRONG, KENNETH W
3904 STROTZ, TOBY
6282 STROUD, BRIAN
1000 STROUP, JOHN M
1286 STRUSS, JON D
11054 STUARD, ALAN
4170 STUART JAMES

10903 DAVEY, DAN
6882 DAVEY, EDITH & M E
10342 DAVEY LYNNE
7975 DAVICK JERRY
7877 DAVID, DUWAYNE
4244 DAVIDSON, DENNIS
10349 DAVIDSON HARRY A
4833 DAVIE, R A
11210 DAVIES, DAWN SONGFEATHER
5338 DAVIES DOUGLAS
4296 DAVIES GEORGE L SR
1584 DAVIES ROBERT
5779 DAVIS, BILL
3231 DAVIS BRAD
1240 DAVIS, BRUCE
3534 DAVIS, BRUCE
7461 DAVIS, BRYAN
2577 DAVIS, CANINE
5305 DAVIS, CHARLOTTE R
3804 DAVIS, CHERYL
10060 DAVIS, CHRISTOPHER
7267 DAVIS DALE
5505 DAVIS, DAVID
5780 DAVIS DE LOUS
6942 DAVIS DENNIS
6449 DAVIS DIANE
4135 DAVIS, DIANNE
5596 DAVIS, DONALD E
7458 DAVIS, DUANE
5431 DAVIS EDWARD C
11850 DAVIS ELVA
11909 DAVIS, FRANCIS
232 DAVIS, GARY S
5595 DAVIS, GAYLE M
192 DAVIS GRACE K
7210 DAVIS, JAMES L
2908 DAVIS JEAN E
4712 DAVIS JIMMY
6032 DAVIS, JOCELYN
4090 DAVIS KARL
6491 DAVIS KEITH R
10837 DAVIS, KEN
3741 DAVIS, LEROY
2623 DAVIS, MARGARET W
1645 DAVIS, MARY
2366 DAVIS MCCLELLAND
668 DAVIS MICHAEL
11432 DAVIS, PATRICK
5544 DAVIS, RANDY
4123 DAVIS RICK
10879 DAVIS, ROBERT B
2640 DAVIS, ROBERT E
7167 DAVIS RUBEN
902 DAVIS SUSAN
1 DAVIS, TOM H
1237 DAVIS, TROY
5926 DAVIS, W C
11063 LUECKE, PH D, WILLIAM
9808 LUGINI, ROBERT
3101 LUHMAN, ANNALEE
10703 LUHMAN, DALE
8782 LUHR, CHAD
1710 LUKE, DARRELL
10332 LUKE, ED
2959 LUKE-JONES, MARGARET
2156 LUKOWSKI E T
1223 LUKOWSKI, EDMUND
11653 LUKOWSKI, GARY
5718 LUMSDEN, CHARLES
5719 LUMSDEN VICKIE
10777 LUND, ADDIE
10155 LUND, CHARLES
1087 LUND, DAVID W
7589 LUND, JOHN
11048 LUND, JOHN
5356 LUNDBERG ROLAND
8107 LUNDGREN BERNICE
8106 LUNDGREN JOHN A
9602 LUNDI, ADELINE
7907 LUNDQUIST, MARK
6757 LUNDSTROM CASEY
9007 LUNDSTROM DEBI
9008 LUNDSTROM JIM
8864 LUTE, RAY
6104 LUTHER, ANNA MAE
6103 LUTHER CHARLES
9574 LUTTRELL MATTHEW
2102 LUTTRELL TOM
10240 LUTZ, MARK P
10296 LUXENBURG GRETCHEN
4289 LY, NHAN
826 LYKKE, GREG
8601 LYLE ALICE
3137 LYLE, DAVE
8600 LYLE JERRY
7428 LYLE, KEVIN
1668 LYLES, LIZABETH
3135 LYMAN BECKY
5793 LYNCH BARBARA
9199 LYNCH DONALD
8797 LYNCH JUDITH A
8798 LYNCH, LEONARD M
1192 LYNCH MARK
9200 LYNCH ROSE
5850 LYNCH, WILLIAM
3582 LYNN CLARENCE
6490 LYNN ESTILL L
7528 LYNN FRANCIS
7526 LYNN GORDON
8510 LYNN JASON
2759 LYNN, NICHOLAS
4800 LYNN, RICHARD
9735 LYON, KAYE LYNN
11163 LYON MAXWELL
4193 STUART, RANDY
5660 STUBBEN, RICHARD
11294 *STUBBS, VICKI*
844 STUCKY, ANNETTE F
10665 STUEBE, MIKI
5635 STUECKLE MARY E
4690 STUECKLE, WALT
4059 STULL, NANCY
2680 STULL, WILLIAM
9017 *STUMM, RICK*
8205 STUMPF ADRIAN
8209 STUMPF, AMBER-MARIE
8206 STUMPF CAROL
8210 STUMPF, DALE
8207 STUMPF DEIDRE
8211 STUMPF, RONALD
6004 *STURTEVANT, LENORE*
6308 STUTESMAN, GLEN
6309 STUTESMAN, SHERRI
4312 STUWE BRUCE
11506 STYCZYNSKI, LINDA
8877 SUAREZ EMMA T
8284 SUENKEL, KATHY
8221 *SUENKEL, KELLIE*
11072 SUGG PATRICK
521 SUK, TOM
852 SUKUMAR, DR N
4853 SULLERS, JOHN
9234 SULLINAN, SUE
10518 SULLIVAN BRUCE
4402 *SULLIVAN DAN*
11471 SULLIVAN, ERIC
4401 SULLIVAN GEORGE
4430 SULLIVAN, MARY
1973 SULLIVAN MICHAEL
3899 SULLIVAN MIKE
11051 SULLIVAN MORGAN
2866 SULLIVAN PATRICK D
8238 SULLIVAN R G
3332 SULLIVAN RICHARD
11470 SULLIVAN, SCOTT
4400 SULLIVAN VERA
4575 SUMMERFELT, DELORES H
4574 SUMMERFELT, EARL R
4573 SUMMERFELT, TAMI
6264 SUMMERHILL, JASON
6263 SUMMERHILL, ROY
1049 SUMMERS-GREVE, LINDA
10941 SUMNER, JOHN
8167 SUMPTER, ROBERT
103 SUNDBLAD, ERNEST
549 SUNDBORG JEAN P
2120 SUNDIN, OLAF
9944 SUNDQUIST, LIANN
10580 SUNDQUIST STEPHEN
11006 SURDYK, CHLOE R
2774 SUSAN LAURA

8122 DAVIS, WAYNE L
944 DAVIS, WILLIAM A
8882 DAVISON, CATHERN M
1377 DAVISON, JOE
7476 DAWKINS, KURT
508 DAWSON, PATRICIA A
552 DAWSON, RON
3280 DAY, ALLEN
3358 DAY, DAN
2312 DAY, DENNIS
7123 DAY, DORIS E
8574 DAY, ERIC
7122 DAY, GREGORY D.
9962 DAY, JAY
10353 DAY, JOHN
7124 DAY, LEO
11333 DAY, ROBERT
2057 DAY, ROBERT L
9352 DAYTON, DON
2214 DEAL, ED
6131 DEAL, JEROLD
5109 DEAN BRETT
6646 DEAN, DEBRA
6699 DEAN, JODIE
6643 DEAN, LARRY
5661 DEAN LOREN
6685 DEAN RICK
6140 DEAN, THEODORE
11434 DEAN, WILLIAM
1580 DEANE, E J
1583 DEANE, WILMA
3622 DEARING, JOHN
8349 DEASON, MICHAEL
7424 DEBARTOLO, DAVE
7224 DEBB, PHIL
8480 DEBOER, JEFFREY L
1055 DEBOER, JOHN
5711 DECAMP, BARBARA
5710 DECAMP, LARRY
6367 DECKER, CHARLES
10624 DECKER, DELMAR
3417 DEDERICK, CHARLES
10496 DEDINAS MONIQUE
10455 DEE BILLY
1343 DEERY, HAROLD
10378 DEETER, ERIC
11351 DEETER, LETTY
2930 DEFAUW, DAVID
10333 DEFAUW, DAVID
2031 DEFERRARI, COLLETTE
3402 DEGALLIER JEFFREY
3531 DEGRANDPRE, MIKE
9864 DEGROOT, IVA M
58 DEGROOT, L L
9043 DEHART, KATHY
9001 DEHART, TOM L
6417 DEHLINE, EUGENE A
11508 LYONS, DOROTHY
5993 LYONS, SUZIE
3956 LYTLE, DEBRA
3957 LYTLE, GREG
556 LYTLE, REX
8244 MAASS, JOANNE C
629 MABBOTT, HENRY
8049 MABBOTT, ROGER
676 MAC FARLANE, DAVID
5020 MACAK, ANNE
10787 MACAULAY, A
10634 MACDONALD, JEFF
5773 MACE, TERRIE
7853 MACFARLAME, KELVIN
4708 MACHADO, DERRY
2238 MACHINE, NEWELL
5828 MACISAAC, JOHN
10509 MACK, ANNE
5909 MACK, C R
3166 MACK JOHN
3145 MACKAY, GAIL
2607 MACKAY, GLEN
9734 MACKAY, GRACE
3686 MACKEY, STEVE
5143 MACKIE, JOHN
1234 MACKIN MIKE
5906 MACKLIB, MARK
461 MACKLIN, JOHN D
2944 MACLEAN, BRUCE D
10270 MACLEOD, DORIS
11719 MACOMBE, DON
895 MACOMBER NORMAN
9798 MACPHERSON, DOROTHY
6658 MACPHERSON, E L
9717 MACSHANE, BOB
9626 MACSHANE, HAROLD
9627 MACSHANE, JOAN
10141 MACWHINNEY, BETSY
9095 MADDEN, FRANK
10403 MADDEN LINDA
9094 MADDEN LOIS
3159 MADELINE, BEATRICE
10203 MADER, LARRY
4809 MADSEN, ERIC N
2488 MADSHE, MELVIN
4953 MADUSKA, JOSEPH
8991 MAESTAS, RICHARD
7134 MAFFETT, SHARON F
468 MAGER, TALMON R
1361 MAGGARD, J M
11493 MAGGIORA, DEBRA
9748 MAGNER, GLEN
1238 MAGNUS, JIM
2948 MAGNUSON, ALYCE
284 MAGNUSON, ANDREW CRAIG
2578 MAGNUSSON, BAISS E
5860 MAGNUSSON, HUGO A
2802 SUSAN, RICHARD
9691 SUTER ALBERT
8322 SUTER, RICHARD
2075 SUTHERLAND, BILLIE
11479 SUTHERLAND, DAVID
919 SUTHERLAND, DWIGHT
8729 SUTHERLAND, JAMES
8730 SUTHERLAND, JAMES K
11277 SUTHERLAND, JOHN
5802 SUTHERLAND, KEITH
8671 SUTHERLAND LOUIS
4006 SUTHERLAND, ROBERT L
78 SUTHERLAND, SHARON
2078 SUTHERLAND TARRIA
4267 SUTTER, CHARLES
8373 SUTTON, DAVID
8767 SUTTON, EDNA MAE
5526 SUZUKI, DAWN
10619 SVEEN JOHN DAVID Y
1316 SVENDLEY, SANDRA N
1849 SVENDSEN, STEIN
3886 SWALANDER ROGER
11591 SWALLING, LES
4286 SWALTMAN, DEBORAH
9704 SWAN, ROY T
11616 SWANSON ARLAND
7098 SWANSON, BRUCE
1559 SWANSON, JOHN
2476 SWANSON, KEN
3923 SWANSON, MARLENE
2661 SWANSON, NOLAN
937 SWANSON, STEVE D
3846 SWANSON, STEVEN
11456 SWANTAK, STEPHEN
9062 SWARD CARL
408 SWASAND, G
4772 SWEARINGEN, FRANCES
6049 SWEARINGEN, WAYNE
6276 SWEAT, THOMAS
6614 SWEDEEN, RON
10118 SWEENEY, JIM
2679 SWEENEY, KEN
1369 SWEENEY, WILLIAM C
2627 SWEET JOHN W
4938 SWEET, RAYMOND J
9543 SWEETERS DAN
9258 SWEETING M H
3107 SWEETMAN, JOYCE
3106 SWEETMAN, MICHELLE
7272 SWEIT2EN, JIM
3136 SWENDSEN, PEGGY
540 SWENSON, BERNARD M
545 SWENSON, GERALDINE
6446 SWET BEAU
6444 SWET, CARLISE
6443 SWET, LEVI
6445 SWET, RICH

6235 DEHLINE, GENE
6418 DEHLINE STEVEN
11019 DEHMLOW, JIM
10628 DEIBERT, PHILIP
4460 DEINER, ED
2055 DEINES, GARY W
627 DEINES, LARRY
7992 DEITCH, MARY
7795 DEJONG DIANE
861 DEJONG, DOUGLAS
7794 DEJONG, JOEL
7792 DEJONG, JOEY
7796 DEJONG, JOSHUA
8616 DEL RIO RAMON
11869 DELALY JR HOWARD
6435 DELANEY, JAMES
2909 DELAP LINDA L
8668 DELARM JR , DOHN
1110 DELBRIGE, BRAD
7723 DELGADO, JAIMY
7874 DELGADO JORGE
8654 DELGER KEVIN
7838 DELIN JANET
7836 DELIN KEN
11609 DELIN, KEN
3770 DELLINGER, BRAD
2820 DELLINGER, THOMAS M
10209 DELLOLLANDER W D
9068 DELMIE W L
5708 DELUCCHI, MILO C
3431 DELURME, ROBERT
4533 DEMARAIS, PHIL
10013 DEMBOSKI, JOSEPH
60 DEMING CLIFFORD M
11098 DEMPSEY, BILL
462 DENFELD, KAY F
6714 DENIS, JULIE
9753 DENISON JIM
6632 DENMAR, DONALD
2751 DENNEE DOUG
6598 DENNEY BILL
8142 DENNEY, MICHAEL NOLAN
2474 DENNISON, JEFF
1646 DENTON DARLENE
10962 DENZEL, MARY
8129 DENZER, FREDERIC F
4828 DEPAEPE, MRS LOIS E
1888 DEPEU, WESLY
10244 DEPUYDT RAY
10052 DEPUYDT RITA
11180 DERBAWKA, GLORIA
7349 DERING MARY K
11171 DERMIT GAIL
5591 DEROSIER, BILL
1870 DESANTO, JOSEPH G
8419 DESCHAMPS PAUL
11586 DESCHENE, THERESA
5861 MAGNUSSON, MALENA
10271 MAGUIRE, BECKY
4271 MAHITKA, TOM
1797 MAHONEY, JULIE
9822 MAHONEY, TOM
6016 MAIDEN, HARRIET
8185 MAIER, DOUG
8101 MAIER, ROBERTA
1024 MAIER, SAMUEL D
9022 MAIFELD, MARLIN A
7800 MAIFIELD, SUSAN R
11190 MAILLET, CELIA
3981 MAILLOUX, DAN
3982 MAILLOUX, DAVID
6670 MAIN DONALD
6753 MAIN, GARY
5037 MAINE, KEITH
9511 MAINE, M D
9175 MAINS JANET
9123 MAINS TOM
8927 MAIZELS, ROBERT
2893 MAJOR, RICHARD
1619 MAJORS, COLLEEN
466 MAJORS COLLEEN
1864 MAKI KRIS
1859 MAKI, RICH
4335 MAKI, TOM
9427 MALAND WADE
6594 MALAY GEORGE W
10522 MALCOLM JOHN
2605 MALER, CLARENCE A
9465 MALGESINI, LORI
11514 MALIA MR & MRS RICHARD
8256 MALLETT, BILL
1155 MALLEY, PAM
9742 MALLON MIKE
1154 MALLORY DEAN
1152 MALLORY JASON
1153 MALLORY ROSA
10823 MALLORY, THEODORE W
11421 MALLOY ROB
3303 MALM, DAVID
1091 MALMASSARI FRED
5721 MALONE, ANGELEEN
5723 MALONE DOUG
5725 MALONE, JEFF
5720 MALONE, MELINDA
1067 MALONEY MRS DONALD R
8257 MALPASS, G
291 MALTZEFF EUGENE E
11105 MAMMERLY RAMONA
159 MAMOLEN, RICHARD
681 MANCHESTER, KURT
683 MANCHESTER, RITVA
3164 MANCY, STEFFANY
11342 MANDEL ERIC
4665 MANION ROMER C
3718 SWIGERT ERNEST D
1451 SWIMME, JEANNE & WAYNE
572 SWINBURNE, STEPHEN S
2097 SWINDLER, KATHY A
8872 SWINGEN MARTIN
576 SWINGLEY, WAYNE
6667 SWINT, ANTHONY
6668 SWINT, JESSICA
4241 SWOVELAND, DOUGLAS
7922 SYGITOWICZ, LEO
9891 SYGITOWIUZ, LOUISE
10562 SYKES, KAREN
480 SYKES MARVIN RAY
2278 SYLLIAASEN, GORDON C
4007 SYNIC, GARY L
8605 SYTSMA MARY ELLEN
4770 SYVERSON MYRTLE I
10500 SYVERSON, RALPH
6050 SYVERSON, WESLEY
10108 SYVERSON-LEAKE, CAROL
11246 SZABLYA ALEXANDRA
11265 SZABO MARY
3947 SZEKELY, DONNA
4020 SZEKELY MIKE S
8300 TABER, LORYCA
6948 TABISY, JAMES
6947 TABISY, RHONDA
6946 TABISY TAMARA
3047 TABSCOTT ROBERT
5018 TACKETT, PEGGY
4890 TADA, CHRISTEY
5173 TAFT, FRED
4192 TAGGART CHARLES
2071 TAGMAN, SHEILA
11390 TAINEY, PHYLLIS
4507 TAISEL, JAMES
6615 TAIT, DOUGLAS
9874 TAKLO, ROBERT J
3872 TALBOTT CHRIS
3065 TALL, BARBARA D
10101 TALL, JOSEPH B
3064 TALL KAREN L
5960 TALLEY BEATRIC G
7736 TALLMAN, DORIS
4210 TALLMAY SHARON
8567 TAMBURRO STEVE
4813 TANIS, RICK
4285 TANKERSBY CARL
4196 TANNER, TIM
142 TANTUM, WILLIAM
9951 TARICO VALERIE S
8234 TAROLA, WAYNE
10553 TARPLEY, ADINA
11745 TASTAD SUE
5271 TASTET, MICHAEL
11747 TATE JERRY
3701 TATE, ROBY

5070 DESCHER LOWELL
691 DESCHNER, THOMAS H
11156 DESER, CLARA
9127 DESHAW, FRANK
8065 DESIMONE, AUGUSTO
8066 DESISTO, GENNARO
11102 DESMOND FRED
11260 DESPAIN, ROGER
1514 DESVOIGNE, MARK
5274 DETONGE, FRANK
6177 DETTINGER, JUDITH
7921 DEVALOIS CLEM
6504 DEVERE E
2 DEVIN, PRISCILLA
4056 DEVINE, JAMES
129 DEVLIN, DENNIS
5730 DEVLIN, TERRY
702 DEVOE, NANCY
3059 DEVOL, DR ALLAN & GALE
2588 DEVORE, RUSSELL D
2158 DEVORE, WILLIAM
8136 DEWEY RANDY
10697 DEWITT DONALD
4313 DEWITT, ROBERT GEAN SR
1935 DEXTER, EMILY M
9616 DEY FREDERICK W
9614 DEY, LOIS E
6601 DEZOTELL GERALD
8463 DHALIWAL, AMARJIT
8467 DHALIWAL, DEPUTY
8462 DHALIWAL MARION
6652 DICK, BEN
3072 DICK, BOB
6628 DICK, EDDY
11046 DICK, M R
2034 DICKASON R E
10267 DICKES BETSY B
11611 DICKINSON, MICHAEL
8270 DICKINSON, SALLY
7829 DICKS, GW
4039 DICKSON ANDREA
8746 DICKSON, CAMILLE
8747 DICKSON DELORES
8745 DICKSON EMILYU
4161 DICKSON, GINA
4027 DICKSON, GISELA
3810 DICKSON, GREG
1096 DICKSON, JACK
3752 DICKSON, JOHN
3840 DICKSON, JOSEPH
3816 DICKSON KERRY
4076 DICKSON, LYNN
3730 DICKSON, RONALD
8018 DICKSON, TERRY L
10824 DICKSTEIN, DEBORAH
5646 DIEDRICH, BRAD
4865 DIEDRICH, BRENT
4353 MANKE, LARRY
2538 MANN, LEE
7213 MANN, MARY HELEN
7367 MANN, VERNON
1897 MANNING, HARVEY
2113 MANNING, JAY
11445 MANNING, R W
1896 MANNING, PRESIDENT, HARV
6991 MANNON, BILL
1039 MANSFIELD, HAROLD
11920 MANSON, LYLE
9327 MANSUR ROGER
640 MANTON, EILEEN
6157 MANTZ, ED
6545 MANULAUTI, MULIVAI
10779 MANWARING, GEORGE
10795 MANWARING, JEAN M
6784 MAPP, NADINE
6750 MAPP, PETER W
2816 MARABLE, JON R
786 MARCHESE, NINA
10480 MARCKWORTH, PEG
443 MARCKX ILENE
2656 MARCUS, JUDITH
9031 MAREK, ANGELA
3775 MAREZ, HESSIE
2754 MARGESON DAVID S
10400 MARGOLIS, CHARLIE
5765 MARGUARD, SUSAN
9299 MARINO LINDA
10454 MARION, BOB
4154 MARK, EARL
567 MARK, SHERYL
1569 MARKHAM, ED
62 MARKMAN, TERRY
1735 MARKUS, RONNY
10057 MARKUS M D , CYNTHIA
7906 MARN GEORGE
2041 MARONI, RIC
2300 MAROS, ELAINE B
5767 MARQUARD, ROBERT
6176 MARQUEZ, LORRIE
7884 MARR JUDY
4223 MARS JOE
3103 MARSAN, BETH
9826 MARSH, FRED
237 MARSH, J C
2343 MARSH, JOHN
726 MARSH KEITH (JR)
724 MARSH, KEITH V
10063 MARSH LINDA
725 MARSH SHIRLEY
10152 MARSH, SUSAN
7484 MARSHALL, A
10000 MARSHALL ALBERT W
8084 MARSHALL, AMY
2337 MARSHALL, AMY C
11229 TATOM, ALMA
11224 TATOM, ED
2917 TAUSEND, JESSICA L
5952 TAYLOR, AMY
4788 TAYLOR, BERNICE
7419 TAYLOR BRADLEY
10003 TAYLOR, BRADLEY
9938 TAYLOR, BRUCE
9719 TAYLOR, CATHLEEN
7995 TAYLOR, CLAVIN
11295 TAYLOR, DIANE
9024 TAYLOR DONALD E
11411 TAYLOR, ELIZABETH
8796 TAYLOR, FLOYD D
11589 TAYLOR, GRADY
4408 TAYLOR, HELEN
4697 TAYLOR, JAMES
7481 TAYLOR, JOHN
10484 TAYLOR, KATHRYN
9263 TAYLOR, KAY
9038 TAYLOR, LAYNE
11045 TAYLOR, MARGARET
9625 TAYLOR MARI JANE
11524 TAYLOR, NANCY
8602 TAYLOR, PHILLIP E
4790 TAYLOR, ROBERT
2945 TAYLOR ROBERT E
4864 TAYLOR ROGER
2108 TAYLOR, STEVE
3003 TAYLOR, TERRI
10548 TEAR LUCINDA
1363 TEEMER, BILLIE
11520 TEIG, KAREN
3975 TELLESHO, JL
5857 TEMPLETON, FLOYD
936 TENGELIN, NANCY
1463 TENNANT LINDA
7058 TENNISON, HENRY
4240 TENNYSON, D M
8849 TENPAS CHARLES
10708 TEPFER FREDA S
4175 TEPLY, STEVE A
10542 TERN, MARK
1235 TERRY, DAVID P
7338 TERRY, JACK
7346 TERRY, JOHN
7345 TERRY, TERESA
7044 TERWILLEGAR, MARIANNE
7045 TERWILLEGAR, VAL
7043 TERWILLEGAR, WILLIAM
3567 TESCH, ERNIE
1034 TESCH, ROGER
112 TESCH, WILLIAM C
5677 TETER, CAROL
5678 TETER, DON
10183 THALER, TOBY
1969 THAYER, ALAN P

7521 DIENER, GALE
8375 DIETZ, HAL
5225 DIEZSI, BOB
11160 DIGBY, SHARON
7629 DIGENNARO, GINO
8532 DIGNAM, CLYDE T.
3539 DIGREGORIA, JOHN
4230 DILL, JEFFREY
10243 DILLAWAY LEANNE
5862 DILLON, CARROLL
8321 DILLON, FRANK
2555 DILLON SCOTT & LINDA
10009 DILLY, MARGARET
8889 DILSSNER, L.
8838 DINES, STEVE
11319 DINGMAN, DANIEL
10836 DINISH, RICHARD
297 DINSMORE RAY C
2036 DION, TOM
8064 DIPIETRO, JOSEPHINE
2003 DIPIETRO LUIGI
8062 DIPIETRO MICHAEL
6275 DIRSHIL, GLEN
743 DISCHER, JOHN
5587 DISHION, JOLENE
10300 DITORO, LEONARD
4714 DITTENBUR, RONALD P
4100 DITTMAN RICK
811 DITTMAR STANLEY P
2391 DIXON, ANGIE L
574 DIXON, BERNARD F
7833 DIXON, GERALD A
3893 DIXON, JACK
3026 DIXON, JOHN
6895 DIXON LISA
7835 DIXON MARILYN
7834 DIXON, MICHAEL D
3366 DIXON ROY
1524 DIXON SUSAN
1165 DIZEREGA GUS
252 DOAN, ALLEN E
4874 DOANE, RICHARD
11052 DOBNER JUDIE
10120 DOBNER, LEO G
6958 DOCKEN ROGER
11485 DODD JOEL
6529 DODGE MARVIN
11112 DODGE NICK
565 DODGE, ORVILLE
9768 DODS, CLARA BELLE
7308 DODSON, DAVID
5104 DODSON JR , WILLIAM D
3655 DOE ROBERT
1621 DOGGETT, ROBERT & JANE
3385 DOHERTY, NATHAN
351 DOLAN, W CHARLES
4863 DOLE, DEBORAH
2677 MARSHALL, D
7343 MARSHALL, DAVID
10582 MARSHALL, DAVID STANLEY
8039 MARSHALL, DENNIS
1348 MARSHALL, GARY
7483 MARSHALL, HARVEY
9667 MARSHALL, LOIS J
6890 MARSHALL, NITA
1989 MARSHALL, PAUL
10901 MARSHALL, RICHARD U
5357 MARSHALL, RICHARD W
8086 MARSHALL STANLEY
8085 MARSHALL, SUE
1403 MARSHALL, WILLIAM S
2758 MARSHALLL, JOYCE
2221 MARTEENY, JOSEPH A
9849 MARTELLI, BECKY
6748 MARTENS, MICHAEL L
135 MARTIN, ANN D
3337 MARTIN, BRIAN
10616 MARTIN BRUCE
6729 MARTIN, CORY
96 MARTIN, DAN
2018 MARTIN, DEBBIE
3076 MARTIN, DEBBIE S
134 MARTIN, DON T
8431 MARTIN, DORAL
8488 MARTIN ELSA M
186 MARTIN GARY F
4960 MARTIN GLEN
11218 MARTIN, H STEVE
9213 MARTIN, JANE
7115 MARTIN, JOEL
2352 MARTIN JUDI
4081 MARTIN JULIE
3355 MARTIN, L L
4120 MARTIN LARRY D
1368 MARTIN, LAUREL J
7310 MARTIN, RICHARD
1553 MARTIN, SCOTT
7314 MARTIN, SHERRY
2726 MARTIN, SHIRLEY
8450 MARTIN, VICTORIA
10973 MARTIN, VINCE
10928 MARTIN WILL
11217 MARTIN-KERSHAW TOM
1780 MARTINEZ, NORA
2929 MARTINSEN, THOMAS J
3515 MARTINSON KENNETH
2989 MARTOF CHARLES & BETH
4255 MARTONIK, JIM
2986 MARVIN BRUCE
8606 MARVIN, MARLA
10444 MARX, NEVA
6350 MASHBURN, DEANNA
6347 MASHBURN, ERNIE
4003 MASHBURN, JOSEPH E
10205 THAYER, ELAINE
3345 THAYER, WILLIAM
10822 THEIS, JERRY
8750 THEISS, WILLIAM H
1522 THEOPHILUS, ADRIENNE
10845 THERRELL, LISA
7130 THIBODEAUX, JOHN
6543 THICKLINE, ZELLA M
9682 THIEL, EDWARD J
693 THIELE G W.
2972 THIELE, RICHARD
11886 THIELEN, MIKE
3034 THILBERG, DAVID & GUNVOR
11022 THILBERG, NANCY L
8253 THISTLE, ANN L
4360 THOMAS BARRY
10753 THOMAS, CAROL
10866 THOMAS, CECIL C
6279 THOMAS CLARENCE
3200 THOMAS, CODY
7450 THOMAS DOROTHY
1415 THOMAS FRANK
3264 THOMAS JASON
5978 THOMAS, JOHN E
7724 THOMAS, JUANDA
4958 THOMAS, LAWRENCE
9977 THOMAS, LYNNE
11691 THOMAS, M LYNN
1395 THOMAS, MARVIN F
11560 THOMAS TED
6503 THOMASON, VIRGINIA
4293 THOMASSON, CHIN S
9650 THOMPSON, AL
2190 THOMPSON, ANN
6507 THOMPSON, ARCHIE
3862 THOMPSON ART
8197 THOMPSON, C D
4556 THOMPSON, CATHY
8198 THOMPSON, CATHY
8508 THOMPSON, D
2732 THOMPSON DAVID
7655 THOMPSON, DAVID
11091 THOMPSON, DAVID
9069 THOMPSON, DEAN
4562 THOMPSON, DEL
4322 THOMPSON, DON
5449 THOMPSON DOROTHY
9144 THOMPSON, DOROTHY
5450 THOMPSON, ELIAS A
11426 THOMPSON, ERIK
8498 THOMPSON, FRASER
1338 THOMPSON, FRED J
5164 THOMPSON, GRACE
8357 THOMPSON, HOWARD
5378 THOMPSON, JAMES
11258 THOMPSON, JANET
11491 THOMPSON, JOHN

4839 DOLE, MICHAEL
2285 DOLES, DIANE E
2304 DOLESE, THOMAS
2559 DOLPH, PHYLLIS
340 DOLPHIN, ANTHONY L
9844 DOMBROWSKI, JOHN E
6849 DOMITROVICH, BOB
10905 DONAHUE, ELIZABETH M
8553 DONALD, KATY
2207 DONALD, LAURA A
3962 DONALDS, MICHAEL W
3933 DONALDSON, FRAN
1551 DONALDSON, JIM
4758 DONION, JAN
507 DONNEL, CHARLIE M
4610 DONNELLY, GERALD D
5490 DONNELSON, JIM
9978 DONNET, VERNE
8817 DONOVAN, BECKIE
5932 DOOLIN, ALLEN
5931 DOOLIN, KIM
3542 DOOLITTLE, JAMES E
2861 DORE, GREGORY J
10160 DORN, DUANE A
8718 DOROUGH, DAVID
6737 DOROUGH LINDA
10301 DOROUGH LORI
10169 DOROUGH, SCOTT
1156 DOUBET, SCOTT
1143 DOUCETTE, E R
2982 DOUCETTE WAYNE F
1137 DOUCEUR, MIKE
1999 DOUGHTY, CHARLES I
4417 DOUGLAS, MARY ANN
2493 DOUGLAS, MILTON H
10924 DOUGLAS, TIM
10750 DOUGLAS WAYNE
7656 DOUGLAS JR , JOHN
879 DOUGLASS, DONALD C
10137 DOUGLASS, DOROTHY
2331 DOUGLASS REBECCA M
1831 DOUMA, DAVID
631 DOUSSETT, GEORGE K
6284 DOUVILLE, JOHN
1697 DOW, CURT
1698 DOW, JONELL
1695 DOW, KEN
1693 DOW, LINDA
1696 DOW II, KEN
737 DOWD, ANNE H
6605 DOWD, DAVID
4238 DOWD, JOE
10025 DOWD, SHARI
7918 DOWLING, DONALD
8163 DOWLING, VICTORIA M
9030 DOWNER, CYNTHIA
9029 DOWNER, MICHAEL R
6351 MASHBURN, TONY
3526 MASHOCH, MICHAEL
5970 MASON, DON
2715 MASON, LARRY
2725 MASON, LIZ
8000 MASON, S W
2689 MASONHOLDER, LANCE L
11092 MASS, CAROLYN R
4438 MASSAR, HARRIET
4411 MASSAR, WILLIAM
108 MASSART, HELEN
8225 MASSENA, CHARLES J
10094 MASSEY, R DAYLE
4418 MASSIE, GEORGE
5220 MASSINGALE, DARRYL
9964 MASTA, SUSAN
9335 MASTIN, JIM
9336 MASTIN, MUNDY
8068 MATEO, FLORSUIK
7845 MATHERN, TERRY
10721 MATHESON, CAROL
10206 MATHESON, GREGORY JOHN
3581 MATHEWSON, JACK
10256 MATHIAS, MAULTIN
3773 MATHIS, RON
568 MATHIS, TERRY F
10478 MATHISON, CHARLES
2520 MATHISON, W K
11081 MATLOCK, JR ROBERT B
3778 MATORY JR AMOS
4490 MATSON, ALAN
6760 MATSON, LAURA R
8354 MATSON, MARC
5740 MATSON, MIKE
5738 MATSON, PAUL
5739 MATSON, ROGER
3223 MATTER, CLARIBEL
10635 MATTERN, JIM
11672 MATTHEW, JAMES
9379 MATTHEWS, CAROL
9377 MATTHEWS, JOSEPH J
9381 MATTHEWS, MARK S
4345 MATTHEWS, ROBERT
179 MATTHEWS, SUE
4586 MATTHIES, BETTY
1872 MATTIEHIGH, OTTO
8588 MATTINGLY, DEBBIE
8384 MATTIODA, JIM
7162 MATTISON, CURTIS
10985 MATTISON JIM
10053 MATTISON, MARY
3206 MATTISON, NEWTON
10927 MATTISON, SUSAN
9148 MATTOS, JAMES
10399 MATTS, TED
9846 MATTSON, JOHN
2200 MATTSON, STEVEN D
2101 THOMPSON, JOHN L
5379 THOMPSON, JUDITH
7220 THOMPSON, K L
4918 THOMPSON, KERRI
2596 THOMPSON, KEVIN
5452 THOMPSON, LARRY
5380 THOMPSON, MICHAEL
8196 THOMPSON, MICHEAL
1679 THOMPSON, NICOLE
4559 THOMPSON, NICOLE
5333 THOMPSON, ROBERT
5782 THOMPSON, RON
3087 THOMPSON, SAMUEL G
11119 THOMPSON, STEPHEN B
9953 THOMPSON, SUSAN
1946 THOMPSON, TERESA
10683 THOMPSON, THOR
4557 THOMPSON, TODD
350 THOMPSON, WILL F
233 THOMPSON, WILLIAM F
1268 THOMPSON, YOLANDA
6170 THOMSON, DERK
445 THOMSON, GORDON
10150 THOREEN, ARN
10651 THORN ROBERT
3461 THORNBRUE, JANET
768 THORNTEN, FRANK W
9429 THORNTON, ANDREW L
2701 THORNTON, FLOYD
2702 THORNTON, MRS FLOYD
2289 THORNTON, STEVE
5457 THORNTON, TED
8226 THORPE, RICKY
10163 THORPE, SYLVIA A
5876 THORUTON, FRANK
6979 THRAMER, RON
3221 THU, GERALD
1083 THURSTON, POLLY
7399 TIBEAU, RICHARD
2978 TICKNER, MR & MRS ARTHUR
9884 TIDMARSH, THOMAS
11575 TIDWELL, STEVE
11228 TIENHAARA, DICK
3583 TIGGS, DAWINE
326 TILFORD, H O
3734 TILLMAN, DIANE
4186 TILLMAN, DON
7573 TILLMAN, MELANDY
2494 TILLMAN, PATRICIA A
8172 TILSON, BOB
716 TIMM, CARRIE
9155 TIMM, JOHN
9156 TIMM, SHIRLEY
10738 TIMMERS, HAN
2206 TIMMONS, BARBARA
8329 TIMMONS, JIM
178 TIPPERMAN, MARK

2586 DOWNEY, MARGARET T
2750 DOWNING, D J
5298 DOWNS, GERALD
4798 DOWNS, KATHLEEN
10076 DOYEL, LORI
5095 DOYLE, DIANE A
5247 DOYLE, LES
5246 DOYLE ROBERT C
5834 DOZTER WILLIAM
11026 DRAFFAN GEORGE
9934 DRAFS ALAN G
9922 DRAFS GEORGIA
9923 DRAFS, JACK
9926 DRAFS, JANENE
9935 DRAFS, KAREN L
9924 DRAFS, SCOTT
6556 DRAGER, LONNETTE
4998 DRAKE, DOUGLAS
11306 DRAKE JOHN
4597 DRAKE, KEN
8832 DRAKE, MARY
10182 DRANNAN, MICHAEL S
253 DRANSFIELD JIM
9893 DRAUT JAN
8494 DRAWHORN, LARRY
7742 DRECHSLER, CAROL
7741 DRECHSLER, WALT
1632 DREISBACH, BOB
1299 DREW, JOSEPH L
7889 DREYER, DAUN
2241 DRIGGERS, CURTIS
6310 DRIGGERS, GERALDINE
672 DRISCOLL, AMALIA
7691 DRISCOLL, DIANE
7690 DRISCOLL, PATRICK J
8902 DRIVER, KAREN L
6557 DROG, GEORGE A
2410 DRUGGE, DEAN A
4852 DRUMMER, DENNIS
8433 DRUMMOND DAVID
6906 DRUMMOND, GREER
8874 DRUMMOND, TOM
10792 DRUMMOND, TOM
123 DRUNER, WILLIAM
9702 DRYDEN, GARY
2398 DRYFOOS, MICHAEL
34 DUBISCH, ROY, JOYCE M
1540 DUBROW, RICK
11345 DUBUAR, JANEANE
9161 DUCHETEAR, ALFRED
7358 DUE, GERALD
10138 DUFFY, DANA
10030 DUGDALE, DAVID
9265 DUKE, JEFF
4558 DULLEY, TONY
5392 DUMARS, FRANK
2532 DUMONT, VIRGINIA
9406 MATZDORF, BARBARA
9403 MATZDORF HOWARD
9407 MATZDORF, LAURA
2779 MAUDSLEY, LEW
1598 MAUL, FRITZ
1411 MAULDEN, DEAN
3529 MAUPIN, SARA
1169 MAURER, REX
10102 MAUTHE, JOELLE
4979 MAXFIELD, KENNETH
4498 MAXWELL HELEN
10603 MAXWELL, JA
7863 MAY, BARBARA
11172 MAY J C
825 MAY, JACK W
6770 MAY, JACKSON L
9037 MAY, JOE
3697 MAY, ROBERT
7861 MAY, ROY
7862 MAY THERESA
8250 MAY II, FRANK
2695 MAYER MARTIN A
5888 MAYER MARY L
6933 MAYER, MIKE
11320 MAYERCHAK MARK
1277 MAYES RAY
6438 MAYES, ROBERT
11149 MAYHEW GAYLE
1445 MAYHEW MARYLYN
9466 MAYNARD PATSY
5415 MAYNARD TRAVER
10540 MAYO, KIM
1362 MAYR THOMAS
4532 MAYS, LARRY
11062 MAYS, LAURENCE
6913 MAYVILLE, MIKE
3638 MAZE, BEN
6857 MAZIANSKI, J
4292 MAZINGO, TODD
1751 MAZOUR CHRISTINE
5500 MCALISTER MIKE
7328 MCALLISTER JULLIAN
7329 MCALLISTER, MARINA
8852 MCANDIE, JOHN A
8851 MCANDIE JOHN W
8859 MCANDIE KAY T
6926 MCANDREW, KENNETH
6695 MCANES, DAN
150 MCANINCH WALTER
1461 MCARDLE PAULA
8861 MCBARRAN JOHN P
6808 MCBATH, DAVID
7369 MCBATH, NANCY
2255 MCBRIDE, DONALD E
9796 MCBRIDE, JIM
2420 MCBRIDE, ROBERT
1568 MCBRUIN, MARIO
1239 TIPPS, RANDY L
5060 TISDEL, KAREN
9075 TISDEL, STEVE
6075 TITCHENAL, KATHY
10667 TITLAND, JOHN
2685 TITTERNESS, JACK
1606 TITUS, JOSEPH
8573 TJEPKEMA, BOB
10713 TODD, HELEN
3626 TODD, PHILIP
8252 TODD, SALLY J
9040 TOENNESSEN, MICHAEL
8846 TOGIK KEN
2881 TOLER DAVE
1938 TOLFREE, MIKE
10996 TOM, BRENDA
5283 TOMKINSON, BRUCE
5284 TOMKINSON, LORAYNE
10467 TOMLINSON, DONALD
5945 TOMLINSON, FRANK
10576 TOMLINSON, INGA B R
8401 TOMLINSON MIKE R
11040 TOMLINSON RICHARD D
10347 TOMLINSON, SANDRA L
9078 TOMPSON, BARB
1394 TOMS, BARBARA
1393 TOMS, BRIAN
1387 TOMS, STEPHANIE
11299 TOMTAN, EINAR
9757 TOMTAN, JOSEPHINE
3063 TONER, ROCHELLE
7230 TONNESSEN, DAVID
11329 TOOKER, GLADYS
11332 TOOKER, WILLIAM
10789 TOONEN, RONALD
3263 TOPINKA, JASON
3535 TORGERSON, JANNA
1793 TORGESON, LINDA
10733 TORGET, LYNNE
5962 TORGRAMSEN, WENDY
3921 TORRES, GERALD
10423 TORTORICI ROBERT
7808 TOTH JODI
2940 TOWNE HENRY
614 TOYNBEE, JOSEPH C
10597 TOYRA, WINIFRED
3147 TPHOLM MARY BETH
309 TRACEY DIANA
306 TRACEY, WILLIAM P
8365 TRAIL, ROGER
8366 TRAIL, WENDY
4819 TRASTER LAWRENCE
1918 TRAUB JULIE ANN J
578 TRAXLER, MAUREEN A
3528 TRAYNOR, TIM
5178 TREADWELL, M H
8146 TREAKLE, JOHN

1844 DUNAVAN, CARYL
11847 DUNBAR, BILL
1516 DUNBAR, RICHARD
9215 DUNBAR, RORRY
7371 DUNCAN, DAVID
5630 DUNCAN, DONNA
9832 DUNCAN, ROGER M
1781 DUNGAN, CHERYL
469 DUNHAM, RYAN
11120 DUNKLEY, MICHELLLE
2966 DUNLAP, FREDRIC
10711 DUNLAP, GERRY/LINDA
9966 DUNLAP, J
2955 DUNLAP, NANCY
5000 DUNLAP, RALPH
6150 DUNN, BECKY
5180 DUNN, GEORGE
5179 DUNN, LEILA
4528 DUNN, MARK
5177 DUNN, STEVE
5257 DUNNETT PATRICK T
4234 DUNNING, WM
1677 DUNNINGTON, LAUREN
263 DUNNINGTON, TODD
10369 DUNSHEE MALCOLM
9203 DURAND, ARLENE
9202 DURAND, PAUL
7618 DURBIN, TIM
11394 DURGIN, MR LAWRENCE
554 DURHAM, THOMAS
7256 DURKAM DANIEL
776 DURKEN DAN
11866 DURKIN DAN
11490 DURKIN, JEFF
11486 DURKIN, LAWRENCE
11863 DURKIN, RICHARD
11877 DURKIN ROBERT
3614 DURRENT, DAN
3615 DURRENT, SHEILA
10557 DURSCH ANN
1818 DUVALL, JOHN
1997 DUVALL, WM T
10279 DUVANT, CURTIS
9178 DWYER, EUGENE
10295 DYCK REGINALD
11379 DYER, JAMES
1988 DYER, JAMES F
11389 DYER JIMMY
11533 DYER, POLLY
1589 DYKEMA, TERRY
4467 DYNES, DUANE
5435 EAGLE, MIKE
5438 *EAGLE, PATRICIA*
1486 EAGLE, SPIRIT
10431 EAKLE, WENDY
2839 EARLE, CHRISTOPHER J
3565 EASON DARLENE
9621 MCCABE, MARY J
5125 MCCAFFERTY, DARIN
5743 MCCAFFERTY, JAMES
5737 MCCAFFERTY, PAT
5019 MCCAFFERY, TERRY
11423 MCCAIN, PAT
3616 MCCALLUM, W B
5365 MCCARTHY, ANNIE
5370 MCCARTHY, DANIEL
4857 MCCARTHY, DAVID
10544 MCCARTHY, JAMES
1435 MCCARTHY, JILL B
4973 MCCARTY, JON
2050 MCCASHION, JOHN
9013 MCCASLIN, CONNIE
8126 MCCHRACHEL, CONNIE
11725 MCCLAIN, JAKE
835 MCCLANAHAN, ERNEST E
8827 MCCLANE, ROBERT
9909 MCCLELLAN, JERRY
7036 MCCLELLAN JOAN
7855 MCCLELLAN, LILAH
9579 MCCLELLAN MAX
7550 MCCLELLAN, MICHAEL
7002 MCCLELLAN RICHARD
7035 MCCLELLAN, SELMA
7034 MCCLELLAN, TIM
7037 MCCLELLAN, TOM
6787 MCCLELLAND, MARY
6742 MCCLELLAND, TERRY
6641 MCCLIMANS DAN
10466 MCCLINTOCK JIM
11559 MCCLINTON, DUNCAN
11408 MCCLOSKY, MARCIA
8869 MCCLURE, CARL R
89 MCCLURE, EVE
10297 MCCLURE, EVE
3548 MCCLUSKEY, BRIAN
11785 MCCO, JOANNE
6268 MCCOLLEY, DON
413 MCCOLLIM, JIM
6117 MCCOLLIM, KATHIE
6113 MCCOLLIM, LES
4479 MCCOLLIM, YVONNE
7546 MCCOLLUM, DANIEL
7545 MCCOLLUM, VICKI
5588 MCCOMBS KIM
6441 MCCONELLY TERENCE LEE
11153 MCCONKEY, IANA
67 MCCONNELL, GRANT
6442 MCCONVILLE, SHELLENE
8336 MCCORD, JANE
1357 *MCCORKLE, GENE*
1356 MCCORKLE, HEB
3450 MCCORMACK, EDWARD
3319 MCCORMACK, ROBERT K
7774 MCCORMICK, BEVERLY
4337 *TREMAINE, DODD A*
7717 TRENARY, BARBARA
5971 TRENDA, LYNN E
9492 TRENK, DAVE
180 TRENOR MRS CAMERON
7548 TRENT, LOY
137 TRESELER, LYNN & FAMILY
1058 TREWYN-STROM, LEE E
4050 TRI, DAVID E
9792 TRIBBLE, DENISE L
9785 TRIBBLE PAULINE M
9780 TRIBBLE RICHARD L
9805 TRIBBLE, W R
5809 TROELSEN, LINDA
9635 TROFFER DAVID A
10502 TROJE, FRANCES
4634 TROLINDER, S W
9586 TROMBLEY, PATTI
9836 TROMBLEY, RICK
8183 TROOST, JOHN C
3045 TROPPLE, RON
8242 TROUT J MICHAEL
742 TROY, GERALDINE A
1815 TRUAX, MICHAEL
5716 TRUCANO, LUCILLE
6321 TRUDEAU, FRANCIS
10227 TRUE CHRISTIE
6700 TRUE DICK
2281 TRUEBLOOD, MR & MRS LESLI
1816 TRUESDELL, CAROLYN
10032 TRUJILLO, JOHN
9886 TRULL, ROY G
6694 TRULSON, MIKE
3311 TRUMBULL MIKE
3573 TRUNK, JOAN
522 TRUONG THANH TIN
8141 TRYBERGER, BOB
10765 TSAI, MAVIS
11783 TSCHIDER, KENNETH
3205 TUAH, BARBARA
8379 TUCHSCHERER, C P
9028 TUCK, M GENEVIEVE
3544 TUCKER, EILEEN
9661 TUCKER, LONNY A
10658 TUCKER, MARK
10085 TUCKER SCOTT
7797 TUENGEL, DEBORA
7798 TUENGEL JOYCE
7799 TUENGEL, RICHARD L
2729 TUINN, PHYLLIS
6316 TUIOLEMOIN, KILIONA
2654 TULLO, DANIEL
9914 TUNE, GENE
8189 TURAK, JOHN A
11396 TUREK, LEAH
2014 TUREK, MICHAEL
5091 TURLOTT, CURTIS

2484 EASTBURY, JANET
10916 EASTERBERG, CARL D.
11612 EASTERBERG, CHARLES
608 EASTERBROOK WILLIAM G
1305 EASTERLY, RICHARD T
3671 EASTMAN PHYLLIS
1178 EASTWOLD DAVID
9384 EASTWOOD, GEORGE
9390 EASTWOOD, STEVE
4629 EATON, CARL
9283 EATON DONNA M
9278 EATON, FRANCIS E
930 EATON WILL
1923 EBEL, CHUCK
9851 EBERHARDT, DENNIS R
9752 EBERHART, CHARLES F
7251 ECHERT BILL
3153 ECHOLS CRAIG
2124 ECKERT, L R
4880 ECKES, ROBERT
4888 ECKMAN, T J
3388 ECOB, GERTRUDE
1081 ECOB, TRUDY
5058 EDDY, KENNON
8002 EDDY, MCHAEL D
4149 EDEER DAVE
958 EDEN, VAN
3362 EDENHOLM, RAY
334 EDISON JOHN E
9770 EDLAND KAREN S
3670 EDLUND LEONARD
11793 EDRIS, JAMES
4778 EDSON, LOUISE
5717 EDWARDS, ALBERTA
6736 EDWARDS BOB
7293 EDWARDS, CARRIE
7105 EDWARDS CYNTHIA
8105 EDWARDS, DELPHA M
11469 EDWARDS, DEREK
10093 EDWARDS DWIGHT W
8104 EDWARDS FRANK W
5189 EDWARDS, JACKIE
6001 EDWARDS JENN
175 EDWARDS, JOAN
3562 EDWARDS JOHN S
5188 EDWARDS, JULIE
9689 EDWARDS, MARY ANN
8275 EDWARDS MICHAEL
5187 EDWARDS MORRIS
11108 EDWARDS OLA M
7106 EDWARDS PETE
7100 EDWARDS, RICHARD
7467 EDWARDS, RICHARD
8103 EDWARDS, ROBERT H
7405 EDWARDS, ROGER
1051 EDWARDS, TOM
6002 EDWARDS WAYNE
10249 MCCORMICK, BILL
8702 MCCOY, DOUGLAS
8703 MCCOY, PAUL H
8701 MCCOY, PHYLLIS A
8704 MCCOY, TYLER P
6375 MCCUBBINS, FLOYD
6779 MCCULLAUGH, WILLIAM
2084 MCCULLEY, MARK
10303 MCCULLEY, MIKE
2069 MCCULLEY, ROY L
6180 MCCULLOCH, C
8669 MCCULLOUGH, BRYAN
8611 MCCULLOUGH JUDY
6769 MCCULLOUGH, MARIE
8662 MCCULLOUGH MARK
803 MCCULLY, PHILLIP L
6723 MCDANIAL SAM
1221 MCDANIEL CYNTHIA L
5056 MCDANIEL DELLA
541 MCDANIEL, NORMA B
1257 MCDANIEL, RICHARD C
5066 MCDANIEL, SANDIE
6074 MCDONALD, BETTY
3849 MCDONALD, BILL
8985 MCDONALD, DAVID
4656 MCDONALD, DENISE
9291 MCDONALD, DIANA
4654 MCDONALD JACUELINE
4652 MCDONALD JAMES E
8976 MCDONALD K E
9292 MCDONALD, RONALD
4655 MCDONALD TRUDY
11574 MCDOUGALL, MARGARET
1996 MCDOWELL JOHN
884 MCDOWELL-MCGOUGH, GARY R
11518 MCDUELLY, GALA
1383 MCEWEN, IDELLA
390 MCEWEN WILLIAM L
5398 MCFADDEN, FRANK
6673 MCFALL DUANE
8777 MCFALL NANCY
10581 MCFANN, ROBERT A
314 MCFARLAND, ALBERT E
5583 MCFARLAND, TRACI F
235 MCFARLAND, TRUDY L
773 MCFARLAND, VIRGINIA
2981 MCGARREY P A
7275 MCGEE, JIM
9598 MCGEE WAYNE
219 MCGIBBON CHARLES D
600 MCGILL-THOMPSON, ANNE
7960 MCGILLISEROY HOWARD
9438 MCGINNIS, ROBBIE
9378 MCGIRK G W
4249 MCGOWAN, J D
4250 MCGOWAN, KYM
4252 MCGOWAN, MANDY
7347 TURNBERG, NANCY
7913 TURNBERG, STEPHEN
3386 TURNBILL, BILL
11454 TURNER AARON
10322 TURNER, B
8346 TURNER CHARLES
4000 TURNER, DARRELL
11315 TURNER, DEBORAH
2648 TURNER EDWARD
6780 TURNER EMMA
2947 TURNER FERD G
7176 TURNER, GARY M
10732 TURNER, JAMES
3881 TURNER, JAMIE
3594 TURNER, JOHN
11311 TURNER JOHN
11109 TURNER, JOY WOLFE
11312 TURNER, KATHESINE
11679 TURNER, LARRY
11152 TURNER MEGAN
11619 TURNER, PAMELA
4373 TURNER, ROBERT
1023 TURNER VERNA
10621 TURPENING, BERNIE
11865 TURPIN, SHANNON
7312 TUSTISON LISA
10549 TUSUP PAULA
4907 TUTT, CANDACE
2294 TUTTLE, DEBBIE
4600 TWARDY, JOHN F
8531 TWETER JOHN A
3584 TWIGGS, ALICE
3585 TWIGGS, GEORGE
4901 TWONY, CYNTHIA
10099 TYLER, BONNIE J
1409 TYLER CHUCK
7374 TYLER RICK
7849 TYLER ROBERT
9974 TYLER, THOMAS C
6941 TYRA, HOWARD
537 TYSSELING, A R
191 U'REN, STEPHEN
8055 UADRAY WILHELUEIUE
10465 UGE JEAN A
10020 UHLIG LESLIE
10381 ULLMAN MIKE
2960 ULMAN, BARRY
4463 UNDERWOOD, RICHARD
1470 UNKNOWN,
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1011 UNKNOWN,
1496 UNKNOWN,
1202 UNKNOWN,
1214 UNKNOWN,

1730 EGAAS, DAVE
3843 EGELSTAD, RICK
3832 EGELSTAD, SHARON
6964 EGER, CHARLES
6963 EGER, FREDERICK
6962 EGER, RANDALL & PIPER L
5640 EGGE, CARLENE
10694 EGGER, MARK
3371 EGGERTSEN BURTON
10148 EGTVEDT, LISA
840 EICHELBERGER, STEVE C
11008 EICKHOFF, JOANNA
4365 EIDSNESS KAREN
2899 EIDSON JOHN & JULIE
3393 EIKELAND, MARK
10062 EINBERGER EARL
4309 EISEL, JAMES
9146 EISENBACHER, LELA
9147 EISENBACHER, MIKE
1075 EISENHARDT, JOAN
1761 EISENHARDT, MIKE
10351 EISENMAN, ROBERT
11637 EISSINGER, ANN
1773 EISSINGER, TOM
10309 EITNER, KATHY
3300 EKENBERG, MAX D
6903 ELBESON, BONNIE
7911 ELDER, EDWARD
2814 ELDER GEORGE O
8441 ELDER JANEEN
8444 ELDER, KAREN
15 ELDER, LTC JOHN M
8623 ELDER, STEPHEN
4952 ELDEVIK, ROD
7027 ELDRIDGE, LESTER
6734 ELDRIDGE LORENE
4927 ELDRIDGE, PAUL
2843 ELFELT, JOSEPH & JOAN
10872 ELLARD, SHARON
8364 ELLE, JACOB
4546 ELLEDGE, ADELE
9467 ELLEDGE JO
9468 ELLEDGE, KEITH M
11413 ELLELY MARIE
1040 ELLINGSEN BETTY
1594 ELLINGSON, DIANNE
492 ELLINGSON, R
9940 ELLIOT, ELIZABETH
9082 ELLIOT, MIKE
11750 ELLIOTT, BOB
9081 ELLIOTT, BOBBY
2995 ELLIOTT CHALMERS
9087 ELLIOTT, CONNIE
4042 ELLIOTT, CRAIG
5875 ELLIOTT, EUGENE A
9083 ELLIOTT, JIM
5277 ELLIOTT, PAMELA
3218 MCGRANER, PATRICK
11366 MCGRATH, JAMES & CHAREAT
10868 MCGRATH, JEFF
11903 MCGRATH, THOMAS
288 MCGREGOR, BRITA
9819 MCGUFFIN, RICHARD
4419 MCGUIRE, CHRIS T
2638 MCGUIRE, DEBRA
4999 MCGUIRE, GEORGE
3313 MCGUIRE, INGEBORG
9600 MCGUIRE, MIKE
5027 MCGUIRE, PATRICK
11266 MCGUIRE, RICH
542 MCGUIRE, RICK
9597 MCGUIRE, STEVEN L.
9599 MCGUIRE, TIM
4965 MCHAFFIE, SUSAN
4686 MCHENRY, DONALD
4687 MCHENRY, MINTA
705 MCHUGH, CONNIE J
4957 MCILRATH, GURINA
4956 MCILRATH, SCOTT
7394 MCINNES RA
2765 MCINNIS JOHN
9364 MCINTYRE, DEENA
9365 MCINTYRE, RONALD
7188 MCKAY, JAMES R
6583 MCKAY, JOHN
3688 MCKEE CURTIS
5941 MCKEE, DALE C
848 MCKEE DAVE
6496 MCKEE, DOROTHY M
5842 MCKEE, IEON
2319 MCKEE, JONATHAN
1215 MCKEE NEIL H
6000 MCKEE SANDY
5973 MCKEE, TRUDY
4148 MCKEEHAN JACK D
553 MCKEEHAN TERESA L
11515 MCKEEVER, DOUG
1912 MCKENNA, JODI
11198 MCKENZIE, KATHENYNE
2939 MCKENZIE, ROBERT L
2594 MCKEOWN ERIN MICHELLE
7837 MCKERN CHRIS
9182 MCKILLOP, CHUCK
8515 MCKINNEY, BEVERLY
7239 MCKINNON, KATHY
143 MCKINNON, LINDA
2074 MCKLOY, JACK R
10363 MCLACHLAN, ROBERT G
11281 MCLACHLAN ROBERT G
2044 MCLAREN, DAN
368 MCLEAN, BRIAN
4443 MCLEAN, DARRELL
3522 MCLEAN, GIR
4444 MCLEAN, MARY
1601 UNKNOWN,
777 UNKNOWN,
420 UNKNOWN,
796 UNKNOWN,
449 UNKNOWN,
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11287 UNKNOWN,
1078 UNSOELD JOLENE
8424 UPCHURCH, BRIAN
7150 UPDIKE, ARDIS
7152 UPDIKE, ROBERT N
5387 UPEHURLIT, MILFORD
751 UPJOHN, RICHARD
456 UPTON, WILLIAM
1499 URBACH RANDY
2681 URBICK, CHARLES
9174 URNESS, JAMES
11104 USHAKOFF VLADIMIR
132 USITALO, EINO M
1962 USITALO, MARIE E
6292 UTIKAL, DON
10073 UTTER, JEFFREY
4808 UTTER, LISA
3257 VACCHIERTY, C J
473 VADASZ, BELA
2435 VADNAIS, JIM
3067 VADNAL, MATTHEW L
9471 VAHL, JUNE E.
805 VAHLBUSCH, ETHEL
10188 VAIL, BANNING
1620 VAIL, HANK & LINDA
5724 VAIL, JOHN

11357 ELLIOTT, WILLIAM
652 ELLIS, DALE E.
2894 ELLIS, DOROTHY
227 ELLIS, KEVIN
11890 ELLIS, LINDA
3625 ELLIS, MILO
10346 ELLISON, GORDON
6731 ELLISON, STEVE
8426 ELLISON, WILLIAM H
9149 ELMEN, JOHN
5451 ELMENDORF, WAYNE
9142 ELMER, JOHN
10140 ELMER, SHERRIE
3491 ELMER, WARREN
8157 ELMORE EDNA M
7583 ELSTAD DON
4626 ELTVICK ALBERT
7334 ELVERFELD, TROY
5533 ELWOOD, L G
7977 ELY, MORRIS
3238 EMBUM, SUSAN
3158 EMERGING, GAIA
4198 EMERSON RANDY
245 EMERY, LYNN
10970 EMERY, MICHAEL
7333 EMLEY, DAVID W
2916 ENDERLEIN, EDWARD
4834 ENDERLEIN, MARGARET
10983 ENERSON, HAL
8368 ENGEL, GERRY
1318 ENGEL KEN
3658 ENGELBRECHT, JULIE
1378 ENGELEN, HAL
909 ENGELL, CLARENCE R
4774 ENGFER LEORA
7039 ENGHOLM, PETE
7040 ENGHOLM, RUTH
5880 ENGKRAF, CLARENCE A
7259 ENGKRAF JOSEPHINE
1529 ENGLE EDWARD
11517 ENGLE, HEIDI
10490 ENGLE HELEN
2898 ENGLEBRIGHT LOIS & E G
4190 ENGLERT, GEORGE
9968 ENGLISH, AARON
3466 ENGLISH LORAINE
2249 ENSLEY, A L
7070 ENSLEY, AMOS
8779 ENSLEY BERNICE
1380 ENSLEY, BILL
7069 ENSLEY ETHEL
1382 ENSLEY, JAMES
4060 ENSLEY, JERRY
7008 ENSLEY, RANDY
5899 ENTSMINGER, J.
9941 EPLER, WILLIAM E
8903 EPLING, DANIEL N
7732 MCLEAN, RODERICK
4831 MCLEAN, SCOTT
11542 MCLEOD, GEORGE
5916 MCLEOND, NEIL P
9208 MCLUCAS, BERNADINE
9209 MCLUCAS, FRED
3168 MCMACKIN, TOM
11382 MCMAHAN, CHARLOTTE
9532 MCMAHAN, FRED
1354 MCMAHAN GLEN
11381 MCMAHAN GUY
9787 MCMAHAN JIMMY
9872 MCMAHAN, JOHN
9777 MCMAHAN, NORMAN
11386 MCMAHAN, PAUL
11241 MCMAHAN, RICHARD
5211 MCMAHAN TOM
9806 MCMAHAN, WALTER E
8679 MCMAINS, DAVID
8678 MCMAINS, SHELLY
5098 MCMANEMY, ROBERT L
1792 MCMANUS, MR & MRS CHARLE
10426 MCMILLAN ANDREW
6656 MCMILLAN, JEREMY
6655 MCMILLAN, JOSEPH
6654 MCMILLAN, JUDITH
506 MCMILLAN LEONARD
6653 MCMILLAN MIKE
6619 MCMILLAN WAYNE
9754 MCMULLEN, KEVIN M
9980 MCMULLEN, LINDA
5637 MCMULLEN, LOIS
7958 MCMURCHIE, DEBRA
7942 MCMURCHIE, ROBERT
7957 MCMURCHIE, SARAH
5826 MCNALL, MELISSA
2353 MCNALLY, PEG
511 MCNAMARA GERALD
9996 MCNAMEE, STEPHEN
1473 MCNAMEE, VIOLA
5119 MCNERNEY KATHY
11789 MCNEW MARCUS
1004 MCNITT ELAINE
1483 MCOMBU C E
7595 MCPHEE, RON
8755 MCPHERSON, GARY P
842 MCPHERSON, MERCEDES
5539 MCQUOWN, STEVE C
7843 MCREYNOLDS STEVEN
875 MCSORLEY, PEG
7395 MCSORLEY, ROBERT
8954 MCSPADDEN ALISON
11860 MCTIMMONDS BARBARA
794 MCWHORTER, C R
10638 MEADE, DOROTHY
9840 MEADE, LOIS I
9839 MEADE, LOREN
10179 VAIL, MARILYN L
9475 VAIL, MICHAEL
4593 VAILLANCOURT, BETTY J
9 VALACH, E J.
5023 VALBUSH, HOWARD
4281 VALENO, RICHARD
5943 VALENTINE, PATRICIA J
7435 VAN AKKER, MIKE
666 VAN BEEK, C GRACE
647 VAN BEEK HERMAN
1579 VAN BURKLIO, R P
5021 VAN DUIN, CHRIS
5032 VAN DUIN, DUSTIN
4980 VAN DUIN, JOHN
5025 VAN DUIN, LUCY
5034 VAN DUIN, TAMI
5033 VAN DUIN, TED
6599 VAN DUSEN, GEORGE M
2974 VAN DWIGG, JOAN
5902 VAN FOEKEN, W J
5001 VAN GORKAM, JOHN
3512 VAN HULLE, JILL
5869 VAN KUREN, CLAIRE
5883 VAN KUREN, DONALD C.
7442 VAN LEURRER, ADAM
1600 VAN NUS, TOM
7434 VAN PROYEN JR GLENN
6169 VAN RUFF, ERIC
10668 VAN ZANTEN, SHIRLEY
8203 VANAKKER, RYAN
8204 VANAKKER VIOLET
8412 VANBROCKLIN, ART
1641 VANCE, MARK
9214 VANCE, STEPHEN
7415 VANDE PUTH, ELIZABETH
7084 VANDEKAMP, JOHN
3477 VANDEMAN, HELEN
9074 VANDENBERG, GARY
2240 VANDENBURG, DAN
871 VANDEPUTTE, MATTHEW L
38 VANDER GRIEND, LAMAR
10017 VANDERBERG BRIAN
2867 VANDERKOLK DAN
111 VANDERPLOEG, DAVE
4451 VANDERSTAAY D ALSON
5558 VANDERVATE, ROY
6733 VANDLING JAMES
3624 VANDORIEN, RANDY
9382 VANDYK GARY M
9274 VANDYKE, DOUGLAS
9592 VANDYKE, EMILEE
9591 VANDYKE, ERIK
9271 VANDYKE, MAURINE
11905 VANDYNE, ANNE
7238 VANELK, CHRIS
7231 VANELK, D ELDERT
7232 VANELK, JOEY

8901 EPLING, RHONDA
7283 EPPLING, JAMES
4631 EPSTEIN DR EDWARD
8383 ERB, LARRY
1547 ERB, MARCIA & DAVID
10675 ERCKMANN, W JAMES
9421 ERDLE, LINNIE
113 ERDMAN, DR KIMBALL F
2363 ERELAND, DEFOREST H
6255 ERICKSON, A T
971 ERICKSON, BARBARA J
1047 ERICKSON, BEVERLEY J
11600 ERICKSON, CARL
5695 ERICKSON, CATHIE
4551 ERICKSON, CATHRYN M
5096 ERICKSON, CHARLES
9140 ERICKSON, D S
1209 ERICKSON, DAN E
4900 ERICKSON, DAVE
6254 ERICKSON, DAVID
509 ERICKSON DUANE
7766 ERICKSON, E R
10662 ERICKSON, G A
3994 ERICKSON, HOWARD
1537 ERICKSON, JIM
9361 ERICKSON, JORDEN
2827 ERICKSON, JUDY
503 ERICKSON, LINDA
7946 ERICKSON, M A
5076 ERICKSON PHYLLIS
7769 ERICKSON, RICHARD
4555 ERICKSON, RICHARD L
8014 ERICKSON, SANDY
10048 ERICKSON, STEVE
9366 ERICKSON, SUSAN
3803 ERICKSON, VERNON
6251 ERICKSON, VIRGINIA
7765 ERICKSON, VIVIAN
2646 ERIKSEN, GLENN J
9332 ERINSTAD, GARY
2582 ERNEST, DON W
9444 ERVIN, GEORGE
110 ERWOOD RICHARD G
10413 ERWOOD, STEVEN
10526 ESCHRICH, NANCY
4743 ESPESETH HOWARD A
4896 ESSWEIN, ERIC
2676 ESTES BURTON
3772 ESTES FRED
4145 ESTES, GENE D
4171 ESTES, JR, MILLARD
5487 ETHERIDGE, H C.
2346 ETTEN, ROY K
7211 ETTINGER, E D
2248 EUBANKS, MICHAEL C
11901 EVANS, BROCK
10173 EVANS, CHARLES D
10538 MEADOR, BETSY
9972 MEADOR, JAMES
4871 MEANS, CARI
56 MEANS, MICHAEL
36 MEASSICK, JOE, EVA
7383 MEATHERLIN, JODI
11014 MECKEL, CARLA J
10236 MEDCALF, VAN
10338 MEDING, CHARLES D
4928 MEECE, GLENDEN
3766 MEECE, RICHARD L
5910 MEECK, JEAN
11061 MEEKLOF, DAWN
7318 MEEKS, C E
9740 MEEKS, JUDITH A
9304 MEEKS, RAYMOND E
9341 MEEKS, ROBERT
5948 MEENTS, C J
865 MEESSEN, PATRICIA LOTT
864 MEESSEN, WILLIAM K
9571 MEGINNISS, DEAN H
2276 MEHLER, LEO
1157 MEHLING, CHRIS
1801 MEHLING, H A
7518 MEHOFFRY, SUE & PHILLIP
1326 MEHUR, EVALYN J
1384 MEIER, DAVID E
4658 MEIERS, CLAYTON E
9707 MEILE, BERNARD A
7943 MEISSNER, ROGER
1429 MELA, KRISTIAN R
1940 MELCHERT RUSS
3504 MELGARD, CHRISTIAN
1182 MELILL, DONNA
1543 MELLEMA, JACK
5864 MELLISH, R
5796 MELLON, JAN
5421 MELLOTT, MIKE
3272 MELVILLE, SIMON
2115 MELVIN FELICIA
4080 MELVIN, LARRY
4140 MELVIN, MADELINE
11407 MENACHEM, Y BEN
10239 MENDEZ, VICTORIA
6660 MENDONCA, KRIS
1684 MENG JOSEPH
760 MENICH JEAN
11823 MENOCAL III, ARMANDO
5079 MENVOOD DENNIS L
4613 MENZEL, FRANK
9679 MENZIES, TONY
9121 MERAGER, ANN
9180 MERAGER, KENNETH
1615 MERAT, GRACE
8281 MERGEL, GREGORY LOREN
6315 MERKSLE, TOM
5385 MERRIFIELD, JAMES
7316 VANGIFFEN, PAUL
10390 VANKIRK, DAVID
4932 VANLANDINGHAM, WENDY C
2925 VANMERSBERGEN, DON
6517 VANN, WYATT
6639 VANROY, JAMES
2292 VANSCOY, DOUG
8020 VANTZ, ROBERT A
3336 VANWERTHUIGER, MAURICE
8112 VANWYCK, DOUG
8115 VANWYCK, KAYSIE
8113 VANWYCK, LYNDA
9501 VANWYK, RUSS
8153 VARGAS, SAMUEL
7677 VASARKOVY, KEVIN
11013 VAUGHN, FAYE S
2196 VAUGHN, RICHARD L
1964 VAUGHN, STEVE E.
5871 VAUGHN, WAYNE
11355 VAUGHT, DOUGLAS
8496 VAUTOUR, THOMAS
1860 VAUX, WALLACE W
2400 VAWTER, ROSE
352 VEALE, DAVID
10991 VECK, DON
10394 VELASQUEZ, KATY
1444 VENDRASEK, CHRISTOPHER
3191 VENEZUELA JUAN
7956 VERA, JOE
10310 VERBER RUTH T
8177 VERD PATRICK
2728 VERDUIN, M L
1922 VERELLEN, PATRICIA
11415 VERGARA, RIZALINDA
10252 VERGOWE, KEN
5479 VERLIMB, DAVID
1767 VERNOIZ, SHEA
2215 VERNON, DAVID
10506 VERWOLF, DAVID
10452 VESPERMAN, VICKI
2360 VESS, ANN MARIE & RICH
11481 VESSEY, SHERRI
4083 VETTER, KEN
7929 VICKARYOUS, DON
2046 VICKLUND, HUBERT
9546 VIDITO, CLAUDETTE
471 VIEBROCK, WALTER M
5940 VIERO, DEANNA
630 VILES, GREGORY S
8356 VILLALUZ, SALLY
2851 VILLENEUVE GEORGE E
6404 VILLINES, ERNA W
6403 VILLINES, KENNETH D
4222 VINSON, SCOTT
9254 VIOMAN, R
1953 VISSER, PAM
4570 VITALICH, NOELLE

3751 EVANS, DEBBIE
6378 EVANS, JAMES
6764 EVANS, JO ANN
11176 EVANS, JOHN
116 EVANS KARI
1252 EVANS, KEN
6762 EVANS, KENNETH R
3759 EVANS, KEVIN D
558 EVANS, LARRY A
10453 EVANS LINDA
3489 EVANS, ROBERT W
6763 EVANS ROY E
5259 EVARTS, STEVEN A
11529 EVERETT, HUGH
11303 EVERETT JAMES
10485 EVERETT, ROXANNE
8906 EVERETT, TAMI
1628 EVERSOLE BERTHA
2784 EVERSON, CINDY A
2819 EVERSON, LEON W
10359 EWALL GAIL
1837 EWING, BRIAN
4122 EWY MARK L
1375 EYCHANER, JIM
2434 EYLAR, IVETTA
2378 EYLAR, ROBERT L
2260 EYLER, KEN
6527 FACE, GLENN
952 FAGER CRAIG
3049 FAGER DON & THEA
11169 FAGERHEIM, OLA
10442 FAGUMIO, CHOU
3339 FAIN DANIEL
10237 FAIRBANK, MATT
2716 FAIRBANKS EUGENE
11188 FAIRCHILD CHRISTIE
5735 FAITH DAVID
6606 FAKENBRIDGE BRIAN
100 FALER ROBERT J
10838 FALKENHAGEN JOHN
3847 FALLER GREG
9690 FALSTACH DON
5811 FALTER, MARY
5812 FALTER, RICHARD
6434 FANCHER JR KEN
125 FANT, KAREN I
8398 FARDIG RICK
10615 FARLEY, AMANDA
8805 FARLEY, RANDY
4173 FARLEY WALLACE
5249 FARMER, BRADLEY F
7001 FARMER, DENNIS
8028 FARMER, DON W
2600 FARMER, ED L
7689 FARMER, FRED
3278 FARMER, SHARON
7041 FARMER, VIRGINIA
5386 MERRIFIELD, SANDIE
7868 MERRILL, DENNIS
331 MERRITT, ALBERT E
1605 MERRITT, JAMES
2247 MERRITT, LEE ROY
11842 MERRY, KENNETH
5080 MERWOOD, SHELLEY
7961 MESHKE, GREGORY
4189 MESSER, DOYLE V
4184 MESSER, ROBBIE S
11511 MESSINA, ROBERT
8363 MESSINGER, BOB
5127 MESSMAN, MIKE
2542 MESSOR, ROWLAND E
8158 MESTER, ROBERT T
7993 METCALF, BETH L
4520 METCALF, DEBRA
3192 METCALF, LEE E
11101 METHOT, JOHN
2043 METLOR, DICK
2364 METSKER, WAYNE
9569 METTLER, DAVID
4567 METTLER, DONNA
8311 METTLER LINDA
4202 METTLER ROBERT
8344 METTLER III, FRANK
5563 METZ, HERBERT R
10207 MEWIKIN, KAREN J
5867 MEYER BETTY M
1728 MEYER BRETT
9988 MEYER CHERYL
3189 MEYER, CLARENCE F
10882 MEYER, ELLEN
2552 MEYER, ERIC F
1822 MEYER, JOHN
225 MEYER KENT C
11000 MEYER MARK R
2573 MEYER, PETER
2797 MEYER VERNON
488 MEYERS DALE
11139 MEYERS, DAVID
10121 MEYERS, SCOTT C
11236 MEZO, HEIDI
11234 MEZO JEAN
11232 MEZO, JOHN
11118 MEZO, TOM
2473 MICHAELS SEAN
4366 MICHAELSON, RICHARD
2235 MICHALEK, DIANE
9006 MICHALEK, GARY L
379 MICHALIK, DIANE
10215 MICHALOFSKI, OLAF VON
3146 MICHEL, CHRIS
3364 MICHEL DELORES
10058 MICHELSONS, ZIGURDS
7720 MICKELSON, DAN
2781 MICKELSON, MARK
11363 VITOLO, LOIS
6270 VLACH, DIANE
6271 VLACH, LARRIS
3654 VLADYKER, MARK
3126 VOELLER, PETER
4752 VOERS, LARRY
3304 VOETBERG, MARDE
8764 VOGEL, JAMES R
2129 VOGEL, JOHN R
6885 VOGEL, THOMAS
7339 VOGEL, WAYNE
774 VOGELPOHE AUDREY
5874 VOGELPOHL, LYLE
5071 VOGT, LINDA
10590 VOGT, PETER
3435 VOIGT BILL
3437 VOIGT, K
5494 VOKATY, DWIGHT
4231 VOLIN, RICHARD
4786 VOLINE, TED
11552 VOLINN, ERNEST
6130 VOLK, JAY
8850 VOLLAN, MARK
2733 VOLLMER, HENRY
851 VOLWILER, M D , WADE
3061 VON WRANGEL, FAYE
7298 VONGOHREN ROGER
440 VONROSENSTIEL, PAUL
5807 VOSS, DAN
5593 VOSS, ELDON
5592 VOSS, JANICE
5849 VOSS, PAMELA
3627 VOWELS, GARY LEE
5501 VOYLES, KELLY
4699 VOYLES, SCOTT
9981 VOYTKO, MARY H
536 VREDEVOOGD, BRUCE
562 VREELAND, KEITH R
4684 VUORI, RICHARD
662 WADDELL, DEB
315 WADDELL, DONALD E
3424 WADDINGTON, SANDRA
4538 WADDINGTON, SIMEON
7262 WADE, BEN
11937 WADE IAN
1777 WADE, JIM & BEVERLY
8166 WADE, WILBUR
10630 WADSWORTH KEITH
2056 WAGGONER, DONALD E
4459 WAGNER, C R
4045 WAGNER, DAREN R
9820 WAGNER, DAVID W
3968 WAGNER, DOUGLAS S
4822 WAGNER, E R
10596 WAGNER FLORENCE
4034 WAGNER, HAROLD D.
5117 WAGNER, JIM

44 FARMER, PHD LOWELL J
273 FARNAM, J D
2527 FARNELL DOUG
9504 FARR, ROBERT
7178 FARRAR, JACK A
7184 FARRAR, NANCY A
10780 FARREL, PAM
679 *FARRELL, ROY G*
1227 FARRELL, TERRY
10847 FARRIMOMD, ROBERT
10512 FARRIMOND, MARTY
3708 FASSBIND, LARRY
4628 FAULK, G LENORE
4627 FAULK, WILLIAM
2291 FAULKNER, JOSEPH
575 FAULKNER MERRITT W
6077 FAULKNER ROBERT
7596 FAULKNER, STEVE
3338 FAWCETT, ROBERT
1327 FAX, CHRISTOPHER W
10027 FAXON, BEVERLY
1681 FAY, MOLLY
1939 FEARING, HEATHER
11662 FEENEY, TERRY
161 FEHLHAFER, LEO R
11207 FEICK, DAVID
4462 FEIL ROBERT
10230 FELBECK, JEFFREY
8740 FELDSTED CHARLENE D
8742 FELDSTED, KENT
939 FELIX, DUANE F
154 FELLER, JOSEPH J
3079 FELTON, BETTE
3737 FENLEY, KENN
3935 FENLEY, LADONNA
3937 FENLEY, LEE
3934 *FENLEY, LEE*
3736 FENLEY, LEO D
11881 FENNEL, BRIAN
11879 FENNEL, RON
383 FENSKE DOUGLAS H
6850 FENWICK PETER H
4904 FERBER, GARTH
465 FERBER, MR & MRS ROBERT
9249 FERD, MARK
8316 FERGESON, DONALD
2357 FERGUSON, DEBORAH L
10906 FERGUSON, GARY B
1398 FERGUSON, KAREN M
7584 FERGUSON, RICHARD D
7854 FERGUSON RICK
4367 FERID, EDWARD
5572 FERIS, W M
967 FERKOVICH, ALEX
338 FERM, M H
9946 FERM MARGARET H
9973 FERNALD, ELEANOR
11925 MICKLE, EUGENE
11142 MIDDLETON, GORDON
6305 MIDDLETON, HELEN
6306 MIDDLETON, JAMES
9984 MIDDLETON, JUDITH N
1919 MIDDLETON, MORRIS A
6304 MIDDLETON, NAYLOR
528 *MIDDLETON, SARENA L*
6301 MIEARS JR , CLARENCE
8236 MIKELITCH, RICHARD
4525 MILARD, MARTIN
7809 MILBOURN, JEFF
1264 MILES, DARIEL
8733 MILES, DARIN L
3723 MILES, DAVID
10306 MILES, ELIZABETH
4079 MILES, FRANK
4114 MILES GERALD
1673 MILES JAMES E
11566 MILES JOE
5913 MILEUD PAUL
11497 MILLAN, HOWARD
2673 MILLAY, LOUIS L
739 MILLER ANDREW G
5416 MILLER, BARB
1288 MILLER, BETSY
7551 MILLER BLAIN
9183 MILLER BOB
10817 MILLER, BONNIE K
439 MILLER, BRAD
11170 MILLER, BRAIN
11617 MILLER, CARLA
10568 MILLER, CARRIE
3384 MILLER, CATHRYN
431 MILLER, CHARLES
5413 MILLER CINDI
9911 *MILLER, CLARENCE*
6608 MILLER CLARK
11722 MILLER, CRAIG
729 MILLER CRAIG F
11496 MILLER, D
4316 MILLER, DALE
10292 MILLER, DANA
8748 MILLER DAVID
4569 MILLER DIANA
6164 MILLER, DON
4207 MILLER DONALD
257 MILLER, DONALD G
2572 MILLER, DONALD S
7136 MILLER, DWIGHT R
7221 MILLER, EARL
2223 MILLER, ED
9594 MILLER, ED
7307 MILLER, ELMER
11618 MILLER, ERIC
5232 MILLER, ERNA
6816 MILLER EUGENE
4926 WAGNER JUDITH J
7142 WAGNER JUNIOR L
4469 WAGNER, LEONARD
7852 WAGNER, LINDA
11029 WAGNER, MARK
4950 WAGONER, BETTY
1532 WAHL, ERIN
2540 *WAHL, NANCY L*
10620 WAILJORY, NANCY
11729 WAITE, BRYCE
4754 WAITSELL, BRAD
4390 WAKEFIELD, GRACE
3527 WAKEFIELD, JAY
4391 WAKEFIELD, MARK
2500 WAKEHAM, BRUCE
1251 WALDBRAUER, JAMES R
2700 WALDYS, PETER R
10971 WALENTA, JOHN F
2193 WALES DALE EDWIN
7536 WALHER, WILLIAM
4653 WALKER, BARBARA
7887 WALKER, BETTY
5757 WALKER, CAROL
8075 WALKER CECIL
11259 WALKER, DEBORAH
10022 WALKER, DIANA
8041 WALKER, DON
6426 WALKER, DONALD
4301 WALKER, DOUG
7674 WALKER DOUG
8430 WALKER GLORIA
5064 WALKER, JESS
10921 WALKER JOHN L
5061 WALKER JUDY
7886 WALKER, LORI
9636 WALKER, R L
5758 *WALKER, RICHARD*
2660 WALKER ROBERT V
7931 WALKER, RON
5013 WALKER RUSS
8858 WALKER, SCOTT A
7890 WALKER, STEVE
3187 WALKER, THOMAS H
45 WALKLING, MS LEE
1597 WALKUP DENNIS
7357 WALL, CHARLES
2404 WALL, GUS
11758 WALL, HUBERT
10259 WALL, JANET M
8969 WALLACE, BRIAN
4552 WALLACE, DAVE
4016 WALLACE, FRANCIS
11219 WALLACE, JOHN
10829 WALLACE, JOHN M
4741 WALLACE, ROGER
3523 WALLER, JAMES
11892 WALLER, WILLIAM

7786 FERNAU BRENDA
7787 FERNAU, BRIAN
7790 FERNAU, CHERYLE
7788 FERNAU, JESSICA
10123 FERRARI JIM
1103 FERREIRA, ELAINE
1190 FERREIRA, JOHN
5279 FERRIS JOANNA
5280 FERRIS, JULIE ANN
6336 FERRONI G A
6335 FERRONI T R
3127 FERRY PATTY
470 FERSTL MARGIE A
9649 FETHG LEO J
9197 FETTERLY, AL
1854 FETTERLY, GLORIA
11151 FETTERLY, NANCY
8130 FETTERS, JERRY
5130 FEY MIKE
11781 FEYK, CRAIG
3256 FICK, COTTON
3073 FIDDLER RICHARD
8015 FIDELINE RANDY
7627 FIEDLER, CRAIG
9850 FIEDLER, FRED
1587 FIEDLER, GENE
6659 FIELD, MARILYN
6022 FIELDING EDWARD
6023 FIELDING GRACE
8728 FIERRO CELINA
9277 FIERRO, ESTHER
9276 FIERRO REGIE
8727 FIERRO RICHELLE
2687 FIFIELD, ROBERT
1517 FIGENBAUM, ROBERT
5142 FIGGINS RON
5141 FIGGINS, RYON
7279 FIGUERON PAUL
5582 FILBERT KAREN
8124 FILBIN SHIRLEY M
5966 FILBY ROBERT G
433 FILLSTROM ANN
7296 FINCH CLIFTON
7739 FINCHER, MICHAEL
4501 FINDLEY, DOUG
7151 FINDLEY LES
8378 FINGERSON, LARRY
8381 FINGERSON, LELAND
2833 FINK MICHAEL H
664 FINLAY-DORSEY, HELEN C
3326 FINSEN, MARILYN J
8479 FINSRUD ORVILLE E
6483 FIROK TONY
75 FISCHER, DEAN A
7746 FISCHER, DENISE
4227 FISCHER, EDWARD
417 FISCHER, GLENN
10208 MILLER, FRANCES M
5375 MILLER, GEORGE
8828 MILLER, GREGORY
5360 MILLER, HARRY E
8125 MILLER, ILK SUN
325 MILLER, J. D
798 MILLER, JAMES D
3004 MILLER JIM
3960 MILLER, JIM
10725 MILLER, JOAN LITE
3410 MILLER JOSEPH
5038 MILLER KEITH
527 MILLER, KEVIN
5233 MILLER, KEVIN W
4947 MILLER, LARRY C
11495 MILLER, LIZ
5359 MILLER, LONNIE
2801 MILLER, MARIE G
10757 MILLER, MARILYN L
10501 MILLER, MARK
11314 MILLER, MELISSA
4225 MILLER, MIKE
3620 MILLER, MONTY
1374 MILLER MRS DAVID B
3295 MILLER, MRS ROSALIE
1527 MILLER, NEIL
8040 MILLER, R J
2790 MILLER, RAY G
5455 MILLER ROB
210 MILLER, STEPHANIE
3861 MILLER, STEVE
10422 MILLER, SUSAN
5454 MILLER TAMMI
8542 MILLER, TED
3747 MILLER, TERESA
9129 MILLER, THOMAS
11264 MILLER, TOM
1535 MILLER WILLIAM
5039 MILLER WILLIAM
9856 MILLER, YVONNE L
4053 MILLHOLLAND ERIC
11185 MILLHOLLAND RHODA
10218 MILLIREN PATRICIA
114 MILLIUS, MEL
10290 MILLMAN, EVAN
2924 MILLMAN GERARD R
11649 MILLMAN, TONY
2755 MILLS, ALBERT L
10008 MILLS, ARCHIE
3569 MILLS, BREE
11487 MILLS, DERICK
3021 MILLS, DOROTHY & BLAKE
9774 MILLS, EARL
10142 MILLS, ELIZABETH A
1217 MILLS, HENRY K
867 MILLS, JEANETTE C
831 MILLS, SHARON
1273 WALSH, ANTHONY
2234 WALSH, MARCY R
7261 WALSH RICHARD
2177 WALSH, RICHARD L
9071 WALSH, THOMAS
3174 WALSH, VIRGINIA M
4236 WALSTRAND, C A
2220 WALTENBURG, GARY
8278 WALTER, ARTHUR
8738 WALTER BILL
4300 WALTER, CLAIRE
8799 WALTER, JACK
3503 WALTER L A
5972 WALTER, MARY
8277 WALTER WILLA
10061 WALTERS, DANIEL
6139 WALTERS DAVID
6253 WALTERS, LINDA
5511 WALTNER THOMAS R
6633 WALTNER TIM
9450 WALTON, JACK
1925 WALTON JERRY
10756 WALTON LINDA G
1603 WALTON, VICKI
5929 WALTON, WAYNE R
802 WALTRIP, ROY
6344 WALTZ, ALEXA
6345 WALTZ, KATHY
6346 WALTZ MEGAN
1454 WALTZ ROBERT R
11403 WANER, PAUL
9640 WANTS PHIL
2194 WARBER, LELAND J
10992 WARD, BENNY
7266 WARD, BOB
9638 WARD, FRANCES E
10476 WARD JAMES
5608 WARD JEANETTE J
5551 WARD, LARRY
5893 WARD LEON
9706 WARD, LORNA J
10565 WARD, RICHARD
4165 WARD, TERRI
7060 WARE ANN ELISA
7963 WARE, JOHN L
7059 WARE, MICHAEL
7321 WARE, RAYMOND L
4671 WARES LEVI P
127 WARFIELD, ROBERT A
9313 WARHAM WALT
5900 WARICK G J
11002 WARIG ANNE
3709 WARING, BOB
11093 WARING, BRIGIT C
8088 WARNER, BRENT
4568 WARNER, JAN
994 WARNER, PRISCILLA

7745 FISCHER, JOHN
11033 FISCHER, SCOTT
10873 FISH, JOAN & IVAN
1226 FISHER, CHAD
6365 FISHER, CRAIG
3089 FISHER, DAVID M
3580 FISHER, DENNIS
11230 FISHER, ERIK
3267 FISHER, GAYLE
3323 FISHER, IRENE
174 FISHER, MICHELLE M
8143 FISHER, ROBERT K
6201 FITCH, MIKE
1074 FITCH P E , JAMES W
6122 FITCHENAL, JOHN
11578 FITZER, MARVIN
11714 FITZER RUTH
2251 FITZGERALD, DAN
3097 FITZGERALD, JILL
3445 FITZGERALD, TERRY
1294 FITZGERALD VERN
6707 FITZHUGH, COZETTE
216 FITZHUGH, ELIZABETH
6708 FITZHUGH, JAMES
6706 FITZHUGH, SANDY
11931 FITZPATRICK, K M
10055 FIUT, ROBERT
7621 FLAHERTY, TOM
5914 FLAIG, RICHARD
240 FLANARY, CLIFFORD
6018 FLASCH JOSEPH
6017 FLASCH ROSA
5806 FLATEN, DALE
4903 FLEAGLE, ROBERT
5345 FLEEGE, DR PATRICK A
11624 FLEENER, GORDON
11450 FLEGEL, FRED
441 FLEISCHNER, THOMAS L
7229 FLEMING, CHERYL
5332 FLEMING, CHRISTINA R
7201 FLEMING, DOUG
8304 FLEMING, FRED
9463 FLEMING, GARY
2225 FLEMING L
2756 FLEMING, MARK
7200 FLEMING, MIKE
1809 FLEMING, ROBIN
9464 FLEMING, SUSAN
7206 FLEMING, TIM
10846 FLEMING, WILLIAM P
9927 FLESCHER, RUSTY
8808 FLETCHER, BETTY
8807 FLETCHER, CECIL
4287 FLETCHER, JIM
1928 FLETCHER, MINNIE
563 FLETCHER, SCOTT
9047 FLEURY, DON
3401 MILLS, TWIG
6761 MILLSAP, SHARON
10212 MILLSON, JAMES & KATHY
4326 MILTON, JAMES P
4357 MILTON, JASON
11615 MINARD JR , E LAURY
1333 MINCIN, JOHN
10698 MINCIN, KARL
1334 MINCIN, MRS J
954 MINELGA, TONY
9351 MINER, BETTY
9350 MINER, CHARLES
10532 MINER, JOHN
2611 MINER, JOHN W
11614 MINERS, SCOTT
5873 MINEST, JEAN
1676 MINGO, SCOTT
8973 MINKLER, MIKE
8974 MINKLER TRACIE
4015 MINSWALL, ANDREW G
7651 MINTEER, LAURALEE
2509 MINTER, SUSAN
2211 MINTKEN, CHARLES L
7982 MINTON, DANE
11541 MISCHEL, JEAN
2416 MISHLER, EMMETT S
9965 MISKIMEUS DAVE
5418 MISKO, GENE
4019 MISNER DAVID
6520 MISQUEZ DANIEL
4988 MITCHAEL JACYALYN
7485 MITCHELL ARTHUR
9385 MITCHELL, C FAYE
9990 MITCHELL DONALD W
11688 MITCHELL, JAMES
642 MITCHELL, JAMES R
5287 MITCHELL, LARRY J
7468 MITCHELL, MOSE
1247 MITCHELL ROD
1246 MITCHELL, TIM
4529 MITCHEM, GARY
1038 MITTE, MIKE W
11325 MITZEL, CHARLES
1276 MIVILLE, MARY E
3691 MIX NEAL S
1280 MIX, ROBERT
7237 MOAK, JERALD
7425 MOAT, DON
4454 MOATE, GEORGE
1250 MOBERLY JAMES W
11530 MOBERLY, PAT
1242 MOBERLY, ROGER
5854 MOCABEE, MEL
9152 MOCK, F
9153 MOCK, ROBERT
4601 MOE, JAMES L
11736 MOELLER, HERMINE
2466 WARNER, WILFRED
10323 WARNEY, KATHERINE
11878 WARR, DAVID
7160 WARREN, BEVERLEY
9507 WARREN, BRUCE
4375 WARREN, DALE
7159 WARREN, DALE
740 WARREN, ELEANOR
8810 WARREN, GLENN
3237 WARREN, JAMES
4537 WARREN, KENNETH A
9509 WARREN, MARVIS
8806 WARREN, NADINE
8804 WARREN, ROBERT
1980 WARREN, RON
4899 WARREN, STEPHEN
6928 WARRENEN, BILL
5506 WARTCHOW, MIKE
10820 WARTH, JOHN
9700 WASHINGTON, EVELYN E
9858 WASHO, GEORGE J
9561 WASHO SHARON
3043 WASS AUDREY
411 WASSERMANN, KENNETH W
399 WASSERMANN, MELRENE
7705 WASSON, JOHN
10143 WATANABE, ALAN
5804 WATERHOUSE, ALICE
5805 WATERHOUSE, STEVE
8466 WATKINSON, WAYNE M
11097 WATLAND, KAREN
2903 WATSON, BRUCE A
5272 WATSON, GORDON
918 WATSON KEITH
916 WATSON, RANDY
2090 WATSON, ROWENA
901 WATSON, SUZANNE
7317 WATSON TERRY
7377 WATTS BESSIE
1405 WATTS, CAROL G
7378 WATTS, JAMES
10569 WATTS, LINDEN L
3330 WATTS RONALD H
2198 WAUGAMAN, LYLE C
5174 WAXHAM, MARK
11278 WAYENBERG, KAREN
4279 WEATHERBE, TY
6259 WEAVER JUDY
7709 WEAVER, RALPH
6837 WEAVER, RICHARD
6839 WEAVER, SHANNON
7807 WEAVER TIM
6838 WEAVER VICKI
6423 WEBB, DANETTE
6492 WEBB DOROTHY M
858 WEBB FATHER W ROBERT
4342 WEBB HANK

6741 FLEURY, EARL
5515 FLEURY, GEORGIA L
6238 FLEURY, LAURA
5290 FLINT, CHRIS R
9847 FLOE, ERTHER
5461 FLOWERS CASEY
11692 FLOWERS, RAYMOND
5464 FLOWERS, WILL
1185 FLOYD, DIANE
10192 FLUHARTY DAVE
11621 FLUHARTY, W D
7208 FLYNN BOB
10498 FLYNN GREGORY
8979 FLYNN JIM
9196 FLYNN, JOHN
8977 FLYNN MIKE
10631 FLYNN PATRICK
8978 FLYNN VICKI
8070 FOGELBERG, WILL
11532 FOGELSONG, CLARE
9491 FOGLESONG, TRAVIS N
3298 FOGLIO, GARY
5663 FOLDVIK, SCOTT
1957 FOLEY, ELEANOR M
4108 FOLEY, MICHAEL
5890 FOLIART, JAMES A
8582 FOLSOM, LINDA S
10660 FOLSOM, RICH
11770 FONTAINE, MICHAEL
5341 FOOTE, FRANK W
475 FORBES, BEN C
11630 FORBES, CHARLES
530 FORBES, DEAN
7278 FORBES ERNEST
2636 FORBES, PHYLLIS J
3559 FORBES, STEVEN
8719 FORBES WILLIAM
8025 FORBRICH BRETT A
8021 FORBRICH, DAWN
8495 *FORCE, ROY*
5400 FORCIER, LARRY
3728 FORD, EDIE
6015 FORD EMMA
7662 FORD FRASER
6026 FORD, HARLAN
4068 FORD, JOHNNY
7412 FORD, LYNNE
7411 FORD MARK
1905 FORD PAUL W
329 FORD ROBERT A
7413 FORD STEPHANIE
6028 FORD, TED
10083 FORDERER, SUSANNE M
5664 FORDHAM DOUG
7507 FORGEY, LYLE
10487 FORKER, SUZANNE
756 FORKNER, BEVERLY B

2468 MOENCH CHRIS
1249 MOER, JERRY
1616 MOERDYK, DAVID
5726 MOERHOUSE, DONALD W
8975 MOFFET, BILL
9188 MOFFET, JACK
8981 MOFFET, JANEL
10056 MOHL, GALE
2345 MOHLER, RALPH G
6943 MOHRHAUSER, RICHARD
9136 MOHSEE, DAVID
10354 MOLCAR, RICHARD C
3287 MOLENAAR, PETER
3590 MOLINE ELSIE
2428 MOLINE, GLADYS I
3421 MOLINE, PAUL
11498 MOLLER, J CHRISTIAN
6965 *MOLONNO JAMES*
1484 MOLSEE RUBY
1704 MOLTKE, BOB
3019 MONAGHAN, DANIEL P
10334 MONAHAN PETER K
5149 MONASMITH BRIAN
5105 MONASMITH, PHILIP
2060 MONGAR, GEORGE ROBERT
10832 MONIZ HAROLD
5903 MONROE, DONALD
5904 MONROE, MARION
8229 MONROE PERRY
3575 MONSAAS TONY
7325 MONSEES E. GREGORY
7324 MONSEES, JENNIFER
1700 MONSON ROBERT
5786 MONTAGUE, DAVE
10805 MONTGOMERY, JANE
7994 MONTGOMERY, STEVEN
7438 MONTOYA, THOMAS
1552 MONTZINGO JOANNE
3202 MOODY, ANGEL
2440 *MOODY, DANIEL W*
8794 MOODY DAVID K
4946 MOODY DENNIS
2470 MOODY DON
6470 MOODY EARSKIN
1956 MOODY, JACK
8792 MOODY JESSIE W
1990 MOODY, JOHN H
8795 MOODY MAYNARD J
1945 MOODY, MERRIE M
3317 MOON BRYAN D
4332 MOON DEL
11762 MOON GLORIA
8813 MOON JUDY
1850 MOORE ALLAN
5959 MOORE ARDYTH
4785 MOORE B
7063 MOORE, CASSANDRA M

1391 WEBB KAYLENE
1428 WEBB, RON C
3382 WEBBER, PAM
10742 WEBBER RAYMOND
816 WEBER, JANET
4868 WEBER JENIFFER
1808 WEBSTER THOMAS
7516 WEDEVEN, COLSON
7515 WEDEVEN, LORRAINE G
1966 WEED, WAYNE D
5486 WEEDA, ERIC
5496 WEEDMARK, ROBERT A
10552 WEEKES, STEVE
8083 WEEKS, DUANE
208 WEEKS, L M
4916 WEERTMAN, BRUCE
1176 WEGELIN, JACOB A
3715 *WEIBLE, TIM*
1412 WEIDEMANN, KARL & CHARLOTTE
4150 WEIDMAN, STEVE
11466 WEIGEL, WADE
6009 WEIGLEY, STEPHEN
4423 WEIGLEY, SUSAN
9947 WEIL, JANE
10851 WEIL, KIMBERLY
7782 WEILAND, DAN
9159 WEILER, FRANCES
9206 WEILER FRANK
3151 WEINBERG, HOWARD
1644 WEINSTEIN, DIANE
337 WEISE, RICHARD E
8919 WEISS, DICK
5626 WEISS ERIC
8967 WEISS, H RICHARD
8915 WEISS, MONIKA
8913 WEISS, SANDY
2330 WEITKAMP GRETCHEN
5304 WELANDER, DON A
3255 WELCH CHARLENE
10015 WELCH, CLAUDIA
10874 WELCH JULIA L
3814 WELCH KEVIN
3353 WELCH, MOLLIE
2342 WELDEN CLARK
10330 WELL, RONALD K
3704 WELLER, C L
3705 WELLER RICHARD T
3706 WELLER, RICK
1588 WELLING RICHARD
5347 WELLMAN, JOHN R
4585 WELLMAN, SHARON
1795 WELLNITZ, DAVID
4376 WELLS DARCY
6907 WELLS HAROLD
7168 WELLS, MELINDA
5732 WELLS, ROBERT
11741 WELLS, SHERI

738 FORKNER, CLAUDE J
3015 FORMAN, STEPHEN
2826 FORNALSKI, WAYNE
98 FORNER, BRIAN
1449 FORNER, LORI
9219 FORNEY, KEITH
321 FORNEY, MICHAEL J
9233 FORNEY, W MARIE
8856 FORSBERG, CHERRYL
8860 FORSBERG, HELEN J
8855 FORSBERG, JOHN
6534 FORSYTH, LESTER
8377 FORSYTHE, JIM
495 FORTIER, BERNICE
3563 FORTNER, WAYNE L
1638 FOSBURGH, JAMES
6568 FOSS, ANNE
2469 FOSS CARRIE R
1726 FOSS CON
457 FOSS NANCY
10117 FOSS PAMELA
6567 FOSS, RUSSELL
2462 FOSS STEVE L
9651 FOSSUM JACK A
6820 FOSTER, BILL
4622 FOSTER, DIANE
11346 FOSTER, JEFFREY
10109 FOSTER JOHN D
6425 FOSTER, MARK
4630 FOSTER RONALD
3684 FOSTER, STACE
9281 FOSTER STEPHEN D
3009 FOSTER, TERESA
4837 FOSTER, WALT
2021 FOUGHT, JANE
960 FOUKE, BIFF
1082 FOUNTAIN, CAROL
6690 FOURAKER, TOM
29 FOWELLS, HARRY A
10450 FOWLER, BRIGIT
6286 FOWLER, DENNIS
10404 FOWLER, GREGORY
11126 FOWLER, LARRY
4168 FOWLER, LEE
11795 FOWLER MARY ANN
3894 FOWLER ROY
8988 FOWLER, ROY
8522 FOX, DONNOLA
10355 FOX MICHAEL D
10826 FOX, STEVE
2722 FOXE, DON
7714 FRACKOWIAK, GERALD S
1500 FRALICK, WHITNEY
534 FRANCINI, JOHN M
1079 FRANCIS, C E "WIN"
4728 FRANCK, CHERYL
8340 FRANDFIELD, LARRY
9812 MOORE, DIANE E
3252 MOORE, DON
4974 MOORE, EDWARD
10186 MOORE, ERIN
11375 MOORE, FRANK
7114 MOORE, GARY S
1932 MOORE GWEN
3604 MOORE, JAMES
10611 MOORE, JAN & JAMES
4331 MOORE, JESS F
10861 MOORE, KARI
5497 MOORE, KEVIN L
7555 MOORE, LINDA
5291 MOORE LLOYD
1071 MOORE, MIKE
4294 MOORE, MIKE
7062 MOORE, RICHARD B
7556 MOORE ROBERT
9799 MOORE RON C
3014 MOORE S
7996 MOORE STEVE
684 MOORE, WILLIS
9791 MOORE WINNIE
10415 MOOREHEAD, BARBARA
10286 MOORHEAD, WES
9674 MORAN LARRY W
940 MOREHEAD PAUL
8063 MORELLA RALPH G
6739 MORENO DINO
6881 MORFORD MICHAEL
8382 MORGAN, DENNIS
11911 MORGAN HELEN
11910 MORGAN J P
1770 MORGAN, JANET
4063 MORGAN, JIM
3776 MORGAN, JOHN
7327 MORGAN, KAREN
9885 MORGAN LARRY E
51 MORGAN, RICKEY
1057 MORGAN, ROBERT
7925 MORGAN, ROBERT
4604 MORGAN, SANDRA C
2373 MORGENTHALER, ELRAE
2877 MORGENTHALER, R D
1541 MORI, LIA
1845 MORIARTY DENNIS
9778 MORIARTY, ISABELL
1851 MORIARTY JAMES
3976 MORIN, ROBYN H
2511 MORITZ, RUSS
11661 MORK, ANDREW
1466 MORRELL ANTHONY R
7470 MORRIS, BEVERLY
10977 MORRIS, DANIEL L
7587 MORRIS, DON A
11812 MORRIS, GARY
482 MORRIS KEVIN D
7170 WELLS, WILLIAM
10223 WELLSANDT, CHRIS
1007 WELSH, DAVID L
892 WELSH, GEORGIA
8751 WELSH, WILLIAM E
3032 WELTI, D W
3297 WEMER, FRED C
6978 WENDISH, BETTY
5628 WENDT DEWAYNE F
6198 WENGER, TERESA
2157 WENNER, PAUL
3906 WENRICK KRAIG
6413 WERDER, WAYNE
4466 WERNE, H WALTER
5309 WESCHE, NEIL
3717 WESEN, DARREN
3373 WESSEL, ROY
8642 WESSMAN, GEORGE
8644 WESSMAN SHANNON
8645 WESSMAN, SHARLENE
3791 WESSON, CHARLES L
4129 WESSON, GERALD
1531 WESSON, HAROLD
7730 WESSON, PAUL
3792 WESSON ROGER
11243 WEST, CHRIS
1053 WEST, MARGARET J
11377 WEST, MARLA
11231 WEST MEGAN
1448 WEST, NAN
9531 WESTALL CLIFF
1613 WESTALL, JUDITH
9164 WESTBROOK, STEVE
1525 WESTER DENNIS
8276 WESTERGREEN, TOM
2361 WESTERLUND, GARY D
6320 WESTFALL, JANICE
7539 WESTLAKE, ARLENE
8459 WESTMARK, ARLEEN
564 WESTMARK RUSS
4055 WESTON, TOM
11755 WESTON TRACY
3396 WESTWOOD KAREN
10888 WETMORE ANNE
7410 WETMORE, JOHN
5606 WETZEL, KEITH
5219 WEYAND JEFFREY
9070 WEYAND, RICHARD
6813 WEZA, DONALD
261 WHEALDON EVERETT
9173 WHEATLEY, JACK
7682 WHEATLEY, LILA B
7681 WHEATLEY, MIKE
1549 WHEELER, CHUCK
5752 WHEELER, DAVID
2356 WHEELER, DOUGLAS E
10705 WHEELER, JACK

10021 FRANICH, GEORGE
8326 FRANK, CHARLOTTE
8292 FRANK, DAVID
8337 FRANK, GEORGE
9139 FRANK, JEANNETTE
432 FRANK, KATHY
3980 FRANK, MARTIN
144 FRANK, RICHARD P
8327 FRANK, WINDY
9888 FRANKLIN ROBERTA
3564 FRANKLUND, JEFF
11806 FRANSEN, STEVE
6083 FRANZ, MARVIN
2610 FRANZEN DEREK
8505 FRANZEN, JEFF
5915 FRARE PATRICK J
2155 FRASCH E D
2502 FRAZIER, ERIC
11057 FRAZIER GENE
6511 FRAZIER, JOE
6262 FRAZIER, LUANE
8544 FRAZIER ROBERT
6172 FREDENEK, JOHN
5134 FREDERICH KATHY
9010 FREDERICKS, S P
3480 FREDERICKSON, BEA
6935 FREDLUND STEVE
618 FREDRICK, GENE
715 FREDRICK JIM
628 FREDRICK, MARGE
10740 FREDRICKSON S ROCKWELL
11352 FREDSALL R M
10782 FREED, ANDREA B
4544 FREEDLE, RONALD F
10982 FREELAND, MARK
4511 FREEMIRE JOHN
7418 FREESE CYNTHIA
3802 FREESE, DAVID
3799 FREESE ROBERT F
10084 FREET, CURTIS R
10177 FREIMARK ROBERT M
10294 FREITHS RICHARD
6 FREWING, JOHN L
6856 FREY BEBE
10788 FREY, GREGG W
10990 FREY JOHN
1161 FRIDDLE, KENNY J
489 FRIDLAND RON
6080 FRIED, DAVE
3169 FRIED LARRY
354 FRIEDE BEVERLY
10131 FRIEDMAN JONATHAN
91 FRIEDMAN, MITCH
3028 FRIEDRICH JAMES
2824 FRIEND DON
9286 FRIEND, EDGAR C
83 FRIEND, LISA
373 MORRIS, MARK K
9615 MORRIS, PATRICIA
7554 MORRIS, ROBERT
2162 MORRIS, ROXIANNE L
9619 MORRIS ROY
2161 MORRIS, WILLIAM E
3597 MORRISON, A
3033 MORRISON AMY
8604 MORRISON, ANNA
3413 MORRISON, CAROL
10953 MORRISON DAVID A
1716 MORRISON, DWIGHT
10175 MORRISON, JACK R
3595 MORRISON, JANE
4432 MORROW, BETTY
4426 MORROW, EDWARD
4282 MORROW GREG
6990 MORROW, LINDA
2047 MORSE, GARY
9132 MORSE RANDY
9130 MORSE SUSAN
8635 MORSTAD, JON
5570 MORTENSON, BRENT K
24 MORTENSON-EUERLE JILL
582 MORTIZ, FERDINAND
8956 MORTON, TODD
4247 MOSES, KENNETH
1708 MOSES SCOTT
4246 MOSES VIRGINIA
5084 MOSS, GARY W
8416 MOSS, HAROLD
5878 MOTHERSEAD, ANNABELLE
5879 MOTHERSEAD, DON L
8010 MOTTER DAVE
8007 MOTTER, JAMES S
523 MOTTERN, AGGIE
2110 MOUGHON, CAITLIN J
119 MOULEZ THOMAS R
3735 MOUNT, BRIAN
8717 MOUNT, CORY A
929 MOUNT, PATRICIA G
3739 MOUNT SUSAN
6343 MOUSHEY BRIAN
10176 MOVASSAGHI GRETA
11580 MOYER, CLARENCE
7175 MOYES CRAIG T
11195 MOZLOWSKI, KEN
80 MUCHENBERGER KARL V
79 MUCHENBERGER, MRS BECKY
3589 MUELLER, MARGORIE
311 MUELLER-CAMERON -
2721 MUETH J TRACY
2275 MUHLBEIER CALVIN
2256 MUHLBEIER CARLENE
2262 MUHLBEIER, JOHN R
2252 MUHLBEIER, WILLARD
4518 MULBRATH, DARREN
9236 WHEELER, NEIL
859 WHEELER WOODY
7811 WHEELOCK, F CAMERON
10211 WHELESS, BECKY
6549 WHELESS, NORVA
6550 WHELESS SPENCER D
9273 WHETS, LARRY
8890 WHINERY FLOYD D
4612 WHIPPLE, BEVERLY
2882 WHIPPLE, BILL
5167 WHIPPLE, JAMES
5316 WHIPPLE MELODY
2614 WHIPPLE, RUSSELL
4611 WHIPPLE, TIMOTHY E
7455 WHISMAN RISA
7571 WHITAKER, ERIN
2085 WHITAKER SUSAN
9458 WHITE, BETHANY
4133 WHITE, CHARLES
8638 WHITE, CLAIRE
9461 WHITE DAVE
2658 WHITE, DENNIS
2106 WHITE DIRK
5212 WHITE, HENRY
3340 WHITE, HOLLY
9459 WHITE, JAYNE
3532 WHITE, JENNIFER
7987 WHITE, KATHLEEN
5172 WHITE KEN
7976 WHITE LEE
2776 WHITE PHIL
1490 WHITE RANDY
7989 WHITE RICHARD
7630 WHITE, ROBERT
7648 WHITE RYAN
9462 WHITE, SARA
7631 WHITE, SUSAN
2424 WHITE VERN
4550 WHITEHEAD, CHESTER L
2432 WHITEHEAD CORLIE
9514 WHITENER, DAVE
1651 WHITESIDE, R LEE
8935 WHITING BRYAN
2333 WHITING, CAMERON
8936 WHITING, R D
8937 WHITING SCOTT
11391 WHITLOCK KATHLEEN
9942 WHITLOCK, RON
3365 WHITMORE RICHARD
3483 WHITNAH VICTORIA
4872 WHITNEY, COREY
8299 WHITNEY RUSSELL
6272 WHITTIER JEFFREY
3251 WHITTIG, JERRY
855 WIBORG, JAMES C
10578 WICHERT, ERHARD
3 WICK DALE

3035 FRIES, DONALD J
10147 FRIES ELIZABETH J
10680 FRIES, MARY A
10114 FRIESEM, JUDY
8307 FRIESTMAN, DANIEL
8288 FRIESTMAN, MATT
9124 FRINK, MRS E F
8756 FRISK, RUTH M
4731 FRITCH, BRUCE
4733 FRITCH, MARY
9238 FRITCH, ROY
1721 FRITSCH, FRANK
109 FRITZ, DALE
5157 FRIZZELL LARRY
5642 FRONDORF, EDWARD
1906 FROST, BROOK
4328 FROST, GRAHAM
516 FROST, JOHN
1655 FROST, JULIE
906 FROST, LOREN
11883 FRUITRICH, KRISTINE
10790 FRY, SAM
10806 FRY, STEVE
5790 FRY, TERRY
923 FRYE, BETTY L
900 FRYE ORAN
1271 FRYER JEFFREY
6812 FUCHS, BERNICE
10479 FUEINTES CESAR
1061 FUENTES RENE
3549 FUGATE JILL
2149 FUGER, JAMES B
5981 FUGLESTAD, STEINAR
6571 FUGMAN, DALE
3075 FUHS, MARGARET
11680 FULCHER, JIM
1723 FULLER, LARRY
11888 FULLER, PAULA
4632 FULLER, RICHARD
793 FULLER, THOMAS E
10460 FULLERTON, MARK
1324 FULLINWIDER, JOHN A
1538 FULLINWIDER, SYLVIA
5845 FULTON, L WARREN
1283 FULTON, LOUISE
9014 FULTON ROBERT
9323 FUMAN, BONNIE J
9330 FUMAN GARY
27 FUNG, SUSAN
3951 FUNK, CATHE
90 FUNK, GEORGE B
8705 FUNK, LESLIE C
10402 FUNSCH JEANNE
2587 FURLONG, BRADFORD E
8323 FURNISS, DOUG
70 FURRU, EDWIN R
1981 FUSON, JOE E
8660 MULCAHEY MARIANNE
8659 MULCAHEY MARK
4887 MULCHLER, ANNE
5459 MULDER, JOEL
10096 MULDER, WARREN K
7738 MULDERIG, JAMES
1089 MULFORD, GLADYS
11547 MULHERN, WENDY
6544 MULIVAI, FAROMFILE
4180 MULLANE, T E
59 MULLEN, JAMES R
1443 MULLEN, MARI F
2035 MULLEN, MARY
7988 MULLER, DIANE
7319 MULLER, JOAL
4645 MULLER, JOHN
7305 MULLER, LINDA
4646 MULLER SUE
3690 MULLIGAN, GREG
359 MULLIKEN, JEAN
4514 MULLINS, FRED
4262 MULLINS, LARRY
3636 MULLINS RAY
6181 MULLOWNEY DIANE
6183 MULLOWNEY ED
6182 MULLOWNEY, LEO
1401 MUMA, DAVID
2692 MUMFORD, CINDY
2694 MUMFORD, MIKE
5922 MUMM, DON
5928 MUMM, JACKIE
3790 MUNDALE, TODD
10907 MUNNICH KURT A C
5956 MUNOZ, HUGO F
5326 MUNOZ, V S
10489 MUNSON, CARL
1028 MUNSON JOHN
4431 MURDOCH, JOHN
2663 MURFEN, JULIE L
7806 MURPHIE, JOHN
3469 MURPHY, ALAN
6348 MURPHY, CLARA
10877 MURPHY, DANIEL
11134 MURPHY, DORA
7652 MURPHY, EDWARD
343 MURPHY, EUGENE T
619 MURPHY, J R
11268 MURPHY, JENNIFER
7744 MURPHY, JOHN
4885 MURPHY, JOSEPH
7747 MURPHY LAURENCE
3474 MURPHY, MICHAEL
7748 MURPHY, MICHAEL
6570 MURPHY, ROBBIN D
11177 MURPHY, ROBERT
11595 MURPHY, T J
1760 MURPHY, THOMAS
10737 WICK, DON
5462 WICK, TOM
10388 WICKMAN, GARY
8446 WICKSTROM, JUDY
7171 WICKSTROM, PETER H
11683 WIDMER, DAN
6189 WIEBOLD, DORIS
6190 WIEBOLD, HARRY
6191 WIEBOLD, SUE
10561 WIEGAND, ALLEN
10379 WIEGAND, INGRID
1887 WIELAND, HOWARD
1640 WIELAND, KURT
1889 WIELAND, OLIVE
1890 WIELAND, W LEE
2495 WIEN, JOANNE
5504 WIERMAN, ALLEN D
5508 WIERMAN, JEFFRY L
5813 WIERZBICKI, E GEORGE
4217 WIESLER, KEVIN
8706 WIESS, BEVERLY J
8708 WIESS, ROBERT E
1518 WIGGERS, KEITH
3281 WIGGINS, GARY AND KARMAN
310 WIGGINS, GLENN
2033 WIGGINS, GLENN
3732 WIGGINS, LYLE
2180 WIGGINS, MARIE W
2229 WIGGINS, TIM
11489 WIGGINTON MAHLON
7099 WIGHT, BERT
8279 WIGHT, BRENDA
8280 WIGHT, ELIZABETH
2747 WIGHT, JANE L
2192 WIK, GERALD A
2409 WILBERT, MRS LORETTA
189 WILBOR, ARTHUR B
5566 WILBUR, LLOYD F
7934 WILBUR MARTY
4651 WILCHER, WILLIAM
9589 WILCOX, C BRUCE
9816 WILCOX CAROLE
2479 WILCOX GEORGE
2613 WILCOX, KEN
10922 WILCOX, KENNETH
1069 WILDE, J A
2954 WILDER AUDREY E
7805 WILDER, DEBRA
7804 WILDER, LEE
1117 WILDER, MARGUERITE
6803 WILDER RICHARD
9477 WILDER, RONALD L
11135 WILDERMUTH, SUSAN
828 WILE, BRUCE P
9901 WILEY, CARL R
9821 WILEY, EDITH N
3912 WILEY, WAYNE

8566 FUSON, STEVE
8160 FUTCH, CLEVELAND C
2478 FUTRELL, MAXINE
11441 FYE STAN
9857 FYRE, DONALD R
9698 FYRE, HELEN
6037 GABERT, CAROLE
2341 GABRIELSEN, HELEN
1814 GABRIELSON MARIE
9603 GADBOIS, DARLENE J
9660 GADBOIS PAUL S
9314 GADDIS EMMETT
1717 GAFFNEY, TOM
2912 GAFFNEY JR, BILL
384 GAGE LINDA F ELBERT
2808 GAGNON BRUCE
11476 GAGRON ARLETTA
1300 GAINES, TOM
8925 GAISER, F D
8926 GAISER, MONTY
8924 GAISER, PETE
9270 GALE WARREN
959 GALEOTTI, LORNA
10880 GALL BARRY
4540 GALL RANDY
10254 GALLAGHER RICHARD
11535 GALLAHER DEBORAH
5977 GALLANT GARNER F
8159 GALLAS, GLENN
730 GALLAWAY EARL A
1175 GALLOWAY EUGENE AND RAYE
733 GALPIN, H H
8240 GALPIN, LOIS
1703 GALUS, MITZI
7692 GALYAN REX R
9478 GAMBLE, JOHN G
8428 GAMBLIN ALAN A
9145 GAMIN WILLARD
8753 GANGWER, JACK
5053 GANN, DAVID
5054 GANN, MARY
9732 GANSKE BRIAN L
8526 GARBRICK, EUGENE V
11664 GARCIA DAVID
8303 GARD VIRGINIA
10935 GARDNER BOOTH
10701 GARDNER, LEN
8771 GARDNER WESLEY E
7441 GARDNER, WILLIAM
5502 GARKA, ARNOLD
4700 GARKA MARK
4704 GARKA, MIKE
4706 GARKA, RANDALL
23 GARLAND, ANTHONY C
10065 GARLICK, LOIS
3634 GARNER, DAVID
6144 GARRETT, BRAD
7687 MURRAY, BARBARA J
5982 MURRAY, CAYCE
7688 MURRAY DAN
4997 MURRAY, DONOVAN
4394 MURRAY, DOROTHY
7637 MURRAY, DOUGLAS
4560 MURRAY, ED
8894 MURRAY, EDD J
8213 MURRAY, JAMES R
7668 MURRAY, JAMIE
8331 MURRAY, JAY
7670 MURRAY JENNI
7669 MURRAY, LAURA
5999 MURRAY, MICHAEL J
7667 MURRAY PATTY
145 MURRAY PETER M W
11117 MURRAY, RICHARD
10770 MURRAY, ROSS
5997 MURRAY, SHARON E
8224 MURRAY, SHERRY L
10059 MURRAY, STEPHEN
4994 MURRAY WAYNE
5995 MURRAY MICHAEL
6864 MUSIC WARREN
4261 MUSSELMAN, BYRON
11607 MUSSELMAN SALLY
5368 MUSSEN, DAN
1926 MUSTOE GEORGE
2092 MUSTOE PATTY
2584 MYCEK, LINDA
6383 MYER, CONNIE
9297 MYERS BARBARA
9319 MYERS, D L
5965 MYERS HAROLD D
5110 MYERS, JOHNNY
9380 MYERS, MEL L
4824 MYERS PHYLLIS
10915 MYERS ROLAND L
9662 MYERS TERRY
11922 MYERSON DAVID
1020 MYHRE CURTH
6843 MYHRE GLENN
5987 NAASZ HAROLD H
5988 NAASZ JAQUILENE
870 NAEF, VIRGINIA
9959 NAGEL JUSTINE F
9358 NAGLEY ROBERT
7857 NAIARRO TERRY
4847 NAIR JOY
2492 NAKAMURA, JIRO
5414 NALBACH LYNNE
7205 NALL MRS CAROLYN
7204 NALL, ROBERT B
5989 NALLIE, JIM
6574 NAMKOONA YOUNA
4422 NAP, LOIS
5843 NARLOCK RAYMOND
4368 WILHELM DENNIS
1469 WILKESON, E E
2767 WILKINS, RENEE
2208 WILKINSON, AMUND
744 WILKINSON, DAVID D
880 WILKINSON H D
1519 WILKINSON HERBERT
11261 WILKINSON LINDA
2370 WILKINSON, SHIRLEY
11221 WILKS BRYAN
9541 WILKS DEWY
9548 WILKS, DUANE J
9547 WILKS JACE L
9542 WILKS KEITH
4650 WILL ED
2403 WILL, JULIE
5366 WILLE, CHESTER T
5285 WILLE, RUTH
8507 WILLEMS LISA
3440 WILLEMS, NICK
2992 WILLER, DAVID B
10070 WILLER, DEBRA BOTTLES
1654 WILLERS SERENA
4717 WILLETT, ANDRA
4718 WILLETT, ASHER
9578 WILLHITE, R D
8032 WILLIAMS, ALBERT
3054 WILLIAMS, ALEX
2486 WILLIAMS ANDREW
7452 WILLIAMS, AVERY
6840 WILLIAMS, BARRY
10707 WILLIAMS, BRIAN
6944 WILLIAMS CAROLYN
8029 WILLIAMS, CARRIE K
2385 WILLIAMS COLLIN M
9920 WILLIAMS DARREN
11385 WILLIAMS, DAVE
1976 WILLIAMS, DAVID H
8030 WILLIAMS DAVID J
11206 WILLIAMS DIANE M
9160 WILLIAMS DON
9052 WILLIAMS DONALD
5944 WILLIAMS DOUG
4827 WILLIAMS FRED & AZALEA
7144 WILLIAMS, G W
3346 WILLIAMS GENE
496 WILLIAMS, HANNAH
3716 WILLIAMS HARVEY
9538 WILLIAMS, HARVEY
6776 WILLIAMS JOHN
6109 WILLIAMS KAY
9919 WILLIAMS KELLI
4397 WILLIAMS, KIMBERLY
10931 WILLIAMS LARRY E
11148 WILLIAMS, LINDA
9525 WILLIAMS, MAE
423 WILLIAMS, MARY JANE

6610 GARRETT, DAVID
6129 GARRETT, DENNIS
1734 GARRETT, DWIGHT
6146 GARRETT, GARY
6145 GARRETT, JOANNA
7416 GARRETT, LORETTA
2865 GARRETT, MARCIA
6649 GARRETT, MARLENE
10600 GARRETT, ROGER
8036 GARRETT, ROY
1144 GARRETT, WILLIAM
11891 GARRIC, MARI
11516 GARRISON, BRAD
4939 GARRISON DAVID
1012 GARRISON, EARL L
1006 GARRISON, HELEN M
2625 GARVEY, TONY
525 GARY, LENORE
6038 GASCHK, P J
9334 GASCHK, RANNY
2760 GASCOIGNE ROB
941 GASKINS, W
987 GASTON, MRS JEFFREY C
8472 GATES, BETH
8471 GATES, DUANE E
2736 GATES, JACK
11882 GATES MELODIE
6156 GATES, TIM
1575 GAUKSHEIM, WENDY
3767 GAUKSTEIN GENE
3605 GAUL FRANK
3607 GAUL JAMES
3471 GAUL, WILLIAM
3974 GAVIN T DUANE
9374 GAY DENNIS
3360 GAY, JERRY
3239 GAYDESKI DIXIE
6715 GEARY DOREEN
2688 GEBHARDT, BILL
2706 GEDDES, SUSAN
6799 GEDNEY HARRY
9991 GEDOSCH MARK
3128 GEEGH, WILSON
217 GEEHAN, CHARLES M
476 GEEHAN, TIM
5770 GEER JOHN
9862 GEER MERLE L
5769 GEER, PAM
4912 GEERTS, BART
4233 GEHRING RON
6432 GEIMAN, KARLA
7448 GEIS LONNIE
7019 GEISENDORF, CAROLYN
4753 GEISREITER, ROSE
6247 GEISZLER WALTER
10371 GELDICKS, VICTORIA
2741 GELLERSON, RALPH S
4276 NARR, UNSUK
9282 NASH, ALLEN C
9284 NASH, CAROL A
9539 NASH, DOUGLAS
8628 NASH, RICK
5672 NASH, TIM
3754 NATIONS DENNIS
8778 NATIONS, LAVINIA
4002 NATIONS, VICKY J
605 NAUGHTON, KATHY
4867 NAUMAN, REBEKAH
685 NAUMANN, HC
5297 NAVAL, FRANK
6224 NAY JOHN
6223 NAY, KATHY
8208 NAYLOR, TOM J
2879 NAZY, JANET
2088 NEAL, BRIAN
6086 NEAL, C J
11178 NEAL, RANDY
11505 NEAL, STACY
9262 NEARY, ALICE
8121 NEATHERLIN, JEFF
7384 NEATHERLIN, TOM
1791 NEAULT, MADELEINE & ANDY
8725 NEELAND, MILTON E
9391 NEER, JOYCE
10994 NEGRI, PAM
5580 NEHER HELEN
5521 NEHER JAMES F
9883 NEHER JOHN H
3863 NEIDIGH BILL
2547 NEIL FRED
1285 NEIL JULIE
3408 NEJATI, MEHRDAD
7076 NELLES ADRIENNE
7075 NELLES, BELINDA
7078 NELLES, DELMA
11065 NELLES, RICHARD
2905 NELSON, ANN L
2339 NELSON, ANNE L H
2322 NELSON CARL
9536 NELSON, D M
2927 NELSON, DARRELL
4078 NELSON DAVID R
4439 NELSON DEANN
4496 NELSON DELBERT
4495 NELSON, DONNA
10617 NELSON, GEORGE
10910 NELSON GEORGE B
2222 NELSON, HERBERT R
10352 NELSON, JAMES M
11534 NELSON, JANET
3013 NELSON, JOAN L
9355 NELSON JULIAN
2889 NELSON, JULIE
876 NELSON KATHLEEN
3046 WILLIAMS MYRNA J
5261 WILLIAMS, NICK
249 WILLIAMS, PAT
6961 WILLIAMS, PHIL
6514 WILLIAMS, RANDY
3335 WILLIAMS, RICHARD
6775 WILLIAMS, SHARON
1788 WILLIAMS, STEVEN
513 WILLIAMS, T V.
4097 WILLIAMS, TERRY
10191 WILLIAMS, TERRY
4096 WILLIAMS, THOMAS
4606 WILLIAMS, TOM
7540 WILLIAMS, TOM
3602 WILLIAMS WILFORD
5395 WILLIAMSON, GAIL
3062 WILLIAMSON, JAY A
11636 WILLIAMSON, MIKE
6862 WILLIAMSON RON
7116 WILLIAMSON JR , LEE
11015 WILLIAMSON-KIRKLAND MD, THO
1430 WILLING THOMAS P
8731 WILLIS, DIANNA
4492 WILLIS, DON
9344 WILLIS, DOYLE
5166 WILLIS, DUANE
4760 WILLIS, EMMA
8328 WILLIS, GARY
4043 WILLIS, GARY E
921 WILLIS, GARY R
8735 WILLIS, JACK
10488 WILLIS, JANE
8071 WILLIS, JIM
910 WILLIS, KAREN S
9154 WILLIS, KELLY
11167 WILLIS, KEN
5168 WILLIS, O J
5150 WILLIS OTIS
9340 WILLIS PAT
9162 WILLIS, RANDY
8338 WILLIS, SCOTT
5165 WILLIS, VICKIE
370 WILLIVER, DAYNE
7465 WILLOR, JOAN
7466 WILLOR MICHAEL
4172 WILLOUGHBY, FRANK
10831 WILLSON, KEVIN
177 WILLSON, MARY ALICE
9394 WILSON, BRYAN
9395 WILSON, CHARLES
700 WILSON, CHARLES A
5645 WILSON, DANNY
6081 WILSON, DAVE
2141 WILSON, DEAN W
8027 WILSON, DEBBIE
265 WILSON, DOROTHY
5491 WILSON, EDWARD

1639 GELLERT, ERIC
205 GELLERT, GEORGE O
11317 GELLERT, ROBERT
505 GELVIN, ALAN G.
2010 GEMMILL, HOPE
7426 GEMMILL, LINDA
2525 GENGLER, JEANNE
3603 GENTIS, WALT
7965 GENTRY, DARYL
4942 GENTRY, HENRY
7948 GENTRY, VIVIAN
4516 GEORGE, DAN
5075 GEORGE, JOHN
9756 GEORGE, LA DONNA M.
9834 GEORGE RICH
3699 GEORGE, RON
11297 GEORGE VICKI
4579 GEPNER, JUDI
7817 GERBER, GILBERT
7818 GERBER, MAUDE
9715 GERDES, K DAVID
7195 GERDIN, K W
2651 GERHARD, ED
6807 GERHARDT, SUSAN
363 GERKE ROBERT M
3447 GERL, BOB
4861 GERL CAROL
4846 GERL ELLEN
4859 GERL, GARY
3545 GERMAIN, CARMAN
10958 GERMAIN, PAUL
3363 GERMANN, BILL
11730 GERNER, GENE
11733 GERNER, LEWIS
11737 GERNER, LINDA
126 GESE, LEO J
8497 GESHELL DAN
1556 GESSEL, STANLEY
3780 GETCHELL, BOB
6878 GETCHELL, WILLIAM
504 GETSFRID, LEONARD F
5884 GEYEN, GLADYS
10613 GIACONI, RUTH
10012 GIAMPIETRO, JOSEPH
2005 GIBBS BRUCE
1439 GIBERSON DAWN
10258 GIBONEY, DAVID R
4886 GIBSON, BARBARA
464 GIBSON, JAMES
2475 GIBSON, JAMES A
4295 GIBSON MARK
6386 GIDEON MICHAEL
4030 GIEBEL, CON
4029 GIEBEL DIANE
4024 GIEBEL, DOUGLAS
4028 GIEBEL, GLADYS
11420 GIEBEL, MARK
5852 NELSON, MAXINE
6497 NELSON, MIKE
779 NELSON, MRS RAYMOND
9424 NELSON PETE
10260 NELSON, RALPH
6661 NELSON, RAY
8843 NELSON, RICK
4746 NELSON, RICKY L
6101 NELSON, ROBERT
35 NELSON, ROGER
4933 NELSON S D
4258 NELSON, STAN
3165 NELSON TAMARA HOLMLUND
1265 NENDE, SAM
86 NERENBERG, KATHLEEN
6983 NERSTEN ANNIE
6984 NERSTEN, B J
11304 NESBITT, DAVID
355 NESBITT, PAM
286 NESBITT, ROB
11124 NESBITT, VICKI
5411 NESS, G A
10646 NESS H J
4475 NESS, NOLA
7286 NESS SHELLEY
4473 NESS, VERN
11820 NESSMAN ALAN
1979 NEULICHT, LISA
7707 NEUMANN, J R
2447 NEUMANN W P
1256 NEUROTH, GEORGE R
2216 NEVITT, KRISTINE
7998 NEW, ROBERTA L
6071 NEWBREY, R C
10156 NEWBURY, GEORGE
3102 NEWBY, ANDREA
723 NEWBY, DUKE
9852 NEWELL, EVELYN R
9657 NEWELL, MINOR T
11431 NEWITT MIKE
589 NEWLAND NANCY
11402 NEWMAN BETH
4679 NEWMAN CLARENCE
7642 NEWMAN, DAVID
11703 NEWMAN DENNIS
4745 NEWMAN, JERRY
10507 NEWMAN LINDA
4744 NEWMAN, MIKE
1766 NEWMAN SAMUEL
5576 NEWMEN WARREN
2368 NEWSOME, DON
11828 NICHOLS, DALE
5848 NICHOLS LELIA
2068 NICHOLS LORYANN M
1072 NICHOLS - HOPPE KEN
8898 NICHOLSON, DAVE
2218 NICHOLSON, DAVID C
9476 WILSON EDWARD M
3738 WILSON ELLEN
722 WILSON, FLORENCE
1839 WILSON, H J
10038 WILSON, HARRY
10162 WILSON, J L
11822 WILSON, JANET
9392 WILSON, JILL
3262 WILSON, JIM
9393 WILSON, JIM
11815 WILSON, JIM
9396 WILSON KEN
10195 WILSON MARK
8529 WILSON, MATT
11354 WILSON, RICHARD
6967 WILSON, ROY
3650 WILSON STEVE
10011 WILSON, W HERBERT
6828 WINDER, WADE
11602 WINDH, CAROLE
11598 WINDH, JOHN
11601 WINDH, MARCIE
1386 WINDHAM, KEITH
3592 WINDHORST, GEORGE
3593 WINDHORST, IRENE
7016 WINDISH DAN
7012 WINDISH IRENE
7014 WINDISH, VELMA
10082 WINEMAN, M MARIAN
10918 WINGARD GORDEN
294 WINGARD-PHILLIPS THOMAS L
6330 WINGO DAVID
2236 WINKEL MARY C
5787 WINKEL MEARL
5092 WINKEL WILLIAM C
972 WINKELMAN, POLLY
11851 WINKLER PATRICIA
6681 WINKLEY ANITA
9867 WINKLEY CLARENCE
6680 WINKLEY ELMER
3990 WINKLEY RANDY
7971 WINKUS CLAUDE
3081 WINN NORMAN
1413 WINN NORMAN L
11298 WINN, TOM
5702 WINNINGHAFF, JULIE
9405 WINQUIST DAVID
1821 WINSETT BOB
1820 WINSETT, SINDY
7776 WINSTON JEAN
1738 WINTERS, HOWARD
4616 WINTERS, WILLIAM S
749 WINTHER, GRANT
9837 WIRKMAN, HAROLD W
8765 WIRKUS, JAMES K
11284 WISE, GARETT
837 WISE, LEE

11293 GIEBEL, MAURICE
3828 GIEBEL, RICHARD
5589 GIEBEL WENDELL A
1263 GIESE, PETER
7749 GIESEKE, CHERIE
7752 GIESEKE, KENNETH
7825 GILBACH, HERMAN
4387 GILBERT CATHERINE
4689 GILBERT, CHAUNCEY
11932 GILBERT, EUGENE
2126 GILBERT, JOHN
4383 GILBERT, PETER
1929 GILBERT, TRACY MAPES
7789 GILBERTSON, GEO
5578 GILCHREST MICHAEL D
4971 GILDAY, DON
4093 GILDION, MILO
5406 GILES, BARB
5059 GILGE, CURT
6995 GILL, CHRIS
11073 GILL, CORALEE
6521 GILL, MIKE
4609 GILL, RICHARD H
2958 GILL, ROY
11222 GILLEY, DELBERT
9055 GILLIAM, MARK W
6751 GILLIGAN, MYRELLA
10727 GILLIO, DIANNA
1331 *GILLISPIE, CLAUDIA*
3782 GILLOOLY, LARRY P
11772 GILLUM, MELANIE
9982 GILMAN, BARBARA
9767 GILMORE, TERRY
10357 GILMUR, THELMA T
11561 GILUL, CHRISTINE
2505 GIMUS, D L
6414 GINDER, GEORGE
6415 GINDER, JAN
3331 *GIONO, PETER E*
1269 GIPSON, ZIA
9003 GIRNARD PAULETTE
4269 GISH, ED
9317 GISSEL KEVIN R
6621 GITTINS, KERRY
6650 GITTINS, SUSAN
10957 GIVEN CARY
3944 GJEINES KEITH
5648 GJENDEM, ANDREA
1830 GJENDEM, ARNE
7712 GJERSTAD, ROGER
649 GLADSJO, ERNIE
6089 GLANDER, HERMAN
382 GLANT, DOUGLAS M
486 GLASER, DONALD J
8683 GLASER, GAURIE
8685 GLASER, THOMAS
2818 GLASSEY, MARION
8607 NICHOLSON, JILL
10892 NICHOLSON, JUDY M
8899 NICHOLSON, RONALD W
9645 NICKEL, SLIM H
8343 NICKERSON, C R
2063 NICKERSON, FREDERICK T
1642 NICKOLOFF, STEVEN
6679 NICLAI, PAT
1778 NICOL, MR & MRS DAVID
2485 NIELS, JOHN P
8822 NIELSEN, DENNIS
1070 NIELSEN, ERIC
2328 NIELSEN, ERIC C
9929 NIELSEN, JOHN
9712 NIELSEN, LONNIE
1656 NIELSEN, PAUL
9714 NIELSEN, R C
2142 NIELSEN, ROBERT L
11129 *NIEMELA, GEORGE A*
11430 NIGH, KEVIN
11444 NIGH, PHILIP
9890 NILES, JULIE
318 NILSEN LOU
11555 NILSEN PETER
4672 NILSSON HENRY L
8502 NIMMER, DOUGLAS
7930 NINNEMANN, LEROY
539 NISBIT, ROGER C
1471 *NITOH JUDY*
2633 NITSCH DAVID G
1630 NITTEBERG VERONA
3186 NIXON, NICOLE
6580 NIXON, TRACY
6735 NOBB, BRENT
1423 NOBLE, DENISE
6573 NOBLE RALPH
6380 NOEL BOB
3074 NOEL, MIKE
6523 *NOLLAN THOMAS*
2629 NOLLMAN, KATY
9216 NOMIS DOYLE
4185 NONEMAKER SAM
7660 NONG DING
531 NOOT, BRUCE
6806 NORBERG JOSEPH
9749 NORBISRATH, ROBERTA
7750 NORDBY, ELMA
1817 NORDBY, LOREU
7751 NORDBY, MERTON
5925 NORDINE, WILLIAM M
10588 NORDLUND, ENID A
5036 NOREEN, JASON
9617 NORGAARD, BRUCE
428 NORGORD, R J
3273 NORLING, JENNIFER
7185 NORMAN GARY
5175 NORMAN, MARGARET
6283 WISE, MIKE
11344 WISEMAN, PAUL
591 WISHCAMPER JOE
10745 WITHAL, MARK
2871 WITHELL, MATTHEW
5581 WITHERSPOON, MARTIN
11589 WITT, LEE
1208 WITT, ORIN
87 WITTE, MARK D
2518 WITTENBRINK, CRAIG
7155 WITTER, WILLIAM D
9989 WITTERS, JOHN
11066 WITTROCK, PAUL
7499 WIXARS, TOM
9695 WIZINSKY N
7564 WOECH, JULIUS L
1572 WOJAHN D O
11510 WOKOMA-OKEREKE, AFUA
6540 WOLF, ERIC
2763 WOLF, MILLICENT Y
6067 WOLFE, DORA
873 WOLFE, GORDON V
49 WOLFE, JEROME
2617 WOLFE, NORMAN
9479 WOLFE, OTIS R
1876 WOLFE, PHYLLIS
4441 WOLFE, SAM
2619 WOLFE, VELMA
3115 *WOLFF FRANCES*
2524 WOLFF FRITZ E
1164 WOLFF, GARY
3117 WOLFF, THAUREL
704 WOLPERT, BARB
701 WOLPERT, ROBERT H
7015 WOLWOD, ONNALEE
10841 WONG, GREGORY
7661 WOOD, BRUCE
2253 WOOD, BYRON J
4036 *WOOD, CHESTER L*
4035 WOOD CLAIRE
6785 WOOD, CLAIRE
6774 WOOD DAVID
11245 WOOD, GABRIELLE
7646 WOOD, GREG
6783 WOOD, JOHN
6324 WOOD, KELLY
1084 WOOD, MARTHA
6740 WOOD REBECCA
6354 WOOD ROBERT
7999 WOOD, ROSEMARY
10253 WOOD SANDRA
10071 WOOD, SUSAN
6795 WOOD, TIM
8291 WOOD, TONY
11270 WOOD JR , M D , FRANCIS
8308 WOODBRIDGE, WARREN
3129 WOODCOCK, PAUL A

4242 GLASSY THAD
1963 GLEASON DAVID C
4303 GLEASON RAY
3283 GLEIM, RUTH H
7715 GLENN, ED
1670 GLICK, JAN & HAZEL
5145 GLIDDEN, MIKE
2433 GLIDEWELL, HELEN
9963 GLOMSET NILS
4883 GLOVER JESSE
11873 GLOVER JILL
2299 GMEINER LAWRENCE
2280 GNEHM, RICK
4766 GOBEL, GIVEN
9876 GOCKUELL, E C
2143 GODDARD, MIKE
9247 GODDING, LOIS
4531 GODFREY, BARRY
11768 GODWIN, TED
6460 GOEBEL ART
10609 GOEBEL, KAREN
8405 GOEBEL, W
10090 GOERS JAMES W
4726 GOERZ, ARNOLD
4723 GOERZ, JOHN
4724 GOERZ, LISA
3969 GOETTSCH, DENNIS
4351 GOETZE DIETER
8999 GOFF, ROGER
7186 GOFORTH ALFRED
11401 GOFORTH, JERRY
5498 GOFORTH ROBERT
1904 GOLDBERG, MICHAEL A
10168 GOLDE MARCY
10265 GOLDEN, TARA S
1399 GOLDING, CLAIRE M
1440 GOLDMAN, PETER
4621 GOLDSBARY GARY
7140 GOLDSMITH, RON
8367 GOLDSTEIN, JAY
11392 GOLDSTEIN STEVEN
9647 GOLDTHORPE NAT
9169 GONNASON JIM
9170 GONNASON LEE
8875 GONSALVES RAYMOND A
6546 GONSER, KARRY
6547 GONSER, TOM
3823 GONSHOROWSKI JULIE
1344 GONSHOROWSKI, NATE
3811 GONSHOROWSKI NATE
3812 GONSHOROWSKI, SHELLI
3726 GONZALES, ANISETO
11757 GONZALES, RUBIN
8560 GOODHUE MARK
8546 GOODING, BOB
10159 GOODING, DUNHAM
3219 GOODING, JOHN
4692 NORMAN, PAULETTE
4691 NORMAN, RANDY
3310 NORNSTAFF, JOYCE
10343 NORRIS, FRANK
2172 NORRIS, JACK
6469 NORRIS, KENNETH
5818 NORRIS LILA
3641 NORRIS, MYRNA
11839 NORRIS RICHARD
3579 NORSEN NANCY
3083 NORTH, DOUGLASS
11900 NORTH, LOIS
847 NORTHEY WALTER G
10417 NORTHFIELD, JEFF
5881 NORTON, M A
6389 NORTON, MARCY
11213 NORTON, MARY
1878 NORTON, R A
10305 NORWIL PAT
2226 NORWOOD CLINTON N
7264 NOSSAMAN, DONALD
5323 NOVAK, DICK
9116 NOVAK EDMOND
5920 NOVAK, HARRY D
6672 NOVAK, JIM
11651 NOVAK LILLIAN
9110 NOVAK, PAULINE
11775 NOWAK, HOLLY
10181 NOWAK, THOMAS
6489 NUENKE, DENNIS L
10998 NUNES, CHRISTOPHER
2103 NUNNI STAN
5453 NURMI DANIEL F
1204 NUSHAIT KEITH
2830 NUTTER JACK E
7570 NYBLOM DAVID A
6317 NYDIGGER, HAROLD
7924 NYHUS, CLARENCE
7464 NYHUS, EDNA
2199 NYMAN, FRED W
10773 NYROP, KRIS
4127 NYSETHER, LYLE
4835 NYSETHER MARY
2091 O BRIEN FLORENCE
10314 O BRIEN M J
107 O BRIEN RICHARD M
11871 O BRYANT RAYDONIA
3537 O'CALLAGHAN, DENNIS
3375 O'CALLAGHAN MARILYN
11632 O'CALLAHAN, JANET
524 O'CONNEL NICK
10316 O'CONNELL SHARON
6955 O'CONNER MARY
11562 O CONNOR COLIN
11285 O'DAY, KEVIN
9758 O'DELL, EDDIE
8575 O'HARA JAMES
8333 WOODCOCK, TED
26 WOODHOUSE, PHILIP R
3685 WOODS CLAYTON
1593 WOODS, CRAIG
11380 WOODS, DAN
9595 WOODS, JOHN
9408 WOODS JOHN
6988 WOODS KIM
9781 WOODS LOIS E
11358 WOODS MRS G R
9782 WOODS ROBERT E
197 WOODS THAINE C
4457 WOODS JR , GEORGE
10036 WOODSON, EMILY
10134 WOODSON ROBERT
9288 WOODWARD, GLEN
7406 WOODY, TOM
8558 WOODY, VEONA
122 WOOLERY, JEANNE
2116 WOOLEY, DONALD G
140 WOOLLEY, JOHN & NAN
4260 WOORE, KEN
11133 WOOTEN GEORGE
4263 WORD JUDY
7288 WORK, SHIRLEY
7289 WORK, WILLIAM
5348 WORKMAN DAVE
3679 WORKMAN LEONARD
5349 WORKMAN, MARY
4521 WORKMAN TIM
6892 WORLEY, BARBARA
4437 WORLEY CATHERINE
4424 WORLEY, HARRY
2450 WORMAN ROBERT O
478 WORRELL, ALAN
1921 WORSHAM, NANCY GREEN
7095 WORTHY, MARK
9545 WOTTER TIFFANY
7731 WRAY MICHAEL
6214 WRESSELL, CORLISS
6221 WRESSELL JOHN
2230 WRIGHT ARTHUR
4124 WRIGHT BRAD
4577 WRIGHT, CHARLES
10110 WRIGHT, COLIN
9644 WRIGHT DICK M
332 WRIGHT, DIXON
435 WRIGHT, DORIS
11759 WRIGHT, DOUGLAS
3591 WRIGHT ELIZABETH
9432 WRIGHT, ELTON
5870 WRIGHT G O
10593 WRIGHT, GERTRUDE
4536 WRIGHT GLADYS A
164 WRIGHT, GRAHAM J
9784 WRIGHT, JOHN M D
3224 WRIGHT, K W

9440 GOODMAN, CYNTHIA
11841 GOODMAN DAVID
8876 GOODMAN, DENNIS
11777 GOODMAN, DONALD
1171 GOODMAN, EDITH
9441 GOODMAN, GARY R
9437 GOODMAN JENNY
10098 GOODMAN JULIA
10810 GOODMAN JR , JOHN B
2146 GOODRICH, MAURICE
5263 GOODWILL, MATT
1785 GOODWIN, KEN
1270 GOODWIN, KENNETH J
8127 GOODWIN YONG CHA
6852 GOOLSB, VIC
11926 GORDON, BONNER
8147 GORDON, GLENN M
5815 GORDON, JACK
5907 GORDON JOHN
1450 GORDON JULIA
5814 GORDON, THERESE
11154 GORDON, THOMAS
8840 GORE, JOHN
8699 GORE ROBERT
5858 GOREE, PAUL
10856 GORENBERG, DIANE
9513 GOREW, WM
6467 GORMAN, DANIEL
4519 GORMAN EDWARD
11223 GORMAN, SARAH
1397 GORMLY, RICHARD W
583 GORS, DIANE
7295 GORSUCH, CAROL
3682 GOSE, CARILYN
8656 GOSHEN ROBERT
5124 GOSS, RONALD A
4879 GOSS, SCOTT
7541 GOSSAGE PHIL
1899 GOSSETT, RICHARD L
3234 GOTT, CARL
2604 GOTTLIEB, KAREN
10263 GOULD, ANNE
10566 GOULD, DAVID
10981 GOULDEN JEFF
11279 GOULDER, MICHAEL
4844 GOVIER, CLAUDINE
1267 GOVIER FRED E
7839 GR, REBECCA
7840 GR WILLIAM
10321 GRABO, IRMGARD
3612 GRACE BETTY
6368 GRACE, STAN
8215 GRAEFF, ROB
7212 GRAFF, CARL
11814 GRAFIOUS MARY
10367 GRAHAM, BILL
8586 GRAHAM, CHERYL L
6163 O'KEEFE, JIM
8230 O'LEARY, DENNIS
6530 O'LEARY, RON
8953 O'MAHONY, ELLEN
8951 O'MAHONY, KATIE
8952 O'MAHONY, MAUREEN
8948 O'MAHONY, MIKE
8949 O'MAHONY, PATRICK
8950 O'MAHONY, TIM
2320 O'NEAL, MILES C
10825 O'NEAL, NANCY
5475 O'NEIL, TIM
9729 O'NEILL HELEN I
9744 O'NEILL ROBERT
9731 O'NEILL, STENEY A
10943 O'NEILL, TIMOTHY
9730 O'NEILL WALTER
1746 O'SULLIVAN DENNY
5043 OADES EUGENE
5069 OADES, RANDEE
5041 OADES, SHEILA
7463 OAKSFORD, BARBARA
8011 OAS MARILYN
11919 OBLAK F S
4315 OCHSNER ALLEN R
9987 OCHSNER, LOUIS
10219 OCHSNER RICHARD
7187 ODION, LARRY M
7557 ODLE, JOHN
1836 ODONNELL, JIM
9894 OEHLER, DONALD I
9582 OERGEL, MARK R
3793 OGDEN, ARDIS E
3796 OGDEN, CALEB J
3794 OGDEN ROCKY J
3795 OGDEN VIOLET
5927 OHARA, PAT
5281 OHASHI, JACK K
5282 OHASHI, MITSUKO
7433 OHNSAGER DAVID
7432 OHNSAGER, MAVIS
5275 OHNSAGER, TERRANCE L
10081 OHR, CAROL A
3309 OHRAN COLLEEN
4989 OIKAVI, ARNE
169 OKAMOTO, STEVEN
3389 OLANIE, ERIC
11633 OLASON, THOMAS
5713 OLBRIGHT CORNEI J
11584 OLDHAM, DAVID
2863 OLESON, MEL W
4866 OLIEGLO, JANICE
7457 OLINE, LARRY
9892 OLIVER, CARLENE M
5111 OLIVER, JON
9002 OLIVER, JOYCE
5855 OLIVER M D
9497 WRIGHT, KATTIE
1077 WRIGHT, NANCY J
41 WRIGHT, R C
10505 WRIGHT, V CRANE
8661 WROBEL, DAN
31 WUBLBELS, ROSANN
2536 WULFERS JOHN & DANA
11554 WULFF LISA
3037 WULFF, TAMARA
10870 WUNROW, KEVIN
8312 WURM, DUNCAN
8696 WURZER, MARSHA
8695 WURZER, REUBEN
6141 WYATT DAVE
10573 WYATT, J L
6204 WYMAN, JEAN
5859 WYMAN, KEITH
6245 WYMAN, LARRY
8145 WYNNE, JIM
6384 WYSE, DAN
7949 YAGER, ANNA
6475 YAGER, CARMEN
7955 YAGER, ROBERT
6472 YAGER, ROD
6476 YAGER, SHEILA
3092 YAK, ROGAN
946 YARBROUGH, NICOLA S
10670 YASGER, RICHARD K
669 YATES, ELIZABETH
9250 YAZEL WILLIAM
8721 YEAGER BETT
1272 YEAGER CLARICE
7234 YEAGER, GREG
7180 YERKEL, PATRICIA
4277 YEW, KUK CHIN
4476 YOCHUM, FAYE
6079 YOCHUM MICHAEL
4477 YOCHUM, NEIL
6620 YOCUM, DENIS
3329 YOCUM, GEORGIA
5548 YONKE, RICHARD A
897 YORK, HERBERT E
11805 YOUNG, BRADLEY
1755 YOUNG, CLARENCE
6989 YOUNG, DENNIS
2181 YOUNG, DONALD E
5537 YOUNG, HERMAN T
2358 YOUNG, JAMES A
7447 YOUNG, KATHY
3628 YOUNG, LLOYD
2855 YOUNG, MARK
7445 YOUNG, REX
9697 YOUNG SANDRA
11918 YOUNG, SHEILA
57 YOUNG, STANFORD
728 YOUNGBLOOD, TONI
8964 YOUNGER, STEPHEN F

11634 GRAHAM, DANIEL
1372 GRAHAM, DANIEL A
2990 GRAHAM, DEBRA
5328 GRAHAM DONALD L
9696 GRAHAM ELZE R
8394 GRAHAM, JAMES
11290 GRAHAM, JOSEPH
1098 GRAHAM, KERRY
8716 GRAHAM, KERRY
2531 GRAHAM MICHAEL & JAN
10281 GRAHAM PAT
3472 GRAHAM RON
3720 GRAHN, ARNOLD E
5489 GRAMPS, ERIC
1376 GRANARD RON & SUE
10735 GRANLUND, SCOTT
7218 GRANNELL, CHAR L
7219 GRANNELL, CLIFFORD T
4107 GRANT, DAVID
667 GRANT DOUGLAS S
2762 GRANT JAMES L
660 GRANT, JANICE E
7139 GRANT, JERRY
10136 GRANT, MELINDA
7265 GRANT MERLE
3635 GRANT ROBERT L
3495 GRANTSCOM, CHRIS
8539 GRAU, ERNIE
2595 GRAVES DALE E
3453 GRAY ANDREW
7163 GRAY, DIANA
10064 GRAY, ELLEN
11433 GRAY, GEORGE
7352 GRAY, KEN
2382 GRAY KURT
11936 GRAY KURT
8474 GRAY LINDA
1054 GRAY, ROGER
1396 GRAY RONALD
1404 GRAY, VERNE A
8094 GRAY WAYNE
8475 GRAY WESLEY S
11376 GRAYBILL, DON
8227 GRAZZINI, DONALD W
8302 GRAZZINI RUTH
133 GRECO BUDD
3818 GREEN BILL
7613 GREEN, BOBBY
3513 GREEN, CHRISTINA
5742 GREEN DAVE
566 GREEN, EDWIN T
3312 GREEN, EMERY
6392 GREEN, JEFF
11399 GREEN JOHN
11693 GREEN, JOSEPH
2052 GREEN, JUANITA
99 GREEN, KATHLEEN B
9899 OLIVER, MIKE
9060 OLIVER, STEVE
6055 OLLAYOS, ALICE
2565 OLMSTED, RICHARD
4608 OLSEN, AL
11021 OLSEN BRUCE
6587 OLSEN CRAIG
7531 OLSEN, CYNTHIA
1937 OLSEN JEFFREY
313 OLSEN, MICHELLE
5835 OLSEN, S A
10028 OLSEN, S M
10722 OLSEN, STEVE
996 OLSEN, WALTER H
11189 OLSON, ART
6338 OLSON, BECKY
6099 OLSON BERTEL
6090 OLSON CRAIG
1497 OLSON DR L E
11549 OLSON, ERIC
10477 OLSON ERIK
3226 OLSON GARY
3030 OLSON, GARY R
9404 OLSON, GORDON
3819 OLSON IRVING
4037 OLSON, IRVING W
8609 OLSON JEFF
3869 OLSON JOHN
4066 OLSON JOHN
2862 OLSON, JOHN T
6091 OLSON LORI
2868 OLSON MARK
9338 OLSON MAXINE
3800 OLSON, PATTY M
9337 OLSON PAUL
4143 OLSON PHIL C
3700 OLSON RICK T
632 OLSON, ROD
3932 OLSON ROLF
1599 OLSON, RON
3349 OLSON STANLEY
2832 OLSON SUE
4676 OLSON TOM
6845 OLSON, TONY
6518 OLSON, WILLIAM
1650 OLSON, YORANTE
5974 OMEGNA, PAUL
8116 ONSTAD, MARC
9502 ONSTAD SHARON
3208 ONUFER, JEROME J
6465 OOSTERNYH, DICK
40 OPPEWALL, GARY
5320 OQUIST, BRIAN
7991 ORAM, MARY
11069 ORDAL ROBERT
10280 ORMBERG, THURSA
7391 ORMISTER, BK
4388 YOUNGQUIST, EVELYN
4404 YOUNGQUIST, LARRY
4382 YOUNGQUIST, MARVIN
4407 YOUNGQUIST, SANDRA
4429 YOUNGQUIST, VALA
5268 YOUSKO DAVID
4270 YU, PETER
7268 ZACHARY, ROBERT
3243 ZACHMAN, JON
6209 ZACKULA, KAREN
4969 ZADEH, MOHSEN
736 ZAHN, E
2396 ZAK JON
10842 ZANE, SHERRY
1701 ZANGARI, RENU
4504 ZAPALOE JOHN
9793 ZARETZKE CARL
10395 ZARNOWITZ RICHARD
6676 ZARTUCHE AMY
5615 ZARTUCHE, EDDIE
5614 ZARTUCHE GEORGE
4310 ZAVODSKY, RICHARD
10331 ZAWADG, HELEN
1915 ZECHLIN, JEFF K
1557 ZEED STEVEN
7402 ZEILLMANN, WILLIAM
2099 ZEISE DAVID
1895 ZELLA CRISTIANNE
2114 ZELLA DAVID L
2421 ZELLER, GERALD
7436 ZELLMAN GERALD
7566 ZELLMAN SCOTT
6684 ZELMER JAMES
3394 ZEMAN, CHRISTY
889 ZENDER GREG
7932 ZENDER GREG
11305 ZENDER PAT
11004 ZENTZ, PAT
11331 ZEOLI SHERRIE
9048 ZERBY, DANNY J
6814 ZERBY DAVID
7226 ZERBY, IRENE A
6815 ZERBY LYDIA
3203 ZERETZKE DAVID L
9331 ZERKLE HELEN
5311 ZESSIN, ERIC
7508 ZICKLER, EVELINE
7509 ZICKLER GENE
2335 ZIEGLER, KIM
11825 ZIELINSKI, R
9652 ZIERMAN, LEROY C
4174 ZIEROW JOHN A
6484 ZIMMEHT, CHARLENE L
6883 ZIMMEHT JR, JOHN
8880 ZIMMERMAN FRED E
5554 ZIMMERMAN, JAMES
7486 ZIMMERMAN, L J

4130 GREEN KENNETH J
222 GREEN, M LEWIS
4005 GREEN, MARGARET
6538 GREEN, MARK ALAN
2051 GREEN MARVIN J.
7611 GREEN, MOLLY
4159 GREEN NICK
3692 GREEN PAT D
3925 GREEN RANDY
4073 GREEN, ROBERT
7615 GREEN, ROBERTA
4181 GREEN, SARAH
7614 GREEN, SHAWN
1133 GREEN STEVE
1111 GREEN, SUE
5741 GREEN, ZELLA
5733 GREENE, C W
11468 GREENE, KYLE
10669 GREENE, MARGARET
453 GREENE, SARAH E
6387 GREENE, TIMOTHY
2740 GREENING EARL E
4018 GREENLEAF, DAVE I
915 GREENLEAF, TIY ANNA
573 GREENO, EDWARD F
3016 GREENWAY, JOHN R
3647 GREER DOUGLAS
10486 GREER MARRIE
153 GREETHAM KEITH
973 GREGERSON-MORASH, BILL
8334 GREGFRIED GARY
9515 GREGG, DONALD P
2487 GREGG, PHILO
1307 GREGG, ROSS
5729 GREGORY, BARBARA R
1680 GREGORY, SARAH
10731 GREINKE, JEFF
3652 GREIR, DEWEY
7207 GRENINEER, EARL
4155 GREVE LUDWIG
9663 GREVE, LUDWIG H
9224 GREY CAROL
4910 GRIDER, LORRAINE
1612 GRIENEWALD DAVID
7603 GRIENLUND, GOODA
3601 GRIEVE JAMES
5363 GRIFFIN, LONNY
1491 GRIFFITH, JACK
10037 GRIFFITH, R
10481 GRIFFITH, RUSSELL
3786 GRIFFITHS, JEFF
633 GRIFFITHS, ONA MAE
1422 GRIFFITHS ROBERT
6416 GRIGGS W B
2643 GRIMBLY, KATHLEEN O
3380 GRIMM, ROBERT
438 GRIMMETT SCOTT B
7392 ORMISTER, KATHLEEN
5841 OROLOGAS, GUS
11763 OROZCO, TENACIO
648 ORR, ALLAN
1573 ORR, GARY
2246 ORR, JAMES
437 ORR, JAMES M
10045 ORR, JOHN A
6603 ORREZ, MANUEL
9420 ORTON, ANDREW
7743 ORTON KEN
9419 ORTON LUCI
1389 OSBORN, CYNTHIA
7761 OSBORN RAY
1392 OSBORN, ROBERT B
1711 OSBORNE, DARREL
3148 OSBORNE, JOHN R
5122 OSBOUR, JIM
8132 OSGOOD, CHARLES R
11525 OSNESS DICK
10850 OSROWSKE ROBERT
3875 OSTAFIN BLAINE
1359 OSTBO PAUL M
10405 OSTENDORFF, JOAN
5428 OSTER, GARY
5396 OSTERDAY, ROYAL
3172 OSTERGAARD WILLOW NANCY
4598 OSTERGARD, BERT
9992 OSTLER, ADELE
4749 OSTLUND, TERRY
9672 OSTLUND, TORCHY
4386 OSTRANDER, ALICE
11256 OSTROM GRACE
10554 OSTROM LARRY
7222 OSTROM MARK L
6066 OSWALD, M D
11136 OTT, LYLE
5514 OTTER, RANDY
7659 OTTERSON, LINDA
7841 OTTOW, GEORGE
5623 OTTOW, LAWRENCE H
5622 OTTOW, TANYA
2210 OUSDALE, SHERMAN
1608 OVENS, W R.
7053 OVERBY ALF P
7042 OVERBY, MARIAN
6212 OVERMAN PATRICK
6211 OVERMAN, SHIRLEY
6160 OVERSTREET, KEN
2323 OWENS, DARALEE
5644 OWENS, RICK
5030 OWENS, SHANNON
2448 OWINGS, LEON G
8612 OZANNE, PAMELA
8516 PACE ANDREW
11157 PACE, KAY
2630 PACKARD, CAROLE
7779 ZIMMERMAN, MARGIE G
1998 ZIMMERMAN, MARK D
846 ZINK, DAVID C A
10937 ZINK, J E
10890 ZINK, MARY J
9430 ZINTER, BETTY
9431 ZINTER, RANDY
6069 ZINZA, EDWARD
9357 ZIRKLE, DR F
5401 ZIRKLE, EDITH
9339 ZIRKLE, SANFORD
6033 ZOELLERN, TERI
11038 ZOELLICK, RAYMOND D
533 ZOELLICK, RAYMOND F
5654 ZOOK, NORMAN
7120 ZUANICH, PETER
8074 ZUEHLSDORFF, DENNIS N
8076 ZUEHLSDORFF, JENNIFER .
10122 ZUKOWSKI, ANNETTE
214 ZUMWALT, EDWARD R
7771 ZURIN, GARY
5799 ZUSTIN, WILLIAM
7952 ZWANZIGER, KARL
2405 ZWICK, RAY
3291 ZWIERS, GARY
3296 ZYLSTRA, PERRY
1673 . ABBY
1683 . AUTUMN
1675 . ELIZABETH
1686 . JODIE
1678 . NOELLE
10445 . UNK
10462 . UNK
2072 .
11650 .

2965 GRISMER, TOM
800 GRISWOLD, MARILYN
4768 GRITMAN, BETTIE
4769 GRITMAN, FRED
7216 GROAGH, RONALD
5625 GROCE, LEROY E
5624 GROCE, NORMA J
2461 GROCE, ROBERT E
7360 GRODS, KARLIS
1505 GROENEVELD, WIARD
9521 GROGAN GARY P
2387 GROGAN, GEOF
10895 GROGAN LYN
2933 GROH, R JAMES
1544 GRONLUND, DAWN & DAVE
1113 GRONLUND, ERNEST
2822 GROSS, GENE
11165 GROSS RONALD
1960 GROSS, RONALD T
1042 GROSS, WILLIAM E
11032 GROTHAUS, DAREL E
6613 GROVE DANIEL
9333 GROVER, RICHARD
887 GROVES, RICHARD O
6691 GRUBB, LISA
4489 GRUBBS JOHN
9452 GRUENBERG KIM
9455 GRUENBREG, IAN
4877 GRUENWOLDT GERT
674 GRUMBINE, ED
601 GRUNEWALD, JAMES A
10995 GUICHARD, REX
6381 GUIDE, GARRY
10248 GUIDI, RITA
8128 GUIZZETTI, ARNE
1151 GULBRANSEN, GEORGE
3813 GULBRUNSEN, GEORGE
6364 GULLIFORD DARRELL
3173 GUNBAL, KENNETH J
5707 GUNDERSON, DALE R
6461 GUNDERSON RALPH
801 GUNDLOCK, JEAN R
3673 GUNN, RANDY
4224 GUNN, ROBERT
9312 GUNSACUS J
9692 GUNSCH, VERN
5102 GUNSTONE LARITA
5763 GUNTER KATHLEEN
5756 GUNTER, RICHARD J
7980 GUPPY TIMOTHY
5934 GUSE CONSTANCE M
6531 GUSE, EUGENE
7028 GUSSELDORF, ROGER
11779 GUSTAFSON CHARLES
3598 GUSTAVES, PAT
4474 GUSTIN, E JOSEPH
6096 GUSTIN LINDA

11309 PACKO, ROBERT
3350 PADDEN, HOWARD
7830 PADDOCK, LEE
11340 PADILLA, M
5088 PAFFENROTH ALLEN K
8959 PAGE, BILLY E
1659 PAGE, DON
9967 PAGE GALEN
5424 PAGE, JASON
2138 PAIGE JANE L
5321 PAINE, BOYD
10447 PAINE KATHY
8519 PAK, CHANG
4275 PAK, NAE KIL
4304 PAKAR, JIM
9843 PAKER, CORIANE
6802 PALE CHARLES
3568 PALKA, JOHN
985 PALLARC, JULIE K
2875 PALM, SANDRA
5967 PALMER, ARTHUR
6819 PALMER BRIAN
10728 PALMER, JOHN
5968 PALMER JOHN L
10887 PALMER, JOHN M
11184 PALMER MARSHALL
9945 PALMER, NANCY
8449 PALMQUIST, R J
6084 PANKEN, DAVE
3210 PANKIEWICZ, SHARON
3209 PANKIEWICZ, TERESA
3289 PANUCO, SANDRA
10361 PAPA, MICHAEL
9573 PAPPAN SCOTT
10827 PAPRITZ, JACK
571 PAPRITZ MARK
5885 PARCELL, WILLIAM
975 PARDO CHRIS
4072 PARDO, ELIZABETH
4179 PARDO, ROBERT
4069 PARDO RYAN
52 PARIS KATHY
4982 PARK DONALD
3152 PARK, LOIS R
213 PARKE WILLIAM A,
2585 PARKER, ALLEN
11175 PARKER BETTY
5147 PARKER CHERIE
7348 PARKER, CLARA MARIE
9675 PARKER CLYDE
7079 PARKER DALE
10268 PARKER DAVID
1744 PARKER, FRED
7073 PARKER GAYLE M
641 PARKER, GRACE
7077 PARKER, JAMES M
7899 PARKER JAMIE C

FOREST SERVICE RESPONSES TO SUBSTANTIVE COMMENTS

A substantive comment is defined as "A comment that provides factual information, professional opinion, or informed judgement germane to the action proposed." (Forest Service Handbook for implementing NEPA 1909.15) This section of Appendix J contains of the substantive comments received, along with our response.

The Council of Environmental Quality Regulations for implementing NEPA (40 CFR 1503.1) give five possible ways to respond to comments:

- Modify alternatives, including the proposed action;
- Develop and evaluate alternatives not previously given serious consideration by the agency,
- Supplement, improve, or modify the analyses;
- Make factual corrections;
- Explain why the rationale, authorities, and sources were used in the DEIS and why the Forest's position is maintained in the FEIS.

Organization

Comments are grouped by general subject matter. There is a brief table of contents on the following page. Each comment (or set of comments) has a title, in bold capital letters, followed by the comment(s), and then the response.

We used the respondents own words to record the comment, although some were edited for length or clarity. When two or more comments were made on the same general topic, they were grouped together, with one response. Where possible, a reference is made in the response to the location in the final documents wherein the reader may find changes and/or supporting information. As abbreviations are used throughout this section of the appendix, refer to the Glossary, FEIS.

SOIL PROTECTION SHOULD BE GIVEN MAJOR CONSIDERATION

You would not be amiss to come out and say that, above all, the soil, being the most important of all the resources is the underlying reason for all the management and that any successful management will hinge upon protection of the soils

Serious soil erosion problems aggravated by logging and road; building must be identified by local area and given primary credence in any pertinent plan There is too much emphasis on production and too little on protection.

Response: Agreed. The Land Suitability for Timber Production process includes removal of 95,500 acres of forested lands with unstable soils (the S-8 soils - see Glossary for definition) from the tentatively suitable land base Refer to FEIS, Chapter III, Commercial Timber section and Appendix B. In addition, Forest-wide Standards and Guidelines, Items 7. and 8. under the Soil Resource, Chapter 4 of the Forest Plan, include special prescriptions for activities in soils that are unstable, but do not fall into the S-8 category Soil protection is also addressed at the project-planning level, in the NEPA analysis.

THE SOIL RESOURCE MR's ARE TOO GENERAL

In light of these disturbing characteristics of the northern half of the Forest, the staff opinions regarding timber harvest impacts to fish and fish habitat, and the legal requirements of the NFMA, the Forest Service must implement management practices which protect against these impacts. The MMR's described for the soil resource are extremely general and do not appear adequate to prevent significant damage to aquatic resources (DEIS page IV-160). How do these MMR's differ from current and recent practices?

Response: Only a very brief synopsis of the MR's are presented in IV-160 of the DEIS, there is discussion in greater detail in Chapter 4, Forest-wide Standards and Guidelines for the soil resource, in the Forest Plan The MR's are similar to current protection, but offer considerably more protection than they did several years ago. A major difference is the removal from harvest and road building those lands which contain severely unstable soils; refer to the response above.

DESCRIBE IN MORE DETAIL HOW ADVERSE ENVIRONMENTAL IMPACTS WILL BE PREVENTED

It is stated that mitigation measures, proper construction, and timely maintenance can help negate these effects from runoff and major sedimentation from road systems The extent to which the adverse environmental impacts will be prevented, the mechanisms for doing so, and the commitments toward protection needed to be described.

Response: Adverse environmental impacts will be prevented to the extent possible by using road locations that are compatible with the topography, construction practices that will assure road integrity, and mitigation measures such as proper drainage, grass seeding and other erosion control measures to assure that soil movement will not occur. This is accomplished at the project level by an interdisciplinary team consisting of knowledgeable specialists who determine needs and practices that are

implemented through contractual requirements. Refer to Forest-wide Standards and Guidelines for soil, Chapter 4, Forest Plan.

HOW ARE SOIL AND WATER OBJECTIVES AND STANDARDS MET?

The statement that says that the FS will "Plan and accomplish rehabilitation projects as necessary to meet soil and water objectives and standards" needs to contain specific information to be meaningful Again, criteria, commitments, etc need to be included

Response: New Plan Appendix I details the first phases of the Watershed Rehabilitatio Program. These implementation schedules constitute specific, scheduled projects that will be completed Also refer to the monitoring plan, Chapter 5, Plan In addition, site-specific requirements are determined at the project planning level

DESCRIBE THE PROCESS USED TO DETERMINE SEDIMENT LEVELS

Were sediment levels based on sampling, extrapolations of data from other studies, or what?

It would be helpful for our analysis of the planning efforts if a discussion on the methodology used for determining erosion and sedimentation rates was included in the final EIS. Moreover, drawbacks and limitations of the methodology should also be discussed Tables IV-1 and IV-6 present soil erosion and sedimentation in tons of material over time Such a statement should be made with supporting rationale and documentation, as appropriate.

The Forest Service does not identify in the DEIS the techniques used to quantify sediment yields Rather, the documents simply list the total sediment *expected to come off the entire forest, per year, as a result of any of the* alternatives. This discussion is insufficient under NEPA.

Response: Sediment is that part of erosion that has been redeposited To estimate sediment it is first necessary to estimate the amount of erosion that is occurring The procedures used to estimate erosion and more discussion of the sediment tables developed for Chapter IV are presented in the FEIS

EVALUATE SEDIMENT LEVELS BY WATERSHED

Sediment yields are developed and averaged for the entire forest, which make it impossible to assess the impacts of proposed timber sales and road building to specific basins It would be beneficial to breakdown background sediment inputs and proposed harvest/road sediment inputs by watershed This would facilitate a watershed by watershed analysis and offer greater protection for those basins already severely impacted

Sediment yield is not distributed evenly throughout the Forest. The Forest Service must look at each proposed timber sale, one by one as they effect each watershed or drainage. It is the Tribe's position that such generalizations are merely a means for the Forest Service to rationalize cuts without looking *at the impacts of that cut on a site specific basis.*

Response: You are correct in your statement that sediment yield is not distributed evenly throughout the Forest. In fact it varies greatly, as does the stability of the soils To develop sediment levels for each watershed is beyond the scope of the Forest Plan. This can best be developed at a basin planning level when specific soil types along with locations of roads and harvest units are known. However, since the DEIS was released, the Forest has continued our efforts to develop a method of meeting water quality and riparian management requirements. Refer to new Appendix H for a discussion of the hydrologic cumulative effects analysis procedure, and the method developed to meet these MR's - a maximum number of acres available for final harvest in each watershed, by decade.

CLARIFY SEDIMENT OUTPUTS

For the estimated soil sediment outputs to be meaningful, the current sediment outputs need to be stated, including a breakdown of what fraction is activity generated and what is natural background.

Response: A series of tables in Chapter IV, Soils, FEIS, show sediment broken out by background, from roads, new harvest acres, etc by alternative The current output is similar to Alternative NC (No Change).

CONFUSION ON SOIL EROSION TABLE IV-1

For Table IV-1 (DEIS), does this mean that the preferred alternative will contribute 67,000 new tons of erosion/year? Is this in addition to the existing 72,000 tons per year above natural rates? Are all these caused by human activity?

The second paragraph appears to conflict with previous descriptions of the sediment index The two components should be (1) natural and (2) activity-produced. The latter should include both old and new sources The quantified analysis will be of little value unless this distinction is made.

There are some apparent inconsistencies within Table IV-1 which need to be explained or corrected For example, the background tons of soil per year are higher for Alternative G than they are for Alternative C, and yet this is reversed under new tons of soil per year Also, the ratio of background tons of soil per year to new tons of soil per year appears to be higher for Alternative G than for the other Alternatives. Further, it could be expected that the background tons of soil per year should be roughly the same for all of the alternatives; but the table shows wide variations in soil loss between the alternatives

Response: The background erosion is actually different among the various alternatives This is due to the differences in the amount of restoration (grass seeding, waterbarring, etc) planned on old existing roads in the various alternatives. Alternatives with the most restoration on old roads can be expected to have the least background erosion. The referenced table has been redone for Chapter IV, FEIS, and a more complete narrative added. Note that this table shows erosion, which is not the same as sediment. Erosion is simply movement downslope from point A to point B; it does not become sediment until it enters water

SEDIMENT LEVELS AND WATER YIELD DATA SHOULD BE DISPLAYED DIFFERENTLY

Table B-66a: Compare to minimum management alternative and average last decade Show sediment produced over background (due to activity). Your water outputs indicate something is wrong with your modeling.

In this and subsequent tables, it would be much more useful to show sediments as they increase over natural levels, not the total for natural plus activity-produced sediment. In addition, the water yield numbers should be omitted since their display indicates that this factor will show no change. In reality, the question is not resolved and the numbers simply reflect a lack of quantified data. The constant numbers imply that there will also be no changes in peak or minimum flow values (both of which could be detrimental to fish production).

Response: Sediment levels at best are only an index, useful for relative comparisons among the various alternatives. Water yield remains the same through Decade 5, due to lack of quantitative data in which to base a change.

WHAT IS THE APPROPRIATENESS OF USING FORPLAN TO MANIPULATE RAW EROSION DATA?

There is no discussion on the appropriateness of using the FORPLAN model to manipulate raw data from the erosion and sedimentation study. Such a discussion should be included in detail in the final EIS.

Response: We consider it appropriate since FORPLAN is the model used for all other aspects of the Forest Plan. Refer to the discussion on FORPLAN in Chapter III of Appendix B, FEIS

THE DISTURBANCE RATE FOR SOILS IS EXCESSIVE

We understand that when 12% of an activity site is left in a severely burned, compacted, puddled, etc state, that long-term resource damage is sustained and productivity lost We consider the 20% allowance to be excessive, and to exceed the amount other Forests are using as a limit.

Response: There appears to be some misunderstanding regarding your implied meaning of 12% disturbance, and that it is a disturbance threshold beyond which watershed degradation occurs This 12% stems from work done by Harr (1976), when he found that when a watershed in western Oregon had at least 12 percent of its area heavily compacted by road building, tractor skidding, or tractor windsowing of slash, peak flows were increased. This infers a potential for some damage but there is no tie to watershed degradation or productivity loss. The 20% disturbance allowances you refer to in the Plan are those contained in Regional Direction Supplement # 45 and are used by all Forests in Washington and Oregon.

NOT ENOUGH DISCUSSION OF SOIL FERTILITY

The presentation on timber harvest levels fails to significantly discuss the limits of soil fertility on the suitability of the proposal for long term sustained yield. The statement that the soil on the MBS can generally absorb the effects of management activities with little or no productivity loss is not

substantiated by recent research. Reference is made to the publications of J F Franklin, L D Harris and C Maser.

The statements in the effects of implementation regarding maintenance of site productivity are unsubstantiated. The ability of a large block of land that has been clearcut, intensively harvested, and in places burned, to continue to function with diversity, is questionable. Mike Amaranthus' work has highlighted the importance of site specific soil microbiologic constituents. In fact, different mycorrhizae may be important at different stages in the rotation How has the forest plan evaluated site productivity? It has been essentially been dismissed as a non-problem on this forest

I don't think there is enough data to fully assess the long-term impacts of replacing the self-sustaining old-growth habitat with tree farms than are managed by man. Can we continue to remove large quantities of organic materials from the forest ecosystem without affecting the productivity of the soil?

Response: Soil productivity is addressed in Chapters III and IV in the FEIS. New Forest-wide Standards and Guidelines on Diversity and Long-Term Productivity have been added to Chapter 4, Forest Plan Monitoring soil productivity is also included in the Monitoring Plan, Chapter 5, Forest Plan. Our analysis is based on current observations and measurements of soils and regeneration growth, and when considering future harvest rates and the BMP's that will be utilized. Conclusive research that would support a change in direction is lacking at this time As new knowledge is gained, we will incorporate the findings into Plan direction, standards, and guidelines.

SOIL STABILITY SHOULD INFLUENCE MANAGEMENT ACTIVITIES MORE THAN STEEPNESS OF SLOPE

"Steepness of slope affects other management activities to a greater degree than does soil stability " Please! Nothing should influence management activities more than soil stability or instability, regardless of other factors.

Response: The above sentence gives an erroneous impression and is deleted in the FEIS.

ON WHAT BASIS WERE LANDS WITHDRAWN FROM TIMBER PRODUCTION FOR UNSTABLE SOILS?

Regarding the 95,500 acres were withdrawn from timber harvest because of unstable soil conditions: no management process or criteria are described which show how the Forest Service decided which acres to withdraw Is there a process which the Forest Service uses to review timber sales to determine their impact to soils? Can other acreage be added to that already withdrawn if negative impacts to soils are discovered?

Response: This process, part of the Determination of Land Suitability for Timber Production, is explained briefly in Chapter III, Commercial Timber section in the FEIS; addition detail is included in Appendix B. Also, see the Chapter III, FEIS section on soils. Addition acres can be withdrawn at the project planning level when they are discovered and verified in the field During project planning, an environmental analysis is conducted for

each project. At this time, the potential impacts to soils are determined, along with appropriate mitigation. See the Forest-wide Standards and Guidelines for soils, Items 7. and 8. for discussion on the special treatment prescribed for fairly unstable soils (those not in the S-8 highly unstable category)

INCLUDE A TABLE SHOWING ACRES OF UNSTABLE SOILS IN MA 17

There is need for a table showing the amount of land that has unstable soil conditions in the acres allocated to Management Area 17, by alternative Presentation of such a table would improve our ability to assess the effects of a large allowable timber harvest on important fish and wildlife resources

Response: Generally, there should be no acres of highly unstable soils (S-8 soils) within acres allocated to MA 17. The lands with identified highly unstable soils (95,500 acres) have been removed from the tentatively suitable land base. While small areas or pockets of unstable to fairly unstable soils will be found within MA 17, generally lands allocated to the Timber Management Emphasis prescription are tentatively suitable for timber harvest Therefore, such a table would not likely provide the information you desire.

Since the DEIS was released, the Forest has continued our efforts to develop a method of meeting water quality and riparian management requirements. Refer to new Appendix H for a discussion of the hydrologic cumulative effects analysis, and the method developed to meet these MR's - a maximum number of acres available for final harvest acres in each watershed, by decade Also, see Plan, Forest-wide Standards and Guidelines for soils, Items 7. and 8. for special protection of fairly unstable soils.

NORTH HALF OF FOREST IS UNSTABLE AND SHOULD RECEIVE SPECIAL CONSIDERATION

The narrative under soils for the "North Half of the Forest" should also state that this area is one of the most unstable in the entire Pacific Northwest region. There seems to be plenty of evidence to justify special protection measures in this area, particularly with respect to degree of riparian area protection. While some of this extra protection will come through routine but site-specific application of management requirements, alternatives such as a 100-foot anadromous fish riparian zone merit serious consideration.

Response: The narrative has been modified to include the suggested wording Timber harvest will be limited on the unstable drainages (based on the hydrologic cumulative effects analysis, which resulted in this method to meet water quality and riparian management requirements - see Appendix H). The areas containing the most highly unstable are withdrawn from timber harvest. Additional protection is provided in Forest-wide Standards and Guidelines, and site-specific measures will be provided during project planning and implementation through rigorous application of BMP's.

DEBRIS TORRENTS IN OLD GROWTH

We have only rarely witnessed debris torrents in old growth areas. However, they are relatively common in cut-over areas, especially where small (even seasonal) streams have had their banks denuded by timber practices.

In large standing timber, debris slides (flows) usually "hang up" after only a short distance and become debris "jams."

Response: Agreed; this is reflected in the document text (both DEIS and FEIS).

MORE EVALUATION NEEDED RE: SEDIMENT OFF ROADS AS ROAD DENSITY INCREASES

If the accumulations of sediment in streambeds become significant when the roaded portion of a sub-basin area exceeds 2-3%, and the average road density on the MBS is between 3 percent and "somewhat less than 3%," it appears that the accumulations are or are about to become significant. Therefore, the assumption that road construction will not contribute a critical level of sediment is tentative. This needs to be evaluated much more thoroughly. In addition, how the percentages are calculated, and how the percentages will change over the next decades should also be discussed.

Response: This section (the direct effects of the alternatives on water) has been re-written in the FEIS.

THE EFFECTS OF BURNING ON SOILS HAS BEEN MISREPRESENTED

The effects of burning on soils is misrepresented in this section of Chapter IV, DEIS. There are studies which indicate significant negative effects of burning to long-term soil fertility, soil flora and fauna, and soil organic matter. Paragraph 5 on page IV-6 is particularly misleading, as you have not cited any of the literature which may show negative impacts. Other sentences in this section are contradictory

Response: Burning can have negative impacts on soils with the level of impact depending upon the intensity of the burn. This section has been rewritten in the FEIS for clarity. Also, note in the text on prescribed fire activities in Chapters III and IV, FEIS and in the Plan document· the MBS continues to decrease the acres of broadcast burning prescribed each year.

WHAT ARE THE VARIOUS COURSES OF SEDIMENTATION AFFECTING FISHERIES AND HOW CAN THEY BE AVOIDED?

The DEIS states that "Changes in soil which increase surface erosion and/or mass wasting can have a major effect on fish spawning and rearing, when the material reaches stream channels and is deposited as sediment..." The various causes of sedimentation affecting fisheries and how they can be avoided should be discussed.

Response: Some additions have been made to this text in Chapter IV, FEIS to explain some of the techniques that can be used to hold human-caused sedimentation to a low level These may include: using road locations

where soils are stable and risk of failure is low, construction practices that will assure road integrity, and mitigation measures such as proper drainage, grass seeding, and other erosion control measures to assure that soil movement will not occur.

IMPACTS OF SOIL ON WATER ARE MISLEADING

Having a section on the impacts of soil on water may be misleading because soil itself does not have the impact on water; rather, it is the soil disturbances that cause erosion, sedimentation, and mass wasting The crucial elements are how the soil gets to the water, how much, and whether this affects beneficial uses.

Response: Agreed. We believe this is clarified in the opening statement this section in the FEIS; it is the changes in soils from impacts which promote surface erosion and/or mass wasting can strongly affect water quality, specifically sedimentation.

UPDATE SOIL INFORMATION

The Forest Service conducted a soil survey in 1972. The soil survey techniques are not described in the DEIS. While soil composition may not have changed since the survey was conducted, new information regarding impacts of various activities should be available to update the generalizations made from the survey

Response: The characteristics on which the soil survey was based (ie, soil and geologic properties) have not changed. However, knowledge of how soils respond to various management activities has greatly increased since the survey was made Soil input to current projects always utilizes the most recent knowledge

CONDUCT A SOIL SURVEY AND TAILOR HARVEST MANAGEMENT PRACTICES ACCORDINGLY

The FS is obligated to prevent harvest impacts to fish habitat under NFMA. You must insure that timber is harvested from the Forest only where "soil, slope or other watershed conditions will not be irreversibly damaged. (or) protection is provided other bodies of water from detrimental changes in water temperatures, blockages of water courses and deposits of sediments where harvests are likely to seriously and adversely affect water conditions of fish habitat..." 16 U.S C. 1604 (g). In order to comply with the legal mandate, the FS must conduct a soil survey and tailor harvest management practices accordingly

Response: The MBS has a soil survey in place that identifies the degree of risk of landslides and other impacts to water and fishery values. In addition, soils that are sufficiently unstable so as to incur irreversible damage from management activities have been classified as not suited for timber harvest; refer to Chapter III, Vegetation and Timber, of the FEIS.

TIMBER HARVEST CAUSES NO ADVERSE EFFECTS

We believe that a well-designed timber management program will impose very little risk at all of significant adverse effects, especially relative to the tremendous adverse impacts resulting from natural erosion and catastrophic events. Many forest hydrologists have reached the same conclusion. Dr. David Wooldridge recently wrote that the environmental consequences of current best management practices in forest management are "inconsequential compared to past epidemics." He noted that year-to-year variations in erosion rates due to random natural processes are "the dominant factor in long-term sediment transport processes" and concluded that "in general, amount of erosion caused by man's activities in the forest are insignificant."

Response: This opinion is not shared by the watershed specialists, fisheries biologists, and other specialists on the Forest, especially those with 10-20 or more years of professional experience on the MBS Observation over time, both on-the-ground and from aerial photos, has shown some dramatic changes after significant harvest has occurred Examples are Deer Creek, Finney Creek, and Canyon Creek. These streams were stable prior to logging and supported healthy fish populations. Now, after having been heavily logged, landslides abound, roads are failing, streams are sediment-choked and unstable, and fish runs are absent or seriously depleted. Refer to new material in Chapter III, Appendix H, and text in Chapter IV, FEIS, on the condition of watersheds on the Forest and the method developed to meet water quality and riparian MR's.

MONITOR ROADS TO DETERMINE SEDIMENT LOSS, ETC. AND BUILD NEW ROADS TO SPREAD OUT THE IMPACT ON THE EXISTING SYSTEM

We encourage the Forest to establish a monitoring system on all major drainages to determine sediment load and temperature change on the streams before and after timber harvesting has taken place The Forest should consider road closures when necessary or at least limit the road use to essential management activities during the time of the year when topsoil may be lost. Consider road building in the roadless areas as soon as possible; building access road into new drainages would have a tendency to improve water quality by reducing the work load on existing road systems, thereby reducing the sediment load moving into our streams

Response: Monitoring is discussed in Chapter 5 of the Forest Plan. The impacts of roads are discussed in Chapter IV of the FEIS It has been our experience that roads open to use, but adequately maintained and monitored have relatively little impact on water values. Some problems are caused by failure on old, unused roads that have not been "put to bed." The most severe impacts occur from new construction within the steep, relatively unstable drainages, where cuts and fills are prone to failure.

DOLLAR VALUE OF WATER

In the Plan, the value of the water is listed at $51,876,000 per year. Where did this value come from? Does it include the value of fish produced in the water? Was this based on municipal and industrial or domestic use, or agriculture, or some mysterious combination of uses? Does it include the value of the land? Is recreation value included?

I am concerned about the validity of the $52 million figure given as the dollar value of the water that flows from the Forest. Surely this is only value to those that then sell this resource to others. It is only a proxy value given as a result of not being able to quantify the value of this resource. How was this figure reached? The potential exists for this figure to be balanced against the quantifiable value of some other forest commodity, such as timber, leading to the dilemma of whether the timber is worth more that the water.

Response: As stated in Chapter III, Water, FEIS, the figure shown is based on the value of water for municipal and industrial uses, plus the value of the water from the Forest used for power generation. It does not include values for fish, land, or recreation

CUMULATIVE EFFECTS NEED MORE DISCUSSION

The reference to cumulative impacts needs to be supported by further discussion

Response: The discussion on hydrologic cumulative effects, Chapter IV, has been expanded in the FEIS. In addition, between the draft and final plans, a hydrological cumulative effects analysis was completed by this Forest. It resulted in a method to meet water quality and riparian management requirements; refer to new Management Requirement Appendix H, and the documentation of the analysis process in Appendix B.

FEIS NEEDS MORE DISCUSSION OF CURRENT WATER QUALITY, CONDITION OF STREAMS, ETC.

Headwater streams on the forest are naturally almost sediment free. It would be useful to identify the ones that are not, identify the causes for this, and what is being done to prevent sedimentation, and differentiate between natural and man-induced causes. While the DEIS elaborates on mitigation processes (for removal of streamside vegetation) it should be concentrating on current conditions within the Forest. Again, where are conditions unacceptable, what are their causes, and what things are being done to rectify the problem?

Additional detail on the current status of water quality is needed. There is no organized summary presented which covers the whole Forest. A watershed inventory would be a logical place to present information documenting water quality conditions. It is difficult to evaluate effects on water quality which would result from implementing the various options without documentation on the current status.

Response: Due to the vast number of headwater streams on the MBS, data on their condition is limited. The need to update such inventories, especially as we implement the Geographic Information System (GIS) in 1992, is noted in the Information Needs section of Chapter 2, Forest Plan. Most headwater streams that are in a natural state are sediment free, except

where influenced by landslides or glaciation. The conditions of large basins are know and documented All major watersheds on the Forest were re-evaluated between draft and final Forest Plan, as to their present condition - acceptable or unacceptable - as part of a hydrologic cumulative effects analysis. To meet water quality and riparian MR's, a maximum number of acres available for final harvest, per decade, by watershed, was set These harvest levels set the limits of the drainage to absorb impacts without causing watershed degradation, and allow watersheds in unacceptable condition to recover Refer to new text in Chapter IV, Water, FEIS, and discussion in Appendix B and the new MR Appendix H. In addition, all future timber harvest and road construction will follow Best Management Practices (see new Appendix I, BMP's) and the prescribed standards and guidelines.

ADDITION TO DISCUSSION RELATIVE TO FERC PROJECTS

The discussion relative to FERC projects should note that full mitigation is legally required for any adverse impacts on fish and wildlife resources (although the practical result may be something less). The FERC process also allows for enhancement

Response: This has been incorporated into the discussion in the FEIS Chapter IV, Environmental Consequences

DISCUSSION OF WATER RIGHTS

The State of Washington is responsible for the granting of water rights The Forest Service needs to address the matter of federal reserved water rights as part of their planning process, so that the State can more efficiently allocate, protect, and adjudicate its water resources.

Response: Water rights have not been a significant issue in the past on the MBS, and were not identified as a major issue, concern, or opportunity in the Forest Planning process This is primarily due to the abundance of water on Forest Service Lands.

NEED BETTER INDICATORS OF RESPONSE FOR THE WATER QUALITY ISSUE

For the water quality issue: better indicators of response would include temperature, suspended sediments, BOD, and fish production

Response: This ICO has been refocused between DEIS and FEIS, refer to Chapter I, FEIS and Appendix A (pages A-16 to 19). Water quality is addressed as a facet of the Effects of Timber Management and Related Activities ICO. In response to this comment, we have added "sediment produced from all sources" as an indicator of responsiveness. See Table I-1, FEIS Other indicators to measure responsiveness to water quality include timber harvest levels (acres) and miles of road construction, as they allow direct comparison among alternatives. It is assumed that the alternatives with the highest harvest level and miles of new road construction/reconstruction will have the greatest impact on stream temperature, sediment level, and other water quality indicators. Existing data for stream temperature, etc. is not available at levels necessary to allow projective and comparison at the Forest Plan Level. Fish production

is included as an indicator for the Old Growth Ecosystems and Fish/Wildlife/Plant Diversity issue.

GOAL STATEMENT FOR WATER DOESN'T CONSIDER MUNICIPALITIES

Regarding the Forest-wide Standards and Guidelines, goal statement for water: the Washington State Department of Social and Health Services rules and regulations and the new EPA drinking water regulations are not mentioned with regard to water quality, nor are the desires and concerns of the municipalities expressed in this section.

Response: The goal statement and Forest-wide Standards and Guidelines for water speak to meeting or exceeding State Water Quality regulations. The Forest is not required to supply pure drinking water to municipal watersheds. We are required to supply high quality water that is treatable (FSM 2542.03); this is not affected by the EPA standards.

DELETE CONCLUSIONS ON DISCUSSION OF WATER

Most of the conclusions beginning at the bottom of page IV-14 should be deleted. For example, one conclusion states, "Water yields will not be noticeably different from one alternative to another or from the present situation "

Response: You do not state why you believe the conclusions are not appropriate. After reviewing the pages in question, we believe that the conclusions provide information needed to clarify our discussion. In addition, this section has been updated to reflect the alternatives displayed in the FEIS.

ADD AND CLARIFY THE RAIN-ON-SNOW INFORMATION

Page III-3, DEIS: the description of the climate should include a statement about rain-on-snow, as it is a dominant climate-related hydrologic process on the MBS It is involved in numerous management problems including road failures, debris avalanches and torrents, quantity and quality of fish habitat, and management of riparian areas. There are also some indications that harvesting can affect rate of water delivery to soils during rain-on-snow events *I suggest the following wording be incorporated: [not reproduced in* this appendix.]

Response: These comments have been incorporated, where appropriate, into Chapters III, IV, and the References section of the FEIS

THE EFFECTS OF CLEARCUTTING IN THE RAIN-ON-SNOW AREA ARE NOT DISCUSSED

The analysis in the plan did not address the effects of clearcut logging on stream hydrology and channel stability . Increases in peak flows can result from accelerated snow melt during the rain-on-snow events. This can result in increased mass wasting, erosion of streambanks, changes in channel stability, and downstream flooding, all of which affect the productivity of fish habitat and the survival of eggs and fry. We would suggest that the amount of timber

harvest in the rain-on-snow zone under each alternative be used as an indicator of the potential for changes in hydrology and downstream flooding.

I was very surprised that the report did not address the obvious watershed problem that occurred this last fall. In fact, many if not all of the alternatives seem hell-bent on clearcutting the municipal watersheds as quickly as possible. Isn't it apparent that the greater the clearcut area, the faster the snowmelt and rainwater runoff thus leaving lower reservoir levels following the summer/fall dry season.

I didn't see any mention within the report of increased water needs from national forest municipal watersheds for the ever-increasing Puget Sound population. Additional clearcuting wouldn't seem an appropriate solution for that need

Response: Water runoff from rain-on-snow events on clearcuts has a major influence on erosion and is discussed in Chapter III, FEIS The effects of harvesting and other activities on water yield have been expanded, Chapter IV Soils and Water In addition, a new section on groundwater recharge and aquifers has been added to Chapter III, page II-14.

FUTURE WATER QUANTITY AND SUPPLY HAVE NOT BEEN ADEQUATELY ADDRESSED

I don't think water quantity and water supply for the future has been adequately addressed. Great emphasis is on high quality, but the real problem of the future will be quantity and the Forest Service must face this as the principal resource holder.

The discussion indicates that changes in water yields (at least for smaller areas) can be expected even though they are not quantified in the planning process

Water, a major and vital product of the forest, is recognized in the Plan as to quality but not as to quantity. Protection of watersheds is well covered, but what about increasing water yield and planning for additional storage capacity?

Response: Management activitives on national forests on the west side of the Cascade Mountains do not appear to have significant effect on water quantity There have been a number of small watershed studies, typically 100 acres in size or less, where changes in stream flow - before and after timber harvest - have been measured. The general conclusion is that temporary on-site increases in annual and summer flow normally occur. Effects on peak flows are inconclusive. While initial on-site increases may be substantiated, they are too small (less than 5%) to be measurable in large watersheds, where only one or two percent are the area is harvested annually. This is due to vegetation re-growth in harvested areas. See the previous response for additional sections to refer to in the FEIS.

INADEQUATE DISCUSSION OF WATER QUALITY IN MANAGEMENT AREA DESCRIPTIONS

There is inadequate discussion of water quality in general over the forest, Forest Plan management prescriptions. Comments are too dispersed.

Response: It is not our intent to discuss water quality in the management area prescriptions in the Forest Plan The MA standards and guidelines

include the direction for water and watersheds applicable to a specific MA. Refer to Chapters III and IV, FEIS for more discussion of water quality.

DRAINAGE INVENTORIES NEEDED FOR BASELINE DATA

It is essential that drainage by drainage inventories of both the fisheries and the water quality of the 66 major watersheds be determined and used as a baseline for future evaluation Monitoring of the streams and the fisheries should be made frequently throughout the life of the Plan and compared with the baseline studies. A "triggering mechanism" needs to be in place which would force cutbacks in roading and logging activities once acceptable levels have been exceeded.

Response: Drainage inventories will be done on representative drainages to establish baseline data. Refer to the Information Needs, Fish-Water-Riparian, Forest Plan, Chapter 2. Monitoring will be done to determine changes. When changes exceed established standards, the information will be cycled back into the planning and operational process. Refer to Chapter 5, Monitoring Plan, Forest Plan.

ADDITIONAL RESEARCH NEEDS

There are some research needs that could be included in the list of information needs, Chapter 2 of the Plan I suggest adding some statements similar to the following: determine the extent of the transient snow zone and the probability of occurrence of rate of water delivery to soil during rain-on-snow conditions; study the effects of different types of forest cover (new clearcut, mature forest, 15-year-old unthinned plantation, etc.) on rate of water delivery to soil during rain-on-snow conditons; determine under what site conditions forest roads collect and redirect subsurface water, determine the relative importance of sediment from valley glaciolacustrine deposits reworked by streams in adversely affecting spawning gravels of anadromous fish.

Response: These have been added to the Chapter 2, Information Needs section of the Forest Plan; refer to Fish-Water-Riparian Items 15, 16, 17, and 18.

HOW ARE WATERSHED RESTORATION TECHNIQUES SELECTED?

DEIS, Chapter IV, page IV-28 states "There are some...restoration techniques that will occassionally be used." What does this mean? How many, where, and how many dollars? Are problems in Class II or only Class III addressed? Who decides this?

Response: This paragraph, on mitigation that may be used for water resources, has been reworded in the FEIS to better explain the following: specialized restoration techniques include such items as stabilization of landslide areas, installation of check dams in steep drainage areas, and permanent and temporary water barring of road prisms. They will be used on a case-by-case basis at the project level, when determined by District personnel. A seriously damaged area will likely be repaired, regardless of watershed class, provided that repair is necessary to protect resource values and funds are available.

PLAN ONLY CONSIDERS LIMITED WATERSHED IMPROVEMENT, LIMITED FUNDING

The Plan only identifies 35 acres of watershed improvement projects per year. The data base is at least 6 years old. There is limited funding for field personnel and there is very limited validation of existing conditions. Is the intent to say that only 350 acres of the Forest needs restoration or improvement in the next 10 years? Why is this effort confined to the north part of the Forest? What data base was used to determine the acres in need of restoration?

> **Response:** Refer to the new Plan Appendix I, Watershed Restoration Program. The 350 acres per shown in the Draft Forest Plan was an error; the figures have been corrected in the Forest Plan. The restoration efforts are concentrated in those portions of the Forest with the most severe damage (and conditions). Inventories were conducted in the most critical watersheds.

DISCUSS HOW THE LEVEL OF INVOLVEMENT WILL VARY WITH PROJECT COMPLEXITY

Referring to the Resource Summary for watersheds, Forest Plan: we support the concept whereby the level of involvement will vary commensurate with project complexity. However, this needs additional discussion. The criteria for determining what levels of involvement are appropriate, the monitoring to confirm predictions, the contingency plans, the responsible parties, the level of environmental analysis, etc., all need to be tied into this procedure for it to be meaningful.

> **Response:** It is beyond the scope of the Forest Plan to define the precise nature of the involvement that may be required at the project level. The appropriate level of involvement is determined during the Scoping process, when a project is conceived.

MEETING TIMBER PRODUCTION GOALS WILL DEGRADE CLASS I WATERSHEDS TO CLASS III

The plan further assumes that by dispersing harvest activities from Class III to Class I drainages, the impact of harvest activities will be reduced. It does not address the scenario wherein these watersheds will also be degraded to Class III, because in meeting timber production goals, they will be as heavily cutover as current degraded watersheds.

> **Response:** The harvest rate for Class I watersheds will be limited by the Size and Dispersal of Openings and State of Vegetation Standard and Guideline, Pacific Northwest Regional Guide (1984b), dispersion management requirement, which states that adjacent, cut-over stands must reach at least 4-1/2 feet prior to harvest of the adjacent stand. The Class I watersheds, by definition, are able to absorb this level of harvest without becoming degraded. In addition, to meet water quality and riparian MR's, a maximum number of acres available for final harvest, in each watershed per decade, has been set. Refer to new Appendix H.

DEGRADATION OF SMALL WATERSHEDS CAUSES IMPACTS TO LARGER WATERSHEDS DOWNSTREAM

The degradation of these smaller watersheds also results in downstream impacts on larger watersheds which they are tributary to. According to the Plan, there

are no planned restoration activities in drainages without local anadromous fish populations, despite the fact that they are tributary to larger fish-bearing streams. In fact, it is stated that watershed restoration work is expensive and will only be done on a very limited basis.

Response: The development of a method to meet water quality and riparian MR's, through the hydrologic cumulative effects analysis procedure, will allow dispersion of timber harvest and limiting entry in watersheds that are in an unacceptable condition. See new Appendix H. Meeting the MR's, along with use of Best Management Practices, will allow recovery in the smaller, degraded watersheds. Recovery will be hastened, in high priority areas, with watersheds restoration, as funding allows. Refer to new Forest Plan Appendix I, the Watershed Rehabilitation Program.

HARVEST RATE IS TOO HIGH TO PREVENT WATERSHED DAMAGE

I still do not see watersheds being assessed as entities, specifically with regards to timber harvest I believe that the maximum harvested area percentage for watersheds is still to high to prevent resource damage. It appears short sighted to put so much energy into anadromous fishery improvements when sediment from timber harvest areas degrade the resource perhaps more than any other single factor.

Response: The development of a method to meet water quality and riparian management requirements should help address this. The Category II and III watersheds were evaluated and a maximum number of acres available for final timber harvest, per decade, was established for each watershed This is the harvest rate that the watershed can withstand without incurring soil and water degradation. Refer to the discussion in Chapter IV, FEIS and the new Appendix H.

NEED MORE DETAIL ON PESTICIDES, CHEMICALS THAT MAY BE USED, EFFECTS ON WATER

While the Forest is still enjoined from use of herbicides, the plan should describe those elements of pesticide use that are site-specific to the MBS, but only generally described in the programmatic vegetation management EIS.

Chemicals can enter surface water if applied without proper care. As they destroy forbs and woody vegetation, they may limit large areas of regenerated forestland from contributing to the appropriate forage/cover quota In areas of wildlife habitat, chemicals should be strictly limited, or areas adjacent to hiding cover should be seeded with alternative food sources.

The effect of biocides and fertilizers on aquatic systems need to be addressed in more detail.

Response: The court injunction was lifted in May, 1989; however, the Forest Service is under an administrative stay, imposed by the Chief of the Forest Service, not to use herbicides. Until this stay is lifted, vegetation management will continue to be accomplished using other methods. When it is lifted, we will follow the Pacific Northwest Region, FEIS on Managing Competing and Unwanted Vegetation, the Record of Decision, and the provisions of the Mediated Agreement. Refer to the updated discussion in Chapter III, FEIS, Vegetation. Any proposed herbicide use

will be analyzed in a site-specific environmental analysis, with public involvement and a NEPA document that will discuss effects in detail.

Also note that the prescription for MA 13D, Forest Plan Chapter 4 states: integrated pest management is permitted except where the use of pesticides conflicts with riparian values."

HOW WILL IMPACTS FROM MINING BE INSURED?

It is not sufficient to "insure" that impacts to water resources from mining will not be significant because of the regulatory controls available for water resources. The mechanisms and processes for carrying out the regulations need to be presented.

For mineral extraction, a statement of protection of riparian values is not sufficient. How will this be determined or ensured?

Response: Mining impacts on water quality are addressed in FEIS, Chapter IV. State agencies (Departments of Ecology and Environmental Quality) set applicable water quality standards and permit requirements. The Forest Service may add additional requirements Refer to the Best Management Practices, new Appendix I. Water quality protection methods will be addressed on a project basis, and will include applicable Forest Plan Standards and Guidelines. The removal of tailing ponds, which are a threat to water quality, as well as other needed restoration projects, are inventoried. Restoration will occur if and when funding is provided for this.

Cumulative effects of mining will be evaluated on a project-by-project basis, because mining activities are normally unscheduled. Mining activities depend on economic conditions, technology available to extract minerals, and mineral location. None of these factors are predictable.

CORRECT DISCUSSION ON EFFECTS ON WATER

In Chapter IV, DEIS this section states that increased populations of animals can be expected in our watersheds because of various reasons. Another statement says that there are no known effects in watersheds with uncontrolled access, indicating that having uncontrolled access must be good for water quality. This is completely against the thinking of the vast majority of public health officials and experts in the field

Response: These sections have been rewritten and corrected in the FEIS.

HAVE THERE BEEN INSTANCES OF WATERBORNE DISEASE?

For the comprehensive list of municipal watersheds listed in Table III-2, have there been instances of waterborne disease? Any significant source related water quality problems should be summarized.

Response: There has been no record of waterborne disease in the municipal watersheds.

ERROR IN DISCUSSION OF ROAD 54 IN THE GREEN RIVER WATERSHED

Forest Plan, Appendix G: The closure point on this road is approximately 4 miles west of Lester, as of March, 1988. The closure point will be moved to Lester after a land exchange is completed. You could point out that the FS is still the controller of road 54 and retains full administrative/contractor/ permittee rights to use the road at any time without hindrance. It is only general public use (recreational) that has been given up.

Response: This section of the Plan Appendix H has been re-written.

MODIFY DISCUSSION ON CLEARWATER RIVER

The discussion after Table IV-6, DEIS, needs to be modified regarding the Clearwater River There are substantial numbers of pink salmon here, a species much more prone to be limited by sediments during its critical life history stages (spawning/incubation) It is also probable that the average stream gradient in the Clearwater study area is significantly greater than the the norm on the Forest

Response: The discussion has been modified in the FEIS.

ERROR IN NUMBER OF PEOPLE SERVED BY FOREST MUNICIPAL WATERSHEDS

There was an earlier statement that indicated 1 2 million people were served by the 136,400 acres of the forest supplying municipal water On page S-10, it indicates that 2 million people were served.

Response: Both statements have been corrected to show that the Forest supplies approximately 1.4 million people.

DESCRIBE THE HISTORY OF THE CEDAR AND GREEN RIVER WATERSHEDS IN THE FEIS

It would be helpful if the history of both watershed were described so that a historical perspective could be developed, and one could see the long-term relationship that has existed between the Forest Service and these municipal watersheds.

Response: We feel the length of the discussions on the Cedar and Green River watersheds in the Chapter III, Affected Environment, FEIS are adequate for this level of planning We have added references to current agreements; see References section, FEIS To include a history, especially in the Cedar River, would not meet CEQ's directive to limit lengthy descriptions of the affected environment and avoid including material not specifically germane to the issues and concerns

WHAT IS THE EFFECT OF CITY'S SECONDARY USE POLICIES ON TIMBER SUPPLY AND NFS MANAGEMENT?

The City has put a moratorium on timber harvesting on the 70,000 acres of City-owned lands in the watershed until they complete a secondary use analysis, which appears to be moving rapidly away from further harvesting of City-owned lands there. How will this affect the regional timber supply? What bearing might it have on the management of NF lands in the same area?

Response: On August 7, 1989, the Seattle City Council adopted Ordinance 114632, which embodies the new Secondary Use Policies for the Cedar River Watershed. The City will set aside approximately 50% of its lands in a reserve precluding timber harvest. They will prepare a long-range timber harvest plan for second-growth lands outside that reserve. In addition, the policies call for acquiring 4,000-6,000 acres of old-growth forest that are currently NFS lands, to be maintained as old-growth habitat.

Theoretically, there will be no effect on NFS land management in the area, as the City cannot dictate land management for NF system lands, any more than the Forest Service can dictate management for City lands. However, the intent of the policies is to acquire at least a portion of the existing NF lands with old growth intact. Whether this will result in an overall decrease in NF timber harvest over the next several decades will not be known until the City and the Forest Service negotiate a land exchange. If the City trades mature timberlands for the NF old growth, there would be little or no immediate decrease in harvest If cutover lands are traded for old growth, there would be a net decrease in timber harvest until the cutover lands once again have timber of harvesting age. However, the lands the FS would acquire may be located elsewhere in the State of Washington, or even out-of State.

It is also not really possible to tell what the effects will be on the regional timber supply until the City finishes its inventory, prepares its long-range timber harvest plan, and completes the land exchange with the Forest Service. Even under the scenario that would withdraw the maximum amount of mature timber from the region's harvestable base, the net effect would be very small for the region as a whole (defined, say, as Western Washington). There could possibly be some minor local displacement in the immediate area of the watershed, but most likely local mills would make up at least some of the volume by going further afield. Any decrease would contribute to the overall shrinkage of the available timber base, but its contribution, strictly by itself, would be almost immeasurable.

ASSURE NFS MANAGEMENT IS COMPATIBLE AND COORDINATED WITH NEW CITY POLICIES

We urge you to use the overlap in City and Forest Service planning to assure the creation of compatible and coordinated policies by the two major landowners of the largest single source of drinking water in the State of Washington.

Response: The Preferred Alternative includes a new management prescription for the Cedar River Watershed: 20D Negotiate a New Cooperative Agreement. The MBS has proposed to the City that we begin a renegotiation of the 1962 Cooperative Agreement. A new agreement would to recognize (and incorporate into our working relationships) the many changes that have occurred since 1962, both in the natural and social environments in which we operate, and in the policies guiding the City and the Forest Service. It is our intent to continue to the degree possible the cooperative relationships of the past, within the context of changing demands and management direction.

MANAGEMENT IN THE WATERSHED NEEDS TO BE CONSISTENT WITH NEPA, NFMA, ETC.

The 1962 agreement is nonbinding in that in predates NEPA, NFMA, etc. Activities in the watershed need to be completely revised to bring them in as part of the NEPA process.

Response: Forest Service management activities in the watershed will be governed by the approved Forest Plan, which meets the requirements of NEPA, NFMA, etc.

REQUIRE FAIR MARKET VALUE FOR NFS OLD GROWTH ACQUIRED BY THE CITY

Prescription 20B does not specifically state if the City would be required to pay for the old growth timber at fair market value. This timber is a public asset. It should not be "given" to the City. Also, to do so would set a dangerous precedent for timber stands in other municipal watersheds

Response: By law, the Forest Service cannot sell land to the City (or any other party). Rather, land must be traded on a value-for-value basis (although there is allowance for a value differential of up to 25% to be settled by cash). If the City is to acquire NFS lands in the watershed that have standing old growth, it will have to either find comparable old growth lands somewhere outside the watershed to trade on an acre-for-acre basis, or it will have to acquire sufficient additional acres of land that will be equivalent in total value to the NFS lands in the watershed

WATER PRESCRIPTIONS DO NOT PROVIDE SAFE WATER; FILTRATION NOT ADDRESSED

Management prescriptions 20A, 20B and 20C, Cedar River Watershed, do not provide a commitment to preservation of high quality water so that it can be safely used in municipal system without filtration. Uncontrolled and dispersed human recreational activities on National Forest lands within the watershed present the greatest single health risk to the 1.1 million people who use and depend upon this water supply. Accordingly, the Indicators of Response in your otherwise excellent discussion of Water Quality and Municipal Watersheds, should also include a quantitative evaluation of the level of dispersed, unsupervised public use of the Forest Service lands in the Watershed.

The provisions in intensity 20C, which would result in an increase in dispersed recreation in the Watershed, would present significant problems for the City in complying with the new regulations and other expected changes to these regulations. The City, therefore, opposes intensity 20C. We also recommend that an appropriate management intensity (rather than 20A, 20B, or 20C) be developed cooperatively by the City and the Forest Service.

Our concern for the biological, chemical, and physical characteristics of the streams is not mentioned nor is our prior request that the economics of filter plant be compared to the trade-offs of recreational uses of the watershed.

The City of Seattle is committed to producing high quality water without filtration; we urge that MA 20A, 20B, and 20C explicitly address filtration.

> **Response:** The Forest Service is not required to supply pure drinking water to municipal watersheds, we are required to supply high-quality water that is treatable. Forest Service Manual 2542.03 states, in part: "Encourage municipalities to adequate and appropriate water treatment. Do not rely on management practices to provide pure drinking water". We feel the goal statement for MA 20D Cedar River Watershed meets this intent. An analysis of the economics of filtration is currently outside the scope of the Forest Plan.
>
> The Preferred Alternative management area prescription for the Cedar River Watershed is 20D, Negotiate a New Cooperative Agreement, developed since the DEIS was released The Forest Service will initiate new discussions with the City of Seattle, in light of the 1989 Secondary Use Policies. The FS will not enter into any new land exchanges affecting national forest lands within the watershed until a new agreement is negotiated. Until such time, the 1962 Agreement will remain in effect. See Forest Plan, prescription for MA 20D

UPPER MIDDLE AND S.F. NOOKSACK IMPORTANT FOR MUNICIPAL USE; SHOULD BE W & S

The DEIS recommended logging roads, and ultimately logging, in the North Fork Valley and the Bellingham Municipal Watershed in the Upper Middle Nooksack Valley. These areas are especially important to Whatcom County for domestic water, plus important wildlife habitat. The County feels the Middle and South Forks of the Nooksack should be considered for Wild and Scenic River status, to help protect the scenery and ensure water quality essential to native fish runs.

> **Response:** In the Preferred Alternative, the South Fork of the Nooksack is recommended for inclusion in the Wild and Scenic Rivers system; refer to

Table 4-14, Forest Plan for the classification of various segments. A total of 6.6 miles are recommended. The upper Middle Fork is allocated to a combination of MA 23A, Other Municipal Watershed, MA 14 Deer and Elk Enhancement, and MA 15A Mountain Goat Habitat. There is no scheduled harvest in mountain goat habitat and no new road construction. Refer to standards and guidelines for the management area, Plan Chapter 4. Timber harvest activities will take place in MA 23A; the intensity applied is 17B - natural regeneration, pre-commerical thinning, and final harvest. All Forest-wide standards and guidelines to protect or enhance water quality will apply, and watershed improvement and maintenance activities are permitted. Again, refer to the MA standards and guidelines. Harvest is at less-than-full yield in MA 14, the allocation that is located along the river. Units are designed to achieve optimal thermal cover acreage requirements first, then meet forage requirements. Old-growth as well as second growth stands and clearcuts will occur. Refer to the map for Alternative J (Preferred).

WHO HAS USE OF WATERSHED ADJACENT TO CRYSTAL MOUNTAIN?

Is the entire MA 23A area adjacent to Crystal Mountain a watershed for another municipal facility? If so, which municipal area, what rights do they have, and what impacts might this have on Crystal's development?

Response: The watershed is for the use of Crystal Mountain and the Silver Springs area.

NOT ALL RIPARIAN AREAS AND WETLANDS ARE RECEIVING ADEQUATE CONSIDERATION

Riparian zones are defined to include all wetlands However, discussion of management and environmental effects to riparian zones elsewhere in this section and throughout most of this document only include those areas adjacent to streams, and then are only concerned with fish-bearing reaches of streams.

Management of other wetland areas - around lakes, ponds, springs and non-fish bearing streams, wet meadows, bogs, marshes and swamps - needs to be discussed.

Maintaining wildlife habitat and conditions for fish is not sufficient to maintain native riparian wetland and aquatic system. Native plant communities, nutrient levels, non-fish aquatic species of animals and plants, and food webs all need to be considered.

Management plans for protection of wetland (including streamside) plant communities and native ecosystems are needed, including buffer zones to protect them. Equipment, motorized vehicles, livestock, and in many cases people, need to be kept out of wetlands.

> **Response:** The protection of riparian areas of wetlands (fish and non-fish) is included in the Forest-wide Standards and Guidelines for Water Resources and Riparian Areas (Item 5), Forest Plan. These standards and guidelines speak to lands adjacent to perennial and intermittent streams, lakes, bodies of water of all sizes, wetlands, ponds, seeps, floodplains, and other wet areas. Also, refer to the specific guidelines for MA 13, Riparian As noted, in the Desired Future Condition for MA 13, diversity of vegetation is also addressed; there is no domestic livestock grazing.
>
> A new Appendix I, Best Management Practices for Soil and Water Protection, has been added to the FEIS. This appendix discusses the application of BMP's as a preventative system, including· selection of management practices and evaluation in an environmental document (either EA or EIS, for site-specific projects), implementation and enforcement, monitoring, and evaluation and adjustment.

MAP RIPARIAN ZONES TO ESTABLISH A BASELINE FOR MONITORING

Riparian zones are our most sensitive hydrologic zones and the point of initiation of most large scale mass wasting. By comparing changes in riparian vegetation and channel configuration over time, accurate and efficient assessment of conditions relative to Forest Plan Standards can be obtained. The draft Plan states that Riparian Areas will be mapped during project design; the problem with the above standards is there is no current baseline to measure against. Riparian zones and Class I, II, and III streams need to be identified and the vegetation mapped.

> **Response:** We agree. Refer to Forest-wide Standard and Guideline for Water Resources and Riparian Areas, Item 11. Riparian zone mapping will be conducted as funds allow and has already been started. Approximately 18 miles of aquatic/riparian mapping was done in 1989.

MORE DISCUSSION, GUIDANCE RE: INVENTORY AND MAPPING RIPARIAN AREAS

We support the decision to inventory and map riparian areas for the Forest-wide data base, but discussion of this needs to be much broader It should include the data that the Forest will be collecting - very useful for cumulative effects. Specific guidance is needed so that data collection will be consistent across the forest. How will the information gathered here be used to address the information needs identified on page 2-19? How will decisions affecting riparian area be handled without this inventory?

> **Response:** Several guidelines are given in the Information Needs section of the Plan. In addition, as the MBS implements a Geographic Information System, more information on how to map riparian areas may be developed. Prior to the inventory development, decisions affecting riparian areas will be made on-ground at project site after evaluating pertinent factors of the riparian area.

WHAT SIZE WETLANDS WILL BE PROTECTED?

In MA 13 Standards and Guidelines, Item C 1 e , for managing wetlands, is it meant that wetlands will only be protected if threatened and endangered species are involved or if the wetland is at least several acres in size. It appears that this may unnecessarily neglect some important wetlands How is the "several acres in size" to be interpreted?

> **Response:** In the Plan, MA 13, C.1.e has been changed to read "...Manage wetlands to protect all bogs, swamps, and beaver ponds."

WHAT TYPE OF STREAMS ARE INCLUDED IN RIPARIAN AREAS? HOW IS THE BOUNDARY DETERMINED FOR OTHER RIPARIAN AREAS, INCLUDING WETLANDS?

Does the width of riparian areas (100 feet from the water's edge on both sides of all perennial streams) include intermittent streams that do not directly supply domestic water, are not used by fish, or contain enough water to be a major contributor to streams that contain these characteristics? How and when is the boundary determined for protecting all other riparian areas, including wetlands?

> **Response:** The area included for the purposes of Forest planning is defined in Chapter III, FEIS. Actual riparian boundaries for streams and other riparian areas are determined during site-specific, project level planning, based on topographic and vegetative conditions. Refer to Forest-wide Standard and Guideline, Plan Chapter 4, Water and Riparian Items 4 and 11

WHAT ARE THE CHARACTERISTICS OF RIPARIAN AREAS?

It is stated that "Geographical boundaries of riparian areas are determined by on-site characteristics." What are these characteristics? How much of the area around the riparian area is included within the area to protected?

> **Response:** There are several on-site characteristics that are evaluated to determine the geographical boundary These are topography, vegetation, soil stability etc. Usually all the unique riparian vegetation is included within the boundary. The most common topographic boundary occurs at a

natural slope break, such as the top of the inner gorge. Also, refer to the discussion in Forest-wide Standards and Guidelines, Chapter 4, Plan.

INFORMATION ON WETLANDS IS INSUFFICIENT

There is insufficient information in the EIS with regard to impacts on wetlands. How many wetlands are in the National Forest, and where are they? How can they be characterized? What benefits do they provide, and how do the alternatives differ in terms of their impacts on wetlands?

Response: As discussed in Chapter III, Riparian Zones, there are thousands of wetlands on the MBS, located on valley bottoms and within topographic depressions. They range in size from a few yards square to several acres. The actual number of wetlands is unknown, as many of the smaller wetlands, and those located in undeveloped or wilderness areas, are too small be seen on aerial photos. The characteristics of wetlands are defined in Chapter III, FEIS and in the glossary. Also, see Chapter III, Riparian, FEIS for a discussion of the benefits. Chapter IV, Environmental Consequences, includes the impacts of implementing each alternative on wetlands - see Water, Chapter IV.

LIST ALL STREAMS ON THE MBS, ALONG WITH PROPOSED BUFFERS.

I would like a list of all the streams, even if they do not run the entire 12 months of the year, along with the minimum proposed buffer for each stream, for protection from logging near a riparian zone. Since only a small amount of all the timber harvest comes from the riparian areas, the actual increased cost of maintaining buffers or entire undisturbed riparian zones could not be a large contributing factor to overall timber production costs.

The Forest needs to complete a full stream survey before the next planning period.

Response: The prescription for MA 13, Riparian and Fish Habitat Emphasis, includes the specific standards and guidelines to be used for all Class I, II, and deeply incised Class III streams, and lakes, wetlands, ponds, seeps, floodplains. In addition, refer to the Forest-wide Standards and Guidelines for Water Resources and Riparian Areas, Chapter 4, Plan. In part, MA 13 calls for meeting or exceeding water quality; extended rotations for some harvesting (some areas will not be harvested and some will be managed on a normal rotation - to be determined at the project level, environmental analysis); maintenance of streamside vegetation; soil protection; fish habitat improvement; and maintaining or improving the diversity of tree and animal species.

A list of **all** Forest streams is beyond the current scope of the Forest Plan. Such information, along with the site-specific riparian prescription, is developed at the project level. The MBS is in the process of implementing a Geographic Information System (installation to be completed by 1992). With the aid of this computerized technology, we should be able to generate a mapped layer of all streams before the next round of Forest planning.

AVOID ANY MORE LOSS OF WETLANDS; DISCUSS THEIR REHABILITATION

Wetlands are fast becoming rare and unique habitats because so much has been lost; further losses should be avoided entirely. How are the wetland areas rehabilitated:

Response: The Forest-wide Standards and Guidelines and standards and guidelines for MA 13 (Forest Plan, Chapter 4) speak to wetlands and riparian areas In addition, we are required to follow the direction of Executive Order 11990 - Protection of Wetlands (1977). It requires agencies to take action to minimize the destruction, loss, or degradation of wetlands, to preserve and enhance their benefits, and avoid construction in wetlands unless there is no practical alternative and the action is designed to minimize impacts. Because the Forest Service is a multiple-use agency, it is not possible to limit entirely activities in wetlands. However, the objectives are to minimize disturbance and maintain the integrity of the wetlands. Where disturbance does occur, rehabilitation will be done by re-establishing vegetation on disturbed areas.

BETTER RIPARIAN PROTECTION NEEDED

The forest needs better riparian protection. A 100-foot buffer should be provided for all sizes and classes of streams. This would also provide potential wildlife corridors and restrict erosion and siltation.
It is stated that "Emphasis will be placed on the protection of riparian areas so that their integrity is maintained " Riparian integrity needs to be clearly defined. Under such an approach, what level of impact still preserves the integrity of the area?

The Forest-wide Standards and Guidelines for riparian areas are extremely vague, with far too much qualifying language. They need to reflect a more greater level of protection for the vital riparian ecosystem

Maintenance of buffer strips should be clearly mandated for all riparian types, and enforcement of timber harvest regulations near buffer strips should be strictly enforced.

It appears that Class I, II, and heavily incised Class III aquatic/riparian areas may not be given the quality of protection that is required for conservation of fish and wildlife resources. There is simply too much flexibility in the Plan, which could result in intensive logging and road building within these areas.

Response: Riparian integrity means that the quality of the area will be maintained to meet the riparian objectives that are defined for a specific riparian area during project analysis. At the time of project proposal, the boundaries of the riparian area are set, depending upon specific topographic variation: see Forest-wide Standards and Guidelines. Refer to the specific management prescription for MA 13, Chapter 4, Forest Plan; specifically note that timber harvesting is on an extended rotation, and is permitted only when riparian objectives can be accomplished. MA 13 L.2.a. states that roads should avoid riparian areas when possible and that they may be located in a riparian area only if riparian values are protected. There is discussion in Appendix B on the FORPLAN modeling done for MA 13.

Note that buffer strip is an outdated term. The present concept (and the one used in this planning process) centers around managed vegetation in the riparian zone. Trees are left in sufficient numbers to achieve desired objectives, such as: shade over the stream, future large woody material recruitment, etc. Site-specific requirement are determined during project design.

CLASS III AND IV STREAMS IGNORED

The width of the "buffer" seems to be fixed by stream class rather than site specific conditions. Other problems· without any inventories of Class III and IV streams, how can the plan propose narrow "buffer" widths? The implication, again, is that the Class III and IV streams are unimportant to fish production. This doesn't fit with commonly accepted ideas about ecosystems and food chains.

The preferred way to mitigate impacts to the riparian zone is to give full protection to that zone for all stream Classes This would require that logging and road building occur well outside of the riparian zone.

Standards and guidelines for riparian zones may be inadequate to protect important fish and wildlife resources such as anadromous fish, amphibians, cavity nesting waterfowl, other waterfowl, and mammals. It appears that lightly incised Class III streams and all Class IV streams can be heavily logged. Consequently, the management guidance preserved here should be re-evaluated and changed to meet fish and wildlife requirements. It should be noted that what happens in these small headwater streams has a disproportionate effect on downstream biological activity.

In the smaller, lightly incised or intermittent streams, the plan allows for a ten foot buffer which is totally inadequate for fish and wildlife protection. Studies have shown that wildlife and fish species diversity is reduced significantly as streamside zones are decreased. Since riparian habitats are so critical for wildlife and fish, they merit special protections and the State recommends a riparian zone as wide as the potential height of the tallest trees in the zone. This prescription should apply to all waters bearing fish as well as smaller Class III streams featuring key wildlife habitats.

Response: The streams side management unit (SMU) discussed in the Appendix B (including the 10-foot width for Class IV streams) are widths that were used **only** for modeling timber harvesting constraints in FORPLAN. They have no tie to the width of the riparian area on the ground. For project level, or timber sale planning, a District ID Team will determine the actual riparian area boundaries for all steams. At a minimum, riparian areas are maintained as per the Forest-wide Standards and Guidelines. Actual on-the-ground project planning will determine the riparian widths along all stream channels. Note Item 6, maintaining riparian areas in accordance with FSM 2526, which states, in part, "Give special attention to land and vegetation for approximately 100 feet from the edges of all perennial streams, lakes, and other bodies of water. This distance shall correspond to at least the recognizable area dominated by the riparian vegetation." (FSM, as amended 3/86) Timber harvesting in this 100 foot zone can only be planned and developed it the riparian area dependant resources of soil, water, fish and wildlife can be protected or adequately mitigated. MA 13C will be applied to all Class I, II, and deeply incised Class III streams.

The Forest-wide Standards and Guidelines also speak to lightly incised Class III streams with existing fish useage. Refer to Item 9.b..

CLASS IV STREAMS NOT PROTECTED IN THE PLAN

The ramifications of the series of assumptions documented in Appendix B (page B-150) ends with the following "the SMU prescription does not apply to Class IV streams." Thus, the following appears to have occurred:

Stream Class	Current Actual Protection	Planned Protection
I & II	225 feet width	200 feet
III deeply incised	125 feet (average)	100 feet
III lightly incised	125 feet (average)	10 feet
IV	125 feet (average)	None

We realize that this only applies to the planning process and that each case will be examined on its own individual merit. However, changes of this magnitude must significantly impact implementation or the planning process is deliberately flawed. We cannot see how even existing levels of fish production (which are already admittedly far below potential natural levels) can be maintained with this type or reduced habitat protection.

Response: These widths were used only in FORPLAN modeling to determine a Forest-wide timber harvest constraint Actual riparian area widths will be determined on a project level bases During project level planning, at least 100 on each side of a channel must be considered. This situation is similar to the current actual protection column

"DEEPLY" AND "LIGHTLY" INCISED ARE SPECIAL TERMS

The basic stream classification system described is common to National Forests in general. However, "deeply incised" and "lightly incised" is a special adaptation unique to Mt. Baker-Snoqualmie

Response: These characteristics, which do describe the physical situation on the MBS, are defined in the Glossary

MITIGATION IS LIKELY TO BE COSTLY, AND FUNDS PLANNED FOR FISHERY ENHANCEMENT ARE LIKELY TO BE DIVERTED TO MITIGATION

The narrative discussion under "Water and Riparian Resources" consistently points to a direct relationship between expensive mitigation measures and levels of management activities (timber harvest, roading relationship. For example, Alternative D - which has a high level of timber harvesting, etc. would require "intensive mitigation measures" while Alternative C has "least mitigation required". However, none of this is quantified. A realistic expectation it that mitigation would be a significant cost, particularly for management activities in the riparian area. It is also probable that funds planned for fishery enhancement will actually be diverted to mitigation in most of the alternatives involving moderate to high levels of forest management activities.

Response: The actual cost of either fisheries or watershed mitigation is difficult to narrate, and the scale and/or scope of the mitigation is highly variable over the Forest. Difference between fishery mitigation (rehabilitation or restoration) and enhancement (improvement) for this Forest is this: mitigation is correcting a situation in order to restore fishery production or capability to a previous desired state, while enhancement is improving or making better an exiting acceptable fishery production or capability level. Watershed Rehabilitation and Fish Habitat Improvement schedules for the first decade of the Plan are included in Plan Appendices I and C

IDENTIFY RIPARIAN AREA MITIGATION STANDARDS MORE FULLY

The standards for riparian area mitigation that have been developed need to be identified more specifically. By stating that special attention will be given to activities in riparian areas, there are no assurances that the riparian areas will be adequately protected and that potential impacts will be properly mitigated. For example, what will and will not be allowed in riparian areas should be discussed

Response: Mitigation measures applicable to all alternatives are discussed in Chapter II, FEIS. Also, refer to Forest-wide Standards and Guidelines for riparian areas, and the standards and guidelines for MA 13, both in Chapter 4, Forest Plan. Together, and with the mitigation measures and application of Best Management Practices (determined at the site-specific project level), these provide a great deal of detail regarding what will and will not be allowed in riparian areas. Additionally, each proposed project - from timber sales to trail reconstruction - will involve an environmental analysis, following the NEPA process, with site-specific mitigation measures for each alternative.

DISTURBING SOILS PROVIDES HABITAT FOR NON-NATIVE AND WEED PLANT SPECIES

Disturbing soils provides habitat for non-native and weed plant species. Their establishment can change the species composition and succession of plant communities. They can alter food webs by displacing native species. This is particularly true of wetland and riparian systems, but also applies to uplands.

Soil erosion can lead to sedimentation of wetlands and riparian areas altering the native vegetation (killing vegetation, altering the hydrology, soils and aeration of the areas).

Response: It has been our experience that native vegetation, almost without exception, comes back on disturbed soil on the MBS. The re-establishment of native species will be delayed a few years if the determination (at the project level) is made to plant non-native grass species in order to provide erosion control (and the sedimentation that can occur in wetlands if erosion is left unchecked.) After a few years, the area is unusually invaded by native species and the grass disappears.

Forest-wide Standards and Guidelines for Diversity and Long-Term Productivity speak to a goal of maintaining native (and desirable introduced) plant species. (Plan, Chapter 4). Big game preferred seed will be used for reseeding in identified winter range (Wildlife Forest-wide Standards and Guidelines) And the Forest-wide Standards and Guidelines

for Wilderness state that non-native plants should not be introduced. Also required in wilderness is the use of weed-free hay or grain for pack and saddle stock, to minimize the accidental introduction of non-native species.

DISCUSS SOIL IN RIPARIAN AREAS AND EFFECTS OF TIMBER HARVEST, ROAD CONSTRUCTION ON THEM

Soils in riparian areas (all wetlands) are not discussed in much detail, contrary to what is stated in this paragraph. Effects of road building and timber harvest on these soils especially need to be discussed.

Response: Soils - Forest-wide - are discussed in Chapter III, FEIS; the effects of road construction and timber harvest on soils are discussed in Chapter IV More site-specific analysis of proposed activities on soils in riparian areas will be done in project-level environmental analysis. Refer to Chapter 4, Forest Plan, Forest-wide Standards and Guidelines for the soil resource for practices, standards, etc that will be met in all management areas to maintain and enhance soil and land productivity.

HOW IS IT DETERMINED WHEN WATER TEMPERATURE IS AN ISSUE?

How will it be determined where and whether water temperature is an issue? And doesn't it usually become an issue until after the shading requirement goes below 80%, and it is to late?

Response: If water temperatures is likely to be an issue in a ground-disturbing project, it is first identified by District personnel during the scoping process for an environmental analysis Once identified as a concern, an analyses or evaluation is made to determine the significance or magnitude of the problem. Under Forest-wide Standards and Guidelines, Water Resources Item 10, we have cited additional information to quantify "acceptable limits" for water temperature.

GIVE MORE ATTENTION TO VARIOUS MANAGEMENT CONCEPTS IN RIPARIAN AREAS

Greater attention should be given to clarifying riparian zone management concepts, such as providing for recruitment of large woody debris to a stream. For this example, information is needed on the recruitment potential (to the stream) of large woody debris under an unlogged condition as compared with the logged condition. Further, management concepts (e g., stream classes, timber management intensities, structural erosion control, forest-wide standards and guidelines and riparian prescription for fish and wildlife) should be presented in such a way as to form an integrated whole

Response: Beyond the Forest-wide Standards and Guidelines (Chapter 4, Plan), and those of MA 13, this level of detail - such as potential to recruit large woody material - must be described and identified at the project level, when site-specific analysis can be done, and the riparian area identified and mapped. The specific aquatic/riparian inventory of the potentially affected stream system will determine the desired future large, woody material level and recruitment condition.

INSUFFICIENT COMMITMENT TO WATER QUALITY AND RIPARIAN AREAS

The Forest-wide Standards and Guidelines lack the specific commitments to water quality and riparian areas needed to ensure adequate protection.

> **Response:** These are the Standard and Guideline Statements that apply Forest Wide. More specific and intensive watershed protection measures are utilized in various management areas, in sensitive areas, etc. Also refer to the new Appendix I, on application of Best Management Practices. In addition, we have included specific monitoring (Plan, Chapter 5) activities with the objective of measuring how effective our prescriptions, standards, guidelines, and mitigation measures are in meeting the stated objectives and desired future condition for riparian areas. If we find, as each activity and output is measured, that adjustments need to be made, the Plan will be amended.

FOR SILVICULTURAL TREATMENT, HOW ARE RIPARIAN OBJECTIVES DEFINED?

Under MA 13, Item E., silvicultural treatments will be permitted only when riparian objectives can be met How are the riparian objectives determined, and who makes the decision whether or not the treatments are consistent with the objectives? A reference to another section of the EIS may be in order. There should also be inclusion of BMP's for mitigation, as well as contract conditions.

> **Response:** The riparian objectives are discussed in the Forest Plan, Forest-wide Standards and Guidelines. Specialists on each project-level ID team will be involved in the selection of various silvicultural treatments to insure that stated riparian objectives are obtained. In addition, the application of BMP's (refer to new Appendix I) plus stated monitoring (Chapter 5, Forest Plan) all help insure that the objectives are met.

CLARIFY MA 13C STANDARDS AND GUIDELINES FOR ROAD CONSTRUCTION IN RIPARIAN ZONES

MA 13C, (L) (2) (c) states that water quality/anadromous fisheries habitat problems caused by road construction will be given "high priority for corrective action " There should be a high priority for protection above and beyond correction. Further, how does "high priority" translate into management reality?

13C (L) (1) says: "Locating roads in riparian areas can only be done if riparian values are protected." You need to explain **how** values are to be protected. Under (L) (2) (a), what are the "stated riparian area objectives"?

> **Response:** Riparian area objectives are site-specific and are defined at the project level. The objectives may vary, depending upon topographic, geologic, and vegetative conditions, and habitat requirements at that site. Roads will be located in riparian areas only if the objectives which have been defined for that site can still be met. Should damage inadvertently occur, it will be given high priority for correction. Priorities for watershed rehabilitation are defined in new Appendix I, Forest Plan.

CLARIFY ITEMS E. AND F. UNDER STANDARDS AND GUIDELINES FOR MA 13

(E) (2) (b), the purpose of the reference to F1 is unclear.
(E) (2) (b), what happens if more than 10% of the area is damaged, and what defines the area? How is this enforced and monitored?
(F) (1) (a), what does it mean to permit watershed improvements and maintenance? Should they not be required? We suggest that a more active, rather than passive, approach be taken.
(F) (2) (a) how is no more than 10% soil exposure ensured?
(F) (2) (b), how are disturbance, widely distributed, and project area to be interpreted?

Response: Reference to F1 is an error; it should be F2 and has been corrected in the Plan. The project area will vary in size depending upon the particular project The BMP's that will be used should limit soil exposure to no more than 10% of the area. Monitoring will be done to verify that this standard is met, if the limits are exceeded, the BMP's will be revised so as to accomplish the desired objective in future projects.

CORRECT STATEMENT ON WATER LEVEL IN WETLANDS

Referring to the effects section, Chapter IV: changing water levels can have major effect on wetlands, causing them to dry up and change to other vegetation or habitats, or flooding and killing wetland vegetation.

Response: This has been incorporated into Chapter IV of the FEIS.

SUGGEST MODIFICATIONS TO WORDING IN MA 13 STANDARDS AND GUIDELINES

Do not feel the language in MA 13C, program element Recreation Planning is appropriate. Specifically, we are concerned about the wording ".. conflicts will be resolved in favor of riparian and anadromous fish values." The NEPA standards govern, but a progressive, creative, and flexible approach to resolving conflicts must be used.

Under the title "Descriptions of Lands..." for MA 13: the second paragraph says riparian areas contain a variety of resources. The Forest completely left out timber, these lands are, in many cases, the most productive timber lands.

The guidelines for riparian areas focus primarily on the protection of water quality. These habitats are also of very high value to wildlife; attention should be given to protecting riparian habitats for wildlife habitat.

Response: The wording of this standard comes directly from FSM 2526 03 as amended 3/86, and which states in item 2. "Manage riparian areas under the principles of multiple-use and sustained-yield, while emphasizing protection and improvement of soil, water, vegetation, and fish and wildlife resources. Give preferential consideration to riparian dependent resources when conflicts among land use activities occur." The wording of this portion of the MA 13C prescription has been modified slightly since the Draft Plan, it now reads "...conflict will be resolved in favor of the dependent riparian resources and values (soil, water, fish, and wildlife.). *This better meets the national direction. The value of timber in these* areas is recognized, as harvest is permitted when riparian area objectives can be met.

CORRECT WORDING IN THE RIPARIAN STANDARDS AND GUIDELINES

Forest-wide Standards and Guidelines, page 4-97, Item 4: strike the word "large" from the first sentence.

MA 13, J 4 a: the second sentence should read, "...amount of mature riparian habitat."

MA 13C, L.2.c: must be full mitigated in kind, on site.

> **Response:** The suggested changes have been made in the Forest Plan, Chapter 4.

WHICH TREES ARE RETAINED IN MA 13?

MA 13C, C.1.b.: which trees are not planned to be harvested? How will it be determined which trees are needed for slope stability or future wood debris?

> **Response:** This will be determined by a project-level ID Team, with specialists from at least timber, hydrology, and fisheries.

CLARIFY SHADE REQUIREMENTS FOR MA 13

MA 13C, C.1.c.: for monitoring streamside vegetation, it is not clear whether 80% shade is 80% of the existing total watershed.

> **Response:** The 80% figure refers to all the fish bearing streams within the planning area or the drainage (watershed).

IDENTIFY CURRENT HABITAT CAPABILITY AND VEGETATION DIVERSITY IN RIPARIAN AREAS

Under MA 13C C.1.d: current levels of habitat capability and riparian vegetation diversity need to be identified. Discussion needs to be given to what criteria will be used for determining which places are selected for improvement.

> **Response:** Levels of habitat capability and riparian vegetation are varied across the Forest. As noted in Item 10. Forest-wide Standards and Guidelines for Water and Riparian, and the Information Needs in Chapter 2 of the Plan, much of the exact mapping (and thus identification of both habitat capability and diversity of existing vegetation) will be done, site-specifically, on each watershed. New Appendix I in the Plan shows the Watershed Rehabilitation Program for the first 10 years of Plan implementation As inventory, site-specific projects, and watershed or area assessments are completed, this program may be adjusted

WHAT DOES "EMPHASIZE" MEAN FOR FISH AND WILDLIFE HABITAT IN MA 13?

Under Habitat Improvement (MA 13 C 2) fish and wildlife habitat to be emphasized. How is this emphasis to be realized, i.e., what does emphasize mean and what specific activities will be encouraged and actually carried out?

Response: Emphasis in this case means given highest priority for management consideration and action at a watershed or project level. The standards and guidelines included in the MA prescription discuss some methods for habitat improvement; also, refer to Mitigation Measures for fish, Chapter IV, FEIS.

I DO NOT UNDERSTAND "STRATEGY" IN MA 13

In the "Description of Lands Where Prescription Applicable" for MA 13, there is also reference made to "this strategy" - what strategy? There is no strategy discussed or presented.

Response: The wording in this paragraph has been modified for clarity in the Forest Plan; the words "this strategy" have also been deleted.

CORRECTION IN FEIS, CHAPTER III

On page III-19, paragraph 1, last sentence, Riparian Zones and Planning: Possible typographic error: this sentence probably should have said "or do not contain enough water to be a major..."

Response: The suggested change has been made in the FEIS, Chapter III.

NO RIPARIAN PROTECTION FOR STATE WILD AND SCENIC RIVER

No comprehensive riparian protection has been implemented for this State designated scenic river and its 64 tributaries.

Response: The Washington State Scenic Rivers Program does not require specific riparian protection. In the Preferred Alternative, the Skykomish River and a number of it's tributaries are is recommended for designation as part of the National Wild and Scenic River System. Refer to Alternative Descriptions, Chapter II, FEIS and Appendix E, which discusses each river in detail

"FULL RANGE" OF TIMBER ACTIVITIES NOT APPROPRIATE IN MA 13

Page B-43 states "A full range of silvicultural activities.. " - this is not appropriate for riparian areas, i.e. thinning, fertilization, brush control. Please modify this in Appendix B.

Response: We have substituted "limited range" in this sentence in the FEIS, Appendix B

CORRECT WORDING RIPARIAN MR IN APPENDIX B

Appendix B, page B-42: the third paragraph under "Riparian Minimum Management Requirements" has a critical assumption. Basically, "within an acceptable level of disturbance" means "while still protection streambanks, maintaining stream shading, and providing a buffer against sediment moving into the stream." This should be so stated.

Response: This clarification has been added.

ARE MAPS TOO SMALL IN SCALE TO SHOW RIPARIAN AREAS?

The accompanying maps do not show the management areas for riparian and fish habitat emphasis. Page 4-98, #10, implies that these areas area not known If the resolution of the maps is such that the riparian and fish habitat areas cannot be shown on the maps, they still need to be identified somehow.

Response: The riparian standards and guidelines apply to lands meeting the characteristics identified in the Forest Plan Standards and Guidelines They are too small to be mapped for the FEIS and, as stated in Item 10., exact boundaries will be mapped during the planned inventory.

THE RIPARIAN AREA DISCUSSIONS ARE POORLY ORGANIZED

The monitoring and evaluation of riparian areas is covered in several sections of the Plan; all of this material should be pulled together under one heading titled Riparian Areas.

Response: In the preparation of any document, especially one as complex as the Forest Plan, there are many different ways that information can be organized. The organization of information, monitoring, standards and guidelines for riparian resources is handed in the same way as other resources. The format of this document is determined 1) by direction (national and Pacific Northwest Region) and 2) for ease of use by managers on the ground. Riparian resources are discussed together with soil and water resources in the Forest Management goals and Forest-wide Standards and Guidelines sections of Chapter 4 of the Forest Plan. The monitoring plan (Chapter 5) contains a separate heading for riparian resources.

REGIONAL AND FOREST DIRECTION FOR RIPARIAN MANAGEMENT NOT INCLUDED IN PLAN

You refer to Riparian management guidelines from a memo released in the early 1980's, yet you fail to print these guidelines in your forest plan. Why?

Response: These documents are available in the Planning Records, and only referenced in the plan documents, to meet requirements of 40 CFR Parts 1500 to 1508 (the CEQ Regulations for Implementing NEPA) to reduce paperwork by incorporation by reference.

ANY ROADS IN RIPARIAN AREAS SHOULD CROSS STREAMS AT RIGHT ANGLE

To discussion in MA 13C, L.1.a: add "No new roads should be constructed unless necessary to cross; these should be constructed at right angles to the stream channel."

Response: *The prescription, as written, is designed to first, protect the* dependent riparian resources. Adding this level of detail to the MA standards and guidelines is beyond the intent of the Forest Plan and, on a site-specific basis, may restrict project design so that the objectives of the MA cannot be met.

LIVESTOCK ALSO DAMAGES RIPARIAN AREAS

Livestock use also has a serious effect on riparian zones (all wetlands).

Response: There is no domestic livestock use in riparian zones on the MBS; refer to MA 13, Item D. Range (Plan, Chapter 4), which reads "No practice."

PROHIBIT MINERAL EXTRACTION IN RIPARIAN AREAS

Mineral extraction and processing "material sites" should be prohibited in riparian zone.

Response: As described in Chapter III, Minerals, locatable minerals can be acquired under the General Mining Laws of 1872 (as amended); their removal cannot be precluded by Forest Plan standards and guidelines. Salable minerals (common varieties of sand, gravel, etc) are disposed of under the Materials Act of 1947 (as amended); disposal of salable minerals is at the discretion of the FS. As stated in MA 13. G.a., extraction of common variety minerals may be conducted provided riparian values can be protected. Any activity will be analyzed in an environmental document.

NO LOGGING, ROADS, BROADCAST BURNING IN RIPARIAN AREAS

There should be no logging in wetland and riparian areas, no vehicle use, or road construction. Trails should be routed around the area. Avoid broadcast burning except where clearly necessary

Response: Detailed management prescriptions for the management of riparian areas are included in Chapter 4 of the Forest Plan; also, refer to Forest-wide Standards and Guidelines There are been some updates between draft and final plans MBS use of broadcast burning is/has been very limited; we will continually decrease our use of broadcast burning as a management tool. Refer to Chapter III, Fire, FEIS.

NO ORV's IN RIPARIAN AREAS

There should be no use of ORV's in any of the riparian area types, on or off trails. The use of ATVs in streambeds is particularly destructive and their use should be specifically prohibited in the Forest.

Response: ORV use is permitted on existing roads or ORV trails (MA 13C); new Item A 5 b. regarding new ORV trail construction/reconstruction states that these activities will be permitted only when state riparian objectives can be accomplished. The use of ORV's in the aquatic portion of the riparian zone is not permitted (MA 13C, A.2.a.)

MAINTAIN NATURAL SPRINGS

Natural springs should be maintained for the use of wildlife, and livestock should not be allowed to degrade these vulnerable habitats.

Response: Natural springs have been added to Forest-wide Standards and Guidelines for Water and Riparian Areas, Chapter 4, Forest Plan.

THE FOREST SERVICE PLACES TOO MUCH FAITH IN THE USE OF BMP's

The Forest Service seems to place much too much faith in the use of BMP's. The use of BMP's does not ensure State Water Quality Standards will be met or exceeded A BMP is "the most effective, practicable (including technological, economic and institutional considerations) means of preventing or reducing the amount" of nonpoint pollution to a level compatible with water quality goals. Just because you say you will use the "best" management practices doesn't imply the best for the resource, as BMP's can be diluted by economic considerations.

The DEIS states that water quality standards for the State are met through application of Best Management Practices (BMP's). The process for how this will be carried out should be explained further.

With reference to BMP's and water quality standards: the Plan and EIS must be consistent and accurate on the relationship between the two throughout the documents.

> **Response:** The material in new Appendix I, FEIS includes more detailed discussion of the implementation process for BMP's, plus samples of general and specific BMP's. Best Management Practices are the primary mechanism to enable the achievement of water quality regulations. BMP's are selected and tailored for each site-specific project, and the selection process is part of the NEPA process. Monitoring and evaluation are key steps in the BMP process; as these steps proceed, the BMP may be changed if it fails to achieve the desired objective.

THE TIMBER-FISH-WILDLIFE AGREEMENT STANDARDS SHOULD REPLACE THE RIPARIAN MMR

The new Washington State Forest Practices Regulations (TFW Agreement) meet the needs of the FS and allow harvest scheduling in all classes of riparian areas. The TFW regulations have been reviewed by the public and passed the State of Washington Environmental review process. They should replace the MMR riparian constraints. The MMR's go way beyond the BMP requirements and should be dropped.

We insist, as a minimum, that the FS address the Timber/Fish/Wildlife process and the Best Management Practices (BMP's) set forth in the rules and regulations affecting water quality. This process would provide assurance the State needs to approve the forest plans for water quality compliance.

We think that the new Washington State Forest Practices Regulations meet the needs of the Forest Service and allow harvest scheduling in all classes of riparian areas. These new state regulation have been developed by the State Departments of Natural Resources, the Department of Wildlife, the Department of Ecology, and several environmental organizations and Indian tribes. The new regulations have been reviewed by the public and passed the State of Washington Environmental review process. The TFW agreement standards should replace the MMR riparian constraints The MMR's go way beyond the BMP requirements and should be dropped

> **Response:** The Forest Service is a multiple-use agency which is required by various laws to protect many resources. Some of these laws which are binding include: the Organic Administration Act, 1987; National Environmental Policy Act, 1969; and the National Forest Management Act, 1976. The Washington State Forest Practices Regulations do not provide all

the resource protection sufficient to meet these federal laws The State Forest Practices Act Rules have been certified as Best Management Practices for silviculture activities. An initial comparison has been made of Forest Service practices; it was determined that they meet or exceed the State's BMP's.

Section 208 of the Clean Water Act and Section 319 of the Water Quality Act of 1987 are the legal precedents that most affect forest management because they address nonpoint source pollution. It has been determined that even with the use of BMP's, a number of drainages on the MBS have become severely degraded as the result of past activities. Examples are Deer Creek, Finney Creek, and Canyon Creek. Landslides, failing roads, unstable streams, and degraded fish habitat are becoming common. Because of these conditions, we completed a hydrologic cumulative analysis; this procedure resulted in a method to meet water quality and riparian managements. Refer to more detailed discussion in new Appendix H, in Chapter II and IV, FEIS, Appendix B, and Forest-wide Standards and Guidelines for Soil, Air, Water, and Riparian Areas, Chapter 4, Forest Plan.

RIPARIAN AND WATER QUALITY MMR'S WERE DEVELOPED WITHOUT PUBLIC COMMENT

The riparian and water quality MMR's are developed differently by each forest; the process used did not involve the public and in several cases, was not interdisciplinary. Each water quality MMR was applied to all alternatives and each forest claims their approach is required by law, even though the MMR's differ for identical stream classes.

Response: Each National Forest has its own set of climatic, topographic, soil, and geologic conditions. Stream classes are based only on size and broad use. Identical classes can have very different conditions among National Forests; therefore, what may be appropriate for a stream on one forest may not be appropriate for the same class of stream on another forest. In addition, National Forest lands have a much different character that do State and private lands.

In the DEIS, documentation in Appendix B, Appendix J, and Chapter II, DEIS explained how the MR's were developed. These documents provided reviewers with the information needed to comment on the development of management requirements. Comments received during the 115-day review period were considered in preparation of the FEIS.

In response to public and agency comment on the draft plan, more analysis was done to develop a method to meet water quality and riparian MR's. The process used, and the extensive meetings with both the scientific and academic communities and timber industry representatives are summarized in new Appendix H, and explained in detail in the planning records.

THE CONTEXT OF THE STATEMENT ON BMP's AND THE EPA IS NOT CLEAR

The context of the statement on BMP's and the EPA is not clear. The purposes for which the reports are prepared and are carried out needs to be discussed, as well as how they affect Forest Service management activities.

Response: Refer to new Appendix I, FEIS, for more discussion on Forest Service BMP's. A determination is made periodically determine if Forest

Service BMP's meet or exceed State requirements. This is included in the report submitted to the EPA.

WHAT ARE BMP'S? WHAT FEEDBACK MECHANISMS EXIST TO REPORT TO THE STATE?

What are BMP's? What guarantees that they are adequate? What feedback mechanism has been designed to report water quality conditions in the Forest to the State Department of Ecology?

Response: BMP's are defined as "methods, measures, or practices selected by an agency to meet nonpoint source control needs. Refer to discussion added in new FEIS Appendix I, that addresses the question of adequacy for meeting State water quality regulations. The feedback mechanism is contained in the process to implement the State Water Quality Plan on lands administered by the FS, as described in a Memorandum of Understanding between the Department of Ecology and USDA Forest Service (7/79), and "Attachment A" - referenced in the MOU - "Implementation Plan for Water Quality Planning on National Forest Lands in the Pacific Northwest" 12/78.

REQUIRE BMP'S, MONITORING FOR PROJECT ACTIVITIES

The MBS should consider requiring BMP's, site monitoring, and tracking cumulative effects before, during, and after project activity.

Response: These will be monitored. Refer to the Monitoring Plan, in Chapter 5 of the Plan. Also, refer to new Appendix I, on BMP's.

INCLUDE DEVELOPMENT, VERIFICATION OF BMP'S IN MA 17

under MA 17 standards and guidelines, Timber element, Item 25: Timber Harvest Administration should include development, implementation, and verification of BMP's; this will help determine that BMP's are doing what they are supposed to do - monitoring is needed. Under Item 29 or 30, the FS should ensure that the environmental components of the sale have been satisfactorily done.

Response: The reference to BMP's suggested is covered under Item F.1. Water, Soil, and Air Planning, which states "meet Forest-wide Standards and Guidelines " Refer to Chapter 4, Forest-wide Standards and Guidelines for Water Resources and Riparian Areas. Items E. 19, 21, and 24, Timber Harvest Administration, have been reworded to reflect this comment.

NEED MORE DISCUSSION ON CUMULATIVE EFFECTS

The reference to cumulative impacts on page 4-98 of the draft plan needs to be supported by further discussion.

Response: Considerable new discussion on hydrologic cumulative effects has been added to Chapter IV, FEIS, new Appendix H, and Appendix B.

MORE PROTECTION FOR MODERATELY UNSTABLE SOILS, PREVENT "DEER CREEK" EVENTS

The narrative under "Special Conditions" describes protection for soils with "a 75 percent probability of a doubling of mass soils movement." The problem is that "risk" is really a gradually diminishing series of values over a range, from highly unstable to very stable soils. The draft plan does not adequately address soil types with a moderately high degree of risk (for example, with a 50 to 75 percent probability of a doubling of mass soil movement). A table of special measures by risk category would be useful. In addition, the draft plan's discussion of the Deer Creek situation is very superficial. This is the "best known" example of forest environmental damage in the entire Pacific Northwest region. The case merits detailed discussion at several points in the plan, including cumulative effects. The planning process needs to present in detail how it will prevent a new "Deer Creek" in the future

Response: We have specific direction to remove lands with soils that are susceptible to irreversible damage from the tentatively suitable for timber production land base (reference, Land Suitability for Timber Production, 36 CFR.219.14 and Regional Planning Direction 1920, November 10, 1983). The level of risk is defined as a "75 percent probability of a doubling of mass movement."

Soils that are unstable but are not sufficiently unstable to be in the above category are protected in several ways. Refer to updated Forest-wide Standard and Guidelines for Soils, Chapter 4, Plan, new Item 8, which states "Other soils that are known to be unstable, but which are not sufficiently unstable to be classified as S-8, will require special transportation planning, design, layout, preconstruction, construction, and maintenance techniques." All unstable soils are investigated during project planning, and the appropriate BMP's are recommended. These would include specific road location and construction requirements, rehabilitation measures, harvest methods, where harvested, timing and size of units.

In addition, refer to Appendix H for discussion of the hydrologic cumulative effects analysis procedure to meet water quality and riparian management requirements. Watersheds in unacceptable conditions (and one criterion for determining watershed condition was streambank stability) will be subject to a set maximum number of acres available for final harvest, by decade

Some additional discussion has been added to the "special conditions" section of Soils, Chapter III, FEIS. There is no guarantee that a "Deer Creek" type of event will never happen in the future. However, meeting management requirements and management area and Forest-wide Standards and Guidelines, plus use of appropriate BMP's will minimize the chance of this occurring.

PLAN DOESN'T ADDRESS EFFECTS OCCURRING OUTSIDE THE FOREST BOUNDARY

Snohomish County is currently attempting to identify and eliminate nonpoint sources of pollution. Logging practices have been identifed as a major source of pollution and silt in the lower Stillaguamish, affecting many recreational uses and destroying salmon runs. Yet the plan does not even address the problem of watershed impact on streams and rivers outside of the Forest.

The Forest's habitat is critical is Puget Sound natural salmon production and there are large amounts of private land within the National Forest boundary. These two factors justify a greatly expanded planning treatment for cumulative effects, particularly with respect to riparian areas. The draft plan only has a few vague statements; specific criteria for future decision-making are needed.

Because of the checkerboard ownership pattern in the lower Greenwater, the FS has the obligation to mitigate poor land practices (abuse and over-cutting) on private lands.

Response: The analysis presented in the DEIS, Chapter IV did include some discussion on the cumulative and indirect effects of implementing alternatives on national forest land on other lands, including a section on conflicts between the effects of the alternatives and the plans and policies of other agencies and landowners Refer to each resource section in the DEIS. Forest Service policy directs each Forest to consider the effects of adjacent and intermingled activities. There is no legal mandate that requires the Forest Service to adjust management in National Forest lands to offset the effects of adjacent activities.

In response to public comments about the cumulative effects of harvest and road construction in watershed, between DEIS and FEIS, the Forest developed a procedure to meet water quality and riparian management requirements. A *set maximum number of acres available for final harvest, by watershed, by* decade was the result of this analysis, which should also result in hydrologic recovery in watersheds currently in an unacceptable condition. See Appendix H, FEIS.

We will continue to assess the cumulative effects of all activities on all land ownerships (national forest and all other) during site-specific project planning activities. Case-by-case decisions will be made at the project level as to what, if any, adjustments of National Forest projects are necessary to offset other land owner's activities.

ADD CUMULATIVE EFFECTS ANALYSIS AND EFFECTS ON EACH WATERSHED TO TABLE IV-4

The text with DEIS Table IV-4 states: "These percents will give a very rough estimate of the effects of harvest activities on water." There should be a narrative describing the relationship between the two. A table of anticipated impacts to water for each watershed should be included. This could be part of a comprehensive cumulative impacts analysis.

Table IV-4 would be much more useful if modified to consider cumulative effects. In this case, the proportion of each watershed outside of Forest Service control (if any) could be shown.

Response: Table IV-4, Chapter IV FEIS, has been replaced, based on the results of the hydrologic cumulative effects analysis procedure, to meet water quality and riparian management requirements. The table now shows the maximum number of acres of final harvest available, by watershed, to meet these MR's. In most cases, the harvest level is reduced for the first two decades, increasing in the third and fourth. Refer to Appendix H.

Watershed condition is a key item in the monitoring plan; see Chapter 5, Forest Plan. As we monitor the effects of implementing the plan, by

watershed, the information you asked for can be collected. At this time however, the final documents do not show the anticipated impacts to each watershed. A table of anticipated impacts to water for each watershed would be appropriate at watershed or project-level planning, but is beyond the scope of the Forest Plan.

DEFINITION OF OLD GROWTH USED IN THE PLAN IS INADEQUATE

You should use the more restrictive definition of old growth that was formulated by your own Pacific Northwest Research Station.

The 297,000 acres that meet most scientist's definition of old growth are less than half of the 667,000 acres referred to in the draft plan. Your totals include mature, large sawtimber; the DEIS explains this, but nevertheless calls it all old growth.

The FS use of the single criterion of 21 inch diameter at breast height (DBH) is not a valid method for identifying old growth stands, 21 inch DBH trees are generally about 125 years old, substantially younger than the criteria by Franklin et al (1981). In addition, old-growth structural features are not used as part of the definition.

The FEIS should re-evaluate the consequences of the alternatives on old growth and old-growth dependent wildlife in light of a more accurate and scientifically valid definition of old growth, that put forth by the agency's own team of experts: "Interim Definitions for Old-growth Douglas-fir...in the Pacific Northwest," J Franklin et al , PNW Research Station, 1986.

By including mature secondary growth in the overall inventory, the loss of the most sensitive areas of primary old growth is obscured. This aspect of the plan needs much clarification.

The text defines old growth as "mature, large sawtimber, at least 21 inches DBH." The glossary definition (page V-46) is different.

Response: Four primary definitions have been proposed for old growth in the Pacific Northwest: 1) the definition used in the Region 6, 1984 Regional Guide, 2) the definition proposed by the Society of American Foresters in 1984, 3) the interim definition proposed by the interagency Old-growth Development Committee (Franklin et al., 1986), and 4) a series of old growth definitions developed by Peter Morrison for the Wilderness Society.

For this planning process, we used the definition of old growth as developed in the R-6 Regional Guide; this definition was developed as part of the EIS for the Regional Guide, and had considerable public review. It was assumed that further refinement of the definition was needed, that Forest Plans were due to be produced soon, and the the refined definition could be used in the next round of planning. The refined definition was published by Franklin et al., Research Note PNW-447, but the Region has continued to use the definition established in the Regional Guide. The definition used by the Wilderness Society in "End of Ancient Forests" closely resembles the definition from Franklin et al. and Research Note PNW-447 (developed as an objective of future inventories, not to amend the Regional Guide).

All four definitions are based on ecological stand conditions. Each includes provisions for multi-species, multi-canopy conditions, large woody debris standing as well as on the forest floor, and trees that are old. But the definitions also contain significant differences.

As stated above, the old growth definition used in the Glossary for the MBS DEIS and FEIS is that established by the Regional Guide. However, in both

the DEIS and Final EIS and Plan, the MBS has been limited in our ability to generate more accurate old growth acreages from our existing inventories. The most recent timber inventory for this Forest (1976) was not based on ecological conditions, but on tree classes such as seedlings, saplings, poles, mature small sawtimber, and mature large sawtimber

It was necessary to interpret the existing inventory data (along with some additional stand mapping) to generate acres of old growth. This is explained in Chapter III of the DEIS/FEIS. Trees classed as mature, large sawtimber (trees 21" or more in diameter and averaging about 250 years of age) were considered old growth. The old growth figures used by the Wilderness Society were also generated through interpretation of our existing inventories, or in some cases, inventories that were designed for other purposes. As the Society's definition of old growth is more restrictive, the acres are different.

All west-side Forests in the Region are now starting an accelerated inventory of all potential old growth; mapping should be completed by the fall of 1990. The old growth inventory is part of the new Integrated Resource Inventory, which replaces the old, timber-only inventories. The old growth inventory is designed to measure physical and biological attributes of stands, not just size and class. This will enable us to respond to various definition of old growth in the future.

The text in various chapters of the FEIS has been revised to reflect the above information. Also, the Information Needs section, Chapter 2 of the Forest Plan has been updated.

WHAT ABOUT VIRGIN TIMBER THAT DOES NOT MEET "21 INCHES DBH" DEFINITION?

Does your definition of old growth - large sawtimber, 21 inches DBH - cause any confusion in roadless areas that may have virgin growth not meeting this definition?

Response: This may cause some confusion. Older trees that did not meet the mature, large sawtimber criterion were not considered old growth for this round of planning. Once the new Integrated Resource Inventory is completed, we will have the ability to respond to many different definitions of old growth. See above response.

UPDATE THE OLD GROWTH INVENTORY; IT SHOULD BE FIELD VERIFIED

Old growth inventories done by the Forest Service are inadequate. They do not make a distinction between true old growth and "mature" forests and much of the data is not field checked.

It is unclear what proportion of the inventoried old growth has actually been field inventoried. With all of these problems and sources of error in the Draft documents, we must request that the Forest completely re-evaluate and update its inventory of existing old growth, using up-to-date definitions and accurate, field-verified data. A complete moratorium on old growth harvest should be instituted until an accurate inventory has been obtained.

I urge the FS to re-evaluate and update its inventory of old growth. The data in the plan is based on a 1976 inventory which has been updated, in a manner

which is not clear to me, to reflect cutting through 1983. In speaking to FS personnel, there seemed to be some confusion regarding the updating of the data base. The total acreage of "old growth" remaining does not seem to reflect the amount of cutting has taken place.

Response: Refer to the responses for previous comments. For the FEIS, the acres of old growth and the old growth resource map has been updated to reflect additional acres of old growth harvested through 1988, but no new inventory has been completed, as explained above. On-the-ground information, provided by the District specialists, was used to update this map. The scale of the FEIS old growth map has been increased, to 3/8" to the mile, compared to 1/4" to the mile in the draft plan.

OLD GROWTH MAPS ARE INACCURATE

There are obvious discrepancies between Audubon's maps and the FS old growth map. The data base and map should at least be updated to the present.

The old growth resource map does not reflect present, on-the-ground conditions. Comparing it to a 1977 Darrington map, and with my personal knowledge, the resource map it is off in many drainages on this district. Forest-wide, there must be an immense amount of acreage that is misrepresented and has already been cutover.

Response: As mentioned above, the old growth resource map for the FEIS has been updated to reflect all harvested acres through 1988. Once the old growth/potential old growth inventory is completed in the fall of 1990, more accurate maps can be produced.

ACRES OF OLD GROWTH AVAILABLE FOR HARVEST ARE CONFUSING

I question the analysis of old growth timber availability. The final result was 667,000 acres of old growth, but this figure includes trees over 4,000 feet in elevation and stands located in preserved areas. The plan implies that over 600,00 acres of old growth are potentially loggable, in actuality, only about 300,000 acres are available.

Response: As explained in the DEIS (III-27), and updated in the FEIS, 232,500 acres of the 643,500 acres (FEIS) of old growth are located within wilderness; 134,400 acres are considered unsuitable for timber harvest because of unstable soils, high elevation areas that are difficult to regenerate, or because they have been withdrawn (such as Research Natural Areas.) The remaining 276,600 acres (FEIS) of the total old growth are tentatively suitable for timber harvest. See Chapter III, Diversity and Old Growth section, FEIS.

Land is not suitable for timber production until it is assigned to a management prescription, in an alternative, that includes timber harvest In the Preferred Alternative, 140,817 acres of old growth are suitable, at the start of the first decade. At the end of Decade 1, the old growth remaining on suitable lands will be about 121,900 acres - along with all the unsuitable/wilderness acres of old growth.

MAPS, DISPLAYS, DATA SHOULD SHOW OLD GROWTH BELOW 2500 FEET ELEVATION

A low-elevation old growth stratification should also be considered in evaluating the alternatives and shown on the maps. The data base includes a 2500 foot stratification, but this is not made available in the plan or used in the evaluation of alternatives. This low-elevation old growth has characteristics and values which are very different than the higher elevation old growth.

High-elevation old growth forest was lumped together with low-elevation old growth forest in setting aside areas for the spotted owl, despite the fact that high-elevation forest is of little use to the spotted owl. This mistake should be corrected.

The DEIS fails to document the quantitative and qualitative differences between low-valley old growth stands and higher elevation, steep slope old growth stands. The DEIS fails to identify those old growth stands that are essential for the survival of either big game or non-big game wildlife.

At the Open Houses, after the DEIS was released, one display had a bar graph showing the percent of old growth remaining in each alternative. However, this pattern would appear quite tame if shown against a bar graph showing percent of old-growth under 2,000 feet elevation remaining.

> **Response:** The old growth resource maps for the FEIS has been modified to show old growth located below 2,500 feet, between 2,501 and 4,000 feet, and above 4,000 feet in elevation. We have also revised a number of sections of the final documents to show acres of old growth, by management area (wilderness, dispersed recreation, timber emphasis, etc.) by the three elevation ranges

DEIS OVER-ESTIMATES THE ACRES OF OLD GROWTH, LOW-ELEVATION OLD GROWTH

The DEIS significantly overstates the amount of remaining old growth. Using the FS definition, Peter Morrison (Wilderness Society consultant) found only about 297,000 acres of true old growth remain, with less than 20,000 acres of classic old growth below 2500 feet, where the greatest species diversity is found.

I estimated that only about 56,000 acres of old growth exist below 2500 feet, whereas the Forest Service numbers provided to me indicate there are 166,665 acres of old growth below 2500 feet. This discrepancy needs to be sorted out.

> **Response:** An expanded discussion of the acres of old growth (as defined for this round of planning - see response to the first old growth comment), has been added to Chapters II (see Table II-91 and text), III (Old Growth and Diversity section), and IV in the FEIS. In summary, in the Preferred Alternative, a total of 502,721 acres of old growth (mature, large sawtimber, 21" and larger DBH) will remain in management areas will no timber harvest. There are 32,860 acres of old growth below 2,500 feet within wilderness, and an additional 131,292 acres in wilderness located at 2,500 to 4,000 feet in elevation. In the Preferred Alternative, there are approximately 84,000 total acres of old growth under 2,500 feet that are unsuited for timber harvest.

STANDARDS AND GUIDELINES FOR OLD GROWTH HABITAT ARE WEAK

Standards and guidelines for MA 11 and 12 are far too weak and non-specific, with too many poorly-defined exceptions. Either these areas should be left alone, so that they can retain natural old growth community process, or they should specifically prohibit entry and/or use of these areas by ORV's and livestock or for any form of timber management, road construction, or firewood cutting

Response: Management Areas 11 and 12 are dedicated old growth habitats for the primary old growth indicator species on the Forest As written, the standards and guidelines for these MA's prohibit management activities such as timber management, road construction, new trail construction, ORV use, and livestock use except under stringent controls and restrictions, to maintain the integrity of the old growth habitat component. Restrictions on the timing of certain activities, such as trail reconstruction, are also included.

ACRES OF OLD GROWTH MENTIONED IN THE DEIS ARE INCONSISTENT

The acres of old growth mentioned in Chapter III, Wildlife conflict with statements elsewhere in the documents

I'm confused about some information presented on old-growth acres. The summary states there are about 667,000 acres of old growth within the MBS. The figures, however, show that at the end of Decade 1, all alternatives result in 667,000 acres of old growth remaining. This seems inconsistent with discussions elsewhere that state nearly all harvesting will be in old growth (Draft Plan, page 4-7).

Response: The acres of old growth throughout the documents have been updated to reflect harvesting that has occurred through 1988.

The bar graphs in the summary were incorrectly labeled in the DEIS. The figures shown represent the **beginning** of Decade 1, where all alternatives will have the same starting acreage This has been corrected in the Final.

TABLE OF ACRES OF REMAINING OLD GROWTH IS MISLEADING

DEIS Table IV-12 indicates hardly any difference in the effective old growth habitat area between Alternatives G and H. 426,000 and 471,000 acres in Decade 5, respectively. This kind of comparison is wildly misleading, since most of the difference is the extremely rare low-elevation, classic old growth forest.

Response: This table (Chapter IV, Wildlife, FEIS) has been revised and now shows acres of old growth habitat, by alternative, based on updated inventories of suitable owl habitat (completed between draft and final plans) In all alternatives, there are a total of 232,500 acres of old growth in wilderness: 32,860 acres below 2,500 feet, and 131,292 acres located between 2,500 and 4,000 feet.

PROTECT MORE LOW-ELEVATION OLD GROWTH, IN LARGER TRACTS

It is extremely important to protect the few remaining lowland (below 2,500) tracts of old-growth forest. Recent studies by forest ecologists at the University of Washington indicate that over 90% of the Pacific Northwest's original old-growth forest has been logged, and that several of the important lowland communities are virtually extinct.

Those roadless areas lying at lower elevations (below 2500 feet) and containing old growth should be considered "critical sensitive areas" because this habitat type is usually limiting. There is relatively little of this habitat remaining in the Puget trough.

From the map, it appears that half or more of the remaining old growth in the southern end of the Forest is mountain hemlock/silver fir, which generally grows above 4000, is not of great commercial value and slow to reforest. Including this type in all old growth calculations obscures the probability that all low-elevation old growth will be cut.

Despite your assertions that old growth will be largely preserved under Alternative H, it is obvious from the maps and documents that low-elevation habitat will be largely eliminated.

> **Response:** In the Preferred Alternative, 32,860 acres of low-elevation old growth (under 2,500 feet elevation) will remain in wilderness Of the approximately 19,000 of old growth harvested in Decade 1 in the Preferred Alternative, about 61% will be old growth under 3,000 feet in elevation. See Chapter II, output tables, and Chapter III, FEIS for more information. These discussions have been updated and expanded, in response to these and other comments on the DEIS.

PROPOSED PLAN WILL REDUCE DIVERSITY AND CREATE ADDITIONAL HABITAT FRAGMENTATION

Any plan which results in scattered and small areas of old growth will have a negative impact on a variety of organisms; the small areas of old growth will be like "biological islands".

Much of the old growth that does remain is so fragmented an punctuated by roads as to have lost most of its biological value. Refer to the Wilderness Society study. The FS should consider not only total acreage of old growth, but also the fragmentation and isolation of patches.

It is imperative to retain extensive coherent stands of old growth, not only for the well known indicator species such as the spotted owl, but also as a reservoir for a diverse flora and fauna, especially mycorrhizae and invertebrates, for which there is as yet negligible data. We simply do not fully know the roles played by the diversity of species associated with forest stands, from youth to maturity, on a long-term basis Proposed stands are inadequate in size, fragmented and subject to deterioration at their margins

We must systematically save a greater portion of our remaining old growth forest, now, while it is still distributed fairly evenly throughout most of the major drainages on the MBS. Roughly 10% of each major drainage should be old growth, including stands at all elevations.

The treatment of old growth in the DEIS is by far the most seriously flawed

portion of those documents. With the principles of island and old growth ecosystem ecology, a viable old growth forest system can only be maintained if 10-15% of each drainage is retained in old growth. That old growth must be well-distributed over the given land base, with corridors of mature forest linking the old growth reserves.

We suggest that any one drainage has a total of at least 5 percent old growth and, where larger blocks occur, they should be favored for protection over the fragmented and isolated stands. This will provide both sufficient habitat and travel corridors to help ensure population viability.

According to Jerry Franklin, uninterrupted forest patches should be at least 500-600 acres in size to remain ecologically viable units. It is most sensible ecologically to retain entire drainage basins intact in order to ensure that viable forest patches (especially old growth patches) remain. How do the alternatives respond to this concern?

For long-term survival of old growth species, they must be assured a good interconnected network of old growth forest, both within the MBS and with nearby old growth areas in Canada, North Cascades National Park, Wenatchee NF, and Mt. Rainier National Park.

Diversity is a complex concept In order to maintain the regional or global species diversity, it is necessary to maintain large areas of some relatively homogeneous habitats, such as old-growth forests. This may mean that the local diversity is low. But without maintaining these large homogeneous areas, species which are dependent on these habitats or species which are widely spaced throughout the environment may not survive, reducing the regional and global species diversity.

Increasing the "edge effect or creating a relatively small scale patchwork of different habitats may increase the number of species which can occupy and area, but these species tend to be cosmopolitan and often weedy species (species which can take advantage of disturbed habitats). Species which are specific to native ecosystems or are intolerant to disturbance decrease or are eliminated from many managed, patchwork areas.

Isolated pockets of old growth do not provide habitat corridors. For species that require more resources than are available in a single area, a network of refuges connected by corridors would allow travel between areas of old growth (Simberloff and Cox, 1987). The DEIS does not include an alternative that would provide habitat corridors.

A systematic policy of logging the last remaining old growth forests (and the resulting loss of biological diversity) violates 16 USC 1604(g)(3)(8) which requires the Forest Plan to "provide for diversity of plant and animal communities." Such a policy also violates 36 CFR 219.27 (g) which states that "reductions in ..existing diversity...may be prescribed only where needed to meet overall multiple use objectives."

The Forest Plan must recognize the importance of old growth and state explicitly how the FS plans to protect this irreplaceable resource.

Of concern is the fragmentation of the remaining old growth. More than 60,000 acres of the remaining 297,000 is so fragmented as to be of little use to old-growth dependent species. New information on forest fragmentation reveals the importance of forest patch size, shape, and distribution as key factors in

wildlife population viability and dispersal. For instance, "interior" species, such as the spotted owl, pileated woodpecker, and fisher, avoid edges and therefore need large contiguous blocks of habitat. The draft plan fails to address the effect of fragmentation on wildlife populations and the amount of increased fragmentation to be expected from logging.

Fragmentation also exposes small remaining patches to windthrow. Consequently, harvesting will result in a greater reduction of old growth than is estimated in the plan's calculations. It appears that little consideration was given to information about minimum stand sizes to avoid the problem of blowdown.

Harris suggests the use of core conservation areas, with old growth islands surrounded by outward-fanning layers of increasingly intensive management. (Harris, 161) This concept of planning does not separate conservation and development, but integrates them. Biogeographic theory suggests that management strategies be applied to much larger areas which can provide sustained use.

Response: The alternatives in the DEIS provided for diversity of forest types (and seral stages within those types) and of non-forest vegetative types. The alternatives in the FEIS provide for similar diversity through varying amounts and distribution of different seral stages, including old growth. Changes between the release of the DEIS and this FEIS include: a revised network of SOHA's, larger in size, to meet the direction of the Supplemental FEIS to the Regional Guide; a revised network for the indicator species for mature/old growth - the pine marten and pileated woodpecker; additional discussion and analysis of the existing situation and effects of implementing the alternatives on diversity (see Chapter II, expecially Table II-91), Chapter III, and Chapter IV, FEIS); and Forest-wide Standards and Guidelines for Diversity and Long-Term Site Productivity have been added to Chapter 4, Forest Plan.

The component of the ecosystem that is of particular concern, as it relates to habitat fragmentation, is old growth. For any alternative in the FEIS, 276,600 acres of old growth have been identified as tentatively suitable for timber harvest. Each alternative will retain a different amount of this old growth component. The total acres of tentatively suitable land are fairly well distributed across the Forest and occur at various elevations. In the first decade, in the Preferred Alternative, about 61% of the 19,000 acres of old growth that will be harvested are located below 3,000 feet elevation.

PRESERVE OLD GROWTH UNTIL MORE MONITORING, RESEARCH IS DONE

The evaluation of the draft preferred alternative on old-growth dependent wildlife and plant species is woefully inadequate, as are the monitoring and mitigation programs. What species of plants and animals are dependent on old growth ?

The Forest Service should initiate a system for on-the-ground monitoring and assessment of the old growth portions of the forest.

At this time we do not know that old growth ecosystems can be managed at all and still maintain the integrity of the ecosystem. There is much research on the subject and with the uncertainty, it is best to leave stands undisturbed until more information is gathered The best available information suggests

that to maintain old growth ecosystems, 5-15% of the forest in each major plant community be dedicated to old growth ecosystems and should be well distributed by slope, aspect and elevation.

A goal should be preservation of original old growth until biological research determines that old-growth dependent species can, with certainty, survive in the *now aging second growth.*

Research done by the Old Growth research team in Olympia has not been incorporated into the draft plan; it should be included in the FEIS.

Too little research has been done to determine to what extent the health of younf forests depend on adjacent old growth stands as reservoirs for disease and pest control species (fungi, etc.)

Response: According to USDA, Forest Service publication "Wildlife of the Pacific Northwest: Occurrence and Distribution by Habitat, BLM District, and National Forest" by Keith Guenther and Thomas Kucera, October 1978, only two species occurring on the MBS are dependent upon old growth for their survival· the Northern spotted owl and the bald eagle A significant number of species occurring here use old growth habitat for a portion of their habitat requirements. We have no documentation of any plant species occurring on this Forest that is totally dependent upon old growth habitat for its existence.

As recent as July/August, 1988, researchers presented papers at various symposia on old growth and related wildlife species. Results of these studies suggest there are 11 individual species and 2 groups of species in the Northwest that are closely associated with old growth Douglas fir or with features of old growth habitats: Olympic salamander, Oregon slender salamander, northwestern salamander, spotted owl, Vaux's swift, red crossbill, pine siskin, northern flying squirrel, and red tree vole. The species groups are cavity nesting birds and Myotis bats. These species are among the group of 75 species which we knew were closely associated with old growth. The degree of association varies by season and physiographic province. For a number of species, the studies were not conclusive and further work is needed.

We will continue to incorporate the latest research findings and results of our monitoring, through periodic reviews of our Forest Plan, as it is implemented If any of the findings indicate a significant change in management direction, the Plan can be amended to incorporate that change.

We plan to monitor several species that depend upon and use old growth habitats. Refer to the monitoring plan, Chapter 5, Forest Plan.

SUPPORT THE CONCEPT OF DEDICATED OLD GROWTH

We object to the assertion that old growth can be "managed for." Old growth is not simply old or large trees, but a complex ecosystem of plants and animals that has evolved over hundreds of years. The characteristics and diversity of a true old-growth ecosystem cannot be duplicated by timber management practices. We support the concept of dedicated old growth.

Response: As discussed in Appendices B and J of the DEIS, the MBS conducted an efficiency analysis during the establishment of management

requirements for wildlife (to provide for viable populations of native vertebrates, as required by NFMA). The results of this analysis indicated that, in terms of effect on timber outputs, it was more efficient to "dedicate" existing old growth for those species which use old growth as an indicator habitat, as opposed to a implementing a "managed" old growth concept. Also see Appendix H, FEIS.

LITTLE OLD GROWTH PROTECTION IN ALPINE LAKES MANAGEMENT AREA

The Alpine Lakes Management Area plan did not address old growth either as a resource or wildlife habitat. The draft Forest Plan indicates little additional old growth protection over the Alpine Lakes plan. A significant old growth resource exists in the Pratt drainage, particularly the "bridge" of old growth across the river between the valley side slopes This is some of the lowest elevation stands remaining on the Forest (below 1500 feet).

Response: The issue of old growth is addressed in several sections of the the Alpine Lakes Land Management Plan FEIS, see short versus long term effects (page 88) and the response to public comments, page 118.

As stated on page 118 of that FEIS· "Low elevation old growth forest were considered when the Alpine Lakes Wilderness boundary was drawn in 1976. There are over 950 acres below 2000 feet elevation and over 21,211 acres between 2000 and 3000 feet elevation in the Wilderness .In addition to the wilderness, the management unit contains over 3,300 acres below 2000 feet elevation and 5,252 acres between 2000 and 3000 feet elevation in the Dispersed Recreation Allocation Asahel Curtis Area at 2,400 feet elevation is dedicated to remain old growth forest. This topic will be addressed further in the Wenatchee and Mt. Baker-Snoqualmie Forest Plans..."

The "bridge" of old growth (mentioned in the comment) was actually logged (by railroad) in the 1940's. Most of the old growth was removed, but scattered old growth trees were left. Since that time, the area has regenerated to a dense stand of understory hemlock with scattered old growth above it. This stand is partially located within the General Forest allocation of the Alpine Lakes FEIS, and can be considered for timber harvest. However, any value of the stand as a "bridge" for old-growth dependent wildlife would have to be considered in the project environmental analysis, with full opportunity for public input.

There are no old growth stands (below 1500 feet) at the lower end of the Pratt. The stand often referred to is actually less than 160 years old. The old growth overstory was removed from this area in the 1940's when it was railroad logged. There are about two dozen very large, old trees scattered over several hundred acres, left after the original logging There are no plans to remove these large trees.

MANGE THE FOREST FOR DIVERSITY

Forest needs to be managed to maintain diversity.

The various alternative management proposals boil down to a basic management principle. Maintenance or enhancement of complexity - genetic, structural, and spatial, whenever possible. Foresters must develop an appreciation of nature's complexity, the merit of that apparent disorder, and must conserve it

Response: Agree. NFMA requires that "management prescriptions...preserve and enhance the diversity of plant and animal species so that it is at least as great as that which would be expected in a natural forest." The discussion of diversity has been expanded to include a Forest-wide goal statement and Standards and Guidelines, Plan, Chapter 4, with added discussions in Chapters III and IV, FEIS.

The substantive means by which vegetative diversity is maintained is through the management requirements (MR's) for fish and wildlife. By maintaining "viable populations of existing native and desired non-native vertebrate species in the planning area," the Forest maintains at least the diversity of the natural forest by maintaining the populations of vertebrate species and the habitats they depend upon Refer to Appendix H, Chapter II, and Appendix B for discussion on MR's and to Chapter IV, FEIS for the effects of implementing the alternatives.

NEED TO MANAGE FOR PREMIUM DENSE-GRAINED TIMBER, PLANT OTHER SPECIES

None of the plans provide for sustained yield of dense-grained timbers, nor has consideration been given to sustained yield of premium long-aged species, especially western redcedar. Virtually only Douglas-fir is being replanted, ignoring valuable other species

There is no planning for premium, dense grain timbers after the existing old growth has been cut. I believe we have a moral and economic imperative to replace other premium species on a sustained-yield basis, particularly western redcedar.

What quality can we expect from 60-100 year rotations? It's already on the markets: poorer quality, wide-grained, narrow diameter logs yielding decreasing design stresses, and best suited for small dimensional studs and wood fiber/pulp uses. What about those of us dependent on the aesthetic and structural characteristics of dense grained timbers, shingle stock, and door and window stock?

Not managing for high-quality timber will insure that none exists, which will insure that no industries exist which can use it, which insures that no demand will exist for high quality wood Managing for forests of uniform size, quality, and species will allow for greater mechanization, larger mills and fewer mills, less competition, less employment, lower revenues, less product diversity, lower timber harvests, and less economic stability

Managing for high quality timber or longer rotations is more ecologically stable. The forests in the Pacific Northwest are composed of conifers with long lifespans The ecology of these forests developed around the multi-storied, multispecies stands with large old trees dominating. The best way to maintain a healthy ecosystem and harvest trees, is to try to duplicate

some of the structure of the ecosystem. This can be done using long rotation quality wood management regimes. If we do not maintain the health if the forest, we will lose its productivity which will decrease timber harvests and revenues

Planners can use forecasting in two ways. The passive way currently used by the FS timber planners is leading toward disaster. The forest which will result from the proposed forest plans will be composed of small trees averaging less than 10 inches in diameter, timber harvest will be dominated by knotty, low quality wood with a very high percentage of juvenile wood fiber, and the forest will be dominated by clearcuts. The alternative is to identify our goals for timber management, which are produce high revenues, high employment, and high timber volumes. The forest we all want is one managed for larger, older, higher quality trees and a wide diversity of species.

Response· The various management prescriptions include a wide range of timber prescription from no harvest, old growth management areas (MA's 11 and 12), to longer rotations, and also short rotations that emphasize timber production (MA 17). In those management areas where timber harvest is allowed, a variety of products are produced, based on the objectives of the management area and the timber prescription selected.

In MA 17, where short rotation predominate, the diameter at breast height (DBH) of final-harvested trees will average 14 to 16 inches. These DBH's will become greater the longer final harvest is delayed after culmination of mean annual increment Larger trees are also produced in stands which are managed with longer rotations, to meet a number of objectives; included are MA's 1, 2, 5, 6, 7, 13, 14, 15, 17, 20, 21, 22, and parts of 27 (FEIS Chapter II). In these stands, final harvest DBH'S could reach 40 plus inches in 200 years

In the Preferred Alternative, there are approximately 346,000 acres of land suitable for timber production. Approximately 150,000 acres of suitable lands will have extended rotations of 200 years or more. The result large diameter trees (up to 40" DBH) with slower growth rates and thus dense grained wood.

MANAGING FOR A WIDE VARIETY OF SPECIES PROVIDES MORE JOBS

Managing for a wide variety of species provides more jobs *Every tree species* has unique wood properties. As industry becomes more sophisticated, it takes better advantage of the unique properties of each species. While one industry may want the entire forest planted with the species it prefers, the best policy for the region is to manage for a variety of species This adds diversity to the economy, stability, and the highest level of employment.

Managing for quality and diversity provides economic stability The depressed housing market in 1982 had the most impact on those communities most dependent on producing dimensional lumber for home construction. The wood furniture industry expanded during that time. The mills supplying quality wood to overseas markets never shut down. The ponderosa pine mills east of the Cascades were much less affected. So were the cedar, hardwood, paper and firewood producers less affected.

Response. Agree. In the Forest Plan, the MBS will provide a variety of tree species for commercial sale. They include Douglas-fir, pacific silver

fir, western hemlock, western white pine, western redcedar, red alder, mountain hemlock, grand fir, white fir, englemann spruce, and subalpine fir Actual species selection will be based on a site-specific analysis, with interdisciplinary planning. (Forest Plan, Chapter 4). In addition, the Preferred Alternative produces a variety of market and non-market goods, services, and opportunities, to contribute to the diversity of the economic base of the area, (FEIS Chapters II and VI, Forest Plan Chapter 4).

SIGNIFICANT STANDS OF HARDWOODS SHOULD BE PRESERVED

All significant stands of hardwoods should be preserved uncut and should not be "converted" to conifer stands. A thorough analysis of the inherent values, distributional significance, and values to wildlife of these groves should be completed before any development is permitted in these unique and valuable habitats.

Response: The MBS is currently inventorying its resources. By the end of 1990, the Forest will have a good indication of the distribution of the hardwood stands. Not all hardwood stands will be harvested in the Forest Plan; some will follow a natural course to climax, in management areas where timber harvest is not allowed. In MA's where timber harvest is allowed, hardwood stands will be managed But even here, some hardwood stands will be allowed to regenerate, while others will be converted to conifer species. The management for each stand will be determined at the project level, after a site specific analysis by an interdisciplinary team, in an environmental analysis (NEPA document). A "no action" alternative will be considered in each case. See Forest Plan, Chapter 4.

WHAT SPECIES ARE USED TO REGENERATE HARDWOOD STANDS?

When hardwood stands are harvested, what species are used for regeneration.

Response: We have added to Appendix B, Chapter III, E, the information regarding regeneration of hardwoods We will plant red alder and may use coppicing (letting sprouts regenerate from the cut stumps) for red alder, black cottonwood, and big leaf maple.

REPLANT CEDAR

Cedar makes up 9.4% of commercial tree species, yet only 1% of tree species planted is cedar. No Western redcedar superior trees were selected for genetically improved stock. Alternative H preserves only 31% of present old growth cedar Over the years, we have commented to the Skykomish District about the lack of commitment to replanting cedar, especially in riparian areas and clearcut cedar groves above Garland Mineral Springs.

Consider modifying silviculture practices to allow a minimum of 250-year rotations in prime sites for western redcedar. This would accommodate long-term needs of American Indians and will benefit all people. Cedar is still fairly inexpensive, but where we we get it in 100 or 200 years? We need to start promoting its growth now

Response: In response to these comments, we have added a Forest-wide Standard and Guideline for cedar, Forest Plan, Chapter 4. It reads: "Favor the regeneration and management of western redcedar on those sites where it now occurs and on sites where environmental conditions are such that successful establishment and management would occur." Actual rotation lengths will be determined by the specific site and management area. See discussion in the last comment of this Diversity/Cedar section.

The reason western redcedar is not replanted more often is that it is a prolific seeder and where it is established, it exhibits excellent survival and growth. These same characteristics are the reasons that western redcedar was not included in the genetics program.

AREA OF ALASKA YELLOWCEDAR SHOULD NOT BE HARVESTED

The old trail out of Rattrap Pass to Skarr Pass (T.31 N., R.11 E.) went through a solid stand of small **Chamaecyparis nootkatensis** (Alaska yellowcedar) along the ridgetop and south side of the ridge. Alternative H proposed cutting this. It should be left uncut, as the timber is small (probably because it is in an old burn) and the site is probably abysmal. This is a good research area: will yellowcedar regenerate in a burn or in the mountain hemlock zone? As *yellowcedar is valuable lumber ($900 per MBF), it may warrant management rather* than planting noble fir in this zone.

Response: In the Preferred Alternative, this area is allocated primarily to MA 1D Roaded Natural (harvesting permitted with longer rotations) and MA 19 Mountain Hemlock Zone (a study area - any timber harvested is non-chargable). Only a small portion of the area is allocated to MA 17, Timber Management Emphasis.

The vast majority of the Alaska yellowcedar stands on the Forest are found in mountain hemlock areas. In the Preferred Alternative, the overall inventory of Alaska yellowcedar will be reduced only slightly because of the species location in the mountain hemlock type.

WESTERN REDCEDAR SHOULD BE MANAGED FOR ALL PEOPLE

On IV-81, the possibility of modifying silvicultural practices to allow a minimum of 250 year rotation in prime sites for western redcedar growth to accommodate the long-term needs of American Indians for cedar strikes me as something that should be done on a large scale for the benefit of all peoples. Cedar is still fairly inexpensive now while there is old growth to be logged here and in British Columbia, but where will people get it in 100 years? or in 200 *years? We need to start now to develop ways to promote the growth of* western redcedar.

Response: A new Forest-wide Standard and Guideline has been written to address western redcedar. It directs "favoring" redcedar on those sites where it now occurs and on sites where conditions are such that the species can grow and be managed See Chapter 4, Forest Plan, Forest-wide Standards and Guidelines for timber. At the project level, timber management activities will be designed to meet the management objectives of the particular site. The actual selection of species to be grown on those sites will be determined by a certified silviculturist taking in to account the physical properties of the site, e.g. elevation, rain fall, plant

community present now and what can be anticipated in the future. In those areas were western redcedar is present, it will very likely again be part of the regenerated stand. Actual rotation lengths will be determined by the specific site condition and MA objectives.

CEDAR IS NOT A LOW-VALUE SPECIES

In Appendix F, page F-6, cedar is lumped with hemlock and silver fir as a species of low commercial value. Cedar is the material of choice for shake, shingles, siding, and other weather-exposed uses for wood products.

Response: This paragraph in Appendix F (page F-6) has been rewritten in response to this comment.

"RICHNESS" DOES NOT FOLLOW AFTER TIMBER HARVEST

Referring to Table II-8, Diversity of Plant Communities: we disagree that richness increases following timber harvest and reforestation. Intensive timber management is oriented towards producing a monoculture. There is a short-term increase in plant diversity for 5-10 years, followed by a much lower diversity than occurred during the pre-harvest condition, which lasts for the next 60-80 years when harvest occurs again. The net result is less diversity, not more.

Response: In the FEIS, Table II-8 and Chapter IV, Effects on Vegetation have been modified, with references to "richness" and "evenness" removed. These discussions now focus on the changes in age class of timber stands, by alternative. In addition, more discussion on the concept of plant and animal diversity has been added to Chapters III and IV, FEIS.

NO ALTERNATIVE HARVESTS THE OLD GROWTH FAST ENOUGH

None of the alternatives harvest the remaining old growth quickly enough, doesn't harvest enough old growth in the first decade Need to harvest old growth as quickly as possible to convert decadent stands to young, fast growing stands

Response: The MBS is a deficit-inventory forest, meaning that old-growth trees available for harvest must be metered out for 70-80 years before the second growth on the Forest is ready for harvest. If the harvest of old growth is accelerated in the early decades, future harvest levels must decline until the younger stands are ready for harvest. This option of departing from the non-declining flow policy was evaluated in the departure alternatives (E-Departure, H-Departure) in the DEIS.

THE FOREST IS LIQUIDATING ALL OLD GROWTH IN THE FIRST TWO DECADES

In reviewing Table S-2 of the Summary in the DEIS, it appears there will be a sharp decline in the annual timber sale volume after the second decade. Does this mean that the Forest intends to liquidate the mature stands and old growth within the first two decades? Alternative C is the only alternative that appears to provide for non-declining even flow of timber volume offered for sale.

Response: Refer to Chapter II, Table II-9a in the FEIS. The Timber Sale Program Quantity increases from Decade 1 to 2, and from 2 to 5 for all alternatives displayed in the FEIS, except Alternative NC (No Change). As discussed in Chapter IV, FEIS, the direct effects of implementing the alternatives on the various resources, all timber harvest activities in all alternatives in the first decade will occur primarily in old growth stands.

PERCENTAGE OF SALE QUANTITY FROM OLD GROWTH VERSUS SECOND GROWTH SHOULD BE DISPLAYED

I find nothing to indicate what percentage of timber production derives from regrowth areas and what percentage derives from old-growth presently being cut.

Response: Table 4-1, Chapter 4, Forest Plan displays the acres/year cutover. The portion clearcut comes from mature stands. The portion coming from commercial thinning is from second growth stands. In the first decade, about 2,865 acres per year will be clearcut and 200 acres annually commercial thinned (from second growth stands).

NO ALTERNATIVE INCREASES THE AMOUNT OF OLD GROWTH

The range of alternatives is inadequate in that no alternative proposes an increase in the amount of old growth Forest Why not allow some previously harvested areas to revert to old growth ?

Response: The intent of Alternative C is to allow some of the acreage that is presently in an ROS class of Roaded Natural to revert to an ROS class of Primitive. This would be accomplished by road closures and allocations to non-harvest prescriptions. Over time, through the natural process of vegetative succession, these areas could eventually revert to "old growth."

OLD GROWTH ACREAGE DISCREPANCY

On the maps I found the "Starting Inventory of Old Growth" acreage to be stated as 667,000 in the Comparison of Alternatives growth to be "about half" of 599,000 acres. I hope this isn't an example of the "New Math "

Response: In the final documents, the starting inventory for old growth has been corrected and updated through 1988.

NOT ALL OLD GROWTH ACRES CAN PRODUCE HIGH VOLUMES; OLD GROWTH HAS A HIGHER VALUE FROM A PRODUCT STANDPOINT

In Chapter III, page III-27, the DEIS states that old growth stands with a net growth of less than 20 cubic feet per acre per year could be replaced with young stands that could potentially produce in excess of 170 cubic feet/acre/year. The DEIS fails to point out that: (1) Not all of the suitable old growth sites are capable of producing these volumes Note the forest-wide average productivity of 114 cu ft/acre/year; (2) Second growth wood fiber is far less valuable than the old growth, from a product value standpoint, (3) It may not be economically efficient to apply intensive management to many of the old growth stands The DEIS tends to place the greatest value upon the management regime that produces the greatest wood fiber growth rates.

Response: The text in Chapter III has been modified to reflect your first point The text states that 170 CF per acre per year could **potentially** be produced in an intensive management regime Not all suitable acres allocated to a timber harvest prescription will be scheduled for intensive management. For example, western hemlock, Pacific silver fir, noble fir types are not scheduled for intensive management. The management intensities scheduled for the Preferred Alternative are discussed in the Timber Resource Summary section, Chapter 4, Forest Plan.

OLD GROWTH STANDS SHOULD BE CATEGORIZED BY A WIDE VARIETY OF CHARACTERISTICS

It would be helpful in analyzing the various alternatives if old growth was broadly categorized into dominant, co-dominant, and subdominant tree species, age of dominant and co-dominant tree species; and elevation. If the Forest Service data base is sufficient, it would also be helpful to give the number of sub-canopies and snag characteristics for these old growth stands All of this information should be displayed in table form. This information should then be keyed into a large-scale map(s) and displayed by acreage as well as location. Further, the old growth information should be allocated, as appropriate, across the various Plan alternatives and presented in appropriate places in the DEIS. An initial attempt to provide the botanical detail that is necessary for an adequate analysis of the Plan impacts on old-growth animal communities.

The Forest Service should define old growth in terms of the entire component, not just in terms of some indicator species.

> **Response:** This information, while desirable, is not currently available. The MBS, along with other Forests in the Region, is in the process of a new Integrated Resource Inventory, which replaces the old timber-only inventory. The old growth component of the inventory is on an accelerated schedule, it should be completed in 1991. The inventory is designed to measure physical and biological attributes of stands, not just size and class. This will allow more detailed analysis of impacts on old growth communities during plan implementation and updates.

SELECT OLD GROWTH STANDS FOR PROTECTION BASED ON ECOLOGICAL FACTORS

The selection of old growth for protection should be based on an ecological classification of these habitats, and should be independent of the economic status or wilderness classification of these forests. If old growth of no commercial value or in wilderness areas does not meet the habitat quality thresholds established in the habitat evaluation, it should not be counted in the inventory of this habitat for the indicator species, although it may have other substantial value, such as for recreation or scenery.

> **Response:** The process used to establish the habitat network for the northern spotted owl (indicator species for the old-growth habitat type) is documented in the planning records While suitable habitat does exist within wilderness, areas were selected based on habitat needs, distribution requirements, and sightings/confirmations of nesting and breeding pairs of owls. Refer to Appendix H.

DON'T USE STAND AGE TO DEFINE OLD GROWTH IN NATURAL STANDS

Referring to Appendix B, page B-107: the stand age is probably appropriate for natural stands, but should not be used for managed stands, which will likely take closer to 250 years to develop old-growth characteristics

> **Response:** As stated later in that paragraph, the definition we did use in the DEIS (and FEIS) for tracking acres of old growth remaining, is the mature large sawtimber definition. The MBS, along with other Forests in the Region, is in the process of a new Integrated Resource Inventory; the old growth component of the inventory is on an accelerated schedule, due to be completed in 1991. The inventory is designed to measure physical and

biological attributes of stands, not just size and class. This will allow more detailed analysis of acres of remaining old growth, based on any of a number of definitions.

LAST REMNANTS OF IN-LAND RAIN FOREST SHOULD BE PROTECTED

It is the understanding of the National Park Service that the last remnants of natural rain forest in the contiguous forty-eight states exists in the MBS, due west of the Carbon River entrance to Mt. Rainier National Park We believe that this remnant should be preserved; the DEIS Preferred Alternative does not afford adequate protection of this very significant resource.

Response: In the Preferred Alternative, the section of national forest land immediately south of the Carbon River has been allocated to MA 1D, Roaded Natural. The remainder of the area is in MA 17, Timber Management Emphasis. All proposed projects will have a site-specific environmental analysis, with NEPA document, at the project level.

NEED TO MANAGE OLD GROWTH TIMBER ON A SUSTAINED YIELD BASIS

There presently is no Forest Service, or BLM policy of managing our National Forests for old growth timber on a sustained yield basis. Not only must we preserve as much old growth as possible for future commercial use, but we also must ensure its future commercial use, and we also must ensure its future availability on a sustained yield basis. To accomplish this, significant areas of site 1 and 2 land must be selectively logged, leaving behind many middle aged and older trees (50-160 years old or older) to become the new stand of old trees in a relatively short time. We are not suggesting that a short-term rotation be abolished; we are simply saying we need something in addition.

Response: For lands allocated to MA 17, timber management emphasis, the goal is to provide for the production of timber; other multiple-use objectives are also met, see Chapter 4, Plan. On these acres, we will produce trees of small diameters on short rotations. This does not mean that larger trees will not be produced and eventually harvested. This will occur in management areas where timber harvest is not the primary objective (Forest Plan - Chapter 4), with trees grown and harvested on a longer rotation. In addition, the Preferred Alternative has allocated more acres to management areas with extended rotations: acres allocated to MA 2A and B equalled 106,000 acres in the DEIS, and 119,000 in the Preferred Alternative; also, the Preferred Alternative allocates 21,000 acres to Potential Wild and Scenic River, compared to 9,000 in the draft plan.

OLD GROWTH IS MORE VALUABLE

A Washington Department of Natural Resources study found that Douglas fir aged 160 years and older was worth $125 more per thousand board feet (MBF) than Douglas fir less than 100 years old. Old growth western hemlock and white fir were worth $98 more per MBF than second growth.

Response: Agree. At the present time, higher prices are paid for logs with few defects and higher grades. Trees that produce these logs are usually of large diameter and over 160 years of age. Research conducted by the Pacific Northwest Forest and Range Experiment Station indicates that

high grade material can be produced from second growth trees with diameters starting at 16 inches (reference: Ponderosa Pine Symposium Proceedings).

In Management Areas 1D, 2A, 2B, 4, 5, 6, 13, 14 and 27, there will substantial amount of acreage where trees will be grown on rotations exceeding 160 years

SECOND GROWTH TREES HAVE MORE JUVENILE WOOD, WHICH HAS LESS STRENGTH, ETC.

Large, old trees make less juvenile wood. Juvenile wood is the wood within the first twenty rings of the center of trees. All conifers in the Pacific northwest have a long cone-shaped care of juvenile wood. In large, old trees this cone of juvenile wood is less than 5% of the total tree volume, most of the wood is mature wood. But, in small, rapidly grown second growth trees, juvenile wood may comprise most of the tree's volume. Juvenile wood has lower than average strength and specific gravity; shorter fiber length; and higher than average longitudinal shrinkage, tendency to warp, and fibril angles. Timber harvests comprised mostly of juvenile wood will adversely affect all segments of the forest products industry.

Response: Agree. The amount of wood in any tree that meets juvenile wood criteria will vary, depending upon when that tree is harvested. The volume coming from the forest will consist of trees averaging 23+ inches DBH in Decade 1 of implementation; see the analysis done on the Final Preferred Alternative. This analysis also indicated that even in the regulated forest, harvest diameters would vary from 13 to 19 inch in DBH at 70 plus years of age. In both instances, 50+ years of growth would be mature wood, or approximately 5 to 11 inches.

OLDER STANDS OF TIMBER HAVE A LOWER FIRE RISK

Long rotation, high quality timber management regimes have a lower fire risk. The FS plans will create vast expanses of forest where the largest trees are only 17 inches in diameter. These forests are far more susceptible to fire than old growth forests. The research done for the Bull Run Watershed on the Mount Hood National Forest revealed that the most fire resistant timbered stands are old growth stands (with thick bark, which withstands fire, and canopies that are not as thick or close to the ground, so fire does not race through).

Response: Fire has always been a part of the natural cycle affecting the structure of plant communities. Stand replacement fires have occurred at intervals of approximately 150 years at lower elevations and 300 to 1,000 years at higher elevations, based on local ecological studies. These fires were limited in size by natural factors such as weather conditions, topographic feature drainage patterns and natural barriers. Experience on the forest indicates that the fire ratio of Natural to man caused is 45 55 respectively. Fires are usually 10 acres or less in size, and are slow spreading fires, of low intensity that do little damage (Chapter III, FEIS). Management objectives for each MA should keep loss to wild fire at the same level as in the past or less, with the exception of those areas with approved prescribed fire plans, where natural events will take their course (FEIS Chapter III, IV and Forest Plan, Chapter 4).

LARGE TREES PROMOTE TOURISM

Long rotation timber management regimes are better for tourism. The forests in the Pacific Northwest are proposing long rotation management on a small portion of the forests along highways, as this is more visually pleasing to visitors. Practicing the long-rotation management across the entire forest would also be more aesthetic. The tourism divisions in Oregon and Washington are trying to get visitors to get off the main highways and travel the back roads. More and more people are doing so; what will they find when they leave the curtain of big trees along the highways?

Response· Agree In response to the visual quality and recreation concerns voiced in response to the DEIS, in the Preferred Alternative, more acres were allocated to those management areas which feature large trees with no harvest occurring or longer rotations when harvest is allowed. Refer to Table II-8, FEIS, Chapters II and IV, and Forest Plan, Chapter 4.

TIMBER INVENTORY IS OVER 12 YEARS OLD

Accurate land surveys and reliable inventories of all forest resources are essential We are concerned that the MBS is using a timber inventory that is over 12 years old.

Response: As discussed in Appendix B, Chapter II, the timber resource was inventoried and mapped in 1976. In addition, we have updated the condition class inventory to 1989 with inventory volume grown to 1995. The statistical accuracy has been validated for the degree of precision and reliability needed at the Forest Plan level of resolution. (Forest-wide volume estimates are within 10% at the 67% confidence interval.)

The MBS has already started on the new Integrated Resource Inventory, which will replace the old, timber-only inventory. Potential old growth will be re-inventoried by fall, 1990. Physical and biological attributes of stands, not only size and class, will be measured. The rest of the Inventory is scheduled to be completed by 1995.

FORPLAN outputs for the Forest Plan will be reanalyzed with these new data as part of the Monitoring Plan. The need for any adjustments will be considered in light of this analysis See Plan, Chapter 5, Monitoring Plan

TIMBER MANAGEMENT PLAN SHOULD HAVE BEEN UPDATED IN 1981

Why was the timber management plan not revised in 1981 to account for the effects of the Alpine Lakes Management Plan? This Plan directed fewer CFL acres to be available for harvest, resulting in a cut reduction of up to 9 MMBF per year for both the Wenatchee and MBS. This translates to some reduction on the MBS that clearly was not implemented, or it would have shown in Table III-8.

Response: The following direction from NFMA regulations and the Alpine Lakes Management Plan made it unnecessary to revise the TM plan in 1981 36 CFR 219.4(b)(3) states "Each Forest Supervisor shall develop a Forest Plan for administrative units of the National Forest System One Forest Plan may be prepared of all lands for which a Forest Supervisor has responsibility." Alpine Lakes FEIS, page 3: "Calculating programmed harvest levels and scheduling is not the subject of the EIS. This information will be addressed in the Forest Plans currently under development"; and page 153, Plan Revision: "A programmed harvest calculation for each Forest will include the Alpine Lakes Management Unit

TIMBER MANAGEMENT PLAN HISTORY IS CONFUSING

Table III-8 in the DEIS, Timber Management Plan History, makes no sense. The 1968 North Cascade Act would have resulted in a Potential Yield reduction of 36.3 MMBF. Remember, the north unit of the Park had been part of the North Cascades Primitive Area since 1935

Response: Early inventories included all federal forested acres that were considered commercial (CFL) and administered by the Forest Service. Forested acres were not removed from the CFL base until they were transferred to another jurisdiction (such as the National Park Service) or

were removed through special designation, such as wilderness or Research Natural Area. Thus, the acres you refer to remained as part of the PY until transferred to the Park. A brief note has been added to the text of this table, which will hopefully clarify the display.

TIMBER RESOURCE SUMMARY IN THE PLAN IS POORLY ORGANIZED

The organization of this [timber] section of the resource summaries is very poor. The wildlife resource summary better describes the objectives of the program, and should be used as a model. The tables of numbers are fine, but it is difficult to wade through them without an explanation of why they are there and how they related to the objectives of the timber program.

Response: The resource summaries have been substantially rewritten since the DEIS; the discussion under the timber resource summary is hopefully better organized.

GENERAL ENVIRONMENTAL EFFECTS ARE UNCLEAR

Under "Cutting Vegetation" as a general effect of management activities on the environment, we suggest adding that cutting vegetation also changes the timing and flow peaks (page IV-2, DEIS).

On page IV-3, delete item that says burning vegetation is less costly..., this is not an effect.

It is not clear how Planting Vegetation increases noise from motors, logging whistles, and people. Further the significance of these impacts and how they can be avoided should be discussed

Consider wildlife production potential in the direct effects of timber management upon wildlife.

Response: Regarding the first two comments: these corrections have been made in the FEIS.

The second referenced impacts have been moved from "General Effects of Planting Vegetation" to "General Effects of Road and Landing Construction." The effects of noise, etc and their significance are discussed in Chapter IV, FEIS, under "Air and Noise - The Direct Effects of Each Alternative."

The effects of timber management on wildlife habitat and population levels for management indicator species are discussed in Chapter IV, Direct Effects, FEIS.

PLANS ARE NOT DETAILED ENOUGH FOR FULL EVALUATION OF EFFECTS

I have serious concerns that road and timber plans are not detailed enough to ensure full evaluation. Do the roads proposed fully serve all users well over the long pull; or is timber harvest (expedient) alone paramount? What about stability of the soils for road construction? Are these rivers or streams important to anadromous fish, which could be damaged seriously by soil runoff? *Is the timber volume to be harvested in line with overall costs-economic* evaluation?

Response: The Forest Plan does provide direction for all resource programs, practices, uses, and protection measures through establishment of both Forest-wide and management area specific standards and guidelines. The miles of roads, etc proposed in the Preferred Alternative are an integral part of the design of the alternative, and needed to meet the overall objective and goal of the alternative. The environmental consequences of implementing the Preferred Alternative are fully documented in this FEIS, which meets National Environmental Policy Act requirements. The Forest Plan does **not** provide **all** the detailed information needed to evaluate all projects that will proposed. As discussed in Chapter 5, Implementation, Forest Plan, site-specific project proposals will be subject to an environmental analysis, evaluation, and documentation in a NEPA document.

THE FOREST PLAN IS NOT AN "INTEGRATED PLAN" BECAUSE ALL OTHER USES ARE SATISFIED BEFORE TIMBER

The MBS Plan first subtracted huge areas for all other non-timber resource uses and only then allows some of the remaining acres to be managed for timber emphasis. As a result, all other uses are satisfied many times over and the ASQ drops 17%. Such "balkanization" of the forest followed by isolation of the productive timber resource from the forest as a whole is not in any sense an "integrated plan."

Under legislative direction, the Secretary of Agriculture must provide for a high level of timber products on a sustained yield basis and set harvesting levels/management practices consistent therewith. Why, then, in the MBS plan is the renewable timber resource subordinated to all other resource uses?

Response: "Integrated Plan" refers to the NFMA requirement that Forest Plan coordinate all the resources and land uses into a single plan and not separate resource plans such as timber, wildlife, recreation etc. This was discussed in the DEIS, Appendix B, Chapter I. Also see the FEIS, same appendix and chapter. Requirements for integrating individual Forest resource planning into the Forest Plan (36 CFR 219.13) were followed throughout the planning process. The process for development of the various alternatives, including the consideration given for defining the timber resource base, is included in the DEIS, Chapter II, part B.

As noted in Appendix H, Management Requirements, the Forest made a concerted effort to locate habitat areas for the pine marten, pileated woodpecker, and spotted owl in areas that were not suited for timber production (wilderness, research natural areas, areas with inoperable soils or regeneration difficulty).

DON'T RELEASE A FEIS UNTIL DISCREPANCIES WITH TIMBER INDUSTRY ARE RESOLVED

The State has met with timber industry representatives and has been advised of their numerous questions regarding the accuracy and validity of the Forest's timber supply figures. We feel there is merit to at least some of the issues raised. The substantial discrepancy between the industry and the FS over the timber supply base is a major concern; relative agreement on this issue is a most critical element. We do not believe a final EIS should be released until the discrepancies have been resolved.

Response: In response to these (and other of the timber technical issues raised in commenting on the DEIS), the Forest Supervisor and staff from the MBS and the Regional Forester held extensive meetings with representatives from the Northwest Forest Resource Council's technical committee, the Governor's office, PLUS, and others. After a course of action was agreed upon by these parties (see Appendix J and the planning records for documentation of meetings held, attendance, etc.), the following modifications were made in our analysis: recalculation of board foot ASQ volumes for the first decade, development of new site index values for the Douglas-fir and Pacific silver fir/hemlock species groups, adjustment of regeneration time-lags downward for artificial and natural regeneration, updated the number of acres by age class, development of new managed yield tables; development of new empirical yield tables; adjustment of board foot/cubic foot ratios.

With this information and based on the public comment we received, a new alternative, Alternative I, was developed to respond to the objectives of PLUS. Again, refer to Appendix J for a summary of these working meetings.

CORRECT THE BOARD FOOT/CUBIC FOOT RATIO TO INCREASE ASQ

The draft plan uses a factor of 4.89 to convert FORPLAN cubic foot output to board feet. Based on the Forest Service's inventory plot data, the expected factor for the stands to be cut during Decade 1 is 5.10. Correction of this error will increase ASQ by 4.3%.

The BF/CF ratio was recalculated in response to public comment, for Decade 1 only. The results are displayed in the FEIS, Chapter II, timber output tables. (Both ratios are shown.) The conversion ratio is calculated based on a weighted average of the ratios for the stand type and model components actually scheduled during the first decade Program development and target attainment will be based on the cubic feet calculated for planned sale activity during each program year, and appropriate conversion factors calculated at that time.

WHY WEREN'T UNEVEN-AGED MANAGEMENT PRACTICES CONSIDERED?

Even-aged timber management will be assumed for all alternatives. As the MBS is not a lodgepole monoculture, why weren't other kinds of management more seriously considered?

PCT and CT are options in uneven-aged management, just not as cost-effective. However, a management objective would be significantly enhanced through utilization of uneven-aged regimes, it should be the preferred option, such as in riparian areas, and modeled as such.

The series of arguments used in Appendix F show a strong bias toward even-aged management. None of the alternatives present a model of the Forest as is would appear using uneven-aged management. The MBS has chosen to ignore an important local and national issue and has presented us with alternatives that allow no choice.

Appendix F is an apologist's rationale for clearcutting. Wildlife, fish, and old growth values are not discussed. If dwarf mistletoe thrives by increased sunlight, how are the edges of clearcuts different from selective harvesting?

If bole rot is concomitant to selective cutting, is research rethinking harvest practices? In the Appendix, uneven-aged management is given to appear as a cause of root disease.

The rationale for producing even-aged stands is flawed. The DEIS states that uneven-aged stands are more susceptible to pest infestations. In fact, the reverse is true, as evidenced by the mountain pine beetle infestation in Idaho.

If root rot and mistletoe are not such a problem in Pacific fir (see Appendix F, Selection of Harvest Cutting Methods), why automatically go for clearcutting?

Response: Appendix F reviews the rational for selection of a harvest cutting method, either an even-aged or uneven-aged silviculture system, by species zone and management area. NFMA state that "Clearcutting may be prescribed only where it is found to be the optimum method of regeneration to meet multiple-use objectives." This will usually not be known until project planning, when the best method to meet specific management objectives will be addressed on a site-specific basis, when costs, timber values, and harvest systems are determined. While in Appendix F, clearcutting is found to be the appropriate method for a number of species and management areas, the MA prescriptions in the Forest Plan do not preclude selection of an uneven-aged silvicultural system, in most cases. Refer back to Appendix F and see Chapter 4, Forest Plan for more detail.

Although dwarf mistletoe is not as serious a problem in the Pacific silver fir zone as in lower elevations, it still is a problem. With less reliance on prescribed burning - one method of removing mistletoe - clearcutting is the next best tool for removal. Uneven-aged management (such as selection cutting) creates another problem: in harvesting selected trees, those left standing are often damaged by the logging cable. Damaged trees are then more susceptible to bole and root rots, and also to dwarf mistletoe. Refer to FEIS, Appendix F.

UNEVEN-AGED MANAGEMENT

"Uneven-aged methods may require artificial regeneration to maintain the appropriate species composition...". Please explain appropriate species composition Doesn't that depend on the management area objective?

Same comment as above regarding "appropriate species composition". "Uneven-aged management may favor growth of hardwoods and prevent regeneration of tall growing conifer..." In riparian areas, hardwoods are commonly succeeded by conifers; the mix is good for fish and wildlife. "...so that shading is reduced on larger streams." We are not concerned that the mix of hardwood and conifer that would accompany uneven-aged management would in any way contribute to increases in temperature significantly impacting to fish streams, especially as compared to complete removal as in clearcutting regimes.

Response: The "appropriate mix" is that prescribed during the site-specific, environmental analysis by an interdisciplinary team And yes, species selected depends upon the exact objectives for the management area. The standards and guidelines for MA 13 - Watershed, Wildlife, and Fisheries Emphasis in Riparian Areas, give further direction; see Chapter 4, Forest Plan.

Vegetation - Timber

APPENDIX F DOES NOT DISPLAY THE IMPACTS OF THE DIFFERENT HARVEST METHODS

Erosion potential is not mentioned in the selection of harvest cutting method section for mountain hemlock zone. It should be addressed as it was in Chapter IV of the DEIS, in the Effects of Recreation on Soils section

There is no reference to potential impacts to water yield, water quality, channel stability, fish habitat, or insect production in Appendix F.

> **Response:** Resource concerns for each zone were not identified in Appendix F. The criteria used in determining which cutting method to employ takes into account those identified resource concerns. Chapter IV of the FEIS also discusses the effects of harvest activities on the other resources.

SHELTERWOOD HARVEST METHOD SHOULD BE USED ON AREAS WITH EXTENDED ROTATIONS

There is an opportunity to increase timber production on areas where very long rotation ages are specified through the use of shelterwood harvest that would be compatible with the management emphasis on the areas.

> **Response:** As outlined in Appendix F of the FEIS, shelterwood system is one of the even-aged methods available. All or portions of Management Areas 1D, 2, 4, 5, 6, 13, 14 and 27 have extended rotations planned as part of the timber program element (Forest Plan, Chapter 4). The even-aged method of cutting is available to be used in these areas when appropriate. An environmental analysis will be prepared for each project; as part of this site-specific analysis, the harvest method will be selected.

QUESTION ASSUMPTION RE: GENE POOL FOR SEEDLINGS

We question the assumption (Appendix F, page F-6 DEIS) that the selected genetically superior seedlings have a broader gene pool than seedlings produced in natural stands. Large openings are generally planted with stock and are not dependent on distant, less closely related trees for seedlings.

> **Response:** Agreed. This section of Appendix F has been rewritten to reflect your concerns

INTRODUCE GENETICALLY ENGINEERED TREE SPECIES

What is the policy regarding the introduction of genetically engineered tree species? Would any public-owned forest be opened for exploratory scientific research, either by public researchers or private timber companies?

> **Response:** Genetic engineering is not yet a perfected method for forest trees, and is still in the Research and Development phase. As new information becomes available, we will re-analyze Forest conditions. Changes may be made to the Forest Plan, either as amendments or as part of the planned revision (at least every 10-15 years)

HOW WAS THE AVERAGE GROWTH GAIN FOR GENETICALLY IMPROVED SEEDLINGS CALCULATED?

Was the average growth gain because of genetically improved seedlings based on the percentage of timber types on suitable land?

Response: The average was based on tentatively suitable acres. All tentatively suitable acres are entered into the FORPLAN model, the model then selects from various attributes and produces suitable acres based on the allocations for each alternatives. Appendix B of the FEIS has been rewritten to better reflect the process used.

YIELD IS UNDERSTATED DUE TO ERROR IN DETERMINING SITE PRODUCTIVITY

An erroneous procedure for determining productivity on hemlock and Pacific silver fir lands was used in the draft plan. Soil land productivity (site) was adjusted downward to reflect current understocked conditions. Site index is independent of current understocked conditions. The impact of this is to understate future yields by about 30% on these lands

Response: As explained in Appendix B, no adjustments are needed on these issues to proceed in the FEIS. For example, although site quality is used to assess the growth potential of forest land, it is not always a statistically significant predictor of volume per acre in wild stands. It appears that additional clarification will help in understanding the issue of species not being taken into account in determining site indexes and the perception of understating site indexes.

While site index may be a good predictor of initial volume per acre, it will influence growth rates even in an empirical yield. For a given plot, each tree species will generally have a different site index

OTHER RESEARCH HAS FOUND HIGHER YIELDS

I'm enclosing a copy of Newton and Cole's Oregon State University Study, indicating a sustained-yield management scheme with both quality old-growth timber and near old-growth habitat. They've found that the annual volume growth continues to accelerate, producing substantially greater than 100,000 thousand board feet per acre, per year at ages 170-190.

Response: *Arney's Stand Projection System (SPS) provides more realistic* simulations of growth and yield in areas managed for western hemlock and Pacific silver fir, we will continue to use this model in these areas. However, we will continue to use the volumes from the empirical yield tables for poles and small saw timber as an upper limit for naturally regenerated hemlock stands without management. We have used the Douglas fir model (DP-DFSIM) in areas managed for Douglas-fir. In the FEIS and Forest Plan, our yield tables reflect the revised site indices and stockability adjustments, made in response to public comment.

GROWTH ON EMPIRICAL YIELDS

FORPLAN is a model that works in ten-year increments. Each decade's total harvest is assumed to occur in the middle of the decade. Thus, empirical yields must be grown to the middle of the first decade prior to being input

into FORPLAN. The MBS planners grew empirical yields to 1990, but the first decade is likely to run from 1989 through 1998. Thus, the empirical yields should have been growth through 1993.

Response: The initial empirical tables were developed utilizing an estimated beginning time period. This time period did not materialize, therefore the time period for the beginning of the period of the empirical tables has been adjusted to reflect the new start period.

WESTERN HEMLOCK AREAS THAT WILL RECEIVE PLANTING ON 25% OF THE AREA SHOULD HAVE HIGHER YIELDS

Yields for western hemlock areas that will be naturally regenerated were arbitrarily reduced to be no higher than existing stands. The Plan assumes inter-planting of up to 25% of these areas to achieve full stocking, so it is erroneous to assume these areas will have lower yields.

Response: In response to public comment on the DEIS, new managed yield tables were constructed. Refer to Appendix B, FEIS The revised tables for western hemlock and Pacific silver fir were constructed using the Stand Projection System. At this time, there is only a very slight increase in yield with planting genetically superior stock/final harvest, compared to natural regeneration/final harvest. The planting in western hemlock areas will occur in small areas (up to 25% of the area), primarily on temporary roads, landings, and areas where natural regeneration will not be sufficient.

REGENERATION ASSURANCE STANDARD OF 125 TREES PER ACRE IS BELOW STATE MINIMUM

The Proposed Plan indicates that FS Regeneration Assurance standard requires a minimum of "125 well-established trees per acre." This level is less than the Washington State Forest Practices Act minimum of 190 trees per acre.

Response: This figure has been corrected in the Forest Plan. Refer to Chapter 4 Prescriptions require a range of between about 250 to 500 seedlings per acres When the number of seedlings falls below 300, an analysis is made to determine if additional seedlings should be planted.

MORE ACRES SHOULD BE REFORESTED BY PLANTING

According to Table 4-5 in the proposed plan, about 72% of the area reforested after final harvest, in the first decade, would be accomplished by relying on natural regeneration, and only 28% of the area would be planted after final harvest. More acreage should be reforested by planting than is called for in the proposed plan. A heavy reliance on natural regeneration could result in a shift in species composition, to more prolific, lower-valued species such as Western hemlock, and fewer less prolific high valued species such as Douglas-fir

Response: In the Forest Plan, for the first decade, approximately 2,800 acres will be harvested per year and 2,200 of those will be regenerated by planting, rather than neutral regeneration. This change is discussed in detail in Plan, Chapter 4, Timber Resource Summary; also, refer again to Table 4-5 in the Forest Plan

WHAT IS THE VOLUME PER ACRE FOR STANDS YOUNGER THAN OLD GROWTH?

Old growth growth rate is less than 20 cubic feet per year, versus 170 CF/Year fro young trees. However, what is the cubic feet of wood fiber in reserve on young forests for future generations? For 10 year-old trees? 50 year-old trees? No figures are given on volumes available per acre for even-aged forests.

Response: This information can be developed from two tables presented in Chapter 4 of the Plan (both Draft and Final). The acres of various age classes are shown in Table 4-9 (for tentatively suitable acres that come into solution as suitable acres). Acres of suitable timber by productivity classification are shown in Table 4-8. The weighted average potential productivity on suitable lands (from Table 4-8) for the Forest = 115 62 CF per acre per year. Applying this to a stand, for example, of 70 years: 115.62 CF/AC/YR x 70 years x 17,560 acres [number of acres of 70 year old stands, from Table 4-9] = a standing volume for that age class of 142 12 million cubic feet.

THERE IS A PROBLEM WITH DETERMINATION OF SITE PRODUCTIVITY

There appears to be a problem with your classification of site productivity. You seem to be classifying each site based on its current, rather than, potential stocking ability. This can easily be remedied and changed to meet standard forestry practices.

Response. Between the Draft and Final, we changed the process for developing managed yield tables and determination of site indices, primarily in response to public comment. In general, two growth and yield simulators were used to develop projected yields, DFSIM for Douglas-fir and stand projection system for hemlock and true firs Site indices were based on site trees found on existing forest inventory plot's on suitable lands, by species, with site trees determining the group in which the inventory plot would be placed. Once plots were grouped and the model completed, an average site index was calculated. The most current research and methodology was used to convert raw filed site index into final format for use in growth and yield simulators. See Appendix B and the August 1989 MBS documenting development of managed yield intensities.

GROWTH RATES SEEM LOW

The law says that management should not impair productivity. It does not say that you cannot increase productivity. There are many ways to do this which are not addressed.

Present timber productivity in terms of net growth at 34 ft 3/a/yr is extremely low. Someone should express more concern about this. On areas managed for timber as a major use, the potential should be more than 90 ft 3/a/yr. There are many ways to improve this but these are not discussed in any way.

Response: Chapter III of the Forest Plan states the average growth rate of mountain hemlock stands is 35 cu ft/ac/yr. This is due to the harsh sites where mountain hemlock is found. Overall for the Forest, the average productivity is 114 cu ft/ac/yr.

Cubic foot outputs vary widely depending on the management objective of the area. Some areas managed for timber emphasis will have outputs exceeding 120 cu ft/ac/yr, while areas managed for resources other than timber will produce as low as 40 cu ft/ac/yr. Throughout the life of the plan, growth rates will improve as more stands are managed intensively and genetically improved stock is used.

NEED A BETTER EXPLANATION OF "NOT RESTOCKABLE WITHIN 5 YEARS" LANDS

We have an uneasy feeling about the description in the draft Plan regarding land "not restockable within five years." As forestland managers, we feel that unless these sites are talus slope, rock outcrops, or slide areas etc., an extra effort to reforest difficult sites is prudent and can be economically justified. The plan was unclear about the physical characteristics of these 159,739 acres, making it difficult to judge the adequacy of the classification.

Response: In this FEIS, a better explanation of the identification of suitable lands has been added to Appendix B, Chapter II, Land Suitability for Timber Production. A reference to this new discussion has been added to FEIS, Chapter III, Commercial Timber.

DISCUSS THE STANDARD REFERRED TO UNDER REGENERATION ASSURANCE

In the Forest-wide mitigation measures (end of Chapter IV in the DEIS), the standard referred to under Regeneration Assurance needs to be discussed, including what it is, who applies it, and where it can be found.

Response: A reference to the discussion on regeneration difficulty lands in Chapter III, FEIS has been added to this mitigation measure. In addition, the reference to 36 CFR 219.14(A)(3) has been added, and a definition of "reasonable assurance" (from the Chief's letter of 7/15/83 and Pacific Northwest Regional direction 8/23/83) added to the Glossary.

ADDRESS REDUCTION OF SOIL FERTILITY

The Forest Service should address the problem of reduction of soil fertility that results from its silvicultural methods. Specifically, the removal or destruction of the duff layer reduces the number and kinds of microorganisms and fungi in the regenerating stands and these have been shown to be important contributors to tree growth and health

Response: Soil productivity was addressed in the DEIS on pages 111-53 and 54, IV-5 and 6.

RECOMMEND USE OF FERTILIZERS

Suggest that the Forest Service increase the intensity of timber management practices on suitable lands in all the proposed Alternatives contained in the Plan The concept would identify the suitable lands for timber production and mandate that their management emphasize maximum productivity, utilizing silvicultural and economical practices including commercial thinning. Added to the above planned regime, we would recommend the application of nitrogen

fertilizer to Douglas-fir stands occupying lands with site categories IV to II.

Weyerhaeuser has demonstrated fertilization to be cost effective when applied at five year intervals beginning 25 years before rotation age, but not beyond 45 years of age.

We do not understand the conservative view taken today by the Forest Service relative to the application of fertilizers. The narrative in the Plan indicating more research is needed (4-29) seems to have overlooked the many credible studies already completed on suitable lands and extensive use among private forest landowners and Washington State Department of Natural Resources. Rotation ages of North and South Conifer can be shortened by 25 to 20 years, respectively, with the application of fertilizer

Despite the fact that the plan assumes nearly 40% of suitable lands will be replanted in Douglas-fir, it was assumed that only 2% of suitable lands met the criteria for fertilizing. PLUS yield tables incorporating fertilizer response should be used for predicting future yields.

Response· The use of fertilizers was discussed on page 4-29 of the Proposed Forest Plan, and page B-85 of Appendix B: "Analysis determined that only about 2% of tentatively suitable acres may meet criteria and feasibility for this practice..." In addition, the growth simulators used to build yield tables do not appear to predict reasonable response to multiple applications of fertilizers. One MBS silviculturist analyzed yields from the DFSIM model, using multiple applications of fertilizer. The growth due to one application appeared to be consistent with field data, but the multiple applications showed a synergistic effect which, in our judgement, was unreasonably high. Unofficial comments from Bob Curtis, the developer of DFSIM, have substantiated this observation.

PLANTING STOCK SHOULD NOT BE INNOCULATED WITH NITROGEN FERTILIZER

Planting stock used for reforestation on the MBS should not be innoculated with nitrogen fertilizer. Instead, planting stock should be treated with mycorrhizal fungi to insure good growth and to overcome the loss of important mycorrhizal fungi populations through silvicultural methods that include clearcutting and slash burning.

Response: Planting stock used to reforest harvested areas are grown under proper conditions to produce acceptable seedlings at the nursery. At the present time the forest does not innoculate seedlings directly with nitrogen. Nitrogen is applied to the soil during normal nursery operations to promote desired plant growth. When the seedling is transferred to the actual growing site nitrogen fertilizer has been applied in the past to specific sites to promote growth and can be applied under the Forest Plan on specific sites (see Forest Plan Standard and Guidelines).

Mycorrhizal fungi are an ever-present part of soil, under all but the most unusual circumstances, and form their symbiotic relationship with plants at an early age, i.e. in the nursery. The relationship continues when the seedling is planted on the growing site where already present mycorrhizal fungi add to the relationship on new root growth. Current observations, measurement of soils and regeneration growth, on clearcut and burned areas do not lend themselves to great concern for the loss of mycorrhizal i.e.

long term productivity. These facts combined with anticipated future harvest levels and application of BMP's utilized strengthen this conclusion. Conclusive research that would support a change in direction is being conducted at this time. If this research indicates a change in direction is need to insure sufficient levels of mycorrhizal to maintain site productivity it will be incorporated into management activities.

WHAT IS THE RATIONALE BEHIND THE COMMERCIAL THINNING STANDARDS?

What is the rationale behind restricting commercial thinning in management intensities C and E to stands that are "accessible by roads in which 50% or more of the crop trees are Douglas-fir" (Draft Plan, page 4-190)? The assumption that roading is automatically non economical when associated with commercial thinning is not necessarily true. There is a very large body of experience and study that proves that Douglas-fir stands are not the only ones that can be successfully thinned commercially. The MBS very little experience with commercial thinning and seems to have written a standard that is not necessary when compared with work done elsewhere

Response: This standard has been changed in the FEIS and Forest Plan; commercial thinning is allowed in any stand which meets the criteria See Forest Plan, MA 17 standards and guidelines

ARBITRARY TIMING CONSTRAINTS APPLIED

Arbitrary harvest timing constraints are being applied to more than 50,000 acres of unroaded lands containing mature sawtimber and currently classified as economically in accessible. These constraints force the areas to be harvested within the first 5 decades or not at all; the result is only 4,000 acres are harvested and the remaining 46,000 acres effectively become de facto wilderness

Response: The Forest has tested and reanalyzed the effects of changing the constraints designed to avoid concentrating final harvest in the later decades. There does not appear to be a significant effect on ASQ; economics rather than the timing are the major constraint. No changes have been made for the FEIS. However, as we monitor the plan, both economics and the harvest timing constraints will be re-visited.

ALTERNATIVE H FAILS TO ADEQUATELY RESTORE AND RESTOCK CUT-OVER LANDS

The Management Plan does not adequately describe specific management practices for restocking cut-over forest lands for future production. Many areas within the Forest which were harvested 40 to 50 years ago should have nearly-harvestable timber, but in fact have only crowded and dwarfed trees of no commercial value.

In determining total acres suitable for timber production, the Plan assumes that all acres which have been harvested are being returned to a condition suitable for future harvest. It does not take into account previous poor management decisions, conversions to hardwoods, acres lost to landings and slash, and most important, inadequate reforestation at higher elevations.

Response The discussion of reforestation and timber stand improvement in Chapter III, Commercial Timber, in the FEIS has been expanded For the period 1980 through 1988, on the Mt. Baker-Snoqualmie, survival of first-year tree plantings averaged 79%; third year survival was 89% of the trees from first year plantings. The average number of trees per acre was 308, which is generally within acceptable limits of the prescription (Reforestation Survival and Growth Annual Report). Since October of 1981, the Forest has been successful at reforesting all cut-over lands. Also refer to the discussion in Chapter III, FEIS on lands identified as not suitable for timber production due to reforestation difficulty

Since 1982, there has been an average of 2,600 acres per year that have been pre-commercially thinned or released. Whereas, in the same time period, the Forest has reforested over 4,600 acres per year on the average. The Forest is actively seeking funding to treat all plantations in need of thinning or release. It is anticipated that these funds will be received and the additional acres will be treated as part of the timber stand improvement program Goals for management in this type of area can be found in Chapter III in the FEIS, Chapter 4 and 5 of the Forest Plan.

At the present time, stands that were harvested 40 to 50 years ago and have received proper stocking level control activities are generally not ready to receive a commercial thinning In management areas where this prescription was chosen, the stand won't be ready for a final harvest for 20 to 30 additional years when they reach at least 95% of their culmination of mean annual increment. See Chapter II in the FEIS, Appendix B and Chapter 4 in the plan for additional information.

MAINTAIN A LARGE SUITABLE LAND BASE

Because of RARE I and RARE II analysis and other administrative action over the past decade, harvesting has been restricted to an artificially reduced land base creation potential future conflicts with other resources. In order to maintain the highest possible sale level, it will be essential for the final plan to include the largest suitable land base possible, even if every acre is not immediately needed to meet timber production targets. PLUS believes that a final plan based on the largest possible suitable land base, intensive monitoring, and effective mitigation measures can produce timber needed to maintain viable local economies without excessive impact on other resource values and management objectives.

Response: Over the years there have been many changes to the suitable land Base (commercial forest lands); see FEIS Chapter III) These changes have resulted in a reduction in Potential Yield. NFMA and it's implementing regulation, CFR 219.14, required a review of all all National Forest Acres to determine their availability for timber production. This has been accomplished by following a set of criteria (see Appendix B, Chapter II) to determine **tentatively suitable** forested lands - those capable of producing a continual supply of trees on a given acre. The total **tentatively suitable** acres are 597,000 acres. Alternatives are then developed to respond to the issues in various ways. The number of acres actually considered **suitable** for an alternative depends upon the acres assigned to various management prescriptions. In the FEIS, the range of suitable acres in the alternatives is 546,500 in Alternative NC to 247,091 in Alternative G-Modified. See Chapter II, FEIS Output levels will vary depending on

the intensity of management and amount of suitable acres available in the alternative.

In response to comments from PLUS, the Forest developed and displayed in detail a new alternative to meet the goals and objectives stated. Alternative I has 386,512 suitable acres (compared to the Preferred Alternative with 346,411 suitable acres. Refer to FEIS, Chapter II, Alternatives Considered in Detail, for more information.

USE ALTERNATIVE'S D SUITABLE LAND BASE - PRODUCE 220 MMBF PER YEAR

WFIA has determined that the suitable acres existing on both the North and South ends of the Forest actually resembles the suitable acreage as displayed in Alternative D, with the following exceptions: manage the 3,899 acres of MA 1A Primitive for timber production. Also, the difference between acres of MA 1B in Alternative H (244,095 acres) and D (197,095 acres) should be managed for timber harvesting. If these two categories of land classification were brought back into timber management, the forest should be capable of producing approximately 220 MMBF per year.

Response: The range of alternatives considered in the FEIS include alternatives that assign a high percent of the tentatively suitable acres to a timber harvest prescription (Alternatives NC, A, B, and I). See Alternatives Described in Detail, Chapter II, FEIS. Alternative I was developed in response to public comment on the draft EIS, with a goal of producing of 220 MMBF annually, providing increased numbers of big game animals, more trails, and more roaded recreation opportunities. In this alternative, no acres were allocated to MA 1A (primitive dispersed recreation) or MA 1B (semi-primitive nonmotorized recreation). Refer to the output tables (Table II-9a though II-9o), Chapter II, FEIS. As a result, the ASQ for Alternative I is 129 MMBF, Decade 1

Refer to Chapter III and Appendix B, FEIS for a discussion of the process used to determine acres tentatively suitable for timber production.

NEED A DISCUSSION OF HOW LANDS ARE EVALUATED FOR CLASSIFICATION

There needs to be a discussion of how the evaluation of land for classification takes place. This would include discussions of the accuracy of methods and identification of the responsible officials.

Response: The DEIS, Appendix B described the process and the general criteria used to determine which lands are suitable for timber management More detailed information is available in the planning records. The suitability process is also summarized in Chapter III, FEIS

THE SUSTAINED YIELD CONCEPT IS NOT DISCUSSED IN THE DOCUMENTS

Previous documents and discussions with Forest Service personnel have indicated that the FS manages resources on a sustained yield basis, yet we found no direct reference to the sustained yield concept in any of the alternative plans or the DEIS.

Response: The concept of sustained yield management was discussed in Chapter I, DEIS, it is first mentioned on page I-1 in this FEIS Also, refer to discussion of long-term sustained yield capacity in Chapter II, Table II-9c and Figures II-17 to II-23

THE FOREST CAN NOT BE MANAGED ON A SUSTAINED YIELD BASIS

The amount of acreage to be harvested is not consistent with a true long run system of sustainable yield The system we envisage will provide sustainable harvest for human use, but still keep a wide variety of age classes, including old growth, in perpetuity. We would suggest developing a harvest scheduling system based on the model presented by Larry Harris in The Fragmented Forest. [complete discussion of model not presented here; area divided into 8 parts, total area is harvested over a 320 year cycle.] A system of this nature can provide protection for wildlife, but also enhance the long run viability of our timber communities.

Response: All alternatives, including the Preferred, reach long-term sustained yield capacity by the 8th decade. Refer to Chapter II, FEIS, narrative for Table II-9c The inclusion of standards and guidelines, management requirements, and mitigation provide for viability of other resources as well as maintenance of a sustainable yield of commercial timber

STATE WHETHER TIMBER WILL BE SOLD ABOVE THE SUSTAINED YIELD LEVEL

NFMA forbids selling timber above the sustained yield level. How do the alternatives respond to this requirement? This should be stated explicitly in the comparison of alternatives section.

Response: It is discussed in Chapter II of the FEIS, specifically in the narrative for Table II-9c.

IS A TIMBER HARVEST OF 170 MMBF A SUSTAINABLE YIELD?

I question whether 170 million board feet represents a sustainable yield. The fact that roadless areas are being slated for cutting indicates that the USFS sustained yield calculation includes more land than is currently used for logging.

Response: While the roadless area acres were unavailable for harvest during the RARE process (1972 to 1984), the commercial forest land within the roadless areas was used to calculate the annual allowable timber harvest In the Forest Plan, the harvest level is based on the lands available for timber harvest, the productivity of those lands over time, the management emphasis of those lands, plus constraints to spread timber management activities across the suitable land base to meet basic soil and water requirements, wildlife requirements, visual quality objectives, etc and supply a steady flow of wood products. The FORPLAN model schedules harvest levels based on these constraints and determines a sustainable Allowable Sale Quantity (ASQ). Refer to Tables II in Chapter II of the FEIS, Chapter IV in the FEIS and Appendixes B and C for more explanation.

WHY ARE PROPOSED TIMBER SALES FAR IN EXCESS OF THE 60-ACRE LIMIT?

A size restriction of 60 acres for created openings seems reasonable, but well over half of the proposed timber sales in Appendix A are far in excess of 60 acres. One example is Goodman Ridge at 259 acres.

Response: The acres you are referring to are the total acres in the timber sale. Note - in the remarks section of Table A-1 - that each sale is comprised of a number of units. The sale will meet the Forest-wide standards and guidelines for created openings (Chapter 4, Forest Plan). Each actual harvest unit will be 60 acres or less in size. We have clarified this in the introduction to Appendix A of the Forest Plan.

MINIMUM CLEARCUT SIZE SHOULD BE STATED IN THE FOREST PLAN

The minimum clearcut size as stated in Chapter 4 of Draft Plan is ambiguous. Specific guidelines should be adopted rather than using such undefined terms such as "net public benefit".

Response· The language in the Forest-wide Standards and Guidelines for created openings is correct as written; there is no minimum clearcut sizes, only maximum sizes for openings, as stated in this chapter of the Plan For information on net public benefits, refer to the discussion in Chapter II, page II-2 and the glossary.

CREATED OPENINGS SHOULD BE CONSIDERED NO LONGER AN OPENING AT END OF 3RD SEASON

The MBS has paraphrased the Regional Guide, indicating that an area with prescribed tree stocking that is at least 4-1/2 feet high and free to grow is then no longer considered an opening. Our recommendation is that it would no longer be considered an opening when it is adequately stocked at the end of the third growing season. Also, departures from the 4-1/2 feet height are buried in the Plan, such as on page 4-93, Forest-wide Standards and Guidelines. The FS should list these.

Response: The NFMA regulations (36 CFR 219 27(d)(1)) provides a minimum: "openings in forest stands are no longer considered openings once a new forest is established." The regulations then state that Forest Plans may set forth variations to that minimum based on site-specific requirements to meet multiple-use objectives, and that regional guides shall provide guidance for determining variations.

The MBS Plan follows the direction of the Pacific Northwest Regional Guide (1984) regarding when a cutover area is no longer considered an opening The example in Chapter 4, Plan, Forest-wide Standards and Guidelines regarding objectives for big game winter range has been deleted in the Forest Plan; it was taken directly from the Regional Guide, but does not apply to this Forest. This should remove some of the confusion. We did not, however, include a list of MA's which vary from the 4-1/2 foot standard.

GUIDANCE ON CREATED OPENINGS SHOULD BE PRESENTED

The reference for guidance on created openings should be presented. For example, how was it decided that a clearing is considered closed when the tree is 4.5 feet high? Is this from other Forest Service documents? Further, what does "when other resources management considerations prevail" mean, and where in the Plan are the "particular management objectives" to be found?

Response: The reference for the 4.5 foot standard - the Pacific Northwest Regional Guide (USDA 1984b) has been added to this section. "When other resources management considerations prevail" means if other resources such as wildlife, watershed, etc. require a standard more restrictive than the created opening standard, the standard for that resource shall apply. These are found in the specific management area standards and guidelines, such as 2A Scenic Viewshed, Foreground, Item E 2.d.: "Created openings shall no longer be considered openings in sensitivity level 1 areas when trees reach 20 feet in height." See Chapter 4, Forest Plan.

36 CFR 221 SHOULD BE IDENTIFIED AS AN AUTHORIZING REGULATION

It is noted that the Forest Service no longer cites 36 CFR 221 as part of their authorization, although these regulations have not been superseded. Perhaps an acknowledgement would strengthen their emphasis on a continuous supply of timber, stabilization of communities, and opportunities for employment.

Response: The Forest Plan was developed in compliance with all applicable laws and regulations To meet 40 CFR Parts 1500 to 1508 (CEQ regulations) direction to reduce paper, not all applicable laws and regulations were listed in the documents.

HOW LONG WILL THE DISPERSION CONSTRAINT BE IMPOSED AND WHERE?

The sensitivity analysis in the DEIS does not contain information on how long the dispersion constraint will be imposed and the extent of the geographic area to which dispersion should apply. How long does a harvest unit remain open? Why cannot the dispersion constraint be limited to the five decade RPA planning horizon as some forests do, and why must it be applied by allocation zone?

Response: The dispersion constraint will be in effect throughout the life of the Plan. The dispersion constraint applies to all Management Areas that have timber harvesting activity. On a project by project basis, the dispersion constraint is governed by the specifics of the Forest-wide Standards and Guidelines, Timber, for created openings, Chapter 4, Forest Plan. The dispersion constraint is not applied by allocation zone, it is applied by management area and it is modeled by the constraints.

IF TREES ARE A RENEWABLE RESOURCE, WHY DO WE NEED TO LOG NEW AREAS?

You have promoted timber as a renewable resource, so why not farm previously logged low-elevation, fast-regeneration forests rather than logging more virgin forest?

If trees are so renewable, why are we cutting new areas?

Response: Heavy timber management activities did not begin until the late 1950's. This makes the majority of the second growth stands on the Mt. Baker-Snoqualmie 30 years or younger and not ready for commercial harvest for another 20 to 30 years. Final harvest can not occur until stands reach culmination of mean annual increment, or 95% there of, which will not occur until 40 or 50 years at the earliest. See Appendix B, yield tables. Until these stands reach that point, existing stands will be supplying the bulk of the allowable sale quantity. Analysis indicates that reliance on second growth stands to provide the majority of the harvest volume will not occur until the 7th decade. See Chapter II, FEIS and Chapter 4, Forest Plan for additional information.

SHOULD DISCUSS THAT NON-NATIONAL FOREST LANDS ARE THE MOST PRODUCTIVE

The DEIS should have pointed out (in Chapter III, timber base) that the 2,628,000 acres of commercial timber land in the 5-county Puget Sound area that are non-National Forest lands are substantially more productive than those lands on the MBS. Our greatest opportunities to increase the timber supply lie outside the Forest.

Response: The discussion on timber supply (FEIS, Chapter III) has been updated.

MEETING RPA TARGETS FOR TIMBER

It is very apparent from comparison of RPA Program outputs assigned in the 1984 Regional Guide with the outputs for various plan alternatives that the MBS is capable of and intends to meet all targets except timber. Since the RO and the Forest collaborated in setting targets, it is evident that there has been a subsequent, significant change in attitude toward timber production. It is not explainable by any new information.

We strongly urge the Forest Supervisor to fight hard against the RPA timber harvest targets. It is well known that harvest levels in the state far exceed the long term sustainability of the forests

Response: As explained in Chapter I of the EIS, the RPA targets are based on present and anticipated supply and demand for various resources. The 1984 Regional Guide presented a "tentative distribution of its portion of the national resource objectives to each National Forest." The analysis of Forest outputs and their effects is, in turn, incorporated into the National RPA Program.

As discussed in Chapter II (DEIS and FEIS), in "Alternatives Considered But Eliminated From Detailed Study," we were unable to formulate an alternative that could simultaneously meet all of the 1980 RPA targets. There are several reasons, including· a decrease in available land base since the 1980 RPA Program was developed and NFMA resource integration requirements and land suitability classification. See discussion in Chapter II, FEIS.

The analyses and information from this Plan will be used in future updates of the RPA Program, which should result in program targets that are more consistent with the current physical and biological capability of the MBS.

IF THE BUDGET IS REDUCED, ALL PROGRAMS - EXCEPT TIMBER - WILL BE REDUCED

In days of tight budgets, the only part of the program that will not be reduced will be the allowable cut The removal will continue but the replacement will not Neither will there be replacement in kind - there will never be old growth forests again.

Response: Of the 1,303,100 acres of forest lands on the Mt. Baker-Snoqualmie National Forest only 597,000 acres are tentatively suitable for timber production. Thus 706,100 acres will continue to remain in their national conditions, ie. old growth or advancing to an old growth condition, as only natural events would occur here. Refer to the new discussion on Diversity and Succession, Chapter III, FEIS. Since October 1981, the Forest has been successful at reforesting all cut-over land, see Chapter III FEIS. Actual budget allocations will have an effect on all management activities. If funding is not received in amounts sufficient to accomplish the timber management portion of the Forest Plan, it will most likely result in a reduction in the allowable sale quantity. See Chapter I and V of the Forest Plan for more information.

PRIMARY LOGGING SYSTEM ON THE FOREST SHOULD BE BY HELICOPTER

I would like to see the forest service adopt the helicopter as the preferred method of tree removal; nothing is more intrusive upon the outdoor experience than a road. Not only do roads disrupt the feeling of solitude and the view, but they also decrease the amount of viable habitat for the big game. Therefore, I would be less disposed to opposing to logging operations if I knew that at least some of the remoteness of the area would be retained.

Response: Timber harvest activities on the Forest are designed to meet specific resource objectives. As a result, the harvest method used will vary depending upon the resource objective for the area. Helicopter logging is generally used in visually sensitive areas and areas where soil and water are sensitive resources. The Preferred Alternative increases the acres assigned to a Visual Quality Objective of Retention, Partial Retention, or preservation and Acres Assigned to Scenic Corridor, so the helicopter logging system will be used more than in the past.

DO NOT MAINTAIN ARTIFICIALLY HIGH TIMBER SELL LEVELS TO MAINTAIN EMPLOYMENT

Between 1979 and 1986, jobs in the wood products industry in Oregon and Washington plummeted from more than 13,400 to fewer than 101,600 while lumber production increased from 11.15 billion board feet to 12.28 billion board feet - 25% fewer workers produced 10% more lumber. It is clear that sawmill jobs are disappearing in the Northwest, and it is just as clear that the disappearance has no relation to the timber supply. The main immediate cause of the job fall-off was a vast increase in mill efficiency, a result of the 1979-82 recession. The problem won't be solved by cutting all the old growth.

Response: Your observation on industry becoming more efficient is correct. You are also correct in stating that more lumber is being produced in Oregon and Washington These trends of more efficient mills and higher demands for lumber (wood) will most likely continue (refer to Chapter III, FEIS). Timber grown on NF lands is part of the supply base needed to meet anticipated demand for wood products in the United States.

It is the policy of the Forest Service to provide timber on a sustained yield level on an even flow basis with few exceptions (36 CFR 219.16). The Forest Plan does provide for a sustained yield of timber over time, while meeting resource objectives (Chapter II, FEIS and Forest Plan)

In the Preferred Alternative, more acres have been allocated to prescriptions with an extended rotation, in a number of site-specific areas, lands have been allocated to non-development, including no scheduled timber harvest. See Chapter II, the output tables, and refer to the Preferred Alternative map.

PROVIDE A RELIABLE FLOW OF TIMBER TO HELP STATEWIDE INDUSTRY

Policy Number: the National Forest should provide a reliable flow of raw material to help support the viability of the Statewide forest products industry

Response: We agree that the national forests should provide a reliable flow of raw materials. One of the things Forest planning is designed to do is to determine what level of raw material can be counted upon from NF lands. The level of Allowable Sale Quantity (ASQ) set by the Preferred Alternative is lower than historic levels, but it will provide a reliable flow of raw material while achieving a balance with the many nonmarket values desired by the public. Refer to Chapter I, FEIS and "Forest Management Goals" in Chapter 4, Plan.

TIMBER HARVEST REDUCTION WILL RESULT IN MORE HARVESTING FROM OTHER LANDS

The Forest Service's proposed reductions will increase pressure in the State, Simpson, and other landowners with available inventory to accelerate their harvests to satisfy demand for forest products. For every acre of National Forest not harvested, two acres of State or private land must be logged to produce an equivalent volume. It is not clear whether FS harvest reduction lessens or heightens environmental effects associated with timber production.

In considering an annual timber harvest, the Forest Service must consider the supply impacts of the timber harvest reductions presently proposed for almost all national forests

Response The level of harvest on National Forest lands is determined by its capability and the objectives of the Preferred Alternative (FEIS Chapter II and Forest Plan Chapters 3-4). Changes made between draft and final have resulted in a lowering of both ASQ and TSPQ This results in an even larger gap between supply and anticipated demand for timber from National Forest lands

It is anticipated this shortfall will probably be made up from non-industrial forest landowners or imports from outside the region or outside the country It is estimated that private forest landowners will not be able to make up the shortfall

GREATER COOPERATION AMONG ALL TIMBER LANDOWNERS WOULD BENEFIT LOCAL COMMUNITIES

The State does believe that timber-dependent, local communities would benefit from a greater cooperative relationship among all timber landowners in the area, regardless of the harvest level. With the majority of timber harvest occurring on non-federal lands in the MBS area-of-influence, a coordinated strategy to address current and future economic, possibly environmental and resource, problems would be very beneficial We would be willing to work with the MBS and others in exploring this idea.

Response: We agree Our commitment is stated as a Forest-wide Standard and Guideline under General Procedures, Chapter 4 of the Forest Plan: Item 4 states that it is our intent to coordinate management of forest system lands, resources, and activities with appropriate local, State, and Federal agencies, private landowners, Indian Tribes, and interest and user groups.

TIMBER SELL LEVEL IS NOT JUSTIFIED

I strongly urge that the Forest Service's mandate, to insure the sustained yield of National Forests, be used to set an absolute ceiling for future quotas

The MBS's attempt to develop a balanced forest plan that both provides timber needed to maintain viable local economies and protects important non-timber resources, has fallen short We do not believe the Forest has justified the need for a 13% reduction in timber sale level in the first decade We are concerned that the timber sale program described in the plan may not be sufficient to avoid significant adverse impacts on the timber industry and general economy of the Puget Sound area.

Response: The level of harvest, ASQ or TSPQ, is based on the capability of the land and the objectives of a given alterative. As per direction found in 36 CFR 219 27, each alterative will have some level of sustained yield calculated. Forest Service policy also states that Sustained Yield Capacity will be on a non-declining bases with exceptions allowed only when conditions as stated in 36 CFR 219.27-3 are met, i.e. the development of a departure (see Chapter II, FEIS) Long term Sustained Yield Capacity, for any alternative is the upper limit of sustainable production, with the exception of a departure Departures will have production levels fluctuating both above and below the long term sustained Yield Capacity over time, (Ref. FEIS Chapter II).

It is estimated the lower ASQ will have less than 0.1% effect on the income and the employment rates within the five county Puget Sound Basin (FEIS Chapter IV).

A full range of alternatives have been developed during the planning process, Chapter II, FEIS. The alternative chosen as the preferred, Forest Plan, is the alternative that responds to the issues and concerns, and - in the opinion of the Responsible Official - maximizes net public benefits

HARVEST LEVEL IS TOO HIGH; PLAN CANNOT MAINTAIN LEVEL OF PROTECTION STATED

I feel that this EIS does not document the ability to produce the cut level and maintain the level of protection to environment and its elements called out.

So that old-growth habitat and recreational opportunities are not sacrificed, I believe an ASQ of no more than 88 million board feet per year is adequate. The difference in jobs and income is less than four tenths of one percent in the first decade, and the return would be incalculable in saving the ecosystem.

> **Response:** We feel that the level of goods, services, and outputs estimated for the Preferred Alternative are attainable, while still meeting law, regulations, moving towards the desired future condition of the Forest, meeting the Forest-wide and MA standards and guidelines and all management requirements, including all management requirements (See New Appendix H for discussion of the method finalized to meet water quality and riparian MR's). In addition, the mitigation measures common to all alternatives will help avoid, minimize, rectify, reduce, mitigate, or compensate for environmental effects. Importantly - as the plan is implemented and projects are evaluated/activities monitored - if standards and guidelines are not being met, plan amendments will be considered.

LANDS ALLOCATED TO TIMBER EMPHASIS SHOULD BE MANAGED INTENSIVELY

It would appear in reading in reading the "intensities" for management prescription 17 that cost efficiency is the basis for determining which management intensity will be applied. Even though a minimum or low investment level may be more efficient from a strict dollar sense, it could have a drastic effect on the amount and the quality of wood produced from NF lands. I don't believe this is a sound professional approach to timber management, particularly when you consider that profitability is not the only driving force for timber management on NF lands. As low elevation private lands are developed, timber to meet the nation's needs will have to come from a shrinking land base. The National Forests have to be prepared to meet part of this demand. NF lands that are allocated to a timber emphasis should be managed intensively for that purpose.

Why isn't the USFS pushing for intensive timber management in areas already logged?

Intensive forest management practices seem to be largely omitted from the alternatives. Fertilization and stocking control are proven techniques for increasing timber yields. The FS should introduce more intensive forest management as the land base for timber production declines

> **Response**· A full range of timber management prescription were developed for every forested acre, by an interdisciplinary team during the planning process (see Appendix B and Chapter II, FEIS). These prescription were tailored to meet physical and economic consideration of each stand as to its species composition, physical attributes, and location in the forest The final list of prescription were then input into the Forest Planning model (FORPLAN) to calculate a level of outputs for each alternative (and it's varying goals and objectives.) The FORPLAN program selects the most cost-efficient investment level, which may be the Low Investment Level In addition, FORPLAN "runs" were made, varying the objective function, and using both a maximum present net value and/or a maximum timber objective function for development of the Forest Plan; refer to Appendix B. This analysis indicated that timber outputs increased when an objective function of max. timber was used, but the increases were not great. This indicates that, for the most part, the most cost-efficient prescriptions also are the most intensive.

HIGH QUALITY TIMBER IS MORE VALUABLE

High quality timber is more valuable. According to the March 25, 1988 price guides from Random Lengths, the higher quality grades of lumber and veneer are almost always more valuable than the lower grades.

Response: Agree. The Forest Plan did not specifically examine longer rotations to obtain higher quality timber. It was assumed the higher value obtained through a longer rotation would be negated by the higher discounting effect for the increased amount of time it would take to obtain the higher value.

LARGER DIAMETER TIMBER IS MORE VALUABLE

Larger diameter timber is more valuable. The price guides from Random Lengths indicate that higher prices are paid for lumber of the same grade but with larger dimensions. Larger trees are needed to produce this lumber. You can't get 2"x10" boards out of 8" diameter trees.

Response: Agree. Analysis of harvest information in the preferred Alternative, FEIS Chapter II and VI, indicates that the forest will be harvesting trees with an average DBH of 23 inches plus through the 7th decade. Average DBH's being harvested after the 7th decade will range from 13 to 19 inches in DBH. Even with this average, there will be some trees harvested that will exceed 23 inches plus.

In Management Areas 1D, 2A, 2B, 4, 5, 6, 13, 14 and 27 there will be a substantial amount of acreage where trees will be grown on extended rotations. In these areas, the diameters of the trees will be exceed an average of 23 inches.

MANAGING FOR HIGH QUALITY WOOD PROVIDES MORE JOBS

Managing for high quality wood provides more jobs. Ann Hanus, Oregon State Economist, has stated that managing for high quality timber provides more jobs than low quality timber. High quality wood is the foundation of employment for secondary manufacturing in the Northwest. A switch to managing for low quality wood fiber will eliminate the millwork industries, quality door and window manufacturers, and many other industries that rely on high quality wood.

The number of mills in the Northwest is decreasing rapidly The decrease would be faster if we did not need two kinds of mills We now have mills for large diameter timber and high-tech mills for small diameter timber. The small diameter mills require fewer employees to process the same volume of wood. If we continue to manage our forests on short rotations, we will not need the large diameter mills. Managing for large diameter trees will keep both types of mills. Commercial thinnings will supply wood to the small diameter mills if we manage for large diameter trees.

Response: Technology and industries that use large diameter material to produce products are continually changing to remain competitive in the market place. It has been the trend in all industries, as well as in the lumber industries: as older mills become less efficient and competitive they are either closed or modernized to produce saleable products. This usually means more machines and less people to produce a product. Research

has continued to develop methods to use existing and available raw material to meet public needs/demands. They have developed procedures of processing young, small-diameter trees to meet building industry needs as well as management systems that will provide raw material small logs, that will meet the needs of millwork industries. (Reference: Ponderosa Pine Symposium, The Species and its Management.) There will continue to be a supply of older, larger-diameter material from the MBS, under the Preferred Alternative, through the seventh decade; in addition, some large-sized timber will always be available from MA's with extended rotations (riparian and scenic).

MANAGING FOR A WIDE VARIETY OF SPECIES PROVIDES MORE JOBS

Managing for a wide variety of species provides more jobs. Every tree species has unique wood properties. The forest products industry has already taken advantage of some of the unique properties of the species. Douglas-fir makes good dimensional lumber. The pines provide wood for millwork, doors, and windows, etc As industry becomes more sophisticated, it takes better advantage of the unique properties of each species. While one industry may want the entire forest planted with the species it prefers, the best policy for the region is to manage for a variety of species This adds diversity to the economy, stability, and the highest level of employment.

Managing for quality and diversity provides economic stability The depressed housing market in 1982 had the most impact on those communities most dependent on producing dimensional lumber for home construction. The wood furniture industry expanded during that time The mills supplying quality wood to overseas markets never shut down. The ponderosa pine mills east of the Cascades were much less affected So were the cedar, hardwood, paper and firewood producers less affected

Response Agree In the Forest Plan, the MBS will provide a variety of tree species for commercial sale. They include Douglas-fir, pacific silver fir, western hemlock, western white pine, western redcedar, red alder, mountain hemlock, grand fir, white fir, englemann spruce, and subalpine fir. Actual species selection will be based on a site-specific analysis, with interdisciplinary planning. (Forest Plan Chapter 4) In addition, the Preferred Alternative produces a variety of market and non-market goods, services, and opportunities, to contribute to the diversity of the economic base of the area, (FEIS Chapters II and VI, Forest Plan Chapter 4).

MANAGING FOR QUALITY TIMBER WILL PROVIDE HIGHER WATER QUALITY

Managing for quality timber will provide higher water quality Managing for higher quality timber will extend rotation ages, so less clearcutting will be required Managing for high quality timber will allow for construction of higher standard roads and better road maintenance, because the timber provides greater revenues This will decrease sedimentation and debris slides from roads. Long rotations and larger target diameters for harvest will allow large woody debris to enter these streams, benefitting wildlife and fish

Response· One of the major goals/objectives of the Forest Plan is to maintain or enhance water quality. All management activities are designed to accomplish this. Standards and guidelines have also been adjusted to

more adequately address and clarify the role of large woody debris in streams; see Forest-wide Standards and Guidelines, Chapter 4, Plan plus standards and guidelines for MA 13, Forest Plan. Refer to responses in the Water and Fish sections of this appendix for more discussion on this issue.

THE FOREST SHOULD EXAMINE IT'S ROLE AS A "TREE FARM"

The plan should examine the role of the federal government as a "tree farmer" - an activity more properly in the hands of private industry. The plan should also include recommendations for any needed State laws to assure proper and coordinated resource management among private and public landowners. The MBS has arrived at a point where a major change in goals and management policy is due.

The plan should contemplate the phasing out of general timber harvest and tree farming operations on public land at elevations above about 2000 feet. Mill owners and other buyers need to be told that supply from this source is not going to be available and that they should plan accordingly. The remaining lower-elevation FS lands should then be subject to planned resource management coordinated with adjacent public and private landowners. Industry should be encouraged to grow their own raw materials, with consideration given to land exchanges and sales

Response: Changes in the FEIS and Plan, in response to these comments include recommendation of a Preferred Alternative with an increased trail mileage, increased number of rivers recommended for addition to the National Wild and Scenic Rivers System, emphasis on unroaded recreation and greater protection of scenic values. Timber production is emphasized on suitable acres assigned to a timber harvest prescription. First decade allowable sale quantity will be 110 MMBF annually; most harvesting will occur under 3,000 feet in elevation. Coordination with other agencies is addressed in various Forest-wide Standards and Guidelines; see Chapter 4, Forest Plan

THE TEN-YEAR TIMBER SALE ACTION PLAN IS INADEQUATE UNDER NEPA

In Appendix A to the Plan, the Forest Service presents a ten year action plan, sales it anticipates will go forward in the next decade This appendix is not sufficient under NEPA to provide the needed information for an environmental review here. Such generalizations are legally inadequate and fully unjustified when the agency actually knows where, when and how it intends to cut. See e.g. California vs. Block, 690 F. 2d 753 (9th Cir. 1982). It is unclear from the information provided by the Forest Service whether the little analysis the Forest Service does perform has a significant relationship to the actual sale plans it prescribes The Tribe is unclear whether the preferred alternative "H" generated by the FORPLAN model has anything to do with the ten year action plan. The Tribe therefore requests clarification on the correlation between FORPLAN models and the 10 year action plan.

Response: It is not the intention of this Appendix to perform the environmental review at this time. This appendix is intended to identify projects that probably will be worked on in the future. Chapter 1 of the Plan explains that the Forest Plan provides the framework within which project planning will take place Before any projects are developed, they

will have to comply with all National Environmental Policy Act (NEPA) requirements.

STATE THAT ASQ WILL LAST AT LEAST 10 YEARS; OUTPUTS DRIVE THE PLAN

In the Plan, Resource Summary for timber· this section should include a statement that the Plan's ASQ will be at least 10 years in duration, and that the outputs are what drives Plan, not the standards and guidelines. The Forest Service does not guarantee anywhere in the Plan that the ASQ will remain the same for the plan period

Response: As stated in Chapter 5, Implementation of the Forest Plan, projects (including proposed timber sales) are scheduled in response to the management direction in the Plan, planned outputs of goods and services, near-term management needs and opportunities, and the budgeting process. "If there is a conflict between standards and guidelines and program outputs, projects will be in full compliance with standards and guidelines set forth in this Forest Plan." This comes from Chief's 1920 memo, dated February 23, 1990.

CLARIFY REFERENCE TO NEPA REGULATIONS

In Chapter 3 of the Plan, response to the Effects of Timber Management ICO: we suggest referencing the NEPA regulations, to clarify the nature of environmental analysis that will be done. Also, explain "other resources."

Response: *These suggested changes have been made, see* Chapter 3, *Forest* Plan.

SCOPING IS NECESSARY FOR POSITION STATEMENTS

In MA 17 standards and guidelines: you must include under (E) (21), a reference to NEPA. It is part of the scoping process and contributes to the decision-making for determining the addition of a sale project to the Forest's Sale Program

Response: A reference to environmental analysis under NEPA has been added to section sections of element E. in MA 17, see Forest Plan, Chapter 4.

MONITORING SHOULD CORRESPOND DIRECTLY WITH MANAGEMENT INTENSITY

Under Management Practices for Timber Management, it is stated that "Management intensities will vary with site productivity, timber species, other resource management objectives, and timing of implementation." In the same way, the Forest Service should ensure that monitoring intensities correspond directly with management intensities and site sensitivities.

Response: *Agree; the Monitoring Plan has been updated in the Forest Plan* (Chapter 5) to better track management activities and their effects.

NEED REGIONAL PLANS TO COVER LOG EXPORTS, DEVELOPMENT OF FOREST LAND

We need a Pacific Northwest Plan to achieve regional planning to stop the export of logs (let our local saw mills process it), and to create state-wide zoning laws to insure that prime timber-producing lands, whether federal, state, or privately owned, will remain forested and used for tree-growing, not for shopping centers.

Response: Much of what you want is outside the scope of the Forest Plan. We are required, by law, to address impacts on prime forestlands. This is discussed in Chapter IV, FEIS, Environmental Conditions Unchanged by Alternatives, near the end of the chapter.

NOT ENOUGH EMPHASIS IS PLACED ON THE IMPORTANCE OF WOOD RESIDUE IN THE ECOSYSTEM

The Draft Plan did not place enough emphasis on the value of wood residue to the environment. It does not address the effects of removing the organic matter on site productivity, wildlife, soils, etc.

Response: Between DEIS and FEIS, in response to this and other comments, additional Forest-wide Standards and Guidelines were developed to address "Diversity and Long-Term Productivity " See Chapter 4, Forest Plan. This subject also receives more extensive treatment in Chapter III, in the Wood Residue section. Refer to Chapter IV for the effects of implementing the alternatives on this resource.

IMPLEMENTATION OF TIMBER ELEMENTS FOR THE MANAGEMENT AREAS

How are the Timber elements for each of the Management Areas monitored and who implements them?

What criteria will be used to determine the prevention of degradation?

Response Chapter 5, Forest Plan, Monitoring Plan identifies how the different elements will be monitored, who will monitor, how often etc. The responsibility for most of the monitoring in the timber resource lies with the District Ranger.

The actual implementation of the Timber Elements is done at the Ranger District level with review by the Forest Supervisor's Office personnel. Completing environmental analysis, with appropriate NEPA documentation (such as an EIS or environmental assessment, with decision documents) is a very important part of the implementation process.

THERE SHOULD BE AN EVALUATION OF ENVIRONMENTAL RESULTS OF PAST ACTIVITIES

Under mitigation measures: there should be an evaluation of the environmental results of past activities for use in future decision making.

Response: The results of past activities were used, between DEIS and FEIS, to develop a process to meet water quality and riparian management requirements (watersheds were rated on current condition - see Appendix H). Past experience was also a factor in determining land suitability;

refer to Chapter III, FEIS and Appendix B In addition, the information gathered the Monitoring Plan (Chapter 5, Forest Plan) will be used as a source of information in making future decisions.

HOW WILL STANDARDS AND GUIDELINES FOR SOIL, AIR, WATER AND RIPARIAN AREAS BE MET?

To meet the Forest-wide standards and guidelines for soil, air, water, and riparian areas, what are the Forest Service's responsibilities over and against those of the state and private contractors? What kinds of arrangements are made with the contracted harvester, mineral lessees, special use permit holders, etc.? What does the contract include?

Response: The Regional Office has a Memorandum of Understanding with the Washington State Department of Ecology (DOE) regarding administration of Clean Air and Water Quality Act. This agreement essentially says the Forest Service, through its best management practices, will meet or exceed the standards set by the DOE. The Forest's Standards and Guidelines are designed to meet or exceed the State's standards. See Appendix I

On a project by project basis for timber sales, mining operations, special use permits, etc., the appropriate document (Timber Sale Contract, Mining Plan of Operation, Special Use Permit) has provisions to insure the Forest's Standards and Guidelines are met. The needs for the individual project are determined through the development of an environmental document (Environmental Analysis, EIS, etc.)

IMPLEMENT A PRUNING PROGRAM

Pruning limbs from young trees allows them to produce clear wood at a much earlier age. If the FS implemented such a program, over 3,000 new jobs could be created in Oregon and Washington. Pruning young stands will make future thinnings more profitable; very little clear lumber will come from intensively managed stands without pruning

Response: We agree; however, analysis on the MBS to date indicates that pruning of young trees is not an economical practice at this time When conditions change, this cultural treatment will again be reviewed for application on this Forest. Refer to the discussion on timber stand improvement, Chapter III, Commercial Timber, FEIS

A SEPARATE EIS IS REQUIRED FOR THE MOUNTAIN HEMLOCK STUDY

A full EIS must be completed before this project may even be considered. The Study Plan is just that; it does not attempt even a cursory analysis of environmental effects and nowhere are they compared by alternative.

Neither the Mountain Hemlock Study Plan nor the Forest Plan consider the environmental effects of logging, as required by NEPA. The 2,500 acres planned for harvest for research purposes are only mentioned in passing.

Considering the limited quantity of mountain hemlock on the Forest and the extreme conditions under which it occurs, the plan to study logging in this zone represents a major federal action; a full EIS is warranted.

> **Response:** The Mountain Hemlock study plan is part of the Forest Plan and will follow standard and guidelines set forth in the Forest Plan and Management Area 19, Plan Chapter 4. Clarifying language has been inserted regarding the total acres proposed for harvest under the study plan and approximate unit size. 25 sale units of approximately 6 to 12 acres each Refer to Chapter 4, Plan, Resource Summaries and MA 19.

A WORST CASE ANALYSIS SHOULD BE HAVE DONE FOR THE MOUNTAIN HEMLOCK ZONE

The Regional Forester's decision on productivity and suitability [for mountain hemlock acres] is chiefly based on a final analysis report for the Mountain Hemlock Zone study dated February 14, 1983. This report made a number of admissions which show that the degree of "research and experience" at that time could not be used to justify an unsuitability decision.

Such admissions include: 1) all plots contain western hemlock and Pacific silver fir as co-dominants, 2) concerns about regeneration of the Mountain Hemlock Zone did not result in a consensus; 3) the data used to test regeneration came from silvicultural regimes involving Douglas-fir; 4) regeneration success varies significantly by habitat types and environmental factors; 5) general success was found using the shelterwood system; and 6) there is an absolute lack of published literature on managing the Mountain Hemlock Zone on the MBS.

Where incomplete or unavailable information exists which is "relevant to reasonably foreseeable significant adverse impacts," such information shall be obtained and included in the DEIS, unless the costs are exorbitant or the means to obtain it are unknown Your DEIS is legally inadequate, as you failed to perform a worst case analysis, as required by 40 CFR 1502.22.

> **Response:** The mountain hemlock areas were identified as part of meeting 36 CFR 219.14, NFMA implementing regulations, to determine land suitability for timber production. These are lands for which there was not reasonable assurance that, given current technology, the land could be restocked within five years of cutting (Chapter III, EIS) The mountain hemlock study is designed specifically to determine whether - under conditions of a complete scientific study - these lands can be reforested, using a variety of techniques, and possibly returned to the tentatively suitable land base in the future See "Study Plan for the Determination of Suitability for Mountain Hemlock Zone on the Mt. Baker-Snoqualmie National Forest.

We recognize that the information needed is not available, and thus have designed this study to develop it. A worst case analysis is not applicable. The actual acres within MA 19 that could be classified as suitable - do not have unstable soils etc. - are fewer that the total 31,965 acres in MA 19 in the Preferred Alternative, and would have a relatively small contribution to first decade allowable sale quantity. Additionally, the 31,965 acres comprise only 5 percent of the total tentatively suitable acres on the entire Forest Refer to Chapter 4, MA standards and guidelines for MA 19, Forest Plan We feel we are in compliance with 40 CFR 1502.22.

76,000 ACRES OF MOUNTAIN HEMLOCK ZONE HAVE BEEN ERRONEOUSLY CLASSIFIED UNSUITABLE

About 76,000 acres of silver fir land in the so-called Mountain Hemlock Zone were misclassified as unsuitable. The average net green volume per acre on these lands is 6% higher than for the overall large sawtimber class. The real productivity of these lands is more than twice that estimated by the Forest Service, they are capable of producing over 100 cubic feet per year.

A total of 76,000 acres have been incorrectly withdrawn. By changing your management and not burning slash, these acres can easily be added back into the timber-growing land base If private industry can grow and harvest trees on adjacent lands, you can and should do the same

The majority of ground plots taken in the Mountain Hemlock Zone have Pacific silver fir as a cover type, not mountain hemlock. If in fact we do have a problem, it most likely is over-stocking in the Pacific silver fir. The area classified as mountain hemlock should be returned to the suitable forest land base and harvesting techniques modified to suit the terrain and to accomplish the regeneration necessary.

Response: The current unsuitable classification for this land will be continued; there is not reasonable assurance that these lands can be reforested. However, the regeneration study of the zone, as described in the draft Forest Plan, will test the opportunity to change the suitability determination of a portion of this zone The plan calls for the selection of 250 acres of land for harvest in the zone, consisting of 25 parcels ranging in size from 6 to 12 acres each The standards and guidelines for MA 19 have been clarified, see Chapter 4, Forest Plan.

STUDY PLAN NEEDS FULL PUBLIC REVIEW

The study plan to be developed for the mountain hemlock plant association silvicultural practices must be subject to full public review, since many of the MA 19 parcels are located in environmentally sensitive places

Response: Harvest activities will be done in accordance with objectives stated in Chapter II of the FEIS for Management Area 19 and the standards and guidelines found in Chapter 4 of the Forest Plan. An environmental analysis will also be prepared for the study units; any volume will not contribute to allowable sale quantity, but will be part of the timber sale program quantity.

IS 2,500 ACRES EXCESSIVE FOR THE MOUNTAIN HEMLOCK STUDY?

Is 2,500 acres an excessive amount for the study?

I'm opposed to the Mountain Hemlock study, as I don't think "the field" knows any more about the management of these species than we did and 2,500 acres is a lot of failed acreage to attempt to re-establish.

Response: The wording has been clarified in Chapter II of the FEIS and Chapter 4 of the Forest Plan. The actual number of acres to be harvested are 250, in 25 sale units of 6 to 12 acres each.

WHERE ARE THE 25 MOUNTAIN HEMLOCK STUDY UNITS LOCATED?

Why did you not show the specific places on the Alternative H map where the experimental logging is to take place?

Where are the "25 units" mentioned in the Plan (page 4-202)? The location of these must be subject to public review. The 10 Year Timber Sale Action Plan lists only three sales (60 acres) on the Skykomish District.

Response: Mountain Hemlock study units will vary between 6 to 12 acres in size, too small to show on the maps published with the draft and final EIS. In addition, the exact location for five of the study units have not been determined. Along with those already proposed, these units will be identified in the ten year sale program or amendment to that sale program, Forest Plan Appendix A.

CLARIFY ROAD CONSTRUCTION STANDARDS IN MOUNTAIN HEMLOCK ZONE

We are encouraged that your management area [for mountain hemlock study] does not allow for the construction of new roads in these areas.

Under Item L. MA 19 says "no system roads would be constructed..." It is our understanding that this applies to the Study Plan, but it is also our understanding that system road construction is allowed to pass through areas of MA 19 to access other suitable lands for harvest. This point needs to be clarified.

Response: The wording for Item L. Facilities, MA 19 has been clarified. No system roads would be built; temporary roads may be built to meet study plan objectives or to access adjacent management areas.

WHERE ARE MOUNTAIN HEMLOCK ACRES IN THE LAND SUITABILITY TABLE?

Where in the land suitability table (page III-24 DEIS) are the commercial forest land acres in the Mountain Hemlock Zone accounted for? Are they included in III, D. Regeneration Difficulty?

Response: The mountain hemlock acres are included in the 159,700 acres of forested land with regeneration difficulty (part III, D. of the land suitability table). Refer to Chapter III of the FEIS.

IF MA 19 CONTAINS NON-MOUNTAIN HEMLOCK, CAN THE ACRES BE RE-ALLOCATED?

Is it not true that if portions of areas currently allocated to MA 19 are found to not be mountain hemlock, they will be re-classed and available for timber harvest at the project planning level? If so, a statement should be included in the introduction for MA 19.

Response: As stated in part D. Amendment and Revision of Chapter 5, Forest Plan, the boundaries of management areas other than those legally established (such as wilderness) are not firm. They represent a transition from one set of opportunities and constraints to another. Field verification, during project design, may indicate that a mapped MA boundary should be changed to reflect the environmental conditions the MA was intended to include. This section of Chapter 5 explains the process used to amend the Plan, if necessary. If the Forest Supervisor determines the change is significant, the same procedure used to develop and approve the Forest Plan will be followed. If the change resulting from the amendment is determined not to be significant for the purposes of the planning process, the amendment may be implemented after appropriate public notification and meeting NEPA requirements. This process applies to MA 19.

CONSIDER ECONOMIC RETURNS FOR HARVESTING MOUNTAIN HEMLOCK; MARKET FOR THIS MATERIAL IS UNCERTAIN

Consider the full costs of the mountain hemlock study. This economic analysis should emphasize that CMAI for trees in the mountain hemlock zone is 240 years (DEIS, page III-29). This necessitates a very long rotation time and, therefore, a very low present net value for any investment in forest management in this zone.

We object to the current mountain hemlock study, since it appears that mountain hemlock do not regenerate quickly, that the cost for harvest would be very high, that the market for mountain hemlock is uncertain, and that the entire ecosystem could be lost.

I question the need to establish a market for mountain hemlock where no market presently exists. I question the ability of the material to pay its way and return a reasonable amount to the government.

Response: Past management activities indicate that there is a market for this material. Additionally, if after this study it is determined that the mountain hemlock lands can be regenerated within five years, and, thus returned to the tentatively suitable land base, timber management prescriptions would be applied only after an economic analysis. (Refer to Timber Sale Program Information Reporting System (TSPIRS), 1989.) The over all cost of the study will most likely exceed the value of the trees removed from the 250 acres of study plots, but the study will help gain solid research information on future suitability in this zone.

INCLUDE NORTH BEND, WHITE RIVER R.D. IN MOUNTAIN HEMLOCK STUDY; ADJUST CRITERIA

Two changes: the North Bend and White River Ranger Districts should be included in the mountain hemlock acres with regeneration difficulties. In addition, if an area - because of lack of adequate soils and short growing season - cannot produce an adequate-sized stand in 150 years, it should be

unsuitable for timber production (ie. less than 80 cubic feet, per acre, per year).

Response: Enough empirical information is known about Mt. Hemlock stands that occur on the North Bend and White River Ranger Districts to make a determination of suitability using the standard suitability analysis (FEIS Chapter III and Forest Plan Records).

TIMBER SUPPLY ANALYSIS IS INADEQUATE

Timber supply information presented in the DEIS and draft Plan, while better than most reviewed, is inadequate as a basis for final decisions in the forest planning process. An adequate analysis must be completed before publication of the FEIS and the results fully discussed in the planning documents.

Response: We have reviewed and updated the timber supply information, where applicable and where newer information is available. It is impossible to put precise numbers on timber supply for two reasons.

First, private ownerships (and to a lesser degree, public ownerships) respond to market conditions. Reduced prices resulting from any of a number of causes - e.g., a slowdown in the economy, increased supply on the market from other sources, or increased substitution of other materials - will elicit a lower supply response from private ownerships Conversely, increased demand will bring about a higher supply response, within the biological and technological capability of the owners to produce timber. While the biological capability is relatively fixed in the short run, technological changes continue to add to the economic supply by making wood previously uneconomic to bring to market economic to do so now.

Second, industrial forest owners tend to keep confidential both inventory data and production plans to the extent possible. Nonindustrial owners, on the other hand, are a very difficult group from which to extract data of this type because of the diversity and fragmentation of the ownerships. Therefore, it is difficult to get a good handle on available inventory, current plans for production, and future plans for production given various market scenarios from the private sector. This creates a significant problem for supply projections in the Puget Sound area, as the private sector in total accounts for roughly 65%-75% of the regional market.

Changes that have taken place since the original timber supply analysis was prepared for the DEIS indicate these problems In the DEIS, it was stated that, based on best information available at the time, production from industrial forest lands would remain near current levels up through the fourth decade, then decline as an age gap in inventory was experienced Current data now indicate that the gap in industrial inventory will be encountered in the early 1990's and last through about 2010. Thereafter, industrial inventories and production will once again begin to rise (D Adams and R.Haynes, "Future of the Douglas-fir Region Forest Economy," CINTRAFOR Working Paper #26, Univ. of Washington, Dec 1989). On the other hand, production from private nonindustrial forest lands has increased in both relative and absolute terms over the past five years. Speculation is that if prices continue to remain high, production from that sector will continue to stay up. But there is no way to attest to that with any certainty, as the sector is too fragmented to be able to elicit an indication of future production plans given various market scenarios. However, we do know that the inventory exists to maintain as high, or higher, production levels from the nonindustrial private ownerships

In the FEIS, we have laid out the timber supply situation in narrative form with the latest information available; see Chapter III, FEIS. In summary - **given no major changes in levels of economic activity in the economy, either up or down** - timber supply in the region will continue to tighten over the next two decades as all ownerships, except perhaps for nonindustrial private, face declining production capabilities. In the

private industrial sector, that decline is from lack of inventory of merchantable age. In the public sector, both State and Federal, the decline is from less old growth available for harvest as a result of increased requirements for protection of other resource values. In those public sectors as well, it will be at least two decades before current young stands are of merchantable size. The result will be increasing prices until about 2010, when new inventory from all sectors, including the international, will become available, sharply tempering prices. In the interim, the market and consumers may have several choices for coping. Substitution of other materials, technological changes in wood utilization and building techniques, changes in building codes, increased imports from other regions of the U.S. and from Canada, and restrictions on log exports are all possible market and political responses to tightened timber supply.

The timber supply analysis in the FEIS lays out the timber supply situation as best we know it today. Because of the difficulties in attaching numbers to the supply scenarios that have any meaning, in the FEIS we have chosen to utilize a narrative describing the situation and the direction of expected changes in supply by the various ownerships, and have not used specific numbers. The historic-to-date harvests by ownership in the region provide the reference point for that narrative

It is important to examine the current and expected future timber supply situation. It is also important to know that, in the Mt. Baker-Snoqualmie National Forest's area of influence, National Forest timber makes up somewhere between 10%-20% of the market, depending on circumstances in any given year. The Forest is a major supplier, but nowhere near a majority supplier. The Forest has an obligation to meet other resource protection and maintenance requirements and to meet demands for other resource uses. Some of these actions are being adopted at a difficult time from a timber supply standpoint. But the Forest's position in the timber market makes those actions less costly than they would be if the Forest were the majority supplier in the area

EFFECTS OF REDUCTION IN TIMBER SUPPLY ON PULP & PAPER INDUSTRY NOT CONSIDERED

Changes in timber sale levels on the MBS and other National Forests in Washington have a major impact on Washington's pulp and paper industry. We were unable to locate any consideration of this fact in the Plan and DEIS.

The MBS has not fully considered the impact of any reduction in timber supply to the pulp and paper industry, either accumulative throughout the region or to the pulp and paper mills within the MBS zone of economic influence.

Response: Discussion of the pulp and paper industry has been added to the FEIS, Chapter III The situation of the pulp and paper industry in the Puget Sound region is discussed along with the rest of the timber supply and demand information.

Effects of changes in timber sale levels on the pulp and paper industry are not shown directly in terms of reductions in employment and income. This information is included as part of the total estimated change in jobs and income (Chapter II, Table II-9n) . Information on individual sector changes as projected through IMPLAN is in the planning records.

CUMULATIVE REGIONAL ASSESSMENT SHOULD BE MADE OF CHANGES IN NAT'L FOREST ASQ'S

The DEIS contains absolutely no indication that the Forest made any attempt to assess future timber program levels on adjoining National Forests. The final Plan must recognize that proposed reductions on adjoining National Forests will lead to increase competition for MBS timber

Response: The Regional Office in Portland has published an analysis of the cumulative economic effects of the aggregate changes in timber to be supplied from the National Forests, as reflected in Draft Plans, on the regional timber market (USDA Forest Service, "Timber Supply in the Pacific Northwest: Aggregate Implications of Forest Plans," Pacific Northwest Region, June, 1989). The effects for Western Washington indicate that harvest level changes on the MBS, Olympic, and Gifford Pinchot National Forests will not have a major effect on the overall timber supply picture. What does change much more significantly over the next 2-3 decades is harvest from private industrial lands. Any increase in competition for logs from any of the Forests caused by declining harvests will come primarily as a result of these declining harvests from private industrial lands. (Of course, as total available supply shrinks, the changes in National Forest timber harvest levels become relatively more important until supplies once again expand)

The Wenatchee National Forest's Plan calls for only a slight reduction in harvest levels over the next decade. Therefore, the amount of timber available for import into the Puget Sound area from the Wenatchee for processing will not change significantly. And, according to the Washington Mill Survey (Wash DNR, 1988), little if any timber flows from the Mt. Baker-Snoqualmie to the east side of the Cascades for processing.

APPEARS TO BE DOUBLE COUNTING IN LOCAL VS. REGIONAL TIMBER SUPPLY

There appears to be a case of double counting in the Forest Plan, with the Forest claiming a portion of the supply from other regions as part of its total supply picture for its own region. The State's concern is that this is a misleading supply figure and, in fact, the industry in this region may have less timber available than projected.

Response: Defining "supply" and "demand" for a subregion within a regional market is very tricky, particularly as data are relatively limited. Use of ownership origin of "logs consumed" in the Puget Sound area as a measure of supply from that ownership may indeed count the production of logs produced outside the area and imported into the area for processing. Not shown, on the other side of that coin, are logs produced within the Puget Sound region and exported to areas outside the region for processing.

Because supply and demand, as used here, are economic concepts and respond to economic forces, the quantity of logs produced and consumed within a subregion of a market area can change from year to year with changes in relative prices, changes in levels of imports from other regions, or simply because one or two mills close down or open up in any given year. Biological capabilities, of course, are limiting factors for maximum potential supply. But relative prices and available substitutes within and outside a region elicit the actual economic supply from the biological potential. For these reasons, it is definitely of interest to look at the market region (e.g., westside Cascades) as a whole, rather than try to make

precise predictions of economic supply levels on a subregional basis. The Regional Office in Portland produced such a study in 1989 that looks at effects of changes in National Forest timber harvest levels for Washington and Oregon as a whole, and by region within that area, given assumptions about current and expected economic supply from other ownerships. We support the additional work being done in this area by the State through the Department of Trade and Economic Development, and the University of Washington Northwest Policy Center.

In the FEIS, we have dropped specific numbers for supply predictions in favor of a narrative description of the expected magnitude and direction of changes in economic supply of timber by various ownerships over the next three to four decades. This approach, when taken in conjunction with the aggregate study done by the Regional Office, gives a better picture of the overall current and expected timber supply situation in the region.

ABILITY TO MEET INDUSTRY'S "CRITICAL MINIMUM LOG REQUIREMENT" NOT ANALYZED

Timber from the Forest has historically played a vital role in the region's economy and should not be compromised during the current planning process. It is important that the sufficiency of the MBS timber sale program be based on four factors; these four factors will determine whether the existing industry's critical minimum log requirement will be met or not, and must be adequately analyzed in the forest planning process and considered in the decision.

PLUS believes the timber sale program described in the draft Forest Plan will not be adequate to meet the timber industry's minimum raw material needs over the next decades.

Response: There is no statutory or regulatory requirement for the Forest to meet "industry's raw material needs" or "critical minimum log requirement," however they might be defined. The Forest is required to assess and consider the current and expected future conditions of supply and demand for timber, as well as for other resources, as part of the disclosure of the estimated environmental effects of actions stemming from the Forest planning process. Based on that assessment, estimates of effects of alternative land management proposals on the economic and social environments -- including the timber industry -- are made. That has been done in the planning documents, and is discussed in more detail as well in responses to questions about the adequacy of the timber supply analysis earlier in this section.

Timber harvest goals are set according to the physical and biological capability of the land, protection requirements for other resources, demands for other resources as well as timber, and in concert with goals and objectives for the overall management of the Forest. We acknowledge that the projected harvest levels for the Forest Plan are not as high as the industry would like. However, our supply assessment states that timber will still be available in adequate amounts from all ownerships within the region for the industry to keep operating During the next two decades, prices are expected to rise because of a supply squeeze coming as a result of inadequate merchantable inventory on private lands, high levels of demand, and reduced harvest levels on public lands. While the National Forests are major, though not by any means majority, contributors to the timber market in the westside Cascades region, our first priority is to protection and maintenance of the sustainability of all resources on the

Forest. The tradeoffs of doing so versus maintaining higher levels of timber harvest are detailed in the planning documents.

OTHER SOURCES OUTSIDE OF NAT'L FORESTS AVAILABLE FOR AUGMENTING TIMBER SUPPLY

There are ways to offset any reduction in timber sales on the Forest that might result from protection of old growth and other values. A much greater emphasis on State and private lands and processing more logs, rather than exporting them could be made. The FS has responsibilities in these areas through the State and Private Forestry programs and RPA. It is incumbent upon you to make clear to the public that these options are there.

Response: The DEIS discussed the historic and expected contributions to the timber supply by the major land ownerships in Chapter III, FEIS. In addition, it has been pointed out in the same section in the FEIS that private nonindustrial forest lands have increased their share of harvest in both relative and absolute terms over the past five years; that those lands have sufficient inventory to maintain current or higher levels of production over the next two decade; but, that it is difficult to predict or elicit supply response from that ownership because of its fragmentation and diversity

The FS, State, and Private Forestry branch is involved in a number of programs to provide knowledge, assistance and encouragement to non-federal timber land owners, particularly the small private nonindustrial owner. That role is all the FS can play in this arena. The agency also has responsibilities under the RPA of 1974 to assess the past, current and future timber supply situation in the United States over all ownerships, and to discuss the potential National Forest contribution to that supply picture. Again, the agency has no role beyond assessment regarding non-National Forest ownerships, other than perhaps those just discussed under State and Private Forestry programs.

DOCUMENT EXPECTED CHANGES IN CANADIAN TIMBER SUPPLY OVER NEXT SEVERAL YEARS

The Forest should document the expected change in Canadian timber supplies in the future (6-15 years hence) with hard data There is some disagreement as to the timing of a Canadian timber supply decline.

Response: There are no "hard data" than can be used to predict what the Canadian timber supply situation will be in the future. However, indications are that the Canadian exports to the United States are decreasing somewhat, will continue to do so, and will be higher priced than was experienced during the late 1970's and early 1980's. The reasons are fairly straightforward and have parallels in the U.S. experience. Canadians (particularly British Columbia) are beginning to see that there is not an unlimited supply of old growth that can be harvested at rapid rates. Concern is rising in Canada over environmental issues related to timber harvest. This means that more restrictions have been and will be applied to timber harvesting; the result will be a reduction in available timber from Canada, and a corresponding increase in price. (D.Adams and R.Haynes, op. cit., 1989).

TIMBER DEMAND ANALYSIS INADEQUATE (DEMAND IS UNDERSTATED)

The lack of a meaningful timber demand analysis further challenges the validity of the Plan, particularly when the Forest is proposing a reduction in sale levels. Presumably, if proper demand analysis were conducted, the Forest would realize that a reduction in total harvestable volume would have devastating effects on the local industry, its employees and communities.

A thorough demand analysis should be completed and specific curves be used in development of alternatives.

The years 1987 and 1988 have seen record removal of forest products from State and Federal lands. Home construction and commercial uses of lumber products are at a record all time high. Stumpage rates on public lands are reaching records set in 1979 and 1980 The latest available figures indicate that the forest products industry will have removed 253 MMBF of timber from the MBS in 1987.

Response: The demand analysis has been updated, along with the supply analysis, for the FEIS. Three critical factors stand out: demographics, relative prices, and the business cycle.

Demographics indicate that new residential construction will not return to the high levels of the late 1970's. This will provide a damper on the demand for wood products from that end use. On the other hand, "repair and replacement" of residential units is expected to increase over the next several decades, which will at least partially offset the decline in new construction. However, the amount of wood used in repair and replacement is significantly less than that used in new construction, so the offset is not likely to be total

As long as demand for wood products stays at current levels, prices over the next two decades will continue to rise until new inventory comes on line from all ownerships around 2010 (see supply discussion earlier). As prices continue to rise, it is very likely that more supply will be elicited from both nonindustrial private ownerships and from regions outside the Pacific Northwest, which will dampen the price increases Also, increases in relative prices tends to stimulate both technological advances in wood utilization, as well as increased use of substitutes (e.g., metal studs in framing).

The economy has a decades long history of growth and recession periods. The wood products industry is highly sensitive in general to these business cycles History tells us that it is imprudent to base projections for planning that covers several decades on the current slope of the business cycle.

In our revised demand analysis, we recognize the current level of demand for wood products and the effects that demand, in combination with the tightening timber supply over the next 20 years, will have on prices (assuming current business conditions continue and that log exports are not restricted to any major extent). While dropping specific predictions of numbers for wood products demand, we have provided a narrative description of the current and expected future status of demand for wood products from the region.

The decision-making process took into account the expected supply and demand situation over the next several decades and allowed for as much timber harvest as possible while meeting other resource protection requirements, demands for other resource uses, and the overall goals and objectives for managing the Forest. Again, as discussed above under timber supply questions, the Forest has a responsibility to consider the demand and supply situation, and to consider the effects of its planning and management decisions within that context on affected economic sectors and communities. That has been done.

TIMBER DEMAND ANALYSIS INADEQUATE (DEMAND IS OVERSTATED)

While the DEIS states that timber demand will "grow slowly" over the next ten *years, the Northwest Power Planning Council study noted above [Northwest* Conservation and Electric Power Plan, Volume II, 1986] disagrees with this self-serving conclusion Because of the forest products industry's influence on electrical power demands, it is not in the best interest of the Council to overestimate the need for wood products.

No adequate discussion is presented on the likely future for the national economy with respect to the long term demand for housing This lack of substantive discussion is difficult to understand since new housing demand accounts for 40% of the market for lumber and wood products (NWPPC, 1986, cited above).

The Power Planning Council has provided estimates for the future of the national economy that relate to wood products demands. The following factors should be noted: high real mortgage rates; reduction in single family residence share of total new residential construction, with correspondingly less wood used; decrease in average size of new housing units; and relatively constant rate of new housing starts through 2005. The above information clearly shows a high potential for a reduced domestic market for wood products.

Response: Any projection of economic demand for a good or service is necessarily bounded by a number of assumptions. Changes in one or more of those assumptions can change the magnitude and direction of the demand forecasts. The Northwest Power Planning Council recognizes this fact in its forecasting process. The Council forecasts a **range** of demand for electricity with five possible paths - high, medium-high, medium, medium-low, and low - based on different sets of assumptions about levels of *economic and population growth, demand for major products from the Pacific* Northwest such as aluminum, lumber and airplanes, and related national economic trends. The Council has a good track record for pulling together the best possible forecasts, using professional consulting organizations, in-house expertise, and feedback from other knowledgeable parties. The 1986 Power Plan, however, did not foresee the rapid and sustained economic recovery from the recession of the early 1980's. It did not foresee the high levels of log exports currently experienced. And it did not foresee the decline in available timber supply currently expected to last over the next two decades, partly as a result of declining merchantable inventories on private industrial forest lands, and partly as a result of increasing requirements for protection and enhancement of non-timber resources on public lands - e.g., significantly large spotted owl habitat areas are required now compared to even 1986.

While an economic slowdown could certainly reduce the demand for timber from the area, the general tightening of timber supply in the Pacific Northwest (see discussion earlier under timber supply questions) would still keep prices from falling much over the next two decades. At most, the expected real price increases of at least 2.5% per year over the next 20 year (D.Adams and R.Haynes, op. cit., 1989) would be modified somewhat while the economy was in a recession

Other factors keeping demand at least constant, if not growing slowly, are the continued demands for fiber by the pulp and paper industry, continued export demand for logs, reduction in imports and/or price increases of Canadian lumber, and growing housing remodeling and replacement activities that will offset to some degree lower levels of housing starts.

Economic supply and demand estimates must be considered in the broad context of national and regional economic trends, relative prices of competing wood products and substitutes, and international supply and demand They must also be considered in relation to each other; each has no economic meaning in isolation from the other. For the MBS, the main question to be answered from the demand analysis is whether the Forest can sell the timber it has available for harvest without significantly affecting prices If the Forest were to sell all its available timber, but prices declined with each successive unit sold; or, conversely, if the Forest were unable to sell all its scheduled sales for lack of interested buyers at the minimum bid price; then one could say that demand for timber was overestimated, and at least a portion of the lands allocated to timber production could be used more productively in some other allocation. On the average, over the next 20 years, it does not appear that either of these scenarios will occur Barring a major economic downturn, all sales will be sold. And real prices for the region will probably continue to rise. Thus, we reject the notion that demand for timber has been overestimated in the Forest planning process.

(The same question could be asked from the supply analysis, as well -- can the Forest sell the timber it has available without significantly affecting prices? We have seen earlier that real stumpage prices are expected to rise over the next 20 years until young inventories, both domestic and international, reach merchantable age. This indicates that demand is expected to exceed supply, resulting in price increases to balance the market. All other things being equal, if the Forest were to sell more timber, price increases should be moderated somewhat, leading to lower prices for consumers [but perhaps to less revenue for the Treasury as well - a distributional decision that would have to be made politically]. However, all other things are not equal. The Forest has only a very small number of acres that are not suitable for timber harvest under current or expected future prices. Other lands potentially suitable for timber harvest are allocated to less-than-full yield or to no-yield prescriptions to meet resource and environmental protection and enhancement requirements, to meet demands for other resource uses, and to meet overall goals and objectives of management for the National Forest. Therefore, while we recognize a tightening of supply over the next two decades, the Forest does not have additional lands available for allocation to timber production that would not result in even higher opportunity costs than the gains made in moderating timber price increases.)

DEMAND FOR LUMBER AND WOOD PRODUCTS WILL DECREASE DURING 1985-2005

The Northwest Power Planning Council has estimated that the demand for Pacific Northwest lumber and wood products will decrease during the period 1985-2005, with lumber production decreasing by 17% and plywood production decreasing by 25%.

Response: The 1989 Supplement to the 1986 Power Plan has revised this estimate in light of unexpectedly strong economic recovery and growth since the mid-1980's. The Supplement does not make specific projections of demand in absolute numbers. It does expect changes in **production** over the next 25 years (14% and 13% declines in lumber and plywood, respectively), but that is only partly related to a drop in demand from declining housing starts and competition from outside the reason. Up through 2010, a decline in lumber and plywood production in the Pacific Northwest will be related as much or more to a tightening of the supply of input for production rather than to a decrease in demand for wood products. Any decrease in demand for wood products **manufactured in the Pacific Northwest** will be related mostly to increased production costs caused by higher labor and raw material prices, causing a shift in comparative advantage to other domestic and international producing regions.

SHOW THAT WOOD USED FOR STRUCTURES REPLACEMENT WILL BE SIGNIFICANT

If there is any potential for long term growth in regional domestic demands for lumber and wood products....if structures replacement, rather than new construction, will characterize the market of the future. ..the Forest needs to show either that new housing construction will increase in the future or that structure replacement demands can offset reductions in new construction.

Response: We recognize that housing starts will remain at lower levels than the highs of the late 1970's because of demographic factors. Measurements of wood used in repair and replacement are not yet common, but best estimates are that use of wood products for repair and replacement is increasing as the housing stock ages, and as higher housing prices encourage people to stay in place and remodel rather than moving to new housing. We do not expect demand from that sector to offset fully the reductions in demand from lower housing starts. However, demand from all end uses is expected to keep total demand near to slightly above current levels, barring major economic recessions.

TIMBER DEMAND PROJECTIONS OF OTHERS SHOULD BE RECOGNIZED

The Forest should recognize the [timber demand] projections of other agencies and respected entities such as the Northwest Power Planning Council and Wharton Econometric Forecasting Associates.

Response: The Forest used RPA projections as the basis for discussion of timber supply and demand in the Forest planning documents. This work is done by some of the most expert and respected individuals in the field. NWPPC, Wharton (now the WEFA Group), Data Resources Institute and others also do expert and credible jobs of supply and demand forecasting. Forecasting is an inexact science at best, and forecasts of timber supply and demand can be found both higher and lower than those used in the

planning documents because of different forecasting techniques and different underlying assumptions.

NEED INVENTORIES OF RARE PLANTS AND OF PLANT COMMUNITIES

A thorough inventory of rare plant habitats must be made.

Present inventories of rare plant habitats are far from adequate.

Impacted in the higher elevations are botanical areas that have not adequately been surveyed. Only the actual sightings of sensitive plants have been recorded There is not adequate staffing or funding to survey areas for sensitive plants in a manner that allows for the contemplated level of harvest in these areas

Although it is essential to conduct field search and inventory for occurrences of T, E and S plants prior to ground disturbing activities, as the DEIS states the Forest does, it is important to conduct these inventories in the earliest stages of planning and at times of year when the identification of these plants can be confirmed. This may mean several field surveys for each site. A single or poorly timed search of a potential project site will not provide reliable data on all plant species present The Forest should provide for this level of inventory.

A serious omission is the absence of an inventory effort for endangered, threatened and sensitive plants We urge the forest to conduct such an inventory and recognize its importance in the Plan.

To reduce the possibility of irreversible loss of certain populations and habitats, the inventory should be completed relatively quickly (midpoint of the first decade) and give first priority to locations outside of wilderness.

Is the Forest's rare plant data base really adequate to the task of identifying the presence of sensitive species on all portions of the Forest where potential developments will occur? We seriously doubt that this is the case, yet the overall effectiveness of the entire sensitive species standard and guideline process is completely dependent on the accuracy and comprehensiveness of this initial step in the following process If the data base indicates no potential for the presence of the species, then no field inventory is done. But if the data base is incomplete, the system breaks down. We suggest that project level field inventories receive a high priority, at least until the rare plant data base is complete in all areas of the Forest subject to ground-disturbing management activities, including livestock grazing.

How will project level inventories be carried out and by whom? Who will prepare the species management guides for plant species? Will they be trained field botanists? How often will the guides be reviewed and updated? How many trained field botanists does the Forest now employ or intent to employ for such inventories? Are there plans to hire additional botanists to adequately implement the proposed plan? These are critically important questions that need answers before the public can evaluate the adequacy of your listed species management program.

The Forest must conduct a more thorough inventory of the plant communities, with the intention of locating and designating additional RNA's and Botanical Areas

Since, as we know, a number of native plant species and communities are in decline, a new and more thorough botanical inventory of the forest should be made with the goal of establishing additional RNA's and Botanical Areas

Response: Forest-wide Standards and Guidelines have been added for Diversity and Long-Term Productivity; the standards and Guidelines for Threatened, Endangered, and Sensitive Species have been revised to better reflect the intended management of sensitive plants. Proposed project areas will be assessed for suitable habitat for sensitive plants. In most cases, field inventory of the areas will also be needed. As funding is available, inventories for sensitive plants will also be initiated in no-timber-harvest areas, such as wilderness.

During the life of this Plan, the Forest will be developing a data base for rare plants, staffed by professional Botanists and Ecologists. A number of plant inventories already started or beginning in 1990 will also provide information on occurrence of rare plants, as well as inventories of plant communities. These include the Ecology Program Inventory, which began in 1980, and to date includes over 3000 plots throughout the Forest, plus other inventories of old-growth areas, of spotted owl habitat, ground-truthing of areas in various successional stages to calibrate satellite vegetation interpretation, and stand examinations. The Plan does not provide the detail on who will do surveys and how. Surveying will be done to professional standards.

PLANT INDICATOR SPECIES

We suggest the use of plant species are indicators if such specialized habitat types as seeps, bogs, and wet meadows, talus slopes and forest wetlands, all of which should have their own indicator species and MMR's.

Response: The Ecology Program has sampled seeps, bogs, wet meadows, talus slopes, forested wetlands, as well as other types of non-forest and forested communities as part of the ecological inventory, and has the information needed to select indicators of these environments This inventory is ongoing, and will be completed during the life of the Forest Plan. Standards and guidelines for managing riparian and adjacent areas, special habitat types (such as cliffs, caves, and talus slopes), and using monitoring to ensure that these standards and guidelines are met and effective is the method in the Forest Plan for protecting fragile or uncommon plant communities. All threatened, endangered, and sensitive plant and animal species are included on the indicator species list. Management guides will be prepared for threatened, endangered, and sensitive plants on the Forest, with the highest priority given to developing guides for species most likely to be impacted detrimentally by human uses

BETTER INFORMATION ON EFFECTS ON SENSITIVE PLANTS

I request that you present a more comprehensive and realistic assessment of the effects of the Forest Plan on the health and viability of sensitive plant species.

The discussion needs to include the possibility on non-ground disturbing activities that could increase the rarity of plants, this the probably listing of species. Non-ground disturbing activities include prolonged moderate grazing, trampling, hiking and cropping.

Although many of the sensitive plants occur in areas not directly impacted by timber harvest, there are still a number of potential threats to the plants. These include road and trail construction, impacts from recreational use, particularly within "over-used" wilderness area sites, small hydro projects, grazing, campground development, etc. Sensitive plant populations are often quite localized and even small projects have the potential for significant negative impacts. The statement in this section tends to suggest that threats to sensitive plants are minimal because they do not occur in harvest areas. Concern for sensitive plants should be expressed under the other categories (e.g. roads, recreation, etc.) as well.

We are especially concerned with the effects of the Plan on sensitive species occurring in old growth forests, particularly Pleuricospora fimbriolata. It may well be old growth dependent. Its reproductive biology and life cycle are still incompletely understood.

Please show for each individual endangered plant or animal that your forest plan will not adversely affect populations of said endangered plant or animals.

We are concern with some aspects of the treatment in the DEIS of the environmental effects of the proposed plan on native plants, especially sensitive plant species. Effects analysis should include a thorough discussion of the role of livestock and ORV's in the degradation of native plant communities by direct impacts and as vectors for the spread of noxious and invasive weed species. Sensitive plant species on the MBS are presently vulnerable to a number of existing threats to one or more of the listed species, including road construction, timber harvest, livestock grazing, ORV activities, commercial plant and seed collectors and recreational hiking. These impacts should be more completely covered in the DEIS.

We are concerned with the lack of a thorough treatment in the DEIS of the environmental effects of the proposed plan on native plants, especially sensitive species.

The DEIS Ch. 4 contains virtually no discussion of the Alternatives' effects on sensitive plants, only the statement that "activities will be modified to protect them". This is not good enough. We need to know how activities will be modified, what mitigation measures will be used, who will monitor the Forest-wide Standards and Guidelines.

By suggesting that most rare plants occur at higher elevations and are not in conflict with planned timber harvest, this discussion incorrectly minimizes the potential threats to plants by Forest activities. The Plan needs to address threats to plants from recreation, construction, grazing, and alteration of riparian, wetland or aquatic habitats.

Response: Standards and guidelines for managing for diversity have been added to the FEIS and Plan, and sections on threatened, endangered and sensitive plants have been revised. Your comments were considered in those revisions. Chapter IV of the Plan has been revised to better discuss the effects of alternatives on plant community diversity and effects on sensitive plants. The Ecology Program has collected some information on sensitive plants, beginning in 1980. Also, the Forest has initiated a Botany Program specifically to inventory sensitive plants and their habitat.

THE SENSITIVE PLANT LIST

We would like to note that it is at least as likely that a species will be added to the sensitive list, due to the actions of the plan and other reasons, as that they will be deleted.

The Forest Service's sensitive species list should be updated to reflect changes in the State's list.

The complete list of sensitive species, their habitats and recognized threats to these species should be clearly listed in the FEIS

Which plants are on the National Endangered Species List?

The appendices should list the sensitive species occurring on or adjacent to the Forest.

> **Response:** A list of all sensitive, threatened and endangered plant and animal species has been included in the FEIS; refer to the Diversity, Vegetation and the Wildlife sections of Chapter III. These lists are updated each year, considering input from the State. Additions, deletions, and changes in listing categories can occur in these revisions

STANDARDS AND GUIDELINES FOR MANAGING SENSITIVE PLANTS

The development of species management guides for sensitive species is required and important. The Forest's intention to develop these guides should be stated as a separate goal, such as "The Forest will develop and implement a species management guide for all sensitive plant and animal species occurring on the Forest".

The Final Plan should include more specific and enforceable Forest-wide standards and guidelines for protecting listed species Implementation of Region 6 guidelines and FSM directives in this regard should be specifically detailed and explained rather than merely implied.

Management and recovery plans should be developed for all listed sensitive species on a species-specific basis. Provide clearly defined protections for the habitats of each listed species. Under the Plan, which species will receive management plans? What will the effects be on species not chosen? Who will decide? Who will develop the plans? How will the species be managed until the plans are in place?

> **Response:** In Chapter 4, Forest Plan, the standards and guidelines for Threatened, Endangered and Sensitive Species have been revised to better reflect the intended management of sensitive plants Proposed project areas will be assessed for suitable habitat for sensitive plants. In most cases, field inventory of the areas will also be needed.
>
> Management guides will be prepared first for species for which the need is greatest, i.e., those for which there is an apparent threat to viability. As species vary considerably in their habitat requirements, population sizes and distributions, and vulnerability to the range of human activities which occur on the Forest, a unique plan must be developed for each sensitive plant species. These plans will be done to professional standards, under the guidance of qualified botanists.

ADD REVIEW AND INVOLVEMENT OF THE WASHINGTON NATURAL HERITAGE PROGRAM

In the Forest-wide Standards and Guidelines for Threatened, Endangered, and Sensitive Species, sensitive plants should receive the advice and review of the Washington Natural Heritage Program.

Response: Consultation with this Program is included in the standards and guidelines; refer to Chapter 4, Forest Plan

SPECIAL PLANT HABITATS

Fragile plant habitats, such as bogs, wet meadows, talus and cliff slopes, marshes, seeps, and springs should receive specific management protection across the range of land use prescriptions. While the MBS has taken a highly commendable initial step in this direction in the standards and guidelines, more specific protective guidelines should be enumerated and a Forest-wide database inventory should be developed to catalog and exclude such sites from development activities

Response: Revisions have been made to the standards and guidelines for riparian areas and standards and guidelines for diversity have been added to the Forest-wide section, to better address management of fragile and uncommon habitat types such as these. A variety of vegetation inventories will increase our data base on plant communities

VIABLE POPULATIONS OF NATIVE PLANTS

Nowhere is it mentioned that the Forest will maintain viable populations of native plant species. Forest Service policy includes the maintenance of viable populations of native plants, so should the Forest Plan.

Response: This has been added to the Forest-wide Standards and Guidelines for diversity

DIVERSITY OF NATIVE PLANT COMMUNITIES

NFMA requires the preservation and enhancement of diversity yet many of the prescriptions in the draft plan will have exactly the opposite effects.

Large, viable examples of the different plant zones and communities need to be set aside--not just old growth.

Forest-wide standards and guidelines should protect the diversity of native plant communities.

We are concerned that you retain the original mix of native plant species over the entire forest and that you not plant non-native species. Type conversion is not allowed by NFMA (36 CFR 219.26) without extensive justification - which appears nowhere in the DEIS.

Response: These concerns have not been addressed at this Forest Plan level; we have, however, added this as an information need,

NOXIOUS WEEDS

Discuss the effects of noxious weed introductions on native plants, including the role of domestic livestock, ORVs, and other recreational activities in such introductions.

Response: Tansy ragwort is the only "noxious" weed of significance on the MBS, and it is rare, mostly occurring along lower roads. Canada thistle, and some others occur rarely. Refer to the implementation schedule in Forest Plan, Appendix J for the planned control of noxious weeds.

SEEDING WITH NATIVE PLANT SPECIES

It is important to state that natural seeding will be used to eliminate any issues of introducing new species and problems in these areas.

Response: There is an increase in the use of native plant species for seeding for erosion control and wildlife forage enhancement. The introduction of exotic plant species is a concern. In many areas, exotic and non-endemic species were introduced in earlier decades (from horses, homesteaders, and later, brought in on car tires) and have become a common component of the plant community. It would be difficult or impossible to eradicate these, and some have value as forage or erosion control. The Forest-wide standards and guidelines for diversity clarify that the overall goal is to maintain viable populations of all native species, and to maintain adequate representation of all natural plant communities. Site-specific prescriptions for areas will take this, and the area's total management objectives into consideration

NEEDS TITLE

We disagree that noble fir and tansy ragwort (page IV-33 DEIS) increase the value of the forest, as implied by your constricted use of the term "richness." They instead imply an alteration of a native ecosystem; richness does not describe the alterations wrought upon native ecosystems by introduced species, either "desirable" or "undesirable" species.

Response: Noble fior is a native species in the southern part of the Forest, maintained there historically by wildfires. As such, it does contribute to the diversity of the forest The discussion on the effects of the alternatives on vegetation, etc. have been rewritten considerably since the draft plan, in response to this and other comments.

COMMERCIAL COLLECTION OF PLANTS AND FUNGI

What are the impacts of commercial plant and fungus collecting on the Forest and set up stringent guidelines protecting these resources

Permits are given for the harvesting of salal for use across the U.S. and Europe. Washington State is the largest supplier in the world.

The effects of long-term harvesting of bear grass and other plants needs to be researched.

Mushroom harvesting is becoming a concern because of the size of operations that are for commercial purposes. Research is necessary before allowing large-scale operations.

Fungi are a commercially harvestable resource of growing importance in the Pacific Northwest. The conditions required for a sustainable yield of commercially harvested wild mushrooms are not known. This resource has not been considered in this plan and related management practices are not covered.

An inventory of populations of fungi with commercial value and the habitats they occupy could be started.

Commercial collection of native plants and fungi and their seeds and parts is rapidly becoming a matter of resource concern on the MBS, as commercial seed companies now offer high prices for wild-collected mushrooms, plants and seeds. Networks of plant and seed collectors even publish newsletters and pricelists for many species, some as businesses and some as "underground" or informal networks. Washington has become a national center for such operations. The Draft Plan makes no attempt to offer a plan to deal with this growing commercial exploitation of public resources.

What effects will this trade have on sensitive and endemic species? The Plan should provide a clear and specific set of prescriptions for monitoring and regulating expanding commercial ventures on public lands.

A more comprehensive inventory should be made because of the progressively increasing commercial harvest of so-called "minor forest products" for floral supply, gourmet mushroom eaters etc.

> **Response:** We have little knowledge of the harvest of secondary forest products, such as mushrooms, mosses, brush, etc The distribution, growth, and ecology of these ecosystem elements needs research to help determine the effects of harvesting these products. The Forest's Ecology Program will be collecting field data on many of these products in the future.

NO EVALUATION OF THE FUNGAL FLORA

There has been no evaluation in the DEIS of the fungal flora and the effect the different management alternatives will have on it. Maintaining a healthy fungal flora is important for maintaining the angiosperm flora.

> **Response:** The distribution, growth, and ecology of these ecosystem elements needs research to help determine the effects of harvesting these products. The Forest's Ecology Program will be collecting field data on many of these products in the future. Refer to Chapter 2, Forest Plan, Information Needs.

PROTECT BOTANICAL VALUES AROUND TWIN SISTERS

The west side of the Sisters is a spectacular landscape; botanic values there deserve special recognition. There is critical mountain goat habitat (DEIS Appendix C); Bell Creek has a dramatic hanging valley.

Response: In the Preferred Alternative, the west side of Twin Sisters is allocated to MA 1A, Primitive Recreation. The area to the east, between Sisters and Bell Creek is allocated to MA 17 Timber Management Emphasis, MA 14 Deer and Elk Winter Range, and - to the east and north - to MA 5, Proposed Wild and Scenic River. Bell Creek is allocated to MA 11 SOHA and MA 5, Proposed Wild and Scenic River (Recreation River).

DISAPPOINTED THAT THERE ARE NO BOTANIC AREAS IN THE PLAN

We are dissatisfied with the lack of any Botanical Special Interest Areas in the Plan, despite a number of well-known and highly qualified sites.

Response: In the FEIS and Forest Plan, a botanic area at Sulphur Creek (located near the Mt. Baker National Recreation Area, on Mt. Baker Ranger District) has been allocated. Refer to MA 8, Chapter 4 Forest Plan and the map for Alternative J (Preferred)

ACREAGES FOR RNA'S IN TABLE S-1 ARE CONFUSING

In the Summary, Table S-1, the acreages for RNA's are a little confusing. It is a somewhat minor point, but five of the alternatives have acreages that are between 5,238 and 5,240 Shouldn't they all be the same?

Response: The differences in acres result from the rounding of acres in R2MAP On the ground the areas would all be the same size.

ATOMIC ENERGY COMMISSION DOESN'T HAVE RNA'S

In the list of agencies with established RNA's, the Department of Energy could be included, but the Atomic Energy Commission (currently the Nuclear Regulatory Commission), which does not have any RNA's, should be removed.

Response: This has been corrected in the FEIS, Chapter III.

CORRECT NUMBER OF RNA'S TO 102

In the fourth paragraph (P.III-144) a 1972 figure of 48 RNA's in Washington and Oregon is used. That figure is way out of date, in fact as of 1986, there are 102 established RNA's in Washington and Oregon, 39 of which are on Forest Service land.

Response: This has been corrected, in response to this comment.

CLIMAX RED ALDER FOREST LEFT OUT OF LONG CREEK RNA DESCRIPTION

The Long Creek RNA should include "climax red alder forest" as a principal feature (Table III-61 and elsewhere in the planning documents)

Response: This information has been added in the Forest Plan and related documents.

NATURAL HERITAGE PLAN SHOULD BE USED INSTEAD OF RESEARCH NATURAL AREA NEEDS IN THE PACIFIC NORTHWEST

I realize that Regional Office direction is to use the Yellow Book (Research Natural Area Needs in the Pacific Northwest 1975). This document is way out of date. The Washington Natural Heritage Plan is the logical update to to the Yellow Book and deserves mention in that context. The implication is also made that the other agencies use the Yellow Book, when, in fact, the Forest Service is the only agency using it. The other federal agencies all use the updated Natural Heritage Plans.

Response: Regional direction continues to require use of the Yellow Book and cannot be ignored in the Plan. The FEIS has been reworded to eliminate the implication that other agencies use the Yellow Book.

ADDITIONS NEEDED IN THE EFFECTS SECTION OF RNA'S

I believe there are environmental consequences to RNA's, and do not agree that no effects are expected from changes in vegetative plant diversity to RNA's. In fact there are numerous ways effects might occur. The normal process of succession will cause changes. Adjacent land management, that is management practices next to RNA boundaries, can cause changes in vegetative plant diversity. Adjacent clearcuts can cause wind throw, cause changes in microclimate along edges, provide corridors for introduced species, all three of which can cause changes in vegetative plant diversity Recreation use can cause changes. I realize that it is difficult to array these kinds of effects throughout alternatives, yet some mention of them seems important. Otherwise RNA's appear to be preserves that have no real connection to the surrounding landscape and that are "protected" from change once established.

Response: The cited text refers to changes in vegetative plant diversity outside of RNA's, specifically those caused by timber harvest. Thus, the comment about normal succession is misdirected. However, comments about the effects of timber harvest adjacent to RNA's are valid, and the FEIS has been revised to reflect this

NON-RECOMMENDATION OF RNA'S WOULD LEAD TO A LOSS OF BIOLOGICAL DIVERSITY

We disagree with the statement under RNA - Cumulative Effects. Non-recommendation of RNA's not only will reduce the landbase for study of natural processes, but it also threatens biological diversity. The loss of these areas would definitely reduce biological diversity on the Forest.

Response: Text in Chapter IV of the FEIS has been revised to reflect this comment. Also, refer to new text on Diversity, Chapter IV, FEIS.

THESE TIMBER SALES MAY HAVE ADVERSE IMPACTS ON ADJACENT RNA'S

Appendix A lists proposed timber sales for the next ten years. Four of these proposals may have adverse effects on adjacent RNA's, and I hope the District Ranger will coordinate with the RNA scientist in planning the sales.

1. 1988 West Boundary Buyback - Lake Twenty-Two RNA
2. 1991 Betwixt - Lake Twenty-Two RNA
3. 1991 Stalwart - Perry Creek proposed RNA (appears that it may even be in it)
4. 1993 Black Creek Buyback - Lake Twenty-Two

Response :No timber harvest is scheduled contiguous to the Lake Twenty-Two RNA. Land allocated to Management Areas 1B and 11, which are not scheduled for harvest, lie between the RNA and the proposed sales. The appearance that the Stalwart Sale is located in the Perry Creek RNA results from the legal description, which is an approximation of the specific location. The timber will be harvested from Management Areas 2A, 2B, 5B, not the RNA.

RNA'S ARE IMPORTANT FOR BIOLOGICAL DIVERSITY

The protection of biological diversity is mandated by law and the Forest Service is committed to this concept. There is very little in the plan that

links RNA's to biological diversity, and that link is important. RNA's do and will play an important role in protecting various plant communities, aquatic species, and terrestrial species, all part of biological diversity. In some cases RNA's will be the only vehicle for that protection, especially as more of the forest comes under intensive management. The plan seems to equate diversity only with the old-growth issue.

Response: Text in the FEIS and Plan has been revised to reflect this comment, although this concept was recognized in the second paragraph at page III-142 of the Draft EIS and IV-196 of the Draft Plan, which discuss the influence of RNA's on gene pools. The proposed RNA's include a wide array of subalpine lake communities, aquatic communities, a unique assemblage of rare fern species, subalpine parkland mosaic, heather-huckleberry communities, subalpine lush herbaceous communities, and alpine community mosaic with Krummholz, in addition to terrestrial old-growth forest communities.

PERRY CREEK AND CHOWDER RIDGE SHOULD BE RNA'S

The Forest should continue seeking potential RNA's and Botanical Areas. Our Natural Areas Committee has identified several in the past which, as yet, have not been officially recognized. Perry Creek (in the S. Fk. Stillaguamish drainage), Chowder Ridge (N. slope of Mt. Baker) are examples.

Response: Both RNA's were considered in the Draft and are recommended as potential RNA's in the FEIS Preferred Alternative.

LOW-ELEVATION OLD GROWTH RNA IS NEEDED

A low-elevation old-growth RNA is desperately needed to permit continued study of low-elevation forests of Douglas fir and western red cedar.

Response: Several existing RNA's represent these ecosystems on the forest. THe North Fork Nooksack RNA represents Douglas fir and Lake Twenty-two represents Western red cedar Additions are recommended to the North Fork Nooksack RNA in the Forest Plan.

LILY LAKE SHOULD NOT BE PLACED IN RNA STATUS

Lily Lake has been historically stocked with trout by the State Game Department and should be maintained as a backcountry fishing recreational resource and not placed in RNA status.

Response: Stocking would devalue Lily Lake as a typical subalpine lake and would be prohibited except for the re-introduction of former native species with Regional Forester approval. The area represents a mountain hemlock/Pacific silver fir forest, an ecosystem currently not represented in the RNA system. Backcountry fishing opportunities are quite common throughout the Cascades.

SNOQUERA FALLS AREA SHOULD BE RNA TO PROTECT PACIFIC YEW

We wish to propose the Snoquera Falls area as an RNA to protect a unique population of **Taxus brevifolia**, the Pacific yew, as well as other interesting and uncommon plant species. The yew is coming under increasing management pressures in recent years, due to its biochemical properties, and it is essential that the Forest retain some high quality groves to serve as baseline monitoring populations to assess the effects of rapid harvesting elsewhere on the Forest.

Response: The Pacific yew is neither federally threatened, endangered nor sensitive. Snoquera Falls is within the Mather Memorial Parkway and is allocated to Special Area (MA 8). This allocation prohibits timber harvest.

ADD GAMMA HOT SPRINGS OR SULPHUR HOT SPRINGS AS AN RNA

The need for inclusion of natural hot spring communities in the RNA system could be met with designation of either Gamma Hot Springs or Sulphur Hot Springs as RNA's. Either site would be suitable.

Response: Gamma Hot Springs and Sulphur Hot Springs are within the Glacier Peak Wilderness, and will receive a high level of protection regardless of RNA designation. Sulphur Hot Springs is allocated to Management Area 10B, Trailed, and currently receives recreational use. Designation of Sulphur Hot Springs has the potential to create conflicts with established recreation use.

TWIN SISTER AREA SHOULD BE AN RNA

We recommend that the Twin Sisters area, proposed as a Special Interest Area by Alt. G but ignored by the Preferred Alternative, would most appropriately be added to the RNA system. Uncommon geological substrates and an isolated location combine to give the Twin Sisters area an interesting and special flora. This area would greatly enrich the RNA program, and we urge its inclusion in the final Plan

Response: The Preferred Alternative allocates the Twin Sisters area to Management Area 1A, Primitive Recreation The allocation to areas with an emphasis on no timber harvest or developed recreation will substantially protect the unique biological and geological features.

KELCEMA LAKE SHOULD BE AN RNA

We recommend that the Kelcema Lake area be given RNA status for the preservation of an extant population of the sensitive and very easily disturbed Sensitive Plant species, **Fritillaria camchatcensis** The MBSNF has a special responsibility for preserving populations of this species, as a well-known population near the Big Four visitor area has apparently been wiped out by Forest Service development in the area.

Response: Populations of this species are not currently listed as federally threatened or endangered. Sensitive plants are managed so as to avoid listing. Sensitive species will be inventoried and identified

through the regular environmental analysis for every ground disturbing activity. Populations of sensitive species will be managed to protect that species and avoid the need of federal listing.

Kelcema Lake is located within the Boulder River Wilderness. This allocation provides a high degree of protection for the species.

STRICTER STANDARDS NEEDED FOR THE MANAGEMENT OF RNA'S

We recommend a more specific set of guidelines for restricting recreational and commercial exploitation of RNA's. In general, recreational activities that cause any amount of resource degradation are not appropriate in RNA's. Camping and open fires should be specifically prohibited to prevent vegetative destruction. The collection of native plants and their seeds and parts without a scientifically based collection permit should be specifically prohibited. Construction of additional permanent trails in RNA's should be prohibited. Hunting and trapping should be prohibited, not merely discouraged. Use of mountain bikes should also be prohibited on trails through RNA's.

The Plan needs to state that overnight camping is prohibited rather than, "shall be discouraged." FSM 4063.3 directs the forest to prohibit all forms of recreational use if such use threatens RNA values. Overnight camping alters natural conditions and is inappropriate and unacceptable within RNA's. Eliminating established overnight camping use of RNA's and prohibiting the establishment of new recreational patterns within RNA's should be the Forest's goal.

Response: Forest Service policy is to prohibit any form of recreational use if such use interferes with the purposes for which the Research Natural Area was established. The purposes of an RNA are defined in the Establishment Record, which also includes a management prescription that amends the Land Management Plan. Specific guidelines for recreational use are created by the management prescription, and are implemented through orders pursuant to 36 CFR 261. The Land Management Plan contains a more generic set of guidelines, which must allow for the existence of some RNA's with established recreational uses that would be impossible to change.

The Standards and Guidelines state that recreational use or activities will not be encouraged within RNA's. Camping and fires maybe prohibited, as is new trail construction. Hunting and fishing will not be encouraged.

PROHIBIT VEGETATIVE MANIPULATION IN RNA'S

We request that you prohibit any type of timber salvage or "vegetative manipulation" activity in RNA's, as well as scheduled or programmed harvest. Catastrophic events within an RNA do not mean that the research value of the RNA has been destroyed. Much valuable knowledge can be gained by studying the regeneration of particular habitats following catastrophe, and salvage operations of any kind would severely alter the natural regenerative processes.

Response: Standards and guidelines for RNA's prohibit scheduled timber harvest, which also state that natural regeneration following fire, windthrow, insect attack or disease is preferred. Logging may be permitted following catastrophes which threaten the RNA or adjacent values, subject to the approval of the Regional Forester and the Research Station

Director. Substitution of logging for natural regeneration would be *contingent on conformance to the RNA objectives as defined in the* Establishment Record. The Forest Service Manual requires that "Standards for protection and management of a research natural area must support and promote the basic objectives and purposes of establishing the area .... make sure that the establishment record clearly states the objectives for establishing the area and identifies the special values for which the area is being recognized." (FSM 4063.3) Further, "Use only tried and reliable vegetation management techniques and then apply them only where the vegetative type would be lost without management. The criterion here is that management practices must provide a closer approximation of the naturally occurring vegetation and the natural processes governing the vegetation than would be possible without management. Unless the manager is certain that the management practice will meet this criterion, do nothing." (FSM 4063.34) In virtually all cases, this will result in no vegetation management.

NO NEW RIGHT-OF-WAYS SHOULD BE GRANTED IN RNA'S

We request that guideline J-2-c be deleted. No new right-of-ways should be granted in either designated or proposed RNA's, as such activities would clearly degrade the resource values of the RNA's in question.

Response: Roads may be authorized if they contribute to the purposes of the RNA. This is expected to be rare. Road prohibitions may be incorporated in the management prescription included in the Establishment Record

IS RECREATIONAL USE COMPATIBLE WITH RNA'S?

Figure II-2 (page II-47) shows, "the *general type of land uses permitted* within each management area" It incorrectly indicates that RNA's (MA 18) are compatible with Roadless Nonmotorized Recreation. Recreation is prohibited or, at best, discouraged within RNA's. Some RNA's do receive recreational use as a result of historic recreation patterns that are difficult to change. The Forest should make every effort to discourage and avoid any increase in this use. The Figure should indicate that RNA's and recreation have no management compatibility. To show that RNA's and recreation is compatible is misleading to the public and to managers and will encourage rather than discourage recreational use.

Response: Within RNA's, the recreation Standards and Guidelines for Management Area 18 will be applied. These state recreational use is to be discouraged, through the use of permits or closures Forest Service direction (Forest Service Manual 4063.3[5]) calls for recreational use to be prohibited if it threatens the purposes for which the RNA was established, but does not presume that recreation and RNA's are always incompatible. Figure II-2 has been removed to avoid further confusion.

REVISE STANDARDS AND GUIDELINES TO SHOW WHICH OFFICER IS RESPONSIBLE FOR APPROVING SCIENTIFIC USE OF RNA'S

Management Area 18, RNA's (page II-58), incorrectly states that, "Only authorized (by the Chief of the Forest Service) scientific research and

educational uses allowed" In contrast, the FSM ... states that this responsibility lies with the Station Director (FSM 4063.33). Elsewhere (4063.04) the manual states, in consultation with Forest Supervisors and District Rangers, Station Directors are responsible for approving management implementation plans and for overseeing and coordinating approved research on all research natural areas, except those research natural areas in Congressionally-designated areas. Regional Foresters shall approve plans and shall oversee and coordinate approved research on all research natural areas in Congressionally designated areas.

Response: Text in the FEIS has been revised to reflect this comment.

DEIS GIVES INADEQUATE ANALYSIS OF EFFECTS OF HARVEST ON RNA'S

The DEIS gives an inadequate analysis of the effects of harvest on RNA's. Timber harvest adjacent to an RNA can have a variety of potentially serious indirect effects. It is for this reason that the Forest Service Manual (4063.04.6) directs District Rangers to, among other things, "report through the Forest Supervisor to the Station Director any planned activities on, or immediately adjacent to, research natural areas". These effects should be recognized and discussed. In addition, timber harvest activities may have the irreversible effect of destroying an area that will qualify but has not yet been identified as a potential RNA.

Response: Text in Chapter IV of the FEIS has been revised to discuss the effects of timber harvest adjacent to RNA's.

CORRECT GLOSSARY DESCRIPTION OF RNA'S

In the glossary, Research Natural Area is incorrectly defined as an area established by public or private agency. Although private organizations such as The Nature Conservancy cooperate with state and federal agencies to identify and establish dedicated natural areas, Research Natural Area is a federal designation and RNA's are only established on federal lands.

Response: Text in the FEIS has been revised to reflect this comment.

RNA'S NOT COVERED IN THE MONITORING PLAN

Table 5-1, Monitoring Plan, should include monitoring of the Forest's RNA program management and goals, including: a) protecting RNA attributes, and b) identification and establishment of additional RNA's required to fill RNA cell (element) needs. For example, RNA's receiving recreational use will require monitoring and evaluation to determine the need for greater restriction.

For the RNA resource area, the monitoring plan could be as follows:
Action/Effort Monitored: Effectiveness at meeting RNA management objectives.
Objective of Monitoring: Assure the RNA attributes and unmodified conditions are maintained.
Method of Monitoring: Visual site inspection, evaluation of impacts from a)adjacent activities (recreation, timber harvest, etc.) and b) on-site activities that are detrimental to RNA qualities (recreation), Evaluate Forest compliance with standards and guidelines/coordination with Station

Director; Evaluate implementation and effectiveness of individual RNA Management Prescriptions.
Unit of Measure: RNA sites.
Frequency: Annual
Reporting Period: Annual
Precision: M M
Data Storage: District, S.O., and PNW Research Station.
Responsibility: District Ranger
Variability Threshold: When standards are not being met or downward trend is indicated.
Cost: Determine

Response: Table 5-1, Forest Plan has been revised to reflect this comment.

KENDALL PEAK LAKES SHOULD BE AN RNA

I would recommend Kendall Peak Lakes on the North Bend Ranger District as either an RNA or designated Botanical Area. Each lake has a slightly different vegetation type. And the lower lake has an unusual diversity of wildflowers due to meadow/bog shoreline habitats.

Response: The comment is not definite as to whether a terrestrial or aquatic ecosystem is recommended for RNA status, but implies an aquatic ecosystem. Without additional information, it is not possible to assess how the Kendall Peak Lakes might fill one of the ecosystem cells identified in "Research Natural Area Needs of the Pacific Northwest" (Dyrness and others, 1975). However, marsh and bog cells are represented in the existing RNA system.

RNA MANAGEMENT SHOULD BE MORE RESTRICTIVE THAN WILDERNESS

We support the establishment of the proposed RNA's and urge the Forest to continue to inventory for RNA needs, especially in those parts of the forest outside of the wilderness areas. RNA's in the wilderness areas should have more restrictive management than the rest of the wilderness.

Response: When RNA's (Management Area 18) are designated in Wilderness (Management Area 10), the more restrictive of the two sets of Standards and Guidelines (generally, those for RNA's) are implemented.

RNA'S IN ALTERNATIVE G ARE IN ERROR

There seems to be a discrepancy in RNA's for Alternative G - Page II-43 indicates two additional RNA's will be established under this alternative (as opposed to Alternatives C, D, E, F, and H which each proposed five additional RNA's), but the table on page II-49 indicates 6,161 acres of existing and potential RNA's, the highest figure for any Alternative.

Response: This discrepancy has been corrected in the FEIS. Alternative G-Modified has 5 Proposed RNA's.

NEED TO UPDATE THE 1975 LIST OF "NEEDS FOR EXAMPLE ECOSYSTEMS" TO THE PRESENT

Research Natural Areas: Either this section of the Plan or the section on RNA's (4-196) needs to state or clarify the overall goal or objective of RNA designation. How many RNA's are needed? Or what range of variation of natural ecosystems is required for adequate development of an RNA system? Page III-143 lists "... need for examples of ecosystems.. " from the RNA "yellow book" (Dyrness & Franklin 1975). These 1975 cell needs were established based on the state-of-knowledge at that time. Since, the U.S Forest Service, through the work of their own ecologists, has further defined the range of forest ecosystems on the Forest's land. The needs section should, therefore, be updated to reflect this increased knowledge by including major forest associations defined by Henderson, et. al. 1981-1984 in the State of Washington Natural Heritage Plan. If the purpose of the RNA system is to be fully recognized, the Forest should attempt to establish baseline areas in the low elevation hemlock or red cedar community types where an opportunity to plan for designation exists now, rather than later being forced through public pressure to set aside an area that may conflict with future management concerns.

Response: The objectives of establishing Research Natural Areas are stated in the Forest Service Manual (FSM 4063.02), and need not be repeated in their entirety in the Plan. A summary statement has been inserted in Chapter III of the FEIS, however, regional direction is to use "Research Natural Area Needs in the Pacific Northwest" (Dyrness and others 1975) as the basis for assessing RNA needs. A low-elevation hemlock RNA is needed, but these forests are found in the Puget Trough Province, primarily in state and private ownership. Western red cedar forest, without western hemlock or Pacific silver fir dominance, is found in North Cascades National Park

ELIMINATE THE LONG CREEK RNA

Eliminate the Long Creek Natural Area classification. If you can add a natural area at Perry Creek, you should be able to eliminate one which is totally unjustified. Long Creek is simply a timbered slope, nothing unique. It probably had a potential value when it was set aside, but to my knowledge it has never been used. In addition, a vast wilderness has recently been designated on contiguous land What do we need such a Natural Area for, when we now have roughly 100,000 acres set aside in its natural state immediately adjacent to it?

Response: Research Natural Areas are designated to preserve pristine areas that represent widespread ecological areas, as is the case at Long Creek. Management objectives for RNA's and Wilderness are different and not necessarily compatible. Thus, it may be necessary to designate both, in different portions of the same ecological area.

QUESTION THE CONCEPT OF INDICATOR SPECIES

The concept of indicator species is of questionable value.

The management indicator concept, as applied by the Forest, is probably in error.

If no management activities occur in these mini-wildlife preserves, how will these critters help you determine the effects of management on them?

Response: NFMA (36 CFR 219.19) called for the use of management indicator species. Use of this approach has generated much discussion, both favorable and not, plus discussion on other, alternative approaches. Concepts for use in managing for viable populations of native species and monitoring appropriateness of the management methods chosen continue to evolve. However, the current direction is that provided by NFMA. Management requirement habitat areas must maintain the qualities required by the entire group of species dependent on such areas, and not just the habitat characteristics used specifically by the indicator species. As information increases on both the species to which these areas are important and the habitat qualities which they need, additional or different and management prescriptions may be developed.

TO WHAT EXTENT WERE SITES FOR INDICATOR SPECIES INVENTORIED?

What was the Forest's attempt to identify the known sites of indicator species. Are there inventories for these species?

Response: The degree of inventory for various indicator species varies from 80% to 0%, depending upon the species.

Northern spotted owl: habitat areas are approximately 80% inventoried.
Pileated woodpecker and pine marten: no in-place inventory.
Bald eagle: have inventory of known nest sites and much of the roosting areas
Grizzly bear and peregrine falcon no in-place inventory
Black-tail deer and Roosevelt elk: rely on Washington Department of Wildlife inventories and estimates.
Mountain goat: have cooperated with State on an inventory on north end of Forest. Regularly up-dating of wintering habitat inventory
Primary cavity excavators: Have not attempted to inventory these species as of yet.

Also, refer to Chapter 2, Information Needs (Forest Plan) and the Monitoring Plan, Chapter 5 for planned inventories.

PILEATED WOODPECKER IS NOT A GOOD INDICATOR SPECIES FOR OLD GROWTH

Despite the significant amount of research that has been conducted in Eastern Oregon on the pileated woodpecker in particular, the evidence is not compelling that this bird is an appropriate indicator for old growth or mature forest dependent wildlife. With all due respect to the Forest's obligation to follow regional standards and guidelines, it has yet to be demonstrated that the Forest Service model for pileated woodpecker habitat requirements is

sufficiently valid to justify the prescribed limited use of land as applied in this instance.

It is not unusual for pileated woodpecker to adapt to suburban and rural habitats where trees such as cottonwood and alder are growing along water courses in the total absence of seral stages V and VI. The unlikely assumption of the Forest Service model for pileated woodpecker habitat that maintaining viable populations of this species required extensive areas and networks of snags and down logs is not supported by substantial evidence that justifies the provisions for such limited use.

The proposed plan by definition strongly relies upon a dependent relationship between pileated woodpecker and old growth and mature forest habitat in Management Area Prescription 12. The plan apparently provides for this presumed habitat need without taking into account an overlap with riparian Management Area Prescription 13C, which probably provides more suitable pileated woodpecker habitat than MA 12 does.

In regards to the pileated woodpecker, which uses a similar habitat as the pine marten, I would suggest that the forest planners read the recently published thesis at Oregon State University about pileated woodpeckers.

Response: The intensive process of selecting management indicator species was completed with involvement of many of the Forest Service biologists in Oregon and Washington. The Regional Forester insisted on consistency in those species selected, at least by geographical province. For most westside forests, the pileated woodpecker and pine marten were deemed the most suitable to represent species who can utilize both mature and old growth habitats, based on existing literature findings. Guidelines developed in "Management of Wildlife and Fish Habitat in Forests of Western Oregon and Washington" indicate habitat for pileated woodpecker needs to contain 25"+ DBH snags. On the MBS, snags of that size are only found in mature or old growth stands of timber

Most of the land allocations that provide for some level of timber management will not provide for 25"+ DBH snags. We are estimating that 75% of the riparian acres on this forest could have some timber harvest, at full and partial yields, extended rotations, which will make it difficult to maintain pileated woodpecker habitat. Many of these areas will provide suitable habitat for other cavity excavators, but the requirements of pileated woodpecker are unique.

The identification of mature and old growth habitat for pileated woodpecker involved determining habitat requirements from what was known from current literature and mapping a mosaic of habitat areas on the forest, in an effort to maintain viability across the entire forest. In many cases, the requirements were met in a land allocation that would assure this habitat without reducing management activities (ie., wilderness, research natural areas, semi-primitive nonmotorized recreation, spotted owl habitat areas). Pileated woodpecker habitat areas were established in-between other existing habitats to assure adequate distribution.

We feel this concept has validity and will maintain it in the Final Plan. If, through monitoring, additional information is gained about pileated woodpecker or other indicator species, changes will be made in the Plan to adjust habitat requirements of selected species or, in some cases, change species to what will be a more appropriate indicator.

QUESTION USING THE PINE MARTEN AS AN INDICATOR SPECIES

The forest products industry has a great deal of difficulty with the indicator species concept when it comes to animals like the pine marten. This species is found in a variety of habitats throughout the mountainous areas of Washington and Oregon. In both states, a yearly trapping season is set. In Oregon, in 1085, 82 individuals were trapped, with their pelts selling for an average of $22.78 per pelt. Although the 5,000 acres of land set aside is not excessive, additional efforts should be made to locate pine marten habitat in areas that are already restricted from timber harvesting. In areas where pine marten habitat exists in the commercial forests base, timber harvesting should be allowed to continue. Soutiere (1979) recaptured resident pine marten, found in the same area for three months, an area after which partial harvest operations had ceased. Steventon and Major (1982) captured one male in the same area before and after timber harvest activities. His home range included some of the new clearcut, but his use of this habitat was less than expected from its availability. In contrast to clearcutting, selective cutting (57% of harvestable trees removed) as employed in Campbell's (1979) study, and partial cutting (16%-43% of the base areas removed, canopy density of 18-95% as implemented in Soutiere's 1979 did not appear to curtail marten use. Important prey species were not affected by these logging practices and potential nesting sites were noted in selectively-cut areas. Also partial cutting did not significantly reduce marten population densities. Our recommendation is to allow limiting timber harvest in marten areas, and in addition, study closely the ideal of using an indicator that is regularly trapped within the state.

> **Response:** The intensive process of selecting management indicator species was completed with involvement of many of the Forest Service biologists in Oregon and Washington The Regional Forester insisted on consistency in those species selected, at least by geographical province. For most westside forests, the pileated woodpecker and pine marten were deemed the most suitable to represent species who can utilize both mature and old growth habitats, based on existing literature findings. Guidelines developed in "Management of Wildlife and Fish Habitat in Forests of Western Oregon and Washington" indicate habitat for pileated woodpecker needs to contain 25"+dbh snags. On the MBS, snags of that size are only found in mature or old growth stands of timber. See above response for more discussion.

INDICATOR SPECIES LIST INADEQUATE OR INCOMPLETE

Appropriate wildlife or plant indicator species should be designated for hardwood communities.

The need for riparian indicators is especially great.

At least one plant species, and preferably an association of plant species, as well as a vertebrate animal, must be selected as indicator species for riparian habitat.

The indicator species chosen arguably will not achieve the objective of indicating the health of forest habitats. For example, the pine marten is a solitary creature that is rarely found at low elevations. It is unclear how the Forest will monitor the species.

There is no biological justification for using northern spotted owl, pileated woodpecker, marten, mountain goat, roosevelt elk, blacktailed deer, primary cavity excavators as indicator species

We suggest that large, predatory species, such as the wolverine, cougar and bobcat be added to the list of indicator species and allocated MMR areas and standards. As top predators and furbearing animals, these species are numerically rare and environmentally sensitive to any large scale modifications to their habitat As such, they are perfectly suited to indicator species status

An adequate range of appropriate indicator species has not been selected. The most serious of these cases is that there are no proposed indicators for riparian/wetland community types. Each type should have a valid indicator species. (The yellow warbler, willow flycatcher, yellow-breasted chat, wood duck, ruffed grouse and bald eagle are suggested for various riparian types.)

Indicator species should be selected for the special habitats of caves, cliffs, and talus as well as for riparian zones.

There should be MR's for the grizzly bear, wolves, spotted owl, wolverine, bald eagles and fisher.

It seems that at least two other species should have been added to the list of management indicator species· the goshawk and the Pacific giant salamander.

Response: The wildlife sections of Chapter 2, Forest Plan and Chapter III, DEIS, have been revised to clarify the definition and purpose of the indicator species. Appendix H has been rewritten; it documents the process for establishing MR's for certain indicator species.

The establishment of indicator species was a long and difficult process for all Forests in Region Six. The Regional Forester established a policy to aim for a level of consistency among Forests with similar geographic, ecological, and biological settings Many different species were discussed to determine the most representative indicator of a particular habitat type; final selections were made after much deliberation. Refer to discussions in the above responses.

For some habitats, such as the various kinds of riparian areas and special habitats, such as cliffs, caves, and talus slopes, good indicator species were not found. These habitats can best be monitored directly at this time, to ensure that they, and all of their components, are maintained during this planning period.

On-going research and monitoring of the Forest Plan may result in changes in which indicator species are selected, or in standards and guidelines for the MR areas. The concept of indicator species may be replaced with other approaches to maintaining viability of species and the full range of existing habitats on the Forest. Refer to Chapter 2, Forest Plan for the list of Information Needs regarding wildlife species, and Chapter 5, Monitoring Plan.

PLAN IS LACKING IN ON ADEQUATE RIPARIAN INDICATOR SPECIES, OTHER THAN FISH

Your plan is totally lacking in Indicator Species for wetland and riparian lands.

It is incorrect for the Forest to assume that the spawning and rearing habitat requirements of selected fish species adequately represent the biological and physical needs of all the Forest's aquatic animal species. Animal species using riparian and aquatic habitats whose habitat requirements differ from those of fish include beaver, muskrat, mink, river otter, and amphibians. Managing for selected fish species also does not specifically address the habitat requirements of native aquatic and wetland plants. Indicator species should be native species and include other species in addition to fish.

Response: We agree that we are lacking in a terrestrial species for an indicator of riparian health. The biologists for western Washington National Forests met and discussed potential good indicator for riparian, other than fish Some of the species mentioned were beaver, mink, other golden eye, great blue heron, and some species of amphibians. Agreement could not be reached on a particular species. In addition, there were no know monitoring techniques available. One of the future challenges we will have is the monitoring of the species we have selected as indicator species. As we proceed with the implementing and monitoring of the Forest Plan, we will be willing to consider adding another species which can be used as a riparian indicator, if these is a technique available to monitor the species.

We have made some revisions in the goal statement for MA 13 Watershed, Wildlife, and Fisheries Emphasis in Riparian Areas, and placed more emphasis on protection of riparian dependent resources - water quality, fish and wildlife habitat, and soil productivity (Chapter 4, Forest Plan) Also refer to Appendix H, which documents the procedure used to develop a method to meet water quality and riparian MR's.

MMR'S WERE DEVELOPED WITHOUT PUBLIC INVOLVEMENT

Minimum Management Requirements (MMR's) were developed and implemented without public comment, as required by NEPA and NFMA. The true opportunity costs of the MMR's were bypassed.

The public should be involved in the establishment of habitat requirements for the indicator species and the selection of their habitats.

The public should have been involved in the selection of indicator species. The reliance on wildlife biologists as the sole participants in the key decisions about selecting indicator species violates the interdisciplinary planning requirements of NFMA.

The MRs were developed without public input or formal rule making as required by the Administrative Procedures Act.

Response: The National Forest Management Act (NFMA) set legal guidelines for management of the National Forests. The guidelines were interpreted by the Secretary of Agriculture, in cooperation with a Committee of Scientists and with public and professional involvement, to develop regulations. Direction from the Chief of the Forest Service and Region 6 resulted in MR's which reflect the requirements of the laws and regulations in NFMA. The MR direction ensures that minimum legal requirements are applied to all alternatives in Forest Plans consistently across all National Forests. MR's exist for dispersal of created openings, water quality, riparian and wildlife habitat as required by NFMA.

The general concept of management requirements was presented and questions entertained during a series of Liaison Group meetings held in 1984. Refer to the planning records.

In the DEIS, documentation in Appendix B, Appendix J, and Chapter II of the DEIS explained how the MR's were developed. These documents provided reviewers with the information needed to comment on the development of Management Requirements. Comments received on the draft documents were considered in preparation of the FEIS.

Appendix J - now called Appendix H - has been revised in the FEIS and now includes some of the information from Appendix B related to the selection of the most efficient methods of meeting the necessary requirements. The hydrologic cumulative effects analysis was completed, in response to agency, tribal, and public comments. The resulting method to meet water quality and riparian management requirements is documented in new Appendix H. Also, see Chapter II, FEIS, Appendix B, and the Forest Plan, Forest-wide Standards and Guidelines for Water Resources and Riparian Areas, Chapter 4.

DISAGREE WITH PROCESS FOR DEVELOPING AND APPLYING MR REQUIREMENTS

The MR constraints should not have been applied to all alternatives.

The MMR's are not disclosed and discussed in the comprehensive manner required by NEPA

The criterion focusing on the most restrictive habitat requirements is contrary to the Multiple-Use Sustained Yield Act and NFMA. The wildlife requirements must be developed in concert with other multiple use objectives.

The primary effect of using three wildlife species, rather than one, is not improved monitoring of limiting habitat but increased restriction of other forest uses in mature/old growth habitat.

Neither NFMA nor the regulations required the specific sizes or habitat elements of your MR areas.

The consequences of the Forest Service's failure to comply with proper procedures is the artificial narrowing of the range of alternatives and resource outputs.

The MMR analysis fails to describe how the selected method meets the legal requirement.

The Chief's direction does not meet legal requirements for developing MMR's.

RPA program goals must be a factor considered in developing MMR's, and your MMR's preclude meeting the RPA timber goal This violates NFMA.

The EIS fails to highlight MMR decisions.

Nowhere does the EIS discuss the discretionary decisions made relative to the establishment of MMR's.

The MMR analysis does not evaluate alternative methods to meet legal requirements

Resource protection measures must be determined as a result of interdisciplinary analysis and varied among the alternatives of the Forest Plan. This would provide a high level of output of renewable resources.

The MR analysis does not disclose scientific information which supports a different conclusion.

The entire MMR system is fraught with arbitrariness or "best professional judgments."

Some discussion of working with other land management agencies to meet MMR's should be provided.

It appears that access to areas suitable to timber harvesting may have to pass through the MMR's. It is not clear if this is allowed or, if so, what precautions would be necessary.

Response: The MR Appendix has been revised to clarify many of these points. The National Forest Management Act (NFMA) set legal guidelines for management of the National Forests. The guidelines were interpreted by the Secretary of Agriculture, in cooperation with the Committee of Scientists and with public and professional involvement, to develop regulations. Direction from the Chief of the Forest Service and Region 6 resulted in management requirements (MR's) which reflect the requirements of the laws and regulations in NFMA. The MR direction ensures that minimum legal requirements are applied to all alternatives in Forest plans consistently

across all National Forests. MR's exist for dispersal of created openings, water quality, riparian, and wildlife habitat, as required by NFMA (Refer to 36 CFR 219.27.) The Forest management team strove to select the most efficient prescriptions to meet the management requirements. The explanation of MR's and their development has been expanded; see new Appendix H, FEIS.

EFFECTS OF MR's ON OTHER RESOURCE OUTPUTS

The resource trade-offs section of the EIS Summary is silent about MMR's.

The MMR sensitivity analysis does not comply with the Secretary of Agriculture's decision on the MMR appeal.

The Appendix does not reveal how MMR's affect timber production.

You absolutely must change your arbitrary reduction of 3% net green volume for *all cavity excavators*.

Your MMR analysis is totally inadequate and grossly underestimates the impacts of the MMR's. It should be redone

Response: The MR Appendix has been rewritten, better explaining the process used for developing MR's. This Appendix complies with requirements for the MR analysis and documentation. Where opportunity costs are high, alternative ways of managing to meet MR's are examined.

DON'T DROP DEER AND ELK AS A WINTER RANGE MR

We do not agree with dropping the deer and elk winter range MR. You must evaluate viability of individual herds.

Response: MR's were to be developed wherever there was a risk of populations falling below the viability level during the current planning period. Direction from the Chief of the Forest Service (letter to Regional Forester, March 11, 1988) provided that there may be instances where standards and guidelines are not necessary to meet management requirements during the planning period, and sufficient opportunities will remain to impose standards and guidelines needed to meet management requirements beyond that period. A viable population level may be very different than a desired population level, especially in a game species. All alternatives provide for deer and elk populations well above a level which would risk extinction of the species, without needing MR areas set aside to accomplish this.

It is correct that attention must be given to population levels of individual herds, especially if there is any question of viability This issue must be addressed through a combination of species management decisions by the State (e.g. hunting regulations set by the Wildlife Commission and population goals set by the State) and area-specific analyses of habitat capability in the environmental analyses of proposed activities on the Forest. As noted in the monitoring plan, Chapter 5, Forest Plan, we will continue to monitor deer and elk populations, as they are still Management Indicator Species for this Forest.

MR AREAS FOR DEER AND ELK THERMAL COVER ARE NOT NEEDED.

Response: The MR for deer and elk has been dropped from the FEIS. This was discussed in Appendix J, DEIS.

MR's INADEQUATE PROTECTION, OVERLY CONSTRAINING, OR NOT NEEDED AT ALL

MMR levels were intended for use as benchmarks The loss of one habitat or pair at MMR levels provides a risk of non-viability. We recommend the Forest meet level 8 or 9 on the Salwasser Scale, as intended by regulatory language Moderate assurance of viability for 50 years on the planning area does not meet this intent.

The management direction in the preferred alternative precludes viable populations for many of the lowland old-aged forest obligate species.

Many people think your plan will not meet the criterion of protecting at least minimum viable populations of all native wildlife species.

It appears that the spotted owl, peregrine falcon, and possibly the grizzly bear may no longer be viable under your present preferred alternative.

Your prescriptions in the preferred alternative are inadequate in total area, distribution, and quality of habitat maintained for indicator species. Your final plan must include more reasonable protection for old-growth habitat, and that protection must drive the allowable sale quantity, not the other way around.

No constraints to FORPLAN appear to be justified to meet MR requirements. Active forest management will provide more than substantial contribution to meeting habitat requirements for spotted owls, pine marten, pileated woodpeckers,, other cavity excavators, deer, elk and goats

Your constraints incorporated in the Plan to achieve wildlife population goals are excessive. Extensive old growth areas are not required for most wildlife species, and you have ignored the benefits of managed forests with a mosaic of successional stages. Directed silviculture should be included to meet wildlife objectives.

The discussion and documentation falls far short of justifying the proposed constraints on suitable land productivity.

There is no need for MMR's, and in your plan tHE MMR's are over-emphasized and too big. Your requirements are maximum requirements. The number and size of areas should be dropped.

More of the MR's should be placed in areas already restricted from timber harvest.

MMR's must be eliminated. Protection measures which involve the same or more risk of ensuring viability but provide higher timber yields must be examined.

Especially when dealing with the ridiculously low numbers of some of the indicator species, the Forest should err on the side of conservatism by setting aside "too much" habitat, rather than run the risk of setting aside too little, with potentially disasterous results to the wildlife.

The MMR's should be increased to provide for productive and healthy populations of wildlife in perpetuity.

There is a need for MMR's, but in your Plan they are overemphasized and too big.

Response: The process used for developing MR's is described in Appendix H. Research and monitoring needed to permit a full evaluation of the MR standards and guidelines are also described. The implementing regulations for NFMA must be sufficient to meet management requirements and designed to minimize reductions in the achievement of multiple use goals. Where scientific evidence of the effects of management on complex ecosystems was insufficient to provide the entire basis for selecting standards and guidelines, field experience and professional judgment were used to best meet these goals. Monitoring and research will be used to determine the need for changes in MR requirements. Particular focus has been placed on ensuring that management actions during this planning period will not violate management requirements of species whose viability could be at risk during this period

CONCERN ABOUT OCCUPANCY OF MR AREAS

MMR levels were intended for use as benchmarks. The loss of one habitat or pair at MMR levels provides a risk of non-viability. We recommend the Forest meet level 8 or 9 on the Salwasser Scale, as intended by regulatory language. Moderate assurance of viability for 50 years on the planning area does not meet this intent.

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Response: The development of MR requirements did not assume occupancy of all MR habitat areas at all times. Allowances for this were made in determining numbers and distribution of habitat areas. Please see Appendix H for a description of the development of the MR requirements.

Additionally, at this time, and through the 10 to 15 year planning period, habitat beyond the MR habitat areas will remain for these species, in wilderness, no-harvest management areas, and areas available for timber harvest but not cut during this planning period.

VERIFICATION AND UPDATES TO MR AREAS

MR's need extensive on-the-ground verification.

The plan must be flexible enough to change the MMR to correspond with new findings. More study must be done to determine what is necessary to keep viable populations.

It seems risky that occupancy of designated pine marten and pileated woodpecker areas is unknown At least some representative areas ought to have been sampled.

Response: Changes are likely to occur as research and monitoring produce new and better information. The monitoring planned for MR areas calls for verification on-the-ground of the suitability of the area as an MR site, monitoring to ensure that areas remain suitable. Monitoring and research (see Chapters 5 and 2, Forest Plan) will test the appropriateness of the indicator species selected and how well MR areas represent the species group for which they were set aside.

PLAN DOES NOT ADDRESS EFFECTS ON THREATENED, ENDANGERED, SENSITIVE SPECIES

The DEIS does not adequately address the impacts of each alternative on threatened, endangered and sensitive species. The Plan does not adequately protect these species. The Plan should include a proposal to reestablish gray wolves and grizzly bears

The Forest should incorporate into the Plan decisive steps toward encouraging re-establishment of the gray wolf population and grizzly bears on the Forest and should insure maintenance of wolf habitat and the prey base.

The grizzly bear and the gray wolf require large tracts of undeveloped land.

Suspected activities of grizzly bear, peregrine falcons and gray wolves must be pursued with fervor and, if appropriate, their natural reintroduction into the Forest and adjacent areas encouraged.

A major flaw in the draft plan is the attention given to endangered species like the wolf and grizzly bear. Do you propose to continue logging and road building while the studies are being done?

The FEIS needs to pay more attention to the effects of road building and logging on threatened and endangered and sensitive species Regardless of the recovery plans for these species, what will be the impacts of each alternative on these species? The destruction of their habitat will drive them closer to extinction.

Maintenance of wolf and grizzly bear habitat includes no further road incursion, extensive road closures, and no logging of ungulate winter range

The Forest Service has done an inadequate assessment of the impacts of road-building and logging on rare animals such as the grizzly bear, the peregrine falcon, and the gray wolf.

Road-building and logging activity will be going into the heart of the remote places needed by these species for survival, and this has been inadequately assessed.

Your statement that grizzly bears will be protected only on a site specific basis is not sufficient. Grizzly bear management must be considered in every timber sale in the North Cascades Ecosystem Road closures should be enacted when conflicts occur to enhance the possibilities of grizzly bear recovery.

The plan does not identify the effects of alternatives on sensitive species.

Activities should be restricted within 1/4 mile of suspected bald eagle habitat, as well as known bald eagle habitat.

> **Response:** Depending on the species present, the type of time of year of the species' use, and human uses of a specific area, needed protection measures for threatened, endangered and sensitive species vary. Refer to Chapter 4, Forest Plan; additions have been made to the Forest-wide Standards and Guidelines since the proposed plan was released, in response to comments from the public, agencies, and organizations. Forest Plan standards and guidelines address typical protection measures which will be employed, but they will be adapted to each site.

A careful analysis must be made of the potential effects of proposed projects on T&E&S species. Whenever a proposed project may affect a federally-listed species in a detrimental way, we will confer with the U. S. Fish and Wildlife Service, the agency responsible for their management, on measures to be taken. Whenever a sensitive species could be affected negatively, an analysis must be made to determine whether the action could affect viability of the species or contribute to a need for Federal listing. Projects are frequently modified and mitigation measures employed.

Recovery plans for federally-listed threatened and endangered species are the charge of the U.S. Fish and Wildlife Service, and are developed with the participation of other Federal and State agencies and extensive public input. They determine measure which will be taken to aid in the recovery of viable populations of a federally-listed species.

There is an existing Bald Eagle Recovery Plan. Standards and guidelines in the Forest Plan meet or exceed those in the Recovery Plan. It is Forest Service policy that project areas will be assessed to determine whether they contain suitable habitat for threatened, endangered and sensitive species, and, if so, whether these species are present. Suspected habitat would be surveyed for use. Surveys for bald eagles are occurring each year, in cooperation with the U. S. Fish and Wildlife Service, the State, the Nature Conservancy, and the National Park Service. These surveys involve a number of members of the public who volunteer to help accomplish this valuable but time-consuming and often cold and arduous work.

The North Cascades Ecosystem is currently being evaluated as a grizzly bear recovery area Members of the public tend to feel strongly one way or the other on the subject of the area being designated as a recovery zone. There will be additional opportunities for public input before a recommendation is made on this subject. If a decision is made for grizzly bear recovery, the methods employed must be addressed in a plan

Wolves and grizzly bears have been sighted occasionally in the North Cascades, and occurred here historically. Both use extensive areas of habitat and cover large areas in the course of their daily lives. This makes them difficult to locate. John Almack, the grizzly bear researcher for the Washington Department of Wildlife, investigates reports of grizzly sightings. One track and one cache site in the ecosystem have been verified as grizzly sites. Neither was on the Forest, but they were close enough to be within the range of bears using the Forest. The habitat throughout the ecosystem is being evaluated and classified according to types of use. This is due to be completed at the end of 1990. Extensive efforts are being made to trap a grizzly bear to study its habitat use through telemetry (and prove its presence) and to photograph grizzly bears at baited camera sites. Habitat use in the North Cascades may be different than in other ecosystems with grizzly bears Any bear that should occur on the Forest is protected from harm under the Endangered Species Act

Both the wolf and the grizzly bear are most likely to be affected by human use of areas. In other areas of their occurrence, it has been found that it is not the removal or timber or building or roads per se which is harmful to these species, but, rather, it is the human activity which results. Road closures are likely to be a tool for their habitat management, and areas such as wilderness, semi-primitive unroaded areas, spotted owl habitat areas, and other areas where human activities are

discouraged or limited will likely be important habitat areas to these species if they are to recover.

Healthy populations of big game are important to the wolf, and one of the Forest Plan's objectives is to maintain a stable population at a fairly high level.

A formal consideration of wolf recovery in the North Cascades has not been started at present. As with the grizzly bear, consideration of recovery would have to consider habitat quality, and would involve balancing human uses with wolf requirements. Laufer and Jenkins (1989), from a study funded by the Washington Department of Wildlife, recently published a compendium of the history and current status of the gray wolf in the Cascade Mountains of Washington. They recommend further research to determine whether any wolf packs exist in this ecosystem, and to evaluate habitat suitability. They conclude that recolonization of wolves may occur in the future, if it has not already.

STATE LISTED SPECIES NOT IDENTIFIED

The plan does not identify which sensitive animal species and species of state concern occur on the Forest. The status of the spotted owl in Washington State has been upgraded to Endangered. The pileated woodpecker has been listed as sensitive by Washington State.

Response: The list of State threatened and endangered species has been updated and included in the documents. The Forest Service Sensitive Species List is revised each year, based on input from the State. Species which are listed as threatened or endangered by the State, but which are not federally listed, are customarily placed on the Forest Service Sensitive Species List. The State of Washington's sensitive list is a category of a lower degree of present concern than is the Forest Service Sensitive List. Species listed by the State as sensitive are ones about which we share information and welcome State input, but they do not fall under policies for managing Sensitive species. Refer to Forest-wide Standards and Guidelines, Threatened, Endangered, and Sensitive Species, Chapter 4, Forest Plan.

NEED ADDITIONAL STUDIES REGARDING THE REQUIREMENTS FOR T, E, AND S SPECIES

Studies are needed of the requirements of threatened, endangered and sensitive species, to ensure the effectiveness of management guidelines and monitoring programs.

Additional research is required to understand the life cycle and habitat requirements of threatened and endangered species. Little data is available to ensure that the planned management will be effective.

Response: This is correct. Surveys and research will continue on these species and their habitat requirements, and adjustments will be made to standards and guidelines for their management as data give us a better understanding of their needs, and of effective protection measures. Refer to the Information Needs section, Chapter 2, Forest Plan.

CONFLICTING STATEMENT ON SITES BEING PROTECTED FOR BALD EAGLES

The statement " . one existing and two potential nest sites..." conflicts with other document statements indicating 4 sites identified for bald eagle recovery. We again ask that the recovery plan specifics be identified in the plan and implemented in the preferred alternative.

Add that the Forest will meet the levels specified in the recovery plan and the recommended locations. The Forest should also provide for alternative nests sites within 1/4 mile of selected recovery sites. Roosts should also be discussed.

Change to read, "Roads within 1/4 mile of nests, in feeding and/or roost areas will have time-of-year restriction on maintenance and use.

Response: This has been corrected in the FEIS; there is one active nest site and three potential, at this writing. Also see Forest Plan, Chapter 4, Resource Summary for Wildlife Management.

USE GRIZZLY BEAR RECOVERY PLAN

Use grizzly bear recovery plan in the MBS plans.

Response: As of yet, there is no approved recovery plan for grizzly bear in the North Cascades. When that plan is developed and approved, we will comply with the intent. Refer to the Forest-wide Standards and Guidelines, Chapter 4, Forest Plan.

PROTECTION AND MANAGEMENT OF GRAY WOLF

Grey Wolf-Gray Wolves historically used National Forest habitat on the MBS but were killed or driven off by humans. There should be no question that the habitat does exist. And while there is little evidence to indicate that wolves are moving in from Canada to re-establish themselves, such as with grizzly bears, there have been numerous sightings of a pack of wolves in the Ashland Lakes are administered by the DNR and adjacent to National Forest. Perhaps it's time to take a look at how to manage for these critters, instead of pretending they don't exist.

Response: Our coordination with the Washington Department of Wildlife and U.S. Fish and Wildlife Service on gray wolf indicated that at this time habitat inventory and evaluation for gray wolf is not a high management priority also, the Fish and Wildlife Service is not actively pursuing a recovery plan for wolf in the worth Cascade, at the present time.

We will continue to be aware of the species and recognizing the need to protect them and their habitat, which we will do when the species is encountered. Refer to our Forest-wide Standards and Guidelines, Chapter 4, Forest Plan.

ERROR IN LISTING OF SPOTTED OWL

The northern spotted owl is a Washington State-listed endangered species, please correct page III-61 in the DEIS.

Response: The error has been corrected in the FEIS.

MANAGEMENT FOR SPOTTED OWLS NOT ADEQUATE TO MAINTAIN A VIABLE POPULATION

The following should be added "SOHA's shall be located and sized to provide sufficient habitat to sustain existing sites and additional habitats as needed for recovery."

We disagree that populations of northern spotted owls will remain viable over the next 50 years in the planning area under the management proposed in the Plan.

State data indicate that the size and dispersal of your protected owl habitat areas is inadequate to maintain the numbers you project.

The EIS should disclose the acreages known to be used by spotted owls.

Response: Management of spotted owls in the Forest Plan follows current direction as set forth in the Spotted Owl Supplement EIS to the Regional Guide (1987). More information regarding areas used by the owl has been added to Chapter III, FEIS. Several processes are underway which may result in changes in the management direction for spotted owls. An interagency committee of scientists is reviewing spotted owl requirements and will make recommendations on needed management in March, 1990. Also, the U.S. Fish and Wildlife Service is considering the proposal to list the spotted owl on the Federal list of threatened and endangered species, with a decision expected in the summer of 1990 Spotted owl management requirements will be updated based on the results of these two processes in the fall of 1990. This is likely to result in amendments to the Forest Plan.

CLARIFY WHAT IS ALLOWED TO OCCUR IN SOHA'S

The prohibition of salvaging blowndown or dead timber should allow for an exception for catastrophic events

"No new road construction shall be permitted in core area" should be changed to "should."

If new roads must be located in spotted owl foraging areas, the acreage of habitat lost should be replaced

Are new motorized trails authorized outside of the core area?

Response: These items have been clarified in the standards and guidelines for MA 11, Old Growth Habitat, Chapter 4, Forest Plan. The emphasis is on not allowing activities which might degrade habitat or disturb owls within the core area (300 acres around the nest site or likely nest site) and minimizing disturbances in the remainder of the habitat area. Unavoidable habitat losses will be replaced with suitable habitat whenever possible.

HOW MANY SOHA'S ARE OCCUPIED BY SPOTTED OWLS?

The final EIS should discuss the results of surveys, including how many of the sites are occupied by spotted owls.

The Forest's SOHA's do not occur where many of your owls occur.

Response: The documents (Chapter III, FEIS) have been updated to include current information on the number of spotted owl pairs known to occur on the Forest. Occupancy, preferably by a breeding pair of spotted owls, is an important criterion for locating spotted owl habitat sites. However, the distribution of habitat sites over the Forest and maintaining dispersal corridors between sites is also important. Sometimes, in order to maintain well-distributed spotted owl habitat over time, a habitat area is located in a portion of the Forest not currently known to be occupied by spotted owls. The MBS does not yet have an extensive history of surveying spotted owl areas for reproductive sites; just because a site is not occupied for one or two years does not mean that it might not be occupied in another year. Spotted owls do not appear to breed every year. Some spotted owls do not respond to the imitations of their calls used for surveying. Because reproduction is relatively low in this part of the spotted owl's range, occupancy by breeding paris is very important, and adjustments to the network will continue to be made in the next few years to improve the network's viability. Refer to Information Needs section (Chapter 2, Forest Plan) and also the monitoring plan, in Chapter 5.

PLAN DOES NOT ADEQUATELY ADDRESS TREAT OF BARRED OWLS DISPLACING SPOTTED OWLS

The public should know of the problem of incursions of the barred owl into spotted owl habitat.

The final EIS should discuss how many of the SOHA's are occupied by barred owls.

Response: The spotted owl SEIS to the Regional Guide addressed the concern that, as barred owls continue to extend their range into and through spotted owl habitat, competition between the two species will reduce the viability of spotted owls. Additional language regarding the relationship between the two species (not yet well understood) has been added to FEIS, Chapter III, Wildlife. Studies are on-going which seek to determine the effects of interaction between the species At the present time, it is not known whether actions are needed to protect spotted owls from barred owl incursion. We also do not know what measures would be effective Barred owls can use a relatively wide range of habitats, including spotted owl habitat. Fragmenting of previously large old growth areas is believed by many to be a factor in the increase of barred owls. However, there are few areas, even deep into unbroken old-growth areas, which do not have barred owls.

PROTECT MORE OLD GROWTH HABITAT IN THE PRATT, ETC. WHERE HABITAT FRAGMENTED

Most of the Pratt Valley should be designated as a Roadless Area to provide suitable habitat for spotted owls and other old growth species. Spotted owls are known to exist in the Pratt, which provides a critical old growth bridge or

travel corridor connecting the east and west sides of the drainage and connecting the northern and southern areas of the Forest.

The Alpine Lakes Plan, which was drafted many years ago, does not adequately consider new information on Spotted Owl Habitat Areas which has been developed since the Plan was adopted.

The area in T22N R10E NE 1/4 of S24, along the lower part of Annette Lake Trail, is about 500 years old, and should be included in a SOHA. Old growth in Sec. 16, T.21 N., R.10.E. is small, but used extensively by a spotted owl pair. Sections 16, 19 and remaining old growth in T 21 N., R.10 E. and R.11 E. Sec. 18 should be preserved.

Existing spotted owl habitat in the Cedar River Watershed should be retained in National Forest ownership and managed as old growth.

Section 14, T.21 N., R.9 E. should be designated as SOHA. It is prime habitat with documented owl habitation. This stand is perhaps the oldest remaining in the watershed and should not be logged.

Owls have not been sighted in the Findley Lake Basin, which is designated SOHA under Alternative G.

Response: Revisions in the spotted owl network in this part of the Forest have been made since the Draft Forest Plan, based on direction for the spotted owl SEIS to the Regional Guide. The Forest Plan proposes a large SOHA centered in the Meadow Creek area of the Cedar River Watershed. It would total about 3200 acres, including certain acres of habitat which the City of Seattle proposes to maintain as spotted owl habitat. This SOHA is a known spotted owl use area. There are five additional SOHA's in this area (see wildlife map, FEIS). The SEIS identified this area as a "Corridor of Concern", where movement of spotted owls through the area might be hampered. As discussed above, spotted owl management needs are being reassessed by an Interagency Scientific Advisory Board, whose recommendations will be used to revise spotted owl management plans on the Forests. It is expected that their recommendations will address this and other areas of special concern.

WOULD LIKE TO WORK WITH THE FOREST ON THE SPOTTED OWL ISSUE

The forest products industry would like an opportunity to work with the MBS, not only on the issue of whether the spotted owl is an adequate indicator species, but, if this is necessary, we would like to work out ways to minimize timber impacts by locating more of the owls in currently reserved areas.

Response: Management of spotted owls in the Forest Plan follows current direction as set forth in the Spotted Owl Supplement EIS to the Regional Guide (1987). Several processes are underway which may result in changes in the management direction for spotted owls. An interagency committee of scientists is reviewing spotted owl requirements and will make recommendations on needed management in March, 1990. Also, the U.S. Fish and Wildlife Service is considering the proposal to list the spotted owl on the Federal list of threatened and endangered species, with a decision expected in the summer of 1990. Spotted owl management requirements will be updated based on the results of these two processes in the fall of 1990. This is likely to result in amendments to the Forest Plan.

THERE IS NO NEED TO SET ASIDE LAND FOR CAVITY EXCAVATOR HABITAT

The preferred alternative deducts 3% of net green volume from all empirical and managerial tables for cavity excavators; this is excessive. The MMR calls for providing enough habitat for 20% of maximum potential excavators. The 3% reduction provides for 40% of potential. PLUS believes that there is no need to set aside habitat or excavators on suitable timber lands, as there is adequate habitat in wilderness and other forested lands not suitable for timber production, such as stream-side buffer areas, etc

An examination of the distribution of acres for each decade over the next 150 years shows that there will always be enough suitable mature forest habitat to provide for a higher percentage of the maximum potential population of cavity excavators that the 40% sought in the preferred alternative It's 3% reduction in all existing and regenerated yield tables is, therefore, totally unnecessary.

Response: We have reviewed the procedures used in relation to compliance with Regional guidelines (Regional Forester letter, August 1988). The MBS is consistent with the interpretation and assumptions used. Refer to the Forest-wide Standards and Guidelines for Diversity and Long-Term Productivity and also for Wildlife, Chapter 4, Forest Plan.

A July 1986 document, under the name of the Regional Forester, "A Report on Minimum Management Requirements for Forest Planning on the National Forests of the Pacific Northwest Region" indicated a 20% population level to maintain viability of cavity excavators would probably not be desirable, but adequate. However, existing Regional policy indicates that we will not drop below 40% population levels on any lands, even those managed for intensive timber emphasis. This 40% population level can not be met by clumping all the habitat in one corner of a watershed and completely eliminating the habitat on other portions of a drainage Distribution is an important issue and population levels have to be managed on a stand-by-stand basis.

The process used to estimate snag and wildlife trees requirements and the effect on timber yield was described in Appendix J, page J-10, in the DEIS. As stated in that section, there is some uncertainty in our estimates. The effect will be monitored and adjustments, if necessary can be made through a Forest Plan amendment. Refer to the Monitoring Plan, Chapter 5, Plan

NEED MORE DETAIL IN STANDARDS AND GUIDELINES FOR SNAGS, DEAD AND DOWN LOGS

The Forest-wide Standards and Guidelines, Items 1. and 2 need to be more specific for determining dead & down snags.

Response: Additional Forest-wide Standards and Guidelines for Diversity and Long-Term Productivity have been added to the Forest Plan; refer to Chapter 4. More detail and specifics as to size and number of snags and logs is found in "Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington " We chose not to include all the detail in these sources, they are included by reference in the standards and guidelines.

PROVIDE FOR 100% OF THE POPULATION POTENTIAL FOR CAVITY EXCAVATORS

It may be a poor assumption that forested areas with timber management will provide 100% of the potential population of cavity excavators. Much of the areas set aside are high elevation where trees are smaller and, therefore, less suitable to all cavity excavators and dwellers.

Maintain 100% of the potential population of snag-dependent species.

Add (in MA prescriptions): "Maintain sufficient dead and down wood for 100% wildlife population potential."

> **Response:** In the Preferred Alternative, there are 346,411 acres suitable for timber harvest, although not all are allocated to full yield harvest prescriptions (see Table II-9c, Chapter II, FEIS). Forest-wide standards and guidelines state we will maintain a minimum of 40% of population potentials on lands where management will take place. In other allocations, such as riparian areas, semi-primitive nonmotorized dispersed recreation, scenic viewsheds and areas set aside for old growth indicator species, plus lands such as wilderness, RNA, etc., habitat will be maintained at a much higher level than the 40% minimum. Allocations such as semi-primitive nonmotorized and motorized, research natural areas, Mt. Baker National Scenic Recreation Area, and Primitive have no scheduled harvest and cavity excavator habitat will be managed to 100% of population potential.

MAINTAIN 40% OF POTENTIAL POPULATIONS

Use 40% level on lands managed intensively for timber, higher elsewhere. Provide for recruitment trees to ensure future snags.

> **Response:** This correction has been made.

MEET 60% WILDLIFE NEEDS

Add to Item 6 , page 4-151 in the Plan: maintain standing dead and down wood to meet 60 percent potential wildlife needs.

> **Response:** The intent of the management prescription for a potential Scenic River allocation is to manage any activity such as timber harvest to provide for near-natural conditions within view of the river. Design shall achieve visual quality objectives We feel that this level of management will produce a population level for cavity excavators greater than the Forest minimum of 40% and probably closer to 60 - 80%.

IN MA 11, MEET 100% OF SNAG-DEPENDENT NEEDS

In MA 11, meet 100 percent of the needs of cavity nesters.

> **Response:** This allocation consists of natural, existing stands of old growth and suitable habitat for Northern spotted owl. Timber harvest is not permitted, so population levels will be maintained at the 100% level.

HABITAT FOR PRIMARY CAVITY EXCAVATORS WON'T ENSURE NEEDS FOR ALL SPECIES

The assumption that managing for primary cavity excavators ensures the needs of all snag dependent wildlife remains unproven for the long term. Some secondary cavity nesting birds and animals dependent on bark sloughing may fall through the cracks on MA 17 lands.

Response: On all lands, including MA 17, at least the MR level of habitat will be provided, with snags and logs in various stages maintained throughout the timber harvest rotation. Snags with sloughing bark, for example, will be provided, both in MA 17 lands and in other allocations with partial yield and no scheduled timber harvest. Also, refer to the discussion under substantive comments/response for Management Indicator Species for wildlife.

USE OF REFERENCES FROM THE BLUE MOUNTAINS IS NOT APPROPRIATE FOR THIS FOREST

The use of the Blue Mountain material for the Mt. Baker-Snoqualmie is questionable, in that this material was developed for a far eastside area. The MBS has many more riparian habitats and much more moisture than the eastside forest. The selection of the common flicker, hairy woodpecker and downy woodpecker as the primary cavity nesters seems appropriate. These species are quite adaptable to a variety of tree sizes and can be managed for in the managed forest The application of providing habitat throughout the managed forest, though, is questionable, in that much of the nesting habitat, and particularly structures for providing holes for these and secondary cavity nesters, are found along waterways

Response: We agree that "Wildlife Habitats in Managed Forests of the Blue Mountains of Oregon and Washington" should not be the primary source of literature for managing cavity excavator habitat on the MBS in Washington. The standards and guidelines for Management Area 12, Mature and Old Growth Wildlife Habitat (pine marten, pileated woodpecker) were developed primarily from the guidelines developed in "Management of Wildlife and Fish Habitat in Forests of Western Oregon and Washington.

INCORRECT ASSUMPTIONS USED FOR STANDARDS ON PILEATED WOODPECKER

This is a prescriptive standard and guideline for pileated woodpeckers It is based on incorrect biological assumptions and should not be included in Forest-wide or MA standards and guidelines.

Response: We feel that this particular standard and guide is based on the best information we are aware of, related to management of pileated woodpecker on the Washington Cascades. The discussion of habitat requirements for the pileated woodpecker were discussed on pages J-7 and J-8 of Appendix J, DEIS. That discussion also included literature references which were used to develop on standards and guidelines.

THE FOREST SHOULD PROHIBIT CUTTING OF SNAGS FOR FIREWOOD

We strongly urge you to adopt a forest-wide prohibition on the cutting of snags for fuelwood by private or commercial harvesters and to see that it is strictly enforced. This should be written into the Forest-wide Standards and

Guidelines. The MBS should also take action to regenerate snags on portions of the Forest that do not contain adequate numbers of snags. Required per acre snag density standards should be established in consultation with the Washington Department of Wildlife and should be implemented Forest-wide. Snags are so critical as wildlife habitat for a wealth of species, that all snags should be preserved as a general Forest Service policy. Any additional loss of habitat for cavity nesters is an "unacceptable loss".

Response: The cutting of fuelwood on this Forest is done in a "controlled environment." Refer to Chapter III, FEIS for an updated discussion on firewood cutting; its use has decreased in the past years. Most permits are issued for use in a designated area of closed timber sales. This area is usually controlled by a central access. The wood available to the public is leftover material from previous harvesting operations, and is on-the-ground and stacked at a landing. The cutting of any standing dead tree is in violation of the issued permit, and subject to fines.

The standards and guidelines provide for management of wildlife trees and habitat for cavity excavating species.

HOW WERE CALCULATIONS MADE FOR EFFECTS ON TIMBER YIELD?

Referring to effects on timber yields to maintain habitat for cavity excavators (page B-97, DEIS Appendix B)· how was this calculated? What does this represent in numbers and sizes? A normal rotation will not produce the larger size snags required by particular species. How many green recruitment trees are available in this method?

Response: A more detailed description of the process used was found in pages J-10 and J-11 of the Appendix to the DEIS. This process is again discussed in Appendix H, Management Requirements, FEIS.

DEIS FAILS TO DISCUSS HARVEST PATTERN EFFECTS ON SNAG-DEPENDENT WILDLIFE

The DEIS fails to identify and discuss timber harvest patterns as important impacts on population viability and dispersal of snag-dependent wildlife. The size, shape, and distribution of forest patches within the large habitat areas are determining factors for population viability This could conceivably affect harvest operations in the first 15 years of the plan.

Response: The discussion in the Plan referred to projects that will be implemented as part of the Forest Plan All projects are subject to analysis under the NEPA process Population viability, if the area includes habitat for snag-dependent wildlife, will be included as an issue in the project-level analysis, and potential impacts evaluated at that time. This type of detailed analysis is beyond the scope of the Forest Plan.

MEET 100% OF SNAG-DEPENDENT WILDLIFE NEEDS

Maintain 100% of the population potential for snag dependent wildlife

Response: This has been changed to 100% in the Forest Plan.

GOAT WINTER RANGE/POPULATIONS NEED MORE PROTECTION

The Preferred Alternative is expected to result in a decline of 13% of goat numbers over five decades. This decline, however, is the opposite effect that many forest users, including environmental groups, hunters, and the Washington State Department of Wildlife The projected decline is really part of the cost of logging old growth. We feel the cost, as documented in the DEIS, is too high and represents a significant unbalance in the Plan. Goat winter range must receive greater protection than is proposed in the Preferred Alternative.

Response: In the FEIS, the management requirement (MR) size for goats has been increased from 45 acres per family group (assumed to be 13 animals) to 585 acres per family group where possible. Where this is not possible, the amount of optimal thermal cover now present in the family group's area is allocated. MR's are a larger size in wilderness or research natural areas (about 45 acres per individual goat) This proposed change was documented and the trade-offs analyzed in Appendix I - Modifications of Minimum Management Requirements for Wildlife, in the DEIS.

Current goat populations are estimated to be about 1,300 individuals, which is below habitat capability, based on vegetative conditions. Habitat capability will remain above current population numbers in the Preferred Alternative. The Forest, along with the Department of Wildlife, will continue to examine goat harvest levels, parasites, and disturbance from road use and recreational activities - all as possible causes for the current goat population number.

In the Preferred Alternative, 17,110 acres are allocated to 15A, the MR intensity, with no scheduled timber harvest; MA 15B Habitat Improvement is not used. This compares to 781 acres allocated to MR (no harvest) in the draft preferred alternative, plus 4,338 acres allocated to 15B, Habitat Improvement. Refer to Table II-7k for trends of mountain goat populations over the five decades. Goat MR areas will continue to be updated as information on important goat use areas is gained.

REVISE MOUNTAIN GOAT PRESCRIPTION TO 45 ACRES PER ANIMAL

Please revise the mountain goat prescription to provide for a minimum of 45 acres per goat on winter range in seral stages V and VI. These may be managed stands, but on a minimum of a 200-year rotation, removed at no more than 5 percent per decade

Response: The prescription for MA 15A, Mountain Goat Management Requirement, has been revised to provide 45 acres of habitat per individual. There is no scheduled timber harvest. Refer to Forest Plan, Chapter 4, MA Standards and Guidelines.

REWORD STANDARDS AND GUIDELINES FOR MOUNTAIN GOATS

The last word, page 4-89 Item 10, should be changed to "avoided" rather than "mitigated." On page 4-178, MA 15, Item 4.a. - change "has been identified" to "may be expected "

Response: While "avoided" would be appropriate for winter range, we feel the wording as is - "activities that adversely affect mountain goats on

their spring and summer range shall be identified and mitigated." - is appropriate for managing spring and summer range.

Referring to restricting road use in goat winter range: we feel the wording "where harassment has been identified" is more appropriate, rather than where harassment "may be expected " We feel it is important to allow for the situation where goats may not be using a portion of identified winter range in a particular year. In that case, harassment wouldn't be an issue. However, if we have identified the harassment, we will restrict use of roads on those parts of the winter range. Mitiation may involve seasonal restriction on road use or recreation use.

MANAGE ALL MOUNTAIN GOAT HABITAT AT THE IMPROVEMENT INTENSITY

All mountain goat habitat should be managed at Intensity 15B, with emphasis that only 5 percent of the acres in this prescription can be harvested per decade.

Response: As discussed above, acres in the Preferred Alternative are allocated to 15A. Alternatives B (RPA) and C in the FEIS include allocations to MA 15B Refer to the discussion and analysis that was included in DEIS Appendix I, with subsequent discussion in the MR Appendix H, FEIS, for the necessity of an MR for mountain goat The MR level, with no scheduled timber harvest, was determined to be necessary to maintain viability of the mountain goat across the MBS

CLARIFY WHERE MOUNTAIN GOAT MA 15 WILL APPLY

The statement that "Forest-wide Standards and Guidelines require surveys for possible goat winter range during project design" is clear enough, as is the statement that, when winter range is identified, the MA 15 standards will apply (Draft Plan, page 4-88). It is not immediately clear when and where the MMR intensity (15A) will be used and what limitations, if any, are intended by the phrase "selected acres of.. mountain goat habitat " (page 4-177)

We are concerned that District Rangers will interpret the ambiguous direction [discussed in the paragraph above] so as to maximize timber harvest.

Response: *The phrase "selected acres ..of mountain goat habitat" applies* to acres of winter range assigned to MA 15. The Forest-wide Standards and Guidelines for wildlife, Item 9 on mountain goats have been clarified. As the inventory for this species is not complete, it is the intent of the Plan to continually update the identified mountain goat winter habitat and, following a Plan amendment, allocated those areas to MA 15. Also, see Information Needs section , Chapter 2, Forest Plan

NO NEW ROADS TO ACCESS MOUNTAIN GOAT HABITAT

MA 15 states that "No new roads will be constructed to access winter range" (Page 4-177). It is critical that roads not be constructed to access any goat habitat (all intensities). Furthermore, access from existing roads must be restricted.

Response: In response to this, and other comments, changes made to this management prescription in the Forest Plan include new wording of Item L.1. which states "No new roads permitted which access winter goat range." Additional clarification has been added to Item 4.1. to restrict use on existing roads when harassment to mountain goats has been identified; and to Item 4.2. prohibiting motorized use (not just ORV use) on goat winter range from October 31 through June 15th.

MBS SHOULD HAVE USED DEPARTMENT OF WILDLIFE'S LANDSAT INVENTORY FOR GOATS

I noted the use of the Washington State Department of Wildlife's brand-new LANDSAT inventory of mountain goat habitat for the MBS draft plan was omitted This was complemented by on-the-ground work by 122 volunteers in 1985. I understand that the State made these data available to the MBS; were they used?

Response: The MBS cooperated with the State on the 1985 inventory; however, the inventory only covered the north end of the Forest. To the extent possible, the inventory was used to remap goat habitat between draft and final plans. Chapter 2, Plan notes that one of the Information Needs is refinement of the mountain goat inventory.

IT IS UNCERTAIN HOW MUCH THERMAL OVER GOATS NEED - MA 15 TOO RESTRICTIVE

To what extent goats require thermal cover is still an unanswered question. In the DEIS, Appendix B, the MBS admits that there is limited information on the location of winter range utilized by goats Because of the limited information, not only of the winter range, but also of the life cycles of mountain goats, it appears to me that close monitoring of the current population is essential, but the reduction of timber harvest or the policy of no new roads is questionable.

The plan overemphasizes the need for winter cover for mountain goats. They do not need so much old growth; any kind of closed cover will do. Riparian zones will work good in most areas. It is very possible that mountain goat populations have grown because clear cutting has been beneficial to their food source.

The MBS has not identified any of the mountain goat winter habitat by an inventory process. They have precluded timber harvest but, on the other hand, state "If timber management activities are conducted, practices applied shall be for the primary purpose of maintaining mountain goat winter habitat." It appears that "shall" should be changed to "should," both here and in Item L. 1.

MA 15: there is no justification for the 5% restriction on suitable lands for timber harvest.

Response: Mountain goats were selected as an indicator species on the Forest because of their status as a hunted species and as a representative of a unique habitat type. Monitoring populations will give an indication of the effects of management activities on that habitat. Refer to Chapter 5, Forest Plan.

Under NFMA, a management requirement (MR) is provided for indicator species for which viability could be a concern if habitat is not provided in sufficient quantities and quality Our consultation with the Washington

State Department of Wildlife (which is responsible for managing the species), indicated goat populations in the Cascade Mountains of Washington were declining. The State concluded that the decline was due to several factors: too much hunting pressure, loss of winter range cover due to timber harvest; and an above-average loading of intestinal parasites.

These deliberations, in concert with the State, indicated to us that significant cover reduction on National Forest land could jeopardize viability of the species. We could not under law take the risk that our management activities might contribute to threatening the viability of this species.

We then needed to establish a management requirement (MR) for assuring a viable population level, while we gathered additional knowledge of habitat needs, and located and inventoried those winter ranges being used by mountain goats.

In DEIS Appendix J (page J-12), we indicated that specific locations of occupied goat winter range are not well known. The areas identified in the DEIS represent the best information available, gathered in conjunction with the State agencies and others. This information will continue to be up dated. Likewise, the required acres to maintain a goat through the winter are not perfectly established. However, because of the viability issue, establishing a management requirement (MR) that dictated constraints and other management activities was deemed appropriate; it is included in the Forest Plan.

As discussed in Appendix I, DEIS, mountain goat MR's have been revised to include a dispersal requirement and the size of the winter range modified to maintain a viable population. In the FEIS, see Appendix H.

DEDICATING ACRES TO MOUNTAIN GOATS IS EXCESSIVE AND UNSUBSTANTIATED

The recommendation of the MBS to have 33,568 acres of timber land dedicated to mountain goats is excessive and unsubstantiated.

Response: We are unable to determine the source of your acre figure. Refer to the above answer for a discussion of the mountain goat MR.

PRATT RIVER AREA HAS IMPORTANT MOUNTAIN GOAT HABITAT

A specific example of goat winter range that could be impacted by logging and road construction is the lower end of the Pratt Valley (Sections 31 and 32 T.24.N., R.10 E). Mountain goats are regularly seen here during the winter months, on the low elevation ledges of Preacher Mountain. A State Department of Wildlife biologist rated this area as excellent goat winter habitat. The area is also a very important elk and deer winter range. The wildlife productivity of this area is very high and as such, should be managed not for timber, but for big game. This data was not known in 1981, when the Alpine Lakes Management Plan was implemented.

Response: There are 4 mountain goat MR's designated in the Pratt River drainage. One is located on the south/southwest sides of Preacher Mountain. These areas will be monitored for adequacy of the size and locations once the Plan is implemented. The lower elevations of the Pratt

River drainage have been identified as Deer/Elk winter range and allocated to MA 14 (which was 14B in the DEIS - the MR for deer and elk has been dropped, as discussed in Appendix J in the DEIS.) Refer to the map for Alternative J (Preferred).

The Pratt River drainage will be managed for big game as well as a variety of other resources, including timber and recreation. The prescriptions and Management Areas for Mountain Goats and Deer/Elk will ensure viability of the wildlife populations that occur in this area.

MOUNTAIN GOAT PROTECTION NEEDED IN LONESOME LAKE AREA

The Lonesome Lake Roadless Area parcel is sort of a way-station for both elk and mountain goats in their annual migrations to and from higher ranges in Mt. Rainier National Park and the lower ranges on Huckleberry Ridge. The goats winter predominately in Section 14, T.18 N., R.9 E. and Section 10. A pileated woodpecker MMR is proposed for Section 14 in most alternatives; this will be of value for many species. The maintenance or preservation of an old-growth timber "migration corridor" in this area is of vital importance for mountain goats.

Response: The Lonesome Lake area is allocated to the following Management Areas in the Preferred Alternative: Scenic Foreground and middleground for the area within Huckleberry drainage, from the ridge in Sections 34, 27, 22, and 15 to the east; MA 1B, Semi-primitive nonmotorized dispersed recreation surrounds Lonesome Lake and Mule Lake. There is a mountain goat MR (MA 15A) in portions of Section 32 and 33. Within the Lonesome Lake area, there is a small portion of MA 12, mature and old growth habitat.

We recognize the value of the migration route and have been able to avoid it in the past five year-period. No sales are planned in the Huckleberry drainage that affects this area in the next five years. As noted in the Forest-wide Standards and Guidelines for mountain goats, Item 9., we intend to survey to determine the presence or absence of mountain goat winter range as part of project design. Refer to Chapter 4, Plan

ALTERNATIVES UNNECESSARILY RESTRICT BOTH TIMBER HARVEST AND DEER AND ELK

The DEIS Preferred Alternative and the other alternatives unnecessarily restrict timber harvest and deer and elk production, when both could be increased by harvesting more timber.

It appears that the Forest Service has purposely left out any habitat improvement in Alternative D, which is unfortunate. Overall outputs can be better if the land base is maintained at a high level where harvest occurs and habitat improvement on winter range is done.

> **Response:** In the FEIS, we developed and evaluated a new alternative, Alternative I. It replaces Alternative D, from the DEIS. The goal of Alternative I is similar to D, but it better responds to public support for an alternative with a high timber harvest, more emphasis on big game, and access for recreation. The goals for Alternative I include: emphasize resources with an established market price, such as timber production, developed recreation, and minerals; and emphasize enhancement of big game habitat and the development and maintenance of an extensive trail system. The outputs and effects of Alternative I are displayed in the tables in Chapter II, FEIS.

HOW WERE WILDLIFE POPULATION NUMBERS DETERMINED?

Your current level estimates for deer and elk are approximately half what the Department of Wildlife would estimate. Do your figures include the effects on habitat usability due to roads? Is your model forage based? Your figures bear little relationship to harvest level; is this due to investments in habitat improvement?

The Forest should put the same effort into developing realistic wildlife and fish population and habitat estimates as you do for timber.

We understand the State Department of Wildlife has data available on elk, goats, deer, and elk on Forest lands that is not being utilized in this planning process.

> **Response:** The population estimates used in the DEIS were obtained through consultation between Forest Service and Washington Department of Wildlife biologists. The State has made population estimates for only a few of the species for which we have attempted to show populations. State population estimates are made for species an a State-wide basis. Using State estimates and pro-rating them to National Forest lands results in a gross estimate, at best. Even though we have indicated these are population estimates for certain species based on individuals, the numbers are really more of an "index" - not actual populations - and should be interpreted that way. They are valid, however, for showing relative changes in population - up or down - due to different management proposed in a particular alternative, and for comparing alternatives.
>
> In the FEIS, Chapter II output tables, we have clarified the text to make interpreting these tables easier.

QUESTION THERMAL COVER REQUIREMENTS FOR DEER AND ELK WINTER RANGE

The proposed prescriptions have no consideration for the forage/cover interrelationships - they are very questionable technically and wasteful in terms of timber productivity Research information does not support the hypothesis that deer and elk require thermal cover for survival. (cites L.L. Irwin and Merril et al)

New data found in the Mount St. Helens blast area make the standards and guidelines for big game too restrictive. It has been proven and used on other Forests that a 20-foot tall, closed canopy stand is all that is needed for deer and elk winter range.

We do not agree that "thermal cover is considered to be the most critical component of big game winter range " Later research studies have shown that the quality of available forage is an equal, if not more, critical component.

The MBS doesn't have the heavy snowfalls on low elevation lands that were anticipated when the optimal elk habitat definition was written.

The distribution of cover/forage in the DEIS, that is 10% forage and as much as 90% cover, is a sure prescription for starvation of wild unglates. It seems intended to save old growth, not deer and elk.

The DEIS would have us conclude that only the "Winter Range" of deer and elk is critical in the selection of a management plan alternative. There is no evidence presented in the DEIS that establishes the necessary habitat requirements for any forms of wildlife. It is imperative the Final EIS does so.

Response: Habitat requirements and relationships for deer and elk on the Nt. Baker-Snoqualmie N.F. are based on Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington, USDA, Forest Service, Pacific Northwest Region, June 1935

Those areas that have been mapped as deer and elk winter range are identified as the most critical and necessary areas to assure maintenance of viability of both species within the planning areas Brown et al, in Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington, find that deer would usually leave foraging areas for thermal cover when temperature dropped below 20 degrees F or rise above 60 degrees F Additionally, elk were observed in the Cedar River leaving clearcuts for thermal cover when solar radiation exceeded 50% of maximum, or about 10.A.M. on clear days, especially during the hot summer months. In these conditions, the elk sought out the thermal protection offered by old growth stands over that of second growth stands.

In order to provide the best opportunity for deer and elk on their winter range, the Forest inventoried areas of optimal thermal cover. "Optimal thermal cover is defined as a forest stand with:

1) Four layers (overstory canopy, sub-canopy, shrub layer, and herbaceous layer),
2) An Overstory canopy which can intercept and hold a substantive amount of snow yet has dispersed, small (<1/8 acre) openings.

These criteria are generally achieved when the dominant trees average 21" DBH or greater, have 70% or greater crown closure, and are in the large saw timber or old-growth stand condition.

Our understanding of the research done after the Mount St. Helen's eruption indicated that if human disturbance was restricted (such as "no hunting"), and nutritious forage was available, these conditions tended to partially compensate for lack of cover. The converse also seemed to be true: good cover may partially compensate for poor quality forage.

It appears inconclusive about whether animals in an extensively-open area, such as the blast zone, can survive a severe winter without good cover. In addition, as human disturbance or hunting pressure is increased, the need for hiding cover may become more of a factor. In any case, as forage areas over time are replaced with young forests, deer and elk use will decrease. Our objective with MA 14, Deer and Elk Winter Range, is to provide a balance of high quality forage and high quality cover to assure viability of the species and a more stable population trend, rather than a "boom or bust" situation.

As we monitor deer and elk populations, the cover/forage ratio is one unit of measure (see Chapter 5, Forest Plan). If we find different ratios can be used to achieve the balance desired, the guidelines will be changed through an amendment to the Plan

DISAGREE WITH DEFINITION OF OPTIMAL COVER

We do not agree that the defined cover will provide "snow intercept, thermal cover, and maintenance forage" necessary to sustain wildlife. We recommend a definition given in Brown 1985, page 229.

Response: The definition shown in the Glossary of the DEIS was meant to be an edited version of that taken from "Management of Wildlife and Fish Habitat, in Forests of Western Oregon and Washington," Brown 1985. In the FEIS, we have added addition wording from Brown, 1985. In addition, and more importantly, the acres identified and mapped as optimal thermal cover are, in fact, those large saw timber or old growth stands that contain the characteristics suggested in the Brown 1985 publication.

MAINTAIN HABITAT IN CRITICAL WINTER RANGE SMALLER THAN 2000 ACRES

All deer and elk critical winter range should be managed under Intensity B [MA 14]. Element C 1.d. should also read the same range of habitat types shall be maintained on winter ranges less than 2,000 acres.

Response: These suggestions and the wording provided have been added to the standards and guidelines for MA 14 (14B in the DEIS). This includes provision for providing habitat in areas smaller than 2,000 acres.

CONTIGUOUS HABITAT AND TRAVEL CORRIDORS ARE IMPORTANT

Item 6. of the Forest-wide Standards and Guidelines for wildlife should also discuss the importance of contiguous habitat management. It should refer to

winter, transition, and summer range and the importance of maintaining travel corridors with continuity between them.

Habitat corridors should be dedicated in every watershed to provide a migration corridor for wildlife. We have discussed this concept with your planning team for the last decade and nothing has been included in the draft forest plan. This failing must be corrected in the final plan, especially in the North Bend and White River Districts.

Response: This concept is a concern. We have added a new Forest-wide Standard and Guideline in the Plan to address this issue See Wildlife, new Item 13. In addition, allocations in the Preferred Alternative increase the acres providing corridors for wildlife: 30 wild and scenic rivers are recommended. A SOHA has been added in the Cedar River Watershed, providing a better owl network on the North Bend Ranger District. Also, the Forest-wide, revised SOHA network better responds to the concern for evenly dispersed habitat for wildlife.

CONSIDER CUMULATIVE EFFECTS OF MANAGEMENT ON OTHER LANDS

Your assessment does not appear to consider the cumulative effects of timber management on intermingled lands and their depressing affect on population numbers of deer and elk due to lack of cover.

The Forest should analyze impacts of adjacent land management on wildlife, in the final plan.

Response: The assessment in our DEIS did not account for effects of management activities on adjacent and intermingled lands Regional Forest Service policy directs each Forest to consider the effects of adjacent and intermingled activities. There is no legal mandate that requires the Forest Service to adjust management in National Forest lands to offset the effects of adjacent activities.

We will continue to assess the cumulative effects of all activities on all land ownerships (national forest and all other) during site-specific project planning activities. Case-by-case decisions will be made (in the environmental document) as to what, if any, adjustments of National Forest management are necessary to offset other land owner's activities.

ACRES OF DEER AND ELK WINTER RANGE INADEQUATE

The Preferred Alternative does not provide adequate winter range for deer and elk, due to extensive clear-cutting, especially in a number of drainages. *Adequate old growth forest needs to be retained for winter range, especially* below 3,000 feet elevation.

Response: We have inventoried 173,300 acres of suitable deer and elk winter range on the Forest. Approximately 33,600 acres have been allocated to MA 14, and will be managed for enhanced winter range in the Preferred Alternative. Vegetation manipulation (timber harvesting) in MA 14 will be prescribed to meet the objective of improving winter range habitat for deer and elk. Most of the area identified as MA 14 is located at elevations below 2,200 feet.

Additional acreage of the remaining, suitable deer and elk winter range will be managed with other management prescription, but generally compatible to the objectives of MA 14.

Our analyses indicates that the acres allocated to MA 14, coupled with other Forest-wide standards and guidelines, will, over time: improve deer and elk winter range habitat; be adequate to maintain populations for deer and elk well above their viability levels; and will assure population levels reasonably close to current populations Refer to the outputs listed in Table II-9k, Chapter II, FEIS

DEIS FAILS TO INCORPORATE STATE WILDLIFE GOALS IN ANY ALTERNATIVE; COVER WILL BECOME LIMITING TO BIG GAME

None of the alternatives presented provide the wildlife and fish habitat protection at levels necessary to achieve State management goals.

Our specific concern is that the FS proposed plan indicates losses for wildlife populations (except for the bald eagle) across all alternatives To protect existing populations, the FS needs to establish a clear policy to protect existing habitat from degradation and to provide for mitigation for areas degraded as a result of management activities, by replacement in kind, on or off site, or other replacement agreed upon by State agencies

Trends across alternatives would indicate that harvesting more timber and building roads creates more capacity for wildlife use; we do not agree Cover is, or will become limiting to big game.

Response: We interpret State wildlife goals to apply to what can be accomplished on all lands in the State of Washington, including National Forest lands The goals articulated by the State in their comments on the proposed Plan inferred that an established set of State goals were specifically translatable to the lands within the MBS.

The two documents we are aware of and referenced for State goals were 1) A Statewide Comprehensive Plan for Fish and Wildlife on the National Forests in the State of Washington, and 2) Strategies for Washington's Wildlife, 1982

The first document made some habitat capability projections for species, by National Forests, by planning area. The planning area for the MBS also includes the Olympic and Gifford Pinchot National Forests. Those projections were a joint task by Forest Service and State biologists.

The second document was prepared by the State and did not express habitat capability in terms of percent of increase for individual species It stated that the goal for species such as deer, elk, and goats was to increase populations over current levels.

Forest Service projections of the effects of proposed management on deer and elk, and other wildlife populations are displayed and discussed in detail in Table II-9k, Chapter II, FEIS.

DEER, ELK, AND GOAT WINTER RANGE SHOULD BE LANDOWNERSHIP GROUP II: RETAIN

Inventoried goat, deer, and elk winter range should be Group II: retain National Forest ownership and acquire private land as the opportunity and/or need occurs.

Response: These lands will remain Group III in the management prescription for MA 14 and 15. Past experience on the MBS shows that maintaining critical lands in a Group III Landownership Classification (available for land adjustment through exchange) provides more flexibility in accomplishing long-term management objectives. Examples are lands located in the Sultan and the Greenwater Basins; active exchange proposals currently involve deer and elk winter range. However, in both cases we will exchange for more acres of important habitat than those Federal lands exchanged.

The Forest Service is interested in retaining management of important habitat types, as part of the Forest-wide goal of maintaining viable populations of all native and non-native species and improving habitat of management indicator species, such as black-tailed deer and Roosevelt elk. (See Forest Plan, Forest-wide Standards and Guidelines.) A Group III classification does not automatically mean the lands will be exchanged. However, if there is an opportunity to improve an ownership problem and improve a habitat management situation, we are interested in maintaining those options.

ROAD DENSITY

The road density should be 2 miles per square mile

Response: Acres identified in MA 14A in the draft Plan have been combined with MA 14B in the FEIS as Management Area 14, Deer and Elk Winter Range Habitat Improvement. The prescription for MA 14 calls for an average open road density of 2 miles per square mile. Refer to Forest Plan, Chapter 4, MA 14, Item C.1.a..

"SHOULD" NEEDS TO REPLACE "SHALL" IN MA 14

Change the wording in MA 14A and 14B, Item L.2.a and g. from "shall" to "should" so that road construction and reconstruction timing constraints are permissive rather than mandatory The use of "shall" throughout this prescription is a restriction beyond the legal requirements.

Response: There are a number of revisions, including minor "wordsmithing" based on public response, in the Forest Plan Standards and Guidelines However, we did not feel that changing the intent and meaning of several of the standards and guidelines from "shall" to "should" was appropriate. With State Department of Wildlife input, the Regional Forester made the decision that the status of deer and elk populations in the States of Oregon and Washington is healthy and that viability is not an issue; therefore, no management requirement (MR) was needed. Refer to DEIS, Appendix I.

KEEP DEER AND ELK AS MANAGEMENT INDICATOR SPECIES; USE INTENSITY 14B

We recognize that the Region has eliminated deer and elk as a management requirement. We recommend their inclusion as a Management Indicator Species and the use of Intensity 14B; it should be retitled Critical Winter Range

Response: Black-tailed deer and Roosevelt elk remain as Management Indicator species. Between the draft and final plans, deer and elk winter range was re-inventoried All of the acres identified as MA 14A [DEIS] and within the updated inventory, have been added to the 14B acres, to form one management area (14) The standards and guidelines shown in the proposed *Plan for MA 14B are the standards and guidelines for* MA 14, *Forest* Plan. There are some revisions included, based on public response. The title of MA 14 is "Deer and Elk Winter Range."

ADDITION TO CHAPTER III, AFFECTED ENVIRONMENT

Add "elevation" to paragraph 4, page III-60 in the DEIS.

Response: This has been added in the FEIS.

ADD TO LIST OF SPECIES IN THE PUBLIC SUMMARY; CORRECT ERRORS

The northern spotted owl has been listed as endangered by the State of Washington since your document was published. Eagles also winter on the Stillaquamish, White, and Nisqually Rivers. In addition, there are eight species of resident game fish in Forest waters, and at least five other fish species.

Response: This has been corrected in this FEIS and Summary.

USE NATIVE SEED IN BIG GAME HABITAT

Any seeding done to improve game habitat should utilize native seed only.

Response: A new Forest-wide Standard and Guideline has been added to the Plan which states seeding in deer and elk winter range will be done with big game-preferred seed. MA 14 also includes provisions for habitat improvement using desirable forage species planting.

CONSULT WITH THE STATE ON SENSITIVE SPECIES, OTHER SPECIAL NEEDS

The Washington State Department of Wildlife should be consulted on all sensitive species Include coordination with the Department on State-listed threatened, endangered, and sensitive species.

Please consult with Department of Wildlife during the planning and development phases, per the new coordination process endorsed by IAC.

Response: Forest-wide Standards and Guidelines for threatened, endangered, and sensitive species prescribe that the MBS will consult specifically with the Washington Department of Wildlife on guidelines for sensitive species. We have added wording to Item 5. of this standard and guideline to clarify that this also includes coordination regarding unique habitats and species of special concern.

MAINTAIN EXISTING AVAILABLE HABITAT RATHER THAN USING ARTIFICIAL TECHNIQUES

Maintaining available habitat is a far surer method of providing for the needs of wildlife. Constructing and maintaining artificial structures to support the wildlife base relies on funds which may or may not be available in the future; it's expensive and dependent on techniques which are not well tested in some cases.

Improvements for fish and wildlife can be quite destructive locally and all should be evaluated on a case-by-case basis, whether they were in existence prior to wilderness designation or not. For example, salting for certain species of wildlife can cause tremendous damage to the plant communities in the area of the salt blocks.

Response: The mandate for management of the National Forest dictates multiple resource objectives, in a balanced mix, to respond to public issues and concerns as determined through the Forest Planning process. Maintenance of critical habitats for wildlife is accomplished through

allocating acres to Management Areas with prescriptions that will assure protection of that specific habitat.

In other MA's, the goals may be to supply one resource output in concert with another. THis would provide for some level of output for several resources but may not be the highest level for any one. Vegetative manipulation on some acres may provide the opportunity for habitat improvement for some animal species. The decision of what can be used to improve the habitat will be made on a site by site basis. It would not be our intent to waste investment on something that will not work. Monitoring the effectiveness of all habitat improvement projects is an item in the Monitoring Plan; refer to Chapter 5 of the Forest Plan. Coordination with the appropriate State agency is standard procedure.

PRIORITIZE PROJECTS IN THE SCHEDULE OF HABITAT IMPROVEMENT

We suggest the proposed projects be re-prioritized to enhance threatened, endangered, or sensitive species first, then those whose populations are declining, followed by those that are of economic significance.

If the experimental black bear forage project is intended to provide silvicultural protection for trees, we suggest it be funded by that department, in consultation with wildlife

For the wildlife habitat improvement schedule of Table C-1, the activity for wetland forage and habitat improvement is not specific, but should be, to be consistent with the rest of the table

Response: This schedule has been updated; refer to the Forest Plan. These Plan appendices will be amended and revised frequently, as projects are accomplished and others are identified.

HOW WERE GOALS AND PRIORITIES SELECTED?

Referring to Appendix C, Forest Plan, the Wildlife and Fish Habitat Improvement Schedules, how were the goals and priorities selected?

Response: Every effort is made to coordinate goals for the program and the five-year habitat improvement schedule with all involved parties, including State agencies, Indian Tribes, and other potential cooperators, such as fish or wildlife organizations. We realize this is a dynamic process. Inventory data and various species needs may change over time The schedule is meant to be revised and updated, as appropriate, to reflect agreed-upon goals and priorities We have encouraged involvement of the Washington Department of Wildlife at the local level and will continue to do so during project planning, NEPA analysis, implementation and evaluation and monitoring.

ADD WORDING CHANGES TO MA STANDARDS AND GUIDELINES

State of Washington recommends the following wording changes to Standards and Guidelines, Chapter 4, Plan: page 4-170, A.1.a. - should read "...fish and wildlife values"; C.1.e. - change "small..." to read "all"; page 4-215, E.1. - add d. "Seed areas in identified winter ranges with big game preferred forage";

add "and other agency" to Forest-wide Standard and Guideline 1. for Recreation; and page 4-73 - eliminate the words "attempt to..." from paragraph 8.

Response: The suggested changes have been made; a new Forest-wide Standard and Guideline address using game-preferred seed (Wildlife, new Item 12).

WE DISAGREE WITH YOUR DEFINITION OF VIABLE POPULATIONS

Referring to page 4-2, Forest Plan: we cannot agree with your definition of viable populations. In some cases, population levels above those currently found on Forest land will be necessary to meet this definition.

Response: The definition of viable populations stated as a goal for Fish and Wildlife come directly from the language used to implement the National Forest Management Act (CFR 219.19). The goal is to maintain viable populations. This is a key item to be monitored, as directed by the Monitoring Plan, Chapter 5, Forest Plan. If existing populations of a species are below a viable population level, it will be our responsibility to coordinate with the State agencies and define what options are available to improve the viability of that species. It will be necessary to differentiate between viable levels and levels established as State goals for certain species.

CHANGE THE INDICATOR OF RESPONSE FOR WILDLIFE

Old growth left over time is not a good indicator of response for the wildlife ICO. If areas are too small, located at the wrong elevation, or too far apart, they may not provide useable habitat. Some model to measure "usability" of old growth by wildlife would better measure success.

Response: Old growth remaining over time is only one of several indicators used to measure how the alternatives respond to the issues and concerns. For the Old Growth Ecosystems and Fish/Wildlife/Plant Diversity ICO, there is an indicator entitled "habitat for old-growth wildlife management indicator species (under 4,000 feet)" which should meet your concerns. Refer to Table I-1, Chapter I, FEIS for a complete list of indicators of response.

MAINTAIN NEST SITES

Nest sites are required to be maintained by law, whether in active use or not. In the Forest-wide Standard and guideline, change the last sentence: change "should" to "shall", and add consultation with Department of Wildlife.

Response: There is no Federal law that requires maintenance. The referenced standard and guideline has been retained in the Forest Plan. Because the State of Washington does have a law providing some protection, the MBS will coordinate with State biologists on activities in the vicinity of habitat for species of special concern.

ADEQUATE PILEATED WOODPECKER HABITAT

Recent studies in western Oregon indicate that 540 acres is the average amount of old growth used by pileated woodpeckers for breeding purposes.

Response: Research Staff with the Old Growth Project in Olympia (RWU 4203 Wildlife Habitat Relationships in Western Washington and Oregon) presented papers at two symposia in 1988. The papers presented the early results of studies that were done to determine which species of wildlife are closely associated with old-growth Douglas fir. For a number of species, the studies were not conclusive and further work is needed. These include Douglas' squirrel, pileated woodpecker, northern goshawk, pine marten, and seed-eating winter resident birds. As additional information becomes available (or is scheduled, as part of Plan implementation) we will include it in the Plan, or write a Plan amendment if conditions change so that an amendment is necessary.

HIGH-ELEVATION OLD GROWTH HAS LITTLE VALUE FOR WILDLIFE

Thirty-five percent of old growth is in wilderness. Much of this old growth is at a relatively high elevation and, in many cases, has only marginal wildlife value.

Response: Approximately one-third of the 232,500 acres of old growth within wilderness are located above 4,000 feet in elevation. About 56% (131,300 acres) are located between 2,500 and 4,000 feet, and the remaining 14% (32,800 acres) are located below 2,500 feet in elevation. (Note. these are R2MAP acres and may differ from others throughout the documents.) MR acres for the northern spotted owl and the pine marten and pileated woodpecker only include acres that have been inventoried as suitable habitat for the species. Refer to FEIS Chapter III, Wildlife.

CONFLICTS WITH DOMESTIC WILDLIFE NOT DOCUMENTED

Conflicts between domestic livestock and wildlife are not fully documented or evaluated. Cattle and sheep can transmit diseases to deer, bighorn sheep and mountain goats. How will allotments be modified or reduced to avoid disease contamination of wildlife species?

Response: As discussed in Chapter III of the DEIS, there is limited available domestic range on the Forest. In the past, little grazing has occurred on the Forest, with available range being transitory, occurring in timber harvest units. There are no currently active allotments.

PLAN CONFLICTS WITH STATE PLAN FOR FISH AND WILDLIFE

Plan appears to be in conflict with the statewide comprehensive Plan for Fish and Wildlife.

Response: This was mentioned in Appendix G of the DEIS. While the Statewide Plan does mention goals for population levels of certain species (ie. Mountain Goat, Roosevelt Elk) it is neither site nor area specific, so the degree of conflict is debatable.

NO EVIDENCE IN DEIS FOR NECESSARY HABITAT REQUIREMENTS FOR WILDLIFE

The DEIS would have us conclude that only the winter range of deer and elk is critical in the selection of a management plan. There is no evidence presented in the DEIS that establishes the necessary habitat requirements for any forms of wildlife. It is imperative the final EIS does so.

Response: The MBS, as well as all Forests in Region Six, used the management indicator species concept (reference: 36 CFR 219.19). It was discussed in the DEIS, and is discussed in more detail in Chapter 2, Plan and Chapter III, FEIS. By identifying a species that is a good indicator of a habitat found on the Forest, we are predicting we will be able to determine the effects of management activities and relate them to population levels or indices to assure viability of the MIS species, as well as others who utilize the same habitat type.

Habitat needs have been identified for the northern spotted owl, pileated woodpecker, pine marten, bald eagle, blacktailed deer, Roosevelt elk, cavity excavator species, and anadromous fish (riparian habitat). We have identified and dedicated specific habitats for some of these species with a management prescription. Others, such as cavity excavators, will be maintained through application of standards and guidelines throughout the Forest, unless otherwise noted in an individual MA prescription.

CHANGE DATES TO MINIMIZE DISTURBANCE IN MA 12

In MA 12, for pine marten and pileated woodpecker: change the timing restriction dates from April 1 to September 31 to April 1 to June 15, in response to our District wildlife biologist's response.

Response: These changes have been made in the prescription for MA 12, Forest Plan.

ADD TO MA 13 PRESCRIPTION

Under Facilities, for MA 13 Riparian: add to 2.a. "calving or fawning and raptor nesting."

Response: These specific changes were not made, as the wording of this standard in the Forest Plan states road construction and reconstruction will be permitted in riparian areas only when riparian values are protected. Wildlife is included - in the MA 13 Goal Statement and elsewhere - as one of values of riparian areas.

CONFUSION OVER NON-CONSUMPTIVE WILDLIFE USE

In Chapter III, page III-60, the figure of 33% ("non-consumptive use of wildlife exceeds consumptive use by 33% ..") conflicts with table figures in the Plan which attribute only 6% of wildlife recreation to non-consumptive use.

Response: The 33% figure represents non-consumptive uses occurring further than one mile from the users home, on both NF and non-National Forest lands. The 6% figure represents the percent of non-consumptive use we have estimated to occur on the MBS. We recognize this 6% is probably low;

additional data - as the Plan is implemented - will allow better analysis, with amendments if necessary.

PROVIDE ACTUAL ACRES OF HABITAT IMPROVEMENTS, NOT ACRE EQUIVALENTS

To avoid confusion and provide a clear indication of the actual extent of wildlife habitat improvements, we suggest providing actual acreages as well as acre equivalents.

Response: Appendix C, in the Forest Plan, shows the fish and wildlife habitat improvement schedules; the unit of measure is both structures and acres.

NO DESCRIPTION OF WILDLIFE MODEL

We cannot find a description of your wildlife model development or any coefficient development, even though it is stated to be in the appendix volume. Please describe it and whether the loss of use of habitats due to the presence of open roads was used to reduce the population numbers reported.

Response: This description has been clarified in Appendix B, Chapter III. The effects of open roads on wildlife (especially deer and elk) are discussed in Chapter IV, Effects, FEIS.

ADD DISCUSSION REGARDING PROTECTION OF WATERFOWL

The final planning documents should also include a discussion on protection on- and off-Forest waterfowl habitat that could be adversely affected by forest activities.

Response: The MBS has no low-elevation, high waterfowl density areas, but riparian protection (see Chapter 4, Forest Plan, Forest-wide Standards and Guidelines for riparian, plus MA 13) and planned waterfowl habitat improvements (see Appendix C, Forest Plan) will contribute to waterfowl management. See additional discussion on snag protection (Chapter 4, Forest Plan, Forest-wide Standards and Guidelines). The common loon is discussed in Chapter III, FEIS, Wildlife; it is also a sensitive species and is protected by regulation. For the effects of implementing the alternatives, refer to Chapter IV, FEIS, wildlife.

FOREST MUST CONSIDER THE IMPLICATIONS OF THE MIGRATORY BIRD TREATY ACT

The FS should consider the implications of the Migratory Bird Treaty Act for projects on the Forest Standards and guidelines for the Plan give limited indication that the MBS will be managed to specifically conserve migratory birds and their habitat.

Response: The Migratory Bird Treaty Act applies on the Forest. The needs of migratory birds are considered in the Forest-wide Standards and Guidelines and MA prescriptions for MA 11 and 12 (old growth habitat and mature/old growth habitat), scenic viewsheds and wild and scenic rivers (the corridors of MA 2A, 2B, and 5), wilderness, RNA, and in MA 1A and 1B - all provide and maintain habitat for migratory birds.

APPLY A 100 FOOT NO-HARVEST PRESCRIPTION ALONG ANADROMOUS FISH STREAMS

We recommend a 100-foot no harvest prescription along anadromous fish streams, and the prescription applied to other streams as provided in our general comments.

> **Response:** Most of the Forest's anadromous fish habitat falls into either Class I or II stream classes Refer to the standards and guidelines for MA 13D, Chapter 4 Forest Plan. For project level planning purposes, at least 100 feet on each side of all stream classes must be considered as riparian areas. As stated in MA 13, timber harvesting is permitted when riparian objectives can be met, and if the soil, water, fish and wildlife values in these riparian areas can be protected and mitigated. The timber management will be an extended rotation. Other guidelines prescribe specific requirements for the management area.

ENHANCEMENT SHOULD BE AT A HIGH LEVEL; INCLUDE REGULATIONS FOR LEAVE TREES ETC.

I am pleased to note that MMR's with regard to riparian treatments are maintained throughout the process. Stream enhancement expenditures are preferred at a high level, through this has not been defined. It is disturbing to note that no riparian regulations are stated with regard to leave tree, viable condition, stand density and/or composition.

> **Response:** MA 13D is a high investment prescription for enhancement expenditures; this would equate to $250,000 to $400,000 per year, allocated to develop, plan, and implement habitat improvement projects over the Forest. Prescriptions are not stated for leave trees, condition, or stand density because the MBS does not currently have a Forest-wide riparian area data base; without such a data base, it is not possible to state acceptable or unacceptable conditions for these riparian features As stated in the Forest-wide Standards and Guidelines, and noted in the Information Needs section (Chapter 2, Plan), during implementation and continuing through the first planning period, a Forest-wide riparian data base will be collected and evaluated.

LINKS BETWEEN FOREST MANAGEMENT ACTIVITIES AND FISH PRODUCTION NEEDED

Under "Fish-Water-Riparian," modifications are needed. The primary thrust should be development of quantified linkages between forest management practices, environmental changes, and anadromous fish production. In addition, the specific methods proposed need careful review. We have found that (1) summer standing crops in stream study sections are not a good indicator of eventual smolt production; and (2) that smolt production from selected tributaries does not necessarily correlate well with system-wide production levels.

The discussion under "Anadromous Fisheries" seemingly explains the intent of "acceptable level," namely: The approach was taken to incur investment costs that, at a minimum, would maintain existing levels of anadromous fish runs, which are considered minimal for population viability." It also makes it clear that the draft plan will have no quantified linkage between fish production and levels of environmental manipulation ("were difficult to quantify").

Fish
Effects on Fish

The document contains no quantified statements that show relationships between environmental impacts from forest activities and fish production.

Response: A better discussion of the tie between Forest management activities (including timber harvest and road construction), environmental changes, and fish production has been added to Chapter III, Fish, in response to these and other comments. We have also added discussion in Chapter IV regarding the lack of a model (such as sediment or recovery model) to fit the situation on this forest. To address the concern raised by these and other comments on the DEIS, the Forest completed a Forest-wide hydrologic cumulative effects analysis. For a description of the development of this process, refer to Appendix H. This procedure resulted in a better method of meeting water quality and riparian management requirements (MR's) the result is a set maximum number of acres available for final harvest in 70 of the Forest's 78 allocation zones (or watersheds). Again, for more detail and the literature/research used, and the process developed, refer to new Appendix H.

DISCUSSION OF FISH OUTPUTS BY ALTERNATIVE IS POOR

The analysis of fisheries by the Draft EIS is deeply disappointing It suggests that the available fish harvest should be the same under Alternatives H and G. I have not found in the DEIS or elsewhere in the documents an adequate for the fish outputs between these two alternatives Because Alternative H will involve more road building, more logging, and more general development than Alternative G, it will inevitably degrade the pristine environment more than Alternative G. This is reflected elsewhere in the DEIS, such as the sediment index for alternatives. Such a substantial difference in sedimentation alone must mean a substantial difference in fish outputs. A better analysis of fisheries is necessary, or at least a clearer and better explained one.

Table II-7h, shows that Alternatives D, B, H, H-Departure, G and C will produce identical amount of pounds of fish per year; A, E-Departure, and E will be likewise. This is absurd and highly unrealistic! Not only is no variation indicated between alternatives, but also no variation is expected to take place throughout 5 decades of increased road building, logging, and other development. These figures in this chart are quite suspect, especially in regard to fish populations.

The analysis of impacts from each alternative to fish resources is again erroneous and contrary to any reasonable scientific conclusion.

We are expected to believe that construction of and heavy traffic on logging roads, with resultant erosion and sedimentation, will have no effect on commercial harvest of anadromous fish that spawn in streams in these areas - i.e. that the output will be the same for alternative H as for the preferable alternatives, C and G. This is nonsense.

Response: The discussion in Chapters III and IV in the FEIS have been rewritten and should provide a clearer explanation of the problems in trying to apply a sediment-related or other model to this Forest. In order to address the effects on fisheries, the resource was included as a major component of the hydrologic cumulative effects analysis. The results of this procedure - developed to meet water quality and riparian MR's - is a constraint, by watershed, Forest-wide, on the number of acres available for

final timber harvest, by Decade. Refer to new Appendix H for more discussion. Appendix C, Forest Plan, shows the Fish Habitat Improvement Schedule for the Preferred Alternative, including estimated costs, by project, per year for first years of plan implementation.

NEED TO QUANTIFY EFFECTS OF SEDIMENT ON FISH
ASSUMPTIONS, TIES BETWEEN SEDIMENT PRODUCTION AND FISH NOT SUPPORTED IN DEIS

In the DEIS, it is stated that it is not possible to quantify the effects of sediment on fish production. It should be noted, however, that the Olympic National Forest has used a direct quantified linkage between sediment and fish production in their planning process. In addition, other National Forests in this state have used an "index" for environmental impacts on fish (Gifford Pinchot) and a direct relationship between fish production and riparian area disturbance (Umatilla). These same planning options were available for the MBS, but were rejected for largely unspecified reasons.

Given the lack of reliable data in the area of fisheries and sedimentation, the plan is based on a number of assumptions which are stated at various times in the documents, but are never supported by factual evidence. We believe that many of the assumptions are invalid, consequently the analysis which is based on them is flawed. Some of the invalid assumptions upon which the plan and its analysis are based include: Sedimentation from continued timber harvest and road construction under all alternatives will have no impact on the fisheries resource. This assumption fails to recognize that serious damage has already occurred to the fisheries resource from timber harvest and road building in the past and damage is continuing, despite improvements in techniques and erosion control measures. The Plan admits that these activities will result in sediment production, and no evidence is presented to document that damage to fish habitat and populations will not occur or that preventive and mitigation measures have been effective or successful. Evidence from watersheds such as Canyon Creek indicates that landslides occur even on units logged by helicopter. The statement that riparian buffer strips would prevent sediment from reaching the stream is incorrect. In Canyon Creek, for instance, when mass wasting activity has occurred on steep slopes most of the sediment from landslides has been documented to end up in the stream channels. Therefore we believe this assumption is invalid.

The sedimentation analysis is not tied to effects on fisheries resources and recovery of disturbed fish habitat.

Increasing the sediment input into a stream environment has been shown to have a direct negative effect on the ability of the instream habitat to support fish Sediment-related impacts are side-stepped through the basic assumptions of the Plan that further timber harvest and road building activities will not decrease fish production and that sediment impacts to instream habitat and fish production will be offset by mitigation/enhancement opportunity.

FS studies on other forests have documented the increase of sediment production, debris torrents, and road failures, as well as the resultant decrease in fish production caused by forest management activities The DEIS fails to make any attempts at quantifying these impacts to fish resources. Please provide references for any supporting information you might have on this question.

Fish
Effects on Fish

One of the major shortcomings of the Plan is the lack of any attempt to tie the effects of increased sediment from timber harvest and road construction to degradation of fish habitat and reduced fisheries production. The plan loses its credibility to us due to this failure. There is abundant evidence documenting the damage to fish habitat from landslides which occur when unstable areas such as Canyon Creek are logged. Consequently, the failure of the plan to admit that there will be adverse effects to the fisheries resource from timber harvest and forest roads in unstable areas appears to be a whitewash and cover up. We suggest using the sediment yield calculations, with the improvements suggested below, together with the information on the existing habitat conditions and the timber sale plans, to calculate sediment yield and predict effects to fish habitat and stocks on a sub-watershed basis, i.e. the size of Canyon Creek or the South Fork Nooksack.

Response: The model used by the Olympic NF is a model developed for use in the Idaho Batholith. It only includes fine sediment. On the MBS, the major sediment problem is the large bedload materials. The discussion in Chapters III and IV in the FEIS have been rewritten and should provide a clearer explanation of the problems in trying to apply a sediment-related or other model to this Forest. In order to address the effects on fisheries, the resource was included as a major component of the hydrologic cumulative effects analysis The results of this procedure - developed to meet water quality and riparian MR's - is a constraint, by watershed, Forest-wide, on the number of acres available for final timber harvest, by Decade. Refer to new Appendix H for more discussion. An extensive research and literature search was completed prior to development of the MBS-specific process; this documentation is included in Appendix H.

FISH INCREASES HEAVILY BASED ON UNPROVEN MITIGATION AND ENHANCEMENT TECHNOLOGY

The fish production models contained high rates of increase in fish biomass during the beginning stages of the first decade. These yearly high rates of increase in fish biomass appear to be heavily based on the application of unprove mitigation and enhancement technology.

"There will be no decrease in fish production from the current level in any alternative " This statement needs to be examined. It stems from the belief that mitigation technology can be used to fully offset the adverse effects of logging on fish habitat so that current levels of fish production remain stable. This belief is not shared by the State fisheries agencies or the Fish and Wildlife Service.

Response: In order to address the effects on fisheries, the resource was included as a major component of the hydrologic cumulative effects analysis. The results of this procedure - developed to meet water quality and riparian MR's - is a constraint, by watershed, Forest-wide, on the number of acres available for final timber harvest, by Decade. Refer to new Appendix H for more discussion. Appendix C, Forest Plan, shows the Fish Habitat Improvement Schedule for the Preferred Alternative, including estimated costs, by project, per year for first years of plan implementation.

NOT ENOUGH CONCERN FOCUSED ON DAMAGE TO FISHERIES FROM CLEARCUTTING

We question whether enough concern has been focused on the damaged to fisheries from clearcutting. A recent paper by Ruper Andrews, former director of Alaska Department of Fish and Game's Sport Fishing Division sums the problem up as: "Scientific research has not been accomplished to identify constructive changes in the current harvesting of timber and the overall impact on fisheries or individual stocks and populations of fish. We do not know how to harvest old growth forests and maintain optimum fish yield or enhance fish yield. The second statement we can make is that we aren't doing very much to shed any intelligent light on the first statement." We feel that these data are applicable to the MBS and we feel that forest harvests should proceed in a much more cautious manner until the relationship between timber harvest and fisheries has been more clearly documented and understood.

Our views on the uses to which those forest lands should be put are influenced by some of the things we have seen happen that have hurt the steelhead resource. Years of improper logging and logging-road construction, both on Forest Service lands and other adjacent lands, have resulted in the degradation of virtually all of the rivers flowing into Puget Sound. They muddy up and flood easier and often, their courses have straightened and gradients steepened, and their channels have become more clogged with grit and sand, all to the detriment of the steelhead. More and more we are seeing slides occurring similar to the DeForest Creek Slide that has all but wiped out the world-famous run of summer steelhead in Deer Creek, all because of years of careless logging and logging-road construction on watershed lands that are too steep or unstable for that purpose.

> **Response:** In the FEIS, the future timber harvesting activities will be planned and developed within the Forest's watersheds based on the current and future condition of the in-channel fish habitat. Sediment related impacts and effects on the ability of the habitat to support fish will be identified and acknowledged through the application of management requirements for water quality and riparian areas. Applying the MR includes a timber harvesting constraint of the acres available for final harvest, by decade, on 70 of the Forest's 78 allocation zones (or watersheds). Refer to new Appendix H.

SEDIMENT YIELD CALCULATIONS SHOULD BE FIELD TESTED; DISPLAY BY WATERSHED

The validity of the sediment yield calculations should be tested by field checking to determine if the aerial photo analysis is identifying all the features present in the field. There is also no evidence that erosion from the surface of landslides over time can be equal to the initial failure volume. It needs to be determined whether this volume is being measured in the erosion plot calculations. It is possible that sediment production is several times higher than the figures in the sediment yield calculations. Display sediment yield by watershed and separate out background sediment production from that generated by past management practices.

> **Response:** The Forest does not have the information nor data collected by field sampling to validate the sediment yield calculations. We do acknowledge that in some watersheds, erosion from the surface of landslides over time is equal to or greater than the initial failure, and that landslide occurrence and frequency is greater in the northern portion of the Forest (Chapter III, FEIS). Because of this variation, the risk for,

presence and frequency of landslides, and sedimentation, the MBS has examined the condition of each watershed in the process of a hydrologic cumulative effects analysis. See new Appendix H. We will monitor watershed acceptability, sedimentation, and other activities to determine the effects of sediment production on the Forest's fishery resources. See monitoring plan, Chapter 5, Forest Plan

FISHERIES PRODUCTION CONTINUES TO DECLINE; FUNDING FOR ENHANCEMENT INADEQUATE

Fisheries production is continuing to decline due to habitat degradation from past management practices, especially due to sedimentation from mass wasting and debris flows, as in the cases of Canyon Creek and Finney Creek. The difficulty of repairing damaged habitat is also seriously underestimated. In many cases, restoration of habitat may not be technically or financially feasible. Natural recovery times are slow and the effect of past practices may last for many decades. Past damage to the fisheries resource is not acknowledged, and it is assumed that maintaining the present degraded conditions existing in many of the streams is satisfactory performance for the Plan. We consider the present degraded condition of the habitat in many streams on the Forest to be unacceptable and the habitat improvement program to be unprove and underfunded. Reduced fisheries production caused by past timber harvest is adversely affecting tribal income from fishing and is endangering the viability of valuable fish stocks, such as the Nooksack spring chinook. Funding for the watershed improvement program to reduce sediment production and speed stream recovery is inadequate for the need. Therefore we consider the assumption that current production is stable and adequate to be invalid. We think the Forest Service has ducked management responsibility for the condition of the fish habitat The Plan should recognize the habitat degradation that has occurred and incorporate a plan for restoration of habitat to acceptable levels.

Response: These concerns for existing in-channel and fish habitat conditions for the Forests watersheds were considered and used to evaluate the current acceptability or unacceptability in all watersheds during the Forest's hydrologic cumulative effects analysis. This analysis, in response to public comment, is documented in detail in new Appendix H. A total of 70 out of 78 watersheds on the Forest were examined and rated either acceptable or unacceptable. In order to address the effects on fisheries, the resource was included as a major component of the hydrologic cumulative effects analysis. The results of this procedure - developed to meet water quality and riparian MR's - is a constraint, by watershed, Forest-wide, on the number of acres available for final timber harvest, by Decade. Appendix C, Forest Plan, shows the Fish Habitat Improvement Schedule for the Preferred Alternative, including estimated costs, by project, per year for first years of plan implementation.

WHAT ARE THE THRESHOLD LEVELS FOR FISH?

What are the threshold levels for fish and fish habitat and what will be done if management activities cause a drop below that level? It is not sufficient to say the impacts are adverse and unacceptable; rather, the ways and processes for avoiding, protecting, and mitigating need to be discussed.

Response: Refer to the above response for a brief discussion of the hydrologic cumulative effects analysis; see new Appendix H. The monitoring

plan, Chapter 5, Forest Plan, includes the monitoring that will be done, the activities that will be monitored, the threshold of variability, etc. If, during plan implementation, evaluation, and monitoring, it is found that the standards and guidelines are not moving us towards the desired future condition for a management area/resource, a plan amendment will be considered.

COMPARISON OF CUMULATIVE EFFECTS OF TIMBER VERSUS ROADS ON FISH IS UNCLEAR

It is stated that "timber management activities generally have less cumulative effect on spawning habitat quality than do forest roads." The meaning of this comparative statement is unclear Is it based on habitat monitoring on the MBS? Both have the potential to cause adverse environmental impacts and need to be addressed as such.

The cumulative impact assessment for fish is inadequate.

Response: The statement is based on the literature collected from studied watersheds in the Pacific Northwest and British Columbia. On the MBS, this has been observed and acknowledged for the past 10-15 years. Both management activities (timber harvesting and forest roads) can and do cause adverse environmental impacts to the in-channel beneficial uses of the Forest's watersheds. Much of this impact is cumulative in nature. In addition, we have included the fishery resource as a major component in the Forest-wide hydrologic cumulative analysis, completed to develop a procedure to meet water quality and riparian MR's.

FISH, RIPARIAN, STREAM DATA AND INVENTORIES LACKING

Of primary concern to the Tribes is the impact of harvesting activities to fish and fish habitat. The Plan (Chapter 2) indicates gross data gaps with respect to a section entitled Fish-Water-Riparian. The FS lacks complete stream surveys, an inventory of anadromous streams, instream flow impacts model, *assessment of fish production capability linked to habitat improvements, and* more. These data needs are critical if the FS hopes to achieve its standards and specific management directories of maintaining habitat for viable populations of fish.

Throughout both the Plan and the DEIS, the Forest Service announces its dedication to preserving fish habitat The FS cannot achieve this goal without the information that they acknowledge they lack. The information the Forest Service uses to develop and assess its planning alternatives is in many cases neither unique nor relevant to the MBS. Frequently, supporting data constitutes general literature searches which are not geographically relevant to the MBS.

Response: As stated in Chapter 2 of the Plan, these data and inventory needs are important; many of these information/inventory needs are already built into the Monitoring Plan, Chapter 5, Plan. Each of the 78 allocation zones (watersheds) have been analyzed between draft and final plans, and rated as being in either an acceptable or unacceptable condition. As we implement the Forest Plan and management requirements, one of the items we will be monitoring is the condition of watersheds, and whether they are recovering. Also, refer to the literature used in the MBS hydrologic cumulative effects analysis, Appendix H, FEIS.

Fish
Effects on Fish

NEED A SPECIFIC DISCUSSION OF THE IMPACTS OF ROADS ON FISH

The presentation of the impacts of roads to fish is again a presentation of broad categories of what can occur, and of general events that are known to occur, rather than specific discussions of what is taking place on the MBS.

> **Response:** In the FEIS, the Forest addresses the past, present and future impacts of roads as well as timber harvesting activities. The Monitoring Plan (Chapter 5, Plan) and Information Needs section of Chapter 2, Plan have been updated. Also, refer to new Appendix H.

SHOULD STATE WHAT HAS HAPPENED TO FISHERIES AND PLANS TO REVERSE IMPACTS

Chapter III, DEIS: "Major effects to fisheries resource and habitat come from stream sedimentation resulting from road building, timber harvest activities, and recreation over-use on erodible soils; and from vegetation disturbances along streams, primarily that which removes shading vegetation or leaves excess debris in the streams " This is more a discussion of environmental consequences that affected environment. The DEIS needs to describe what these have done to the MBS environment and what is being done to curtail or reverse impacts.

> **Response:** A number of changes have been made to the fisheries discussion throughout Chapters III and IV, FEIS. The Mitigation section of Chapter II also discusses planned measures included in the standards and guidelines to avoid, minimize, reduce, or compensate for undesirable environmental effects. In addition, the FEIS addresses the past, present and future impacts from sedimentation as a result of timber management and road building activities in the discussion of the development of a hydrologic cumulative effects analysis to develop a procedure to meet water quality and riparian MR's. Refer to new Appendix H.

DOCUMENT DOES NOT ANALYZE BASIN-SPECIFIC EFFECTS OF ACTIVITIES

The document makes no attempt at analyzing basin specific effects of forest management activities on fish runs We are particularly concerned about areas such as the South Fork Stillaguamish, Canyon Creek, and Deer Creek which have a history of severe impacts from logging and road building These areas contain highly unstable soils, steep terrain, and high rainfall. They also contain discrete fish runs which must be managed as such. The runs within these areas are considered depressed, but largely to environmental conditions and often constrain mixed stock fishery management. In addition, substantial, amounts of time and money have been spent in recent years to rehabilitate these runs How were sensitive areas such as these considered and why are they not reflected in the analysis of the impacts of each alternative?

> **Response:** In the FEIS, a much more complete watershed analysis was done as part of the development of a hydrologic cumulative effects management requirement. Refer to new Appendix H (the MR Appendix) and revised text and effects discussion in Chapter IV, FEIS. Note, too, additions made in the Monitoring Plan, Chapter 5, Forest Plan.

HYDRO-POWER DEVELOPMENT: EFFECTS ON FISH RESOURCE

The effects of land uses on fish is a generic statement of the impacts of hydroelectric power plant development on fish and fish habitat. It is important that the criteria for what is acceptable and what is not should be discussed. (The FERC Cluster Impact DEIS on the Snohomish River may be useful here.) Also, the process FS will follow if an applicant wishes to put in a dam needs to be included in the EIS. The FS role is ensuring no unnecessary adverse environmental impacts needs to be explained.

Response: The specific procedures to be followed are explained in Forest Plan, Chapter 4, Forest-wide Standards and Guidelines for Land Uses; also, refer to Item J.3 for MA 13D. All such proposals include environmental analysis (NEPA document), including public involvement, with provisions to protect the land and resources of the Forest.

IMPROVE FISHERY INFORMATION TO MEET REQUIREMENTS OF NFMA

Improvements needed in the planning process to address the requirements of NFMA in regards to the fisheries resource.

To meet requirements of NFMA, the Plan should be based on recent, accurate fishery information including reasonable estimates of fisheries production on the forest, inventory of habitat conditions and productivity, and identification of critical habitat for various fish stocks, including sensitive, and depleted runs Streams where productivity has been impaired should be identified Watersheds containing critical habitat, as well as watersheds which due to the nature of their stability or hydrology are sensitive to disturbance should be identified. Timber harvest should be set at levels which will avoid disturbance of sensitive watersheds, allow recovery of previously disturbed habitat, and prevent future disturbance to critical stocks or habitat that have been identified in conjunction with the tribes and state and federal fisheries agencies.

We request that the USFS not implement alternative H at this time and undertake the development of another alternative which addresses the critical fisheries issues we have identified.

Response: In the FEIS, we have addressed all the management concerns raised in these comments by updating the current fishery resource data base. This was accomplished by requesting data input from the Washington Department of Fisheries and Department of Wildlife, and from the Puget Sound Treaty Tribes. In addition, since the DEIS was released, the forest addressed the effects of past, present and future sedimentation and other ground disturbance (natural and human-caused) to the fishery resources in 70 forest watersheds. See new Appendix H for a discussion of the hydrologic cumulative effects analysis. In this analysis, sensitive populations of fish were acknowledged, along with identification of sensitive watersheds. Applying management requirements for water quality and riparian areas will include a timber harvesting constraint (acres per decade) for the 70 watersheds; it will also provide mitigation of adverse effects of management activities on soil, water, and fisheries values.

Fish
Effects on Fish

INFORMATION NEEDS/HABITAT IMPROVEMENT EFFECTIVENESS

Paragraph #6 on page 4-7 seems incompatible with Information Needs #3, #4, #5, #9, #10, and especially #14 or at least overly optimistic. It's unclear how the MBS could have the view that fish habitat will have improved significantly at the end of ten years if the current situation is not well understood and the effects of various management activities on fish habitat and of habitat improvement techniques are unknown as the information needs suggest. It would seem that there is insufficient time to acquire all the information is ten years to be able to make this statement

Response: The Desired Future Condition for the forest's fishery resources reflects what we feel the MBS will look like at the end of ten years of Plan implementation. Refer to the previous response for a brief discussion of the analysis completed between draft and final plans. With the land allocations, timber harvest level, standards and guidelines of the Preferred Alternative, the rehabilitation and improvements scheduled in Appendix C and I of the Forest Plan, application of site-specific BMP's at the project-level, and meeting management requirements Forest-wide for water quality and riparian areas, we feel this description of the fisheries resoucre is accurate.

HOW WAS THE NEED FOR PROJECTS DETERMINED?

How was the basin-by-basin resource need for these projects determined?

Response: The past and present condition of watersheds Forest-wide was analyzed between draft and final plans; refer to Appendix H. Management activities, and the state of the upslope and in-channel conditions were evaluated This evaluation was done in an ID Team process using empirical data, photo interpretation, and professional experience on this Forest. The watershed and fish rehabilitation and improvement schedules in Appendices C and I, Forest Plan, were developed based on the problems identified.

MANAGING ONLY FOR FISH MAY BE LIMITING

In Chapter III, this sentence is incorrect ("The spawning and rearing habitat requirements of these species represent the the biological and physical needs of the forests aquatic animal species ") Managing for the listed species of fish may not necessarily manage for microbe, insect, amphibian, reptile or herptile species which use the forest's aquatic systems. There is literature which indicates that some aquatic beetles may be much more sensitive to perturbations to riparian and aquatic systems than are fish

By only managing for fish species there may be no management for stream reaches which do not have the listed fish species. Not all of the species of fish listed are native to the forest. Managing for species of fish where they do not naturally exists disrupts the native physical and biological system. Managing for the listed fish species does not necessarily manage for native aquatic and wetland plants which are the foundation of the aquatic ecosystems.

Response: Refer to the discussion in this Appendix regarding Management Indicator Species (in the wildlife section). Also, refer to Forest-wide

Standards and Guidelines for riparian areas and the MA 13D standards and guidelines, which speak to management for riparian-dependent resources.

WATERSHED CONDITION CLASS

The Watershed Condition Class Assessment under Fish/Water needs a whole table and section for itself. Table 5-1 in the Monitoring section of the Plan should contain "Watershed Condition" as an "action/effort to be monitored."

Response: Revisions have been made both to the watershed table in Chapter IV and the monitoring plan, based on the hydrologic cumulative effects analysis.

ADDRESS PROTECTION OF FISH-PRODUCING RIVERS AND ENHANCEMENT OF RUNS

Protection of the salmon and steelhead spawning rivers and enhancement of the fish runs in the MBS also should be addressed in the Land and Resources Management Plan. The salmon and steelhead fishery is within the MBS is a resource every bit as economically valuable as the timber. The Plan must accept this fact, assure that nothing is done to further damage the rivers or the spawning runs, and take steps to remedy the damage that has already taken place

The plan also does not disclose the economic impacts to the fisheries resource from the impacts of the projected sediment yield. It does not discuss the tradeoff that was between the economic benefits of timber harvest and the potential damage to the fisheries resource.

The National Forest Management Act (NFMA) directs the Forest Service to prevent "serious adverse" impacts to fish habitat. It is the Tribe's position that the draft plan does not meet this standard, nor assure that the Tribe's federally guaranteed treaty rights will be protected. Whether those impacts, if revealed, would represent real threats to habitat, is unclear

Response: Protection and enhancement (short and long term) of the salmon and steelhead habitats of the forest has been expanded in the FEIS, through inclusion of the fisheries resource as a major component of the hydrologic cumulative effects analysis This process resulted in a procedure to meet water quality and riparian MR's. More up-to-date data has been incorporated, and more evaluation has been added to Chapters III and IV, FEIS to display or narrate the relationship between upslope conditions and management activities and the impacts generated downstream in fish-bearing stream and river systems. Refer to new Appendix H. Additionally, the Preferred Alternative incorporates a high investment level for anadromous and resident fish habitat enhancement (MA 13D). Refer to the Forest Plan, Appendix C for the Fish Habitat Improvement Schedule.

TIMBER EFFECTS, FISH REHABILITATION ARE NOT DISCUSSED

The Plan and EIS also do not address rehabilitation opportunities or acknowledge that past timber harvest activities have caused a significant decline in fish habitat quality, quantity and production The Plan and EIS essentially sweeps the past under the carpet without accepting responsibility for declining fish production The current level of fish production as stated

earlier, is an unacceptable bench mark by which to evaluate the success and failure or Forest resource management. We therefore strongly recommend that the Plan acknowledge its legal management responsibilities by identifying rehabilitation opportunities, strategies and budget commitments toward this end.

Response: In the FEIS, the text and analyses in Chapters III and IV of the document have been rewritten. Since the DEIS was released, the forest has addressed the effects of past forest management activities and the known or suspected impacts to the beneficial uses of the water, namely, the fish and fish habitat. Refer to previous responses and new Appendix H for discussion of the hydrologic cumulative effects analysis. In the process, sensitive populations of fish were acknowledged, along with identification of sensitive watersheds. Appendix C of the Forest Plan, plus the Mitigation sections of Chapter II (Forest-wide) and Chapter IV, FEIS (Fish section) discuss rehabilitation opportunities and planned improvements. Also, see the Watershed Rehabilitation Schedule, Appendix I, Forest Plan.

NO CLEAR LINK BETWEEN CHANGE AND FISH PRODUCTION

The discussion beginning under "Opportunity Cost Analysis" should be deleted. From the Appendices, it is clear that the planning process did not establish any quantified linkage between environmental change and fish production. Thus, riparian area protection is only a "cost" with respect to fish. There are no calculated economic benefits balanced against this cost

Response: In the FEIS, we have responded to this comment by. adding discussions to Chapters III and IV, FEIS that better explain the situation on the MBS, and why models such as a sediment-related model are not applicable; added more discussion to Appendix B, Chapter III on the relationship between anadromous fish production and forest management activities; and included fisheries resouce as a major component to the hydrologic cumulative effects analysis Linkages between watershed conditions and fish production are made Refer to new Appendix H.

DEIS FAILS TO DISCLOSE LOSS OF FISH PRODUCTION, ESPECIALLY CHINOOK STOCK

The DEIS fails to disclose the potential long term loss of fisheries production due to habitat degradation from factors such as sedimentation, temperature increases, changes in peak flows, and habitat disruption from debris flows. Related to this loss of productivity is the potential for loss of populations of depressed and sensitive fish stocks. An example of this is the Nooksack spring chinook stock in Canyon Creek which is identified as a high priority (Category I) resource by the US Fish and Wildlife Service and is on the verge of being extirpated from the creek.

Response: A better discussion of the tie between Forest management activities (including timber harvest and road construction), environmental changes, and fish production has been added to Chapter III, Fish, in response to this and other comments. Refer to Table III-33 through III-37 for production figures of Nooksack River chinook. We have also added discussion in Chapter IV regarding the lack of a model (such as sediment or recovery model) to fit the situation on this forest. To address the concern raised by these and other comments on the DEIS, the Forest completed a Forest-wide hydrologic cumulative effects analysis. For a

description of the development of this process, refer to Appendix H. This procedure resulted in a better method of meeting water quality and riparian management requirements (MR's): the result is a set maximum number of acres available for final harvest in 70 of the Forest's 78 allocation zones (or watersheds). Canyon Creek is rated Unacceptable; in the first decade, a total of 100 acres are available for timber harvest. Again, for more detail and the literature/research used, and the process developed, refer to new Appendix H and Table 2, the AZ Summary in the Appendix. With the land allocations, timber harvest level, standards and guidelines of the Preferred Alternative, the rehabilitation and improvements scheduled in Appendix C and I of the Forest Plan, application of site-specific BMP's at the project-level, and meeting management requirements Forest-wide for water quality and riparian areas, we feel the production levels for fish will be met.

USE 1982 UPDATED VERSION OF IMPLAN MODEL

The final plan should utilize the newly-developed 1982 version of the IMPLAN I-O model for its social-economic assessments.

The IMPLAN I-O model used to estimate employment and income changes for the various alternatives should be updated.

Response: The 1982 IMPLAN model, which includes an interindustry technical coefficients matrix revised as of 1982, has been used to calculate employment and income changes for the FEIS.

CONSIDER UPDATING THE IMPLAN MODEL TO 1986 OR 1987

The [1982] I-O model should be critically examined for potential distortions prior to use due to the fact that 1982 was a severe recession year for the forest products industries and for the U S. and State economies. Such examination may reveal that the model should be updated to 1986 or 1987 industry relations.

Response: The heart of an input-output model is a matrix of linear relationships that describe for each economic sector the inputs purchased from all other sectors (including itself) for each dollar of output it produces The fact that 1982 was a recession year with low final demand for wood products would, in and of itself, produce little if any change in the interindustry technical coefficients. Therefore, employment per unit of production would show little change between 1982 and a nonrecession year What is probably different, though, is estimation of income by the model. According to the Washington Office LMP staff responsible for the FS IMPLAN model, coefficients for income components other than employee compensation tend to be lower than in a nonrecession year. Therefore, a model updated to 1985, for example, would probably show somewhat higher total income estimates.

On the other hand, a model updated to 1985 or later will probably show some measurable changes in the interindustry technical coefficients because of the restructuring of the industry that took place as a result of the recession of the early 1980's. Marginal mills closed, existing mills modernized with more efficient technology, and workforce reductions took place. As a result, today the same amount of lumber is being produced with roughly 25%-30% fewer workers. A model revised to 1985 or later will likely show lower employment related to the same amount of timber output compared to the figures in the DEIS While stated above that income estimates may come back up, that may be offset to some degree because of the wage cuts that many wood products workers took during the recession.

The Forest Service currently has a contract with the University of Minnesota to provide an IMPLAN model updated as of 1985 The updated version should be available by the latter part of 1990.

It is important to remember that I-O models have limited utility for forecasting specific levels of jobs and income more than a few years into the future. What the IMPLAN model really provides is a means to compare the relative effects of different land and resource management alternatives on the socioeconomic environment Even if the numbers produced are not

exact, they reflect the magnitude and direction of changes in a consistent manner among alternatives.

It will never be possible to monitor the specific changes in jobs resulting from changes in Forest management and compare that to the IMPLAN numbers. IMPLAN computes estimated direct, indirect and induced employment changes. Especially in a large and complex economy such as the one in the Mt. Baker-Snoqualmie area of influence, it would be impossible to track accurately anything but perhaps the direct jobs. Indirect and induced job changes are diffused throughout the economy, and changes are subject to a variety of other factors that are assumed constant in IMPLAN for any given run. Also, IMPLAN does not assess over what time frame the estimated changes would actually take place. So it would not be possible to monitor and compare, as the time frame over which to monitor would be unknown.

In summary, the Forest has used the 1982 updated version of IMPLAN to estimate employment and income effects from the alternatives in the FEIS. While not exact predictions, those figures provide relevant information in terms of the magnitude and direction of change of employment and income for decision-making purposes.

PROVIDE BREAKDOWN OF PROJECTED JOB CHANGES BY ECONOMIC SECTOR

By looking under all the indexed references to employment I could not find a breakdown of what industries would contribute to these presumed jobs.

Response: The IMPLAN model generates the reported job changes by economic sector, as included in the model. The version of IMPLAN used for the DEIS had over 400 economic sectors represented The version used for the FEIS is more aggregated, but still has over 200 sectors. The information on changes in employment and income, by sector, for each alternative can be found in the planning records; it can be provided, on request, in nonaggregated or in aggregated form

PROVIDE TIMBER FOR ECONOMIC STABILITY

One of the first mandates of the FS is to provide timber for economic stability.

The reduction in the annual timber sale program proposed from one of the nation's most productive forests is based upon a flawed supply-demand analysis and is fundamentally inconsistent with the Forest Service's statutory obligation to maintain a continuous and adequate supply of timber for dependent mills and communities.

Response: While the Forest Service has been concerned over the years about the effects of its management activities on local economies (the latest example being the Pacific Northwest Strategy recently set out by the Regional Forester), the agency does not have any statutory requirement to provide timber to assure "community stability" (also referred to as "local economic stability"). The Organic Administration Act of June 4, 1897 (16 U.S.C. 475) provided that: "No national forest shall be established, except ... and to furnish a continuous supply of timber for the use and necessities of the citizens of the United States.. " The Multiple-Use, Sustained Yield Act of 1960 (16 U.S C. 528-531) defines both multiple use

and sustained yield, but does not use the term community, or local economic, stability. Nor is the term found in the National Forest Management Act of 1976 (16 U.S.C. 1601-1614). The only statutory uses of the term relative to forest management are in the Sustained Yield Forest Management Act of 1944 (16 U.S C. 583) which authorized the establishment of public/private sustained yield units (such as the Shelton SYU on the Olympic Peninsula) and in the 1937 legislation providing management direction for revested Oregon and California (O&C) lands under the administration of the Department of Interior (43 U.S.C. 1181).

While Congress has not used the term in legislation, legislative history has shown that Congress has long been interested in local economic or community stability Recognition of that interest has been reflected in the promulgation of regulations by the Forest Service and other agencies over the years. However, none of those regulations **requires** provision of timber for community stability. Rather, they are couched in terms of "so far as feasible," "consider" and "evaluate." Even in the NFMA regulations, community stability is indirectly referred to only in terms of adverse economic impacts on local communities being one of the criteria under which departure alternatives will be evaluated, and in the requirement to estimate and evaluate the physical, biological, economic and social effects of implementing each plan alternative.

See Community Stability in Forest-Based Economies (Proceedings of A Conference in Portland, Oregon, 11/16-18/87, Dennis LeMaster and John Beuter, eds., Timber Press, Portland OR, 1989) for a thorough discussion of community stability concepts and issues. In particular, for the statutory and regulatory history, see "Community Stability: Is There a Statutory Solution?" by James P. Perry, pp 30-35. (For an alternate interpretation of that history, see also "Discussion: Neither Complex Nor Obscure in Meaning" by W. Hugh O'Riordan, pp. 51-53.)

NEW RECREATION-RELATED JOBS NOT ECONOMICALLY EQUAL TO LOST TIMBER JOBS

Recreation job growth should be viewed as an addition to lumber and wood products employment -- not as a substitute for it. This is especially true considering the disparity in average wages -- $25,821 in the forest products industries compared to $12,935 in the recreation-serving industries.

Response: It is true that manufacturing jobs typically pay higher wages than many service jobs associated with the recreation industry -- food service, fuel service, lodging, retail trade, etc. However, the disparity is quite a bit less than that cited by the respondent, according to recent figures. This is at least partly because of a decline (in real terms) during the latter 1980's in lumber and wood products hourly earnings. It is difficult to extract a very precise estimate of average wages paid to recreation-related workers, as that category covers portions of a number of economic sectors. Also, one must recognize that, particularly in the Puget Sound economy, not all recreation-related jobs are service jobs Clothing and equipment sectors exist here, as well as oil refineries. Some of the additional spending by recreationists works its way back to these manufacturing sectors, which pay wages significantly higher than the service jobs noted above.

It is not our intent to imply a direct equality between manufacturing jobs foregone and recreation-related jobs gained. That is why change in

personal income estimates are also shown Employment and income estimates together give a more comprehensive view of the expected changes in the economy, compared to using either by itself. It is also not our intent to imply there will be no individual difficulties as a transition is made from higher to lower timber harvest levels. What we have tried to do is to show as well as possible the relative shifts in employment and income as management alternatives change.

RECOGNIZE SPORT FISHERIES CONTRIBUTIONS TO LOCAL ECONOMIES

It would seen that fish have an indirect value for local economies the same as recreation does. Listing only the market value seems to narrow a view. What about boat and motor sales, fishing gear, lodging, etc.?

Response: The values listed for fish in the DEIS Summary, Affected Environment, incorporated the commercial values of anadromous fish and the assigned (noncash) value of sport-caught anadromous and resident fish. Values to local economies from expenditures on travel, lodging, food, etc. are represented in the employment and income calculations under the section "The Human Community."

EMPLOYMENT EFFECTS FROM WILDERNESS, NONMOTORIZED RECREATION ARE DOUBLE-COUNTED

We also question how it is possible to distinguish between the employment created by dispersed nonmotorized recreation and Wilderness. By separating the two categories you are doubling their employment effects, giving them a value that is likely disproportionate to their actual contribution

Response: RVD's for dispersed nonmotorized recreation and Wilderness recreation are tracked separately. However, for purposes of calculating employment and income effects, they are assigned the same expenditure value, as the types of expenditures required to undertake each type of use are very similar (travel, similar types of equipment and food, etc.). The differentiating factor is the number of RVD's projected for each type of use. Per RVD, the employment/income effects would be the same from the model, because the unit expenditure values and their allocations among sectors are the same. In total, they will differ as the number of RVD's for each type differs. If the end results of the two estimates were summed, the total would be approximately equal to the result that would be obtained if they were treated as one. There is no double-counting taking place in the projection of employment and income effects.

DEVELOP REGIONAL I-O MODEL FOR WASHINGTON AND OREGON

The Forest Service should develop separate IMPLAN models for Washington and Oregon to permit assessment of the overall economic impacts of the 19 National Forest plans being developed

Response: The Regional Office in Portland has published an analysis of the effects of the aggregate changes in timber to be supplied from the National Forests, as reflected in Draft Plans, on the regional timber market (USDA Forest Service, "Timber Supply in the Pacific Northwest: Aggregate Implications of Forest Plans," Pacific Northwest Region, June, 1989). Included in the analysis are estimates of regional employment and income

changes derived from a regional IMPLAN model that includes both Washington and Oregon. Because of the regional nature of the timber market, creating two separate state models would not provide as much useful information as does a regional model with both states included.

USE BUREAU OF ECONOMIC ANALYSIS REGIONAL I-O MODELS RATHER THAN IMPLAN

The Forest Service should consider the cost savings and quality of regionalized input-output models developed by the Bureau of Economic Analysis, Department of Commerce, before any further resources are expended on the IMPLAN I-O approach.

Response: Each Forest was free to choose the tool or tools it felt were best suited for analysis of economic impacts of alternative management plans on its area of economic influence. Unlike the national direction to use FORPLAN for optimization modeling, there was no centralized direction that all Forests use IMPLAN. The BEA input-output models were considered as an alternative to IMPLAN by a number of Forests, including the Mt. Baker-Snoqualmie.

There were a number of reasons for deciding to use IMPLAN over the BEA models IMPLAN is very flexible. Single- and multi-county models can be developed and run to look at economic impacts on different portions of an area of influence To do that with BEA models would require a separate request and purchase for each one. For instance, the MBS can look at its entire five-county area, or at subsections consisting of the more urbanized Snohomish/King/Pierce county group and the more rural Whatcom/Skagit combination, using essentially the same data set. Another reason for choosing IMPLAN was the openness of the series of programs used to construct the actual I-O model and the fact that it had in-house support from people readily available who knew the agency, its problems, and peculiar needs. Third, from the Forest's budgetary standpoint, the cost was low. The software and support were provided to the Forest free of charge. All that was required was analysts' time and computer time, both of which would have had to be paid for under any other circumstances. Finally, IMPLAN was developed to run on the agency's UNIVAC computer system at Fort Collins. There have been many instances in which major problems have been encountered in trying to get computer programs developed on one system moved over and running on another system. A good case in point was the early attempt made to get FORPLAN to run on an IBM mainframe. It simply did not work as hoped because of code and system problems.

The dollars and effort put into developing and improving IMPLAN have appeared to pay off, as more and more non-Forest Service agencies and organizations around the country are using the program for economic impact analysis. The development of the PC-based IMPLAN version (Micro IMPLAN) has further enhanced the flexibility of the program, speeded up turnaround time for runs, and has eliminated mainframe timeshare costs.

TIMBER HARVEST BASE FOR COMPARING EMPLOYMENT/INCOME EFFECTS IS TOO LOW

Rather than using the annual TSPQ of 220.1 MMBF from Alternative NC as the basis for comparison of employment and income changes, the three year (1985-1987) average total timber harvest of 255.3 MMBF per year [should] be used, since this is the average operating level for the forest products industries.

Response: The forest products industry is a cyclic one The latter part of the 1980's have been a period higher demand and production The early 1980's were a period of low demand and production Defining a period in the higher end of the production spectrum does not provide a complete picture of the nature of the industry and does not provide a good base for comparison. For instance, the annual average harvest level for 1979-1986 was 219.1 MMBF, which is much closer to the first decade annual average used for comparison of employment and income effects.

For decision-making purposes, the **relative** changes in employment and income are more important than the **absolute** changes. In reality, absolute changes are very difficult to predict, particularly because of a wide variety of factors that are subject to change which are not under the Forest's, or even the industry's, purview. The projected changes relative to the total employment/income picture for the area of influence, and the differences in projected changes among alternatives under a consistent set of assumptions, are most important for evaluating alternatives and their effect on the *social/economic environment*.

INADEQUATE EXPLANATION OF HOW IMPLAN WORKS

A description of the FORPLAN modeling is found in the Appendix [B] In addition, a description of other modeling procedure used to estimate the employment and income impacts should be made available in this section. Although the plan states that the IMPLAN model was utilized, no mention of how employment and income multipliers are calculated is made.

Response: A discussion of input-output models in general, and of IMPLAN in particular, is found in Appendix B, Chapter V ("Social and Economic Impact Analysis"), Section B. While it is true that the IMPLAN modeling is not discussed in as much detail as is FORPLAN modeling, a basic reference to the details of the IMPLAN model and programs is provided; detailed final demand numbers by sector, population and employment base numbers, allocation of final demand numbers among sectors, etc. is in the planning records.

RECREATION RESPONSE COEFFICIENTS FOR EMPLOYMENT AND INCOME SEEM HIGH

The employment and income response coefficients for the various types of recreation seem high in relation to each other and in relation to t.mber.

Response: Wildlife and fish-related recreation generally have greater economic impact through expenditures than general dispersed recreation because of higher expenditures for equipment, licenses, etc. Many hunters and anglers may also use guide services, motels, etc., especially on multi-day trips. Hunters and anglers also tend to have greater investments in equipment, especially RV's used primarily during the hunting and fishing seasons, than do people engaging in general dispersed recreation not involving consumptive use of wildlife or fish

While timber production definitely supports a significant number of direct, indirect and induced jobs, it is generally easier to see where those jobs are than for recreation-related jobs. The latter are diffused over a wide range of sectors in the economy, but are no less real. The Puget Sound area will also show more jobs generated from recreation spending than would

a more rural area in northeastern Washington or eastern Oregon because there are many recreation-related industries here -- outdoor clothing and equipment manufacturers, petroleum refineries, etc. A greater percentage of the expenditures made for recreation turn over with in the region before leaking out than one would find in a less economically diversified area. Thus, more indirect and induced jobs are supported.

FULL PUBLIC INVOLVEMENT NEEDED BEFORE DESTROYING HISTORIC STRUCTURES

We are concerned about the Forest-wide standard for curtal and historic resources within wilderness that states: "If it is determined, after historical evaluation, that a structure is not of significance, it shall be removed by a practical method compatible with the goals of this plan." This method does not involve the public or give consideration to the value of a structure to local communities. We recommend that no structure be destroyed until a full public involvement process is undertaken which focuses particularly on local communities with possible ties to the structure.

Response: Many stories of destruction originate in events occurring prior to the establishment of a cultural resource management program on the Forest in the mid-1970's. Under current procedures, there is provision for public involvement through environmental and historic preservation procedures. The effects of structure removal are evaluated through environmental analyses, and Wilderness standards and guidelines have been clarified to reflect this. In addition, it the structure is historically significant, removal is an adverse effect under 36 CFR 800 (Protection of Historic Properties). Regulations at 36 CFR 800.5(e)(1) and (3) direct that the public be involved in consultations regarding adverse effects. Again, the Final Forest Plan has been changed to clarify this requirement; see Chapter 4.

ADD "OTHER INTERESTED GROUPS" TO GOAL FOR CULTURAL AND HISTORIC PROPERTIES

Suggest you expand goal #3 on page 4-5 for Cultural and Historic Resources and add coordinate efforts with "other interested groups" as well.

Response: We agree The Forest Plan expands the range of cooperators cited in connection with this goal.

NEED TO INVOLVE INDIAN TRIBES IN CONSULTATION FOR HISTORIC PROPERTIES

Throughout the documents, a distinction is made between "Cultural and Historic Properties" and "American Indian Religious and Cultural Uses". The former deals with archaeological resources, undoubtedly many of these sites are of Indian origin While this is acknowledged in the Plan, the role of the tribes is ignored in the consultation process The tribes must be included.

Response: To avoid possible confusion between the resources under discussion, the Plan documents have been revised to speak of "Archeological and Historic Properties" and "American Indian Religious and Cultural Uses", under an overall heading of "Cultural Resources".

Approximately 25 of 175 recorded Forest archeological and historical properties are archeological sites of Indian origin. When excavation permits are issued under the Archeological Resource Protection Act, 36 CFR 296.7 requires notification to Indian tribes of possible harm to, or destruction of, sites on public lands having religious or cultural importance to the tribes. When consultations occur in compliance with the National Historic Preservation Act, 36 CFR 800 1(c)(2)(iii) requires that if an undertaking affects properties of historic value to an Indian tribe on non-Indian lands, the consulting parties shall afford the tribe the opportunity to participate as interested persons. Traditional cultural

leaders and other Native Americans are considered to be interested persons The Forest-wide Standards and Guidelines, Chapter 4 of the Forest Plan, have been revised to more explicitly recognize these regulations.

LACK OF DETAIL FOR CULTURAL RESOURCE MANAGEMENT

With respect to cultural resources, the Preferred Alternative lacks detail in planning which suggests that cultural resources are being relegated to individual management discretion.

Response: A comprehensive Cultural Resource Overview, which is referenced in the Plan, was prepared as part of the planning effort. It describes specific archeological and historical themes and resources. The Implementation Schedule, Appendix D of the Forest Plan, has been amended to included targets for specific areas and resources.

ADD A SUMMARY OF THE CULTURAL RESOURCE INVENTORY PLAN TO THE FEIS AND PLAN

The Forest's cultural resource inventory plan is apparently still under preparation. A summary of the chief features of the inventory plan should be incorporated in the Forest Plan. It should, to the extent possible, outline both project-related and research-based investigations, excavation, and interpretation.

Response: The cultural resource inventory plan has not been written, therefore a summary cannot be included in the Forest Plan. Currently, inventory strategies and tactics are developed on a project-specific basis. Inventory plan preparation is scheduled for Fiscal Year 1992 (see the Cultural Resource Implementation Schedule, Appendix D). The main features of the inventory plan will include a summary of the Forest environment and cultural history, drawn from the Cultural Resource Overview. These will be used to stratify the Forest into environmental zones; survey tactics will be specified for each zone (e.g., transect types and intervals, extent of post-project monitoring, etc.). An outline of investigations is contained in Plan Appendix D.

AMOUNT OF CULTURAL RESOURCE SURVEY IS DIFFERENT IN THE DEIS VERSUS THE PLAN

The DEIS discusses only project or land transfer-related cultural resource survey (Chapters III and IV) in contrast with the Plan, which states in several places that nearly the same amount of land will be subjected to non-project purposeful survey. These two documents should be reconciled.

Response: The text in the FEIS has been revised to reconcile this document and the Forest Plan The wording in Chapter III of the FEIS has been changed to read, ". .inventories generally have been conducted . .." Text describing future non-project purposeful survey has been added; also see the Cultural Resource Implementation Schedule, Forest Plan, Appendix D. The text in FEIS Chapter IV has not been changed, as this material pertains specifically to the mitigation of project effects

THE PLAN SHOULD STATE WHY SO FEW SITES HAVE BEEN RECORDED

The Plan should address why only 20 prehistoric and 100 historic sites have been adequately recorded out of an inventory of 800 sites and 170,000 acres of survey to date.

> **Response:** The DEIS implicitly addressed this issue for prehistoric sites on page III-95. The Forest Plan addresses this issue explicitly in Chapter III of the FEIS. The figure of 800 sites (currently 973) represents sites reported in a number of sources (e.g. ethnographic reports of villages) that did not include field inventory. It also included sites not on National Forest lands. As of April 1989, 173 historic and 23 prehistoric sites have been adequately recorded, largely through project-related inventory. Many reported sites can no longer be located on the ground. Others are not in the National Forest and may never be recorded. The Cultural Resource Implementation Schedule (Plan, Appendix D) includes the recordation of sites lacking adequate records at a regular rate over the life of the Plan. This will not be tied to project inventories. It will reduce the backlog of reported but unrecorded sites

CULTURAL RESOURCE INVENTORY, ETC. SHOULD BE PRIORITIZED

The Forest should prioritize, or schedule the inventory, recordation protection and interpretation of the numerous referenced historic features, such as the "14 distinct mining areas, 6 transportation, and 8 logging areas." Specific examples include the "Snoqualmie Pass Wagon Road; Northern Pacific Railroad Corridor; the Mt. Baker, Silverton, and Index mining districts; and Stillaguamish and Sauk River drainage logging areas."

The Plan should contain information such as priorities and a schedule of management plans for historic resource management.

> **Response:** The Cultural Resource Implementation Schedule (Plan, Appendix D) has been revised to do so. The earlier a management plan is scheduled, the higher its priority.

MORE EMPHASIS ON PRESERVATION OF CULTURAL, HISTORIC PROPERTIES

In discussing the process goals of the Cultural and Historic Properties element, you state that one of the primary aims is to increase "interpretation of cultural resources." There should be more emphasis on preservation than appears in the Plan goals.

> **Response:** Protection objectives have been added to the Forest Management Objectives for Archaeological and Historic Properties Protection Standards and Guidelines were included in the Draft Plan (page 4-75) and have been retained in the Forest Plan. Specific protection activities are scheduled in the Cultural Resource Implementation Schedule, Plan Appendix D.

WILL THE PLAN CONSIDER LEAVING ARCHAEOLOGICAL AREAS UNDISTURBED?

There has been a long standing and well publicized debate between tribes and archaeologists about how archaeological properties should be treated. Tribes

often favor leaving an area undisturbed; the plan diminishes this alternative. Is this an alternative which will be considered and used by the MBS?

Response: Avoiding disturbance to archeological sites may be suggested by any of the parties to consultations required by 36 CFR 296 or 36 CFR 800 discussed above. Forest-wide Standards and Guidelines have been amended to require consideration of avoidance. Use of this alternative will depend on the issues raised during consultations.

LITTLE RECOGNITION OF THE IMPORTANCE OF THE NACHES PASS WAGON ROAD

There was little recognition in the DEIS of the historic importance of the Naches Pass wagon trail. As the first route over the Cascades, and as it intersects the Pacific Crest National Scenic Trail, it should be spared any more degradation from crisscrossing logging roads and clearcuts.

Response: The Naches Pass area was considered for Special Area designation in Alternative G of the DEIS, on the basis of its historic importance. Its historic value is documented in pages 208 to 212 of **A Cultural Resource Overview: Prehistory, Ethnography and History, Mt. Baker-Snoqualmie National Forest.** The Overview was prepared as background information for the Land Management Plan. The Implementation Schedule (Plan, Appendix D) addresses the need for a detailed inventory and management plan.

ALL REMAINING FIRE LOOKOUTS ARE SIGNIFICANT

Of the many fire lookouts that were once on this forest, only a few remain. All have historic significance, despite their eligibility for the state historic register. They represent a bygone era that intrigues the greater share of the hiking public. Green Mountain and Miner's Ridge Lookouts should be preserved in addition to the lookouts listed in the plan.

Response: In the context of historic preservation law, "significance" is defined as eligibility for the National Register of Historic Places. Normally, resources less than 50 years old are not eligible for the National Register. After a comprehensive evaluation of MBS lookouts, none built within the last 50 years were felt to be of such exceptional importance to justify listing in the National Register. Both the Green Mountain and Miner's Ridge Lookouts are more than 50 years old and are listed in the National Register of Historic Places. The Management Area prescriptions for Areas 10E and 18 have been revised to accept the existence of historic structures in these Areas. With respect to other lookouts less than 50 years old, nothing in the Forest Plan precludes their preservation. However, as historic preservation funds are limited, priority will be given to lookouts qualifying for the National Register of Historic Places.

THE AREA AROUND PARK BUTTE LOOKOUT NEEDS PROTECTION

The Park Butte Lookout will soon join the National Register of Historic Places Inventory; although the lookout itself is adequately protected, the surrounding environment is not. Note that the National Register nomination form says [in part]: "These extant fire lookouts, which remain in pristine mountainous forest environments...[are] part of the comprehensive detection system which

worked...to protect and conserve National Forest lands..." It would be sadly ironic, a half-legacy, to save the lookout but not the surrounding environment.

Response: Timber harvest and extensive burned-over areas are elements of panoramic photographs taken from Mt. Baker-Snoqualmie lookouts in the 1930's, and cut-over areas are visible in the background of the Park Butte panorama. A principal objective of fire detection and suppression in the 1930's was to protect public and private investments in forestland, reducing pressure to recover the investment through immediate harvest. Except in a very few instances, usually in National Parks, preservation of the timber stands in perpetuity was not envisioned.

The Forest Plan allocates the area surrounding the Park Butte Lookout to Management Areas 1B, Semi-Primitive Nonmotorized Recreation; 4, Mt. Baker National Recreation Area; and 10, Wilderness. The area at Schreiber's Meadow has been allocated to MA 2A, Scenic Viewshed. The North Fork Nooksack Drainage has been allocated to 14 and 15A, Deer and Elk Winter Range and Mountain Goat Habitat, and to MA 23A, Other Municipal Watershed. Only the South Fork Nooksack contains allocations to MA 17, Timber Management Emphasis The result of these allocations will be the retention of foreground views and a reduction in the modification of middle-ground and background views, compared to the Draft Plan allocations.

PROTECTION, PRESERVATION OF INDIAN RELIGIOUS USE AREAS HAS NOT BEEN ACCOMPLISHED; PLAN VIOLATES AIRFA.

The Forest Service is in direct violation of its own directive as regards the American Indian Religious Freedom Act (AIRFA) . The Forest Service Report to the Federal Agencies [AIRFA] Task Force specifically embraced the interpretation of AIRFA as requiring it to preserve sacred areas of land when necessary to protect American Indian religious freedom. F S. directive states that when land and sites are determined to need protection and preservation, this will be accomplished in and through the land management plan. Protection and preservation of these documented sites has not been accomplished through this Management Plan!

According to Forest-wide Standards and Guidelines for Indian religious and cultural use, protection measures will be taken only where practical!

Response: These two comments state that the Forest failed to follow agency direction by failing to protect all religious and cultural use sites identified in the 1981 **Inventory of Native American Religious Use, Practices, Localities and Resources (Inventory)**. The direction cited is a 1700 (Civil Rights) memo from Forest Service Deputy Chief Jerome A. Miles to Assistant Secretary of the Interior Forrest J. Gerard, dated May 10, 1979. The memo describes Forest Service implementation of the American Indian Religious Freedom Act (92 Stat. 469). It cited a 1020 (Laws) memo sent to the Regions, Research Stations and Washington Office staff directors by John R. McGuire, Chief of the Forest Service, on November 14, 1979. That memo stated, in part:

> "In the interim until further direction is available the following direction will apply. In the preparatory stages of land management planning native traditional religious leaders will be notified of all public involvement activities and invited to provide input. If an issue concerning Indian religious freedom is identified, the cultural resource overview for the forest plan should provide substantive background on the traditional Indian religious practices within the planning area. When examination and consultation determine a need to protect or preserve certain lands or sites this will be accomplished in and through the land management plan."

Final direction was not issued. The interim direction did not imply that all identified sites would be protected, hence the use of the term "consultation", which indicates a mutual decision. The reasoning is made clearer in the following paragraph, which reads in part:

> "Each application by traditional Native Americans to use National Forest system lands for religious purposes shall be carefully considered.... To the extent the proposed use or activity is considered consistent with existing laws and regulations, a special use permit may be issued."

The key consideration is consistency with other laws and regulations, some of which require production of resources or amenities that may conflict with the preservation of religious or traditional use areas. To the extent that such areas are to be preserved, it must be recognized in the Land

Management Plan, as preservation will in most cases constitute a land allocation.

FOREST SERVICE HAS A MANDATE TO PROTECT, PRESERVE CULTURAL/RELIGIOUS USE AREAS

The DEIS states that "mining, energy development and small hydropower development can result in loss of ritual purity and reduce the old-growth and mixed-age stands. Costs of protection and salvage of archeological artifacts will be borne by the operators of the individual projects... If at all possible the resource will be protected." "If at all possible" implies uncertain protection for these resources. I wish to emphasize - the Forest Service has a mandate to protect and preserve cultural resources and religious and cultural use sites.

Response: Protection and preservation of religious and cultural resources is subject to legal and regulatory mandates in addition to the AIRFA. The General Mining Law of 1872 confers rights to locatable minerals upon those who discover them. FS control of these minerals is limited to minimizing impacts on surface resources, through the review of operating plans. If removal of the minerals will disturb or destroy religious or cultural resources, and the effects cannot be mitigated, the FS does not have the authority to deny removal.

THE PLAN GOAL FOR INDIAN USE IS HOLLOWED OUT BY ACTUAL GUIDELINES IN THE PLAN

The MA 7 goal is a worthy one with respect to Indian Religious use, but it is hollowed out by the actual activities under the preferred alternative (H) It is clear use areas and sites will be heavily impacted. In the consultation section, the Plan states that where mitigation in not possible, the "value (of the site) as a religious or cultural use area will be reduced or lost. ..Sites will be protected....and protective measures will be taken... wherever practical... "

Response: The Preferred Alternative assigns between 35% (cedar areas) and 71% (ceremonial flora) of the inventoried religious use acreage to non-developed areas (Table II-9o and Table IV-24). It is not possible to guarantee 100% protection through the Plan, and this is made clear in the document Also, see the above discussion. Further, the Supreme Court's decision in Lyng v. Northwest Indian Cemeteries Protective Association indicates that neither AIRFA nor the First Amendment guarantee absolute protection of all religious sites against the multiple demands on public lands.

PLAN MAKES ASSUMPTION THAT SITES WILL BE DISTURBED

The Plan states that cemeteries will receive 100% protection, although ceremonial use sites and areas will be subject to disturbance. The informants from the tribe were emphatic that disturbance was both irreversible and unacceptable. It is assumed that sites and areas will be disturbed

Response: In Chapter IV, Environmental Consequences of the Alternatives, the DEIS did not make clear that some effects of management activities are irreversible; this text has been revised in the FEIS. Sites not protected through allocation to non-developed areas may be disturbed. They will be

subject to the consultation process during project-level environmental analysis. Options to avoid or mitigate disturbance will be considered (FEIS, Chapter IV and Forest Plan, Chapter 4). It is inevitable that some current and potential religious use sites will be disturbed, and that mitigation will not be possible, leading to an irreversible commitment of resources.

INCLUDE THE RECOMMENDATIONS, MITIGATION MEASURES SUGGESTED IN THE INVENTORY

The Plan/EIS should incorporate the conclusions and recommendations of the **Inventory**, or explain why different measures have been adopted. For example, it recommends that spirit sites be protected from alteration and that a buffer be established around them. Nowhere in the draft Plan/EIS is this suggestion addressed or considered. Instead of specific measures as recommended in the Inventory, the draft Plan/EIS proposes to protect resources needed for American Indian religious uses "wherever practical".

The Plan/EIS must be more specific in its mitigation and protection measures in order to permit a reasoned analysis of the impacts on Native American religious uses of the National Forest.

Response: The discussion in Chapter IV, FEIS has been augmented to include a discussion of the recommendations of the **Inventory** (pages 532-540). With respect to site management, there is a consistent recommendation for protection and preservation of each of the five site types. It is not feasible to protect each and every inventoried site, as this would violate other legal and regulatory obligations of the Forest.

With respect to resource use, the **Inventory** recommended that environments conducive to the growth of important plant and animal resources be maintained throughout the Forest. It is not possible to address effects on these resources in a meaningful way in the Plan, since no information exists on the distribution of many of these species (for example, camas) outside of localities identified in the **Inventory**. Buffers were not included in the Plan, as the need or size of a buffer varies by tribe and even individual practitioner, making an general standard infeasible. Accordingly, the Forest has considered areas that need protection, as identified in the **Inventory** and planned updates. Chapter II, FEIS and Chapter 4, Forest Plan have been revised to be more explicit in the definition of protection and the measures taken to achieve it.

USE CANNOT BE SHIFTED TO ANOTHER SITE ONCE ONE AREA IS LOST

There are some disturbing indications as to what some of the mitigation measures are. Both the Plan and the DEIS refer to identifying sites which are "best suited" or "most appropriate" for a particular use, and discuss having to shift locations as less area is available for religious and cultural uses.

There is a startling lack of sensitivity on the part of the Forest Service to tribal cultural needs. It is obvious that the Forest Service expects to identify suitable or appropriate alternative locations for tribal members to shift their use to once Forest activities have adversely impacted current use sites. This type of treatment is inappropriate when planning Forest activities around these types of sites.

The suggestion that one site is just as good as another for a particular use make clear that the Forest Service fails to comprehend the meaning tribes attach to these sites. Some locations have been utilized over an historic period of time; sometimes the location being passed from generation to generation. In many cases, the site itself contains many qualities which make it unique and irreplaceable.

Response: We do understand that each site is different because of its spirit associations, the religious experiences of particular individuals, or its place in tribal history. Thus, one site cannot completely substitute for another. But there is also the recognition that religious practices are not static. For example, consultations regarding project activities have produced information leading to the conclusion that religious use of National Forest land is increasing as sites are lost on State and private lands. This suggests that some degree of substitution is possible. Also see page 525 of the **Inventory**. In the Forest Plan, the Information Needs section of Chapter 2 has been revised to indicate that there is a need to identify the changing patterns of religious use of the Forest, and to identify areas that are most critical for protection from a tribal perspective. This will be accomplished through updates to the **Inventory** (Plan, Appendix D, Cultural Resource Implementation Schedule).

SITES ARE USED YEAR-ROUND; DISTURBANCES ARE AN IMPACT YEAR-ROUND

As mentioned repeatedly in the Inventory, sites are used year-round The Plan states that timber harvesting etc will be scheduled from April to September. Disturbing the sites during the time of latency is no less an impact than disturbing them during their season of use.

Response: The Forest Plan revises the management area guideline for these areas to indicate that scheduling is one mitigation measure that can be considered to remove conflicts with timber harvest; refer to Chapter 4, Forest Plan, and Chapters II and IV, FEIS. This mitigation covers circumstances in which a protection or mitigation decision is made in a project-level environmental analysis, for a religious or cultural use area **other** than one allocated to a non-development management area The religious/cultural use areas with high-moderate protection have been allocated to management areas that preclude timber harvest.

DEIS FAILS TO CONSIDER INDIAN USE IN ENVIRONMENTAL CONSEQUENCES CHAPTER

The DEIS fails to consider American Indian religious uses in the sections analyzing the relationship between short-term uses and maintenance and enhancement of long-term productivity (p. IV-151), the irreversible commitment of resources (p. IV-151), and the adverse environmental effects that cannot be avoided. It is surprising that one of the ten highlighted issues, concerns and opportunities is not addressed in these sections, as NEPA requires.

Response: The DEIS, pages IV-73 to 81, recognized the adverse effects of many Forest activities on religious uses. Chapter IV, FEIS has been revised to explicitly recognize the irreversible commitment of resources.

RELIGIOUS AND CULTURAL USE NOT FULLY ADDRESSED IN THE SUMMARY

American Indian Religious and Cultural Use issues were not fully addressed in the Summary document. The document (page 41) is vague as to exactly what and how much protection will be given to these sites. Except cemeteries, only a high of 52% of other sites will be given protection.

Response: The discussion in the draft Public Summary was limited, though there was more detailed discussion in the Plan (pages 2-4, 2-21, 3-4, 4-5, 4-7, 4-8, 4-45, 4-76 & 77, 4-154 to 156 and 5-8) and the DEIS (pages S-4, S-8 & S-9, Table S-4, S-33, I-13 & 14, II-53, II-109, III-92 to 94, and throughout Chapter IV) The 52% figure cited in the comment applies to acreage receiving a high level of protection, not sites. In addition, approximately 15% of the acreage would receive a moderate level of protection, the difference between "high" and "moderate" is the expected frequency of encountering other Forest users, not the level of development. The wording in the Summary has been clarified.

DOCUMENTS DO NOT IDENTIFY USE SITES OR EXPLAIN QUALIFYING CRITERIA; INVENTORY PROCESS NOT MADE AVAILABLE TO THE PUBLIC

Since, for confidentiality, lands are not specifically allocated to Indian Religious use, it is difficult to evaluate the effects of these uses. All forest users, including Indians, would benefit by a better explanation as to how these sites were determined and how their use impacts other forest uses.

The location of any of these sites is not identified, nor are number of acres given, under the claim of confidentiality. Besides failing to explain why confidentiality is legally necessary, the DEIS and Plan do not discuss what criteria were used to qualify each site Since the inventory and inventory process are unavailable to the public, one cannot determine if Indian religious uses are primarily at stake on each site; the public cannot evaluate the environmental impacts of such designation. This failure to provide necessary and significant information to the public undermines the NEPA process.

Response: A full discussion of the inventory process and the criteria used to define sites is contained in the first volume of the **Inventory**, which contains the non-confidential information and is available for public review Loan copies of this volume have been made available to Plan respondents, including an individual representing the organization making this comment. Tabular material in the volume lists the sites and discusses their general use.

Information withheld consists of location data and identities of site users These have been withheld under specific exemptions contained in the Archeological Resource Protection Act (P.L. 96-95, as amended) and National Historic Preservation Act (P.L. 89-665, as amended) where the sites include resources that may be considered historical or archeological, and exemptions to the Freedom of Information Act (P.L. 93-502), where release would impair the Government's ability to obtain information in the future, or invade the privacy of individual practitioners. These references have been added to discussions in Chapter II (Table II-9o) in the FEIS.

As discussed in Chapter III of the DEIS, religious use sites are identified through consultation with Indian tribes and tribal groups. Methods are described in the **Inventory**. The classification of sites is based on

information provided by Tribal representatives and practitioners. The Report that accompanied AIRFA (Report No. 95-709, hereater cited as "AIRFA Report") makes it clear that practitioners are the ultimate authority. Information for individual projects is obtained through inquiries to tribal officials and other tribal representatives undertaken during the preparation of Environmental Assessments.

Chapter II of the FEIS has been revised to better describe the use of Management Area 7. Chapter IV of the DEIS described the effects of religious and cultural use on other resources; in the FEIS, this chapter has been revised to improve the clarity of the discussion and expand the scope of the effects assessment.

PLAN VIOLATES AIRFA, COURT DECISIONS BY PROHIBITING ACTIVITIES BASED ON "ANTICIPATED USE"

In Wilson v. Block,... the court found that development of FS land would not impair Indian tribes' ability to exercise their religious beliefs nor deny them access to any sacred areas... Specifically, the court found that as long as Indian religious freedom was protected, access not prohibited, possession and use of religious objects permitted, religious ceremonies allowed, and consultation takes place with Indians before proposed actions occurred, the Act did no mandate that "native traditional religious considerations always prevail to the exclusion of all else."

The Act does not prohibit agencies from adopting land uses that conflict with traditional Indian religious beliefs and practices. In Northwest Indian Cemetery Protective Association v. Peterson ... planned road building and logging operations would have greatly impaired religious exercises on "the only place where they can be performed." ... None of the 308,000 acres on the MBS have been shown to be "indispensable" to the exercise of any Indian tribes' religion, and it has not been shown that any proposed governmental operations are bound to interfere with that exercise... For these reasons the MBS Plan and DEIS violate the Act when they absolutely prohibit logging and road construction in any alleged "high" and "moderate" [use area where use] has not been verified.

Response: The DEIS and Plan show areas receiving "high" or "moderate" **protection from development**, in various alternatives (Table II-9o), not protection of areas with actual, or anticipated, "high" or "moderate" use. "High" or "moderate" protection is based on allocation to management areas that preclude development. These allocations are based on other resource needs, for example wildlife habitat or semi-primitive nonmotorized recreation. The conclusions of the courts in Wilson v. Block and Northwest Indian Cemetery Protective Association v. Peterson are not directly relevant in this situation.

DEIS AND PLAN DO NOT DISTINGUISH BETWEEN RELIGIOUS AND CULTURAL SITES

The declared policy of AIRFA is "to protect and preserve" the right to express, believe, and worship, for religious reasons and not merely cultural beliefs. The DEIS and Plan do not distinguish what sites involve religious expression and what sites are merely cultural in nature.

The Forest-wide Standards and Guidelines even prohibit land-disturbing activities where there is cultural use, which is contrary to AIRFA. Such inflexibility violates the NFMA and protection is not absolutely warranted for each site by Act or by case law. The standards and guidelines must include substitution of comparable timber if protection of any religious site later occurs and lands otherwise managed for timber are eliminated from future harvest activities.

Response: Although the Inventory originated as a response to the AIRFA, it and the Plan also responded to provisions of the Medicine Creek and Point Elliot Treaties, which guaranteed Tribes the right to collect on the unclaimed lands of the State, in common with other citizens. Religious and cultural use areas, identified by the Tribes, are considered protected if they occur on lands allocated to a non-development management area, based on needs for wildlife habitat, etc. or to meet the goal of the alternative. Management Area 7 Standards and Guidelines will be applied within these areas. As timber harvest is already precluded in these MA's, there is no additional impact on timber harvest. MA 7 Standards and Guidelines may be applied to other areas as a result of consultation during project environmental analysis. Substitution of additional timber is not required as long as any loss in timber volume will not constitute a significant change in the Plan.

CLEARLY STATE THAT NO ALLOCATIONS ARE MADE SOLELY FOR INDIAN USE

Apparently, no land allocations are made solely to protect Indian religious sites, but this is not clearly stated in the plan. One could easily come away with the feeling that 440,000 acres are being "hidden" in other allocations to protect them for Indian use.

Response: The text in Chapter II of the FEIS has been revised for clarity.

WHAT AFFECT WILL RELIGIOUS AND CULTURAL USE CONSTRAINTS HAVE ON TIMBER?

In order to comment on the proposal for religious and cultural use, we need to know the effects of these constraints upon timber production. While we know that site specific areas are not listed, it should be easy to include the impacts on timber volume in the final plan.

Response: *Inventoried use areas shown as protected in the Plan are* protected through allocation to a management area that precludes timber harvest and road construction. The primary basis for these allocations were other resource needs, such as wildlife habitat or semi-primitive nonmotorized recreation. Thus, there are no independent effects on timber volume from the protection of religious and traditional use sites.

WHY IS THE EFFECT OF TIMBER HARVEST "UNKNOWN" - IF IT WERE A PROBLEM, TRIBAL LEADERS WOULD HAVE MENTIONED IT

Why, when timber management will benefit religious customs, is the "effect it will have" unknown? (IV-75) If it were a tremendous problem, tribal leaders would certainly have mentioned it.

Response: The record of tribal input on timber management is clear and consistent - it has adverse effects on traditional religious practices. The comment on page IV-75 reflected an **Inventory** finding that collection of edible and medicinal plants occurs where they are available, since for some groups, traditional areas are no longer available or are so altered as to be unproductive (page 535). Available, but modified, sites may be used. This leaves open the question of how much and what kinds of disturbance can be tolerated for this class of activity. However, users are clear in their expressed preference to collect plants from undisturbed areas.

IS IT POSSIBLE FOR INDIAN TRIBES TO REQUEST HARVEST ACTIVITIES?

Is it possible that harvest activities could occur at the request of Indians? If, for example, religious activities will be enhanced through timber management, will the Indians be able to influence timber sale plans? One could assume so, based on the final paragraph on IV-75.

Response: Harvest at the request of Indian tribes is possible, but is unlikely to occur in practice and any volume from such a request has not been programmed in the Plan Tribal input is clear and consistent in indicating that commercial timber harvest is incompatible with religious and cultural objectives. If such a request were made, it would be accommodated through established timber sale procedures, in conformance with the Plan, and subject to the NEPA process.

DISCUSS UNDEVELOPED ACRES OF INVENTORIED RELIGIOUS/CULTURAL USE

How much of the Inventoried Indian religious and cultural use area is currently developed? Are you planning to perpetuate this development or return the areas to a natural state (despite opposition from Indians)?

Response: Planning data are not available to provide a figure for the number or acres of Inventoried use sites and areas currently developed. In the Preferred Alternative, approximately 25 miles of roads will be closed and the area returned to a more-natural condition. Road miles to be closed are within land allocated to MA 1A and 1B: Primitive and Semi-primitive Nonmotorized Recreation. Otherwise, additional acreage will be developed as the Plan is implemented. Comments received from Indian tribes oppose development.

CONFIDENTIALITY OF SITES MAY ALLOW THEM TO BE MISSED IN SALE PLANNING

The confidentiality of these sites may allow them to go un-recognized during planning and layout of harvest activities

Response: Refer to the Forest-wide Standards and Guidelines, Chapter 4, Forest Plan. These established procedures will result in the recognition of religious and cultural use sites identified in the **Inventory**. The environmental analysis process for each proposed project includes an examination of impacts to listed sites, discussion of mitigation measures, and evaluation of a no action alternative. In addition, the affected tribe(s) will be consulted. Updates of the **Inventory** are scheduled for 1991 and 1996 (see Plan, Appendix D, Cultural Resource Implementation

Schedule). Tribal officials or individual practitioners may come forward at any time and identify additional sites.

WHAT PROTECTION WILL AREAS NOT YET IDENTIFIED HAVE?

What protection will those areas yet to be identified as religious and cultural use sites have, if the identified sites will be roaded and logged?

Response: Areas may be identified at any time by Tribal representatives or religious practitioners. Protection will be considered through consultation and decision-making for project environmental assessments. Areas can be protected if the decision will not require a significant change in the Plan. As discussed above, updates of the **Inventory** are *scheduled in 1991 and 1996. Data will be incorporated in the assessment of* resource conditions and public demands that must occur every five years (Plan, Chapter 5).

IS THERE A PROCESS TO DEAL WITH RELIGIOUS USE SITES DISCOVERED THROUGH FOREST MANAGEMENT ACTIVITIES?

Is there a process for dealing with sites which are discovered through Forest management activities which have not been formally identified in the **Inventory**? Discuss in the EIS and Plan.

Response: This has not occurred to date, however, any discoveries would presumably consist of the identification or artifacts or features used in religious practice. In that case, the procedures specified in 36 CFR 800.11 would be followed, with notification of the tribes which historically used, or currently use, the area In the Forest Plan, the Forest-wide Standards and Guidelines have been revised to incorporate this process.

PLAN HAS NO ESTIMATE FOR FUTURE NEEDS FOR SITES, AREAS, AND CEDAR

There is no indication that the agency attempted to determine the future needs for these sites and areas; also, there is no estimation in the plan of how much cedar would be needed by the tribal community in the future.

We recommend that the agency, along with the tribes, establish a schedule of present and future needs for sites and areas; incorporate these figures into the planning process

Response: *Although the DEIS at III-94 indicated that future use would* increase, the text in the FEIS, Chapters III and IV, has been revised to recognize that religious practitioners are increasingly relying on undeveloped areas of the National Forest, as sites on State and private land are developed. More detailed estimates of future use are not within the scope of the Forest Plan. Practitioners may come forward when environmental analyses are prepared for specific projects in order to identify localities not listed in the **Inventory**. Also, updates of the **Inventory** are scheduled, in the Cultural Resource Implementation Schedule, Appendix D of the Forest Plan. The Information Needs section of Chapter 2, Plan has been revised to show the need for trend data in the updates. Effects on cedar availability were addressed on page IV-74 of the DEIS and

are discussed in Chapter IV of the FEIS. It is likely that demand for cedar will increase in the future and that a shortage of cedar for traditional uses will be experienced

ACCESS MEANS NOTHING IF THE SITE IS DESTROYED; ROADS DIMINISH ACCESS

If the Forest Service allows roading, logging and mining etc. in and around religious use sites, of what value is access? Access to nothing, to destroyed sites? Extirpation of the natural conditions of the sites, means the destruction of the site values

Indian people have found their way through the forest for the last 10,000 years or so without the "facilitation" of U.S. Forest Service roads!!

In Section 2, P.L. 95-341, the Executive Branch reported to Congress that in order to preserve Indian free-exercise rights: "The accommodation of Native religious uses within federal land management programs must take into account their desire for these lands to remain in their natural state." This directive is not followed in the Forest Plan...the plan adopts a restrictive and negative interpretation of access Roads do not increase access; they diminish it. The principles of purity, privacy, isolation, and permanency apply to all types of cultural uses . . to diminish these values is to deny "access" in the context of AIRFA, the First Amendment and, most importantly, in the context of the information in the Inventory. And, it should be noted, AIRFA states that protection and preservation should be construed to mean "including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites." The Forest Service, in the Plan, has narrowed the original intent of the Act, and misinterpreted the meaning of "access" in the process

Response: The term "access" has been problematic. "Access" is used in the American Indian Religious Freedom Act (AIRFA), 92 Stat. 469. The Report which accompanied the Act (Report No. 95-709) states, "The issue is not ownership or protection of the lands involved. Rather, it is a straightforward question of access in order to worship and perform the necessary rites." (p. 3) Notwithstanding this, the responsiveness of the DEIS alternatives to the issue of American Indian Religious and Cultural Use was measured by considering the proportion of inventoried use acres afforded moderate or high protection in each alternative. Moderate or high protection was defined as management that would preclude timber harvest and road construction (DEIS, II-66). This approach [definition of access] was taken because of the emphasis on consultation in AIRFA

> "Because much of the present problem stems from lack of knowledge of what traditional native religions constitute, it is imperative that the evaluation find a source of knowledge if it is to rectify the problem It is the intent that the source be the practitioner of the religion...." (AIRFA Report, p. 5)

Still, "access" was used in its more restricted definition at certain places in the Draft Plan and DEIS. In the FEIS and Plan, to more accurately reflect the issue, the term "availability" has been substituted for "access." Definitions of responsiveness to the issue remain the same. This is necessary "to insure for traditional native religions the same right of free exercise enjoyed by more powerful religions" (AIRFA Report, p. 6).

IF ACCESS IS A GOAL, WHY IS THERE AN EMPHASIS AGAINST ROADS?

The goal for Indian Religious and Cultural Uses is access. Why is there such am emphasis throughout the plan against both road and trail access?

Flora and, to some degree, cedar areas should undergo management activities in order to enhance their usefulness for religious and cultural purposes. Why does the staff plan to exclude timber harvest and roading? It seems as though you are actually reducing access, not encouraging it as your goal and the law insist that you must do.

"Some degree of roading...may be desired to provide easier access for the elderly." (II-109) Yet, those alternatives affording "high or moderate" protection preclude roading altogether. Who has decided that elderly Indians or others wishing easy access will not be served in the plan?

> **Response:** The choice of the term "access" in the Plan was based on the use of the term in the AIRFA, as discussed above. The AIRFA Report (page 5) makes it clear that Indian practitioners must define adequate access. Consultation on the MBS and comments on the Draft Plan make it clear that Indian practitioners do not define "access" as roads and trails. For more on this subject, see the **Inventory** pages 176-177, 209-210, 272, 284-289, 301-307, 386, 309, 438-442, 456, 466. "Protect", "preserve" and "set aside" are repeatedly recommended, rather than "road" or "harvest".

NOTE THAT RIGHT OF ACCESS IS NOT A NEW RIGHT

The Plan/EIS should note that the right of access to sites was passed by Congress not as a new right, but as an implementation of the First Amendment to the United States Constitution. The Plan/EIS should go on to consider the current state of judicial decision making in this unsettled area of law.

> **Response:** The Forest Plan has been revised to indicate that concern with religious and traditional uses arises from treaties and the Constitution in addition to the AIRFA. Broadly speaking, the Plan and FEIS consider the most significant recent development in this area of the law to be the Supreme Court's decision in Lyng Northwest Indian Cemeteries Protective Association v. Block. The decision is interpreted as requiring sensitivity to American Indian religious uses, and as encouraging minimization of impacts on religious uses, but as not requiring protection of each specific use.

ROADS IN UNDEVELOPED AREAS, LOGGING LOW-ELEVATION OLD GROWTH AND THEIR EFFECTS ARE NOT DISCUSSED

A number of factors have not been given adequate consideration in the Forest Service preferred alternative. Road building in previously roadless areas and logging of lower-elevation old growth forest will unquestionably reduce the areas available for religious activities and gathering of traditional materials.

> **Response:** These effects were discussed in the DEIS, Chapter IV, pages IV-74-76; parallel text has been included in the FEIS.

LOGGING CEDAR DOES NOT FACILITATE ENTRY TO CEDAR AREAS

The Plan states that roads will facilitate entry to cedar areas for a brief period after roads are built and before trees are cut. This statement is an affront to the intelligence of the Indian and non-Indian people! The implication that the Forest Service is helping the Indian people by opening roads to cedar areas is absurd! This short-sighted "reasoning" ignores the fact that the cedar will be logged! Cedar is a cultural resource. The values of the cedar sites will be lost forever.

Response: The effects of logging on cedar availability were recognized in the DEIS and also in the FEIS, in Chapter IV The brief availability of cedar between road construction and timber harvest was not considered as a benefit to be derived from the implementation of the Plan; this statement has been reworded in the final EIS.

MANAGEMENT OF WESTERN RED CEDAR IS NOT DISCUSSED

None of the plans address the co-management of western red cedar; we are gravely concerned that the limited old growth cedar is threatened

Response: Changes made since the Draft include addition of a Forest-wide Standard and Guideline that states that western red cedar will be replanted where it currently or historically has existed or where it would be suitable to plant. Refer to Chapter 4, Forest Plan. Tribal input into the environmental analysis process for each project will certainly be considered in deciding whether cedar is included in the planted stock.

The protection afforded to cedar sites identified in the **Inventory** is summarized in Table IV-24, FEIS. Overall, as discussed in Chapter IV, the availability of cedar will be reduced

CHAPTER IV DISCUSSION ON CEDAR IS CONTRADICTORY

The section in the DEIS, Chapter IV on cedar is somewhat contradictory. "Cutting of cedar and particularly old-growth forest is perceived as irreparable." (IV-74) Yet, in the next paragraph the document suggests that "Cedar of a variety of age classes from old-growth to mixed-age stands is the *most valuable* " *In other words, although old-growth cedar* is "*irreparable*" after harvest, it is not necessarily the most valuable

Response: The text of this section of Chapter IV in the FEIS has been revised to indicate that cedar of saw-log size or greater is more valuable than cedar of smaller sizes Within the larger sizes, old growth cedar is more valuable than other size classes, and pure stands are most valuable. That is indicated by the **Inventory**. Conversion of cedar stands to a managed condition (i.e. harvest) irreparably destroys the natural qualities, (that is, the spiritual influences on their condition), that confer religious significance.

NEED A POLICY TO PROHIBIT HARVEST OF CEDAR

Recommend that western red cedar be considered a "sacred object" by the agency, and that the agency adopt a formal management policy that strictly prohibits its' commercial harvest.

Response: Consideration of western red cedar as a sacred object would exceed the scope of the AIRFA. Prohibition of commercial harvest would conflict with the Multiple Use-Sustained Yield Act, NFMA, and other legislation. The AIRFA Report shows that its concern with sacred objects is to remove restrictions on their possession. The Forest Plan now includes a Forest-wide Standard and Guideline for western red cedar; see Plan, Chapter 4.

PLAN SHOULD ADDRESS TAKING OF CEDAR

In the DEIS and draft Plan, no specific provision is made for Seyowin access to cedar and other floral needs The NF should allow for the taking of these materials or explain why it believes it is not within its discretion to do so. Note that the Indians reserved these rights by treaty.

Response: Forest policy on cedar use is governed by a 2400/2360 memo of April 27, 1981 to the Director of Recreation R-6, from Arno Reifenberg, Regional Attorney, and a 2400/2360 memo of July 23, 1981 from Regional Forester Jim Torrence to the Supervisor of the Olympic National Forest. The policy was reaffirmed by a July 19, 1989 memo from Michael E. Trow, Attorney, Office of the General Counsel, to the Supervisor of the MBS. In brief, the policy permits negotiated cedar sales to Native American groups. The effects of various Plan alternatives on cedar availability are shown in FEIS, Chapter II, comparison of alternative outputs and effects.

BETTER INVENTORY DATA NEEDED, ESPECIALLY FOR OLD GROWTH CEDAR

Before the Plan/EIS can adequately evaluate protection of old growth cedar forests, the Inventory of other National Forest timber stand data needs to be refined to identify them. Better inventory information is also needed for most other resources.

Response: As discussed in Chapter III, Vegetation and Timber, DEIS, "old growth" was not specifically inventoried in the most recent timber stand inventory. Chapter 2, Forest Plan, Information Needs has been revised to state the need for additional information on cedar availability. Also refer to the new discussion in Chapter III, FEIS on the integrated resource inventory, the old growth portion of this inventory should be completed by 1991 Amendments after this date (and the next full revision of the Plan) will include this new data. In addition, the complete resource inventory (which includes timber, vegetation, and other resource data) will be completed by 1995. Refer to Chapter 2, Plan for the list of information needs for all resources. Listed data will be gathered as funding becomes available.

DISCUSS SITES USED FOR GATHERING

Gathering is a right secured by treaty. Sites traditionally used for gathering roots, berries, mushrooms, and other flora need particularized consideration by the Forest Service.

Discuss impacts on old growth with regard to the several varieties of flora which are found only in old growth areas and are gathered by tribal members.

> ***Response:*** *Recognized in the DEIS on pages III-92 and IV-75. Sites used* for plant gathering are included in data on sites receiving "high" or "moderate" protection, and will be considered in project-level consultation.

INCLUDE MORE OF THE INVENTORY IN THE FEIS

The Plan/EIS should include a more complete discussion and analysis of the historical, ethnological, and legal bases for American Indian religious use of the National Forest. Entire sections of the **Inventory** could be copied and/or summarized for a more thorough foundation for decision making.

> **Response:** The **Inventory** was used in developing the summaries presented in the Draft and Forest Plans/EIS, and constitutes the overview required by the NFMA. Entire sections were not copied, since the Inventory is quite lengthy (743 pages), and 40 CFR 1502.7 recommends that "The text of final environmental impact statements .. shall normally be less than 150 pages and for proposals of unusual scope or complexity shall normally be less than 300 pages" Copying substantial segments of the Inventory would not guarantee better understanding.

INVENTORY IS INCOMPLETE, OUTDATED; COMMIT TO UPDATING THE INVENTORY

The Tribe is appalled by the Forest Service's current position that the Tribe had better hurry up and inform the agency of all such sites now or forever hold their peace. To inventory such sites, the Tribe's elder population must be involved; a great deal of work is involved The Forest Service must exhibit more understanding of this highly sensitive issue.

There were Tribes which did not participate in the **Inventory** process; it is, therefore, incomplete and efforts to update it should be made.

In addition to incomplete participation, the **Inventory** was completed in 1981; it is is old and probably incomplete even as to those who participated Does the Forest Service intend on updating this Inventory?

The implementing regulations for the NFMA (36 CFR 219 12(d)) require that areas needing further research be incorporated into budget development. The need for extension of the work started during the preparation of the Inventory is acknowledged in the Draft. Now, you should implement this by explicitly committing the resources necessary, include this commitment in the Final Plan.

> **Response:** The **Inventory** identified all Native American groups known to have a direct religious interest in lands administered by the Forest. However, specific tribes varied in their participation, and it is likely that use areas were not included in the **Inventory** Also, additional sites

have come into use. Updates of the **Inventory** are scheduled for 1991 and 1996 (Plan, Appendix D, Cultural Resource Implementation Schedule) This schedule is the basis for developing the program budget. The Forest will contact Native American groups regarding the updates and an appropriate format. Details of the budget will be developed based on tribal response. Also, Tribal representatives or individual practitioners may come forward at any time to identify additional localities.

NEED TO IMPROVE THE CONSULTATION PROCESS

The Plan/EIS should create a more adequate consultation process.

Recommend that the FS and the tribe establish agreed upon management principles which will guide all activities in-or-around potential or actual sites.

The Plan emphasizes the importance of the consultation process and Memorandum of Understanding. Yet, the consultation process has failed to respond to Lummi Tribal concerns. When tribal leaders and elders state that an area must be preserved, they are told that, at best, the forest activity can be adjusted "at the margin", or, the activity can be "delayed". Neither of these choices are real choices for areas with a sacred meaning. In addition, the fact that the FS does not meet in good faith to protect these sites, and now, that the Plan outlines the destruction of identified sites, is not likely to increase confidence in the consultation process.

Response: Inquiries will be made of the tribes to evaluate the consultation process and improve it. Establishment of management principles for religious and cultural use sites, through Memorandum of Understanding, will be undertaken within this context.

The Forest regrets that it is not possible to protect 100% of the inventoried religious use sites, and we regret that this is perceived as bad faith. The nature of most religious use sites is such that decisions must be of an all or nothing nature - a site is protected through non-development, or its religious significance is totally lost. It would not be appropriate to miss opportunities for protection or mitigation by failing to require consultation, hence we will continue to consult. A "no action" alternative is considered in each Environmental Assessment, and other protection or mitigation measures may be considered, however, it is not possible to protect 100% of the identified, or potential, religious use areas within the framework of multiple-use management.

THE CONSULTATION PROCESS NOT ADEQUATELY DESCRIBED IN DOCUMENTS

No planning element adequately describes the consultation process that the Service intends to employ when activities threaten to damage or destroy culturally significant sites.

Response: The existing process was briefly described in the DEIS, page III-93 and the Plan at 4-76. In the Forest Plan, the Forest-wide Standards and Guidelines have been revised to more explicitly describe the process to be employed during consultation. In 1987, the MBS contracted for development of a model consultation process, to be used as a starting point for updating consultation procedures. This will be submitted to local

tribes with the inquiry on **Inventory** updates, and responses will be used to develop consultation processes tailored to the needs of each group.

WHICH TRIBE HAS PRIORITY CONSIDERATION FOR USE, CONSULTATION?

With 15 Tribes in consultation about sites, the conflict between the various Tribes and individuals within those Tribes must be great. Which Tribes get priority consideration? This needs to be discussed in the document.

Response: Inter-tribal competition for the use of specific sites is not present, so it is not necessary to establish priorities among the Tribes.

WHEN DOES THE PUBLIC GET INVOLVED IN CONSULTATION?

We support attempts at mitigation through consultation. At what point, if any, does the public enter the process? We believe that we should be included in the early stages of consultation

According to the Forest Indian specialist, the public enters into the consultation process after the environmental assessment is written, and after Tribes are consulted (if there is an potential impact) - in other words, at the end. Does this violate NEPA?

Response: In fact, the public is involved during the first step of the environmental analysis process: scoping. As part of the scoping process, interested or impacted individuals, agencies, and organizations are consulted and invited to develop the issues and concerns to be addressed in the proposed project. The **Inventory** is consulted during scoping, well before the project is documented (either in an environmental impact statement, an environmental assessment with finding of no significant impact, or in a decision memo). If a religious site is present in the project area, the appropriate tribe is consulted during the data-gathering phase. A range of alternatives is developed, based on the input from the tribe and from other organizations and individuals involved. A preferred alternative is selected based on the decision criteria for the project, and the direction of the Forest Plan

TRIBE SHOULD BE FORMALLY INCLUDED IN ALL TIMBER HARVEST DECISIONS

Include provisions in the final plan to formally include the Tribe in all timber harvest decisions. Such coordination is crucial in order to insure that the Tribe's treaty rights are not interfered with by the Forest Service and contracting loggers.

Can we assume that if an area has cedar and pure water all tribes must be notified of ground-disturbing projects? (III-93) This seems to be an open invitation to control the management of the MBS by one interest group. Your goal is to provide access, not to protect the entire forest for Native American religious practice

Response: Including tribes in timber harvest decisions is provided for under FS NEPA Implementing Regulations (FSM 1950 and FSH 1909.15). The Tribe should make this request of the Rangers of the Districts managing lands of concern to the Tribe. It can be implemented at any time: in the

context of a project environmental analysis or through an agreement to send scoping requests to the Tribe. Subsequent decisions can consider Tribal input to the analysis.

Consultation is undertaken with a tribe if a ground-disturbing project is proposed within an area identified in the **Inventory**, or within an area in which the Forest has subsequently been notified of use. The tribe(s) notified are those with a record of use (historic or present) of the project area The Forest goal is to make areas available, subject to the totality of laws and regulations under which it operates.

LITTLE DISCUSSION OF PLAN IMPACTS ON TRIBAL SOCIETY

There is a lengthy discussion of the impacts of the Plan on the Human Community There is, however, little discussion of the impacts of these activities on the tribal social and community structure.

Response: Chapter IV of the FEIS has been revised to add material on the role of traditional culture in maintaining a sense of personal identity and worth, and in maintaining an ordered and meaningful community structure.

PROVIDE LOCAL LAND MANAGERS MORE DISCRETION TO SET ASIDE AREAS

Recommend that the agency restructure the consultation process, providing local land managers more discretion to permanently set aside identified cultural use sites and areas.

Response: The only authority to allocate cultural use sites and areas to Management Areas providing protection is contained in the National Forest Management Act and Renewable Resource Planning Act, which establish the Land Management Plan as the vehicle for making long-term allocation decisions The current Forest Plan will be updated at least every 10 to 15 years. In addition, during the environmental analysis for each proposed, ground-disturbing project, a "no-action" alternative will be considered.

ALL AREAS WITH CONDITIONS FOR TRADITIONAL/RELIGIOUS USE SHOULD BE SET ASIDE

Recommend that areas which contain environmental conditions necessary for traditional and/or religious use be set aside for traditional religious purposes and that transverse corridors be established between these areas.

Response: Areas containing environmental conditions necessary for religious and traditional uses consist of unpolluted lakes, streams and creeks; old growth and associated habitat, and unique geologic formations, all in an isolated setting We have interpreted this comment to mean a request to set-aside all such areas. That is not feasible within the context of existing Forest Service program legislation (Multiple Use-Sustained Yield Act, National Forest Management Act).

SUSPEND ALL ACTIVITY NEAR FOUR SITES

Recommend that all forest activity be suspended within a one mile radius (minimum) of Lummi sites 1-1, 1-3, 1-9, and 1-10. These sites will be significantly impacted under the current preferred alternative.

Response: The Preferred Alternative assigns areas 1-1 to MA 17, Timber Management Emphasis. Area 1-3 is assigned to MA 1B, managed to retain a semi-primitive character for non-motorized recreational use and to provide natural habitat for wildlife. Area 1-9 is primarily within Management Areas 23A (Other Municipal Watershed), 14 (Deer and Elk Enhancement), and 10, Wilderness. Area 1-10 is partially allocated to MA 5 (Recommended Wild and Scenic River), MA 11 (SOHA), and partially to MA 17, the portion allocated to MA 17 is currently roaded. On an acreage basis, a substantial portion of these areas will remain unroaded and unlogged.

DISCUSS AND IMPLEMENT PROCEDURAL ASPECTS OF AIRFA

The Plan/EIS should also discuss and implement the procedural aspects of the AIRFA. AIRFA not only requires access to sites, it also requires that Federal agencies give special consideration to American Indian Religious activities that affect them.

Response: The provision for consultation was discussed in the draft plan, pages 4-76 to 77, 4-154 to 4-156 and 5-8; it is discussed on page III-93 in the DEIS. Parallel text is included in the Forest Plan; Chapter III of the FEIS has been revised for clarity Local Tribes will be contacted on the need to update the Inventory, and updating has been scheduled Additional protection for sites will be considered in the context of project-level environmental analysis, and will be implemented provided it does not constitute a significant change to the Plan

NEED AN ADVISORY COMMITTEE TO EVALUATE ADEQUACY OF THE PLAN

Recommend that the Regional and National Forest offices, in association with the tribes, convene an Advisory Committee to jointly evaluate the adequacy of the Forest Plan, and the planning process, with respect to Indian Religious Use.

Response: A decision was made not to convene the Committee, since tribal comments on the Plan have shown a high degree of consistency, favoring a cessation of old-growth harvest, and other developments of old-growth areas, and calling for a halt to the decline of western red cedar Comments regarding the consultation process have likewise been consistent, expressing dissatisfaction. It is not clear what the Committee would add to this evaluation

SUGGEST A PROGRAM OF CROSS-CULTURAL EDUCATION

Recommend that the agency undertake a program of cross-cultural education, in association with the tribes, to improve understanding of the value and meaning of cultural use sites, areas, and resources.

Response: This recommendation is accepted, and is not dependent upon implementation of the Plan or any specific alternative.

HARVEST OF OLD GROWTH WILL IMPACT RELIGIOUS AND TRADITIONAL USES

The Forest Service makes harvest projections for cutting almost all of the old growth timber over a period of years; the opportunities for tribal members to practice their religion and gather traditional materials unique to old growth forests will be gone. The prospect of handing down a legacy is very dim given these planning objectives.

Response: Approximately 643,500 acres of old growth timber are present on the MBS. Over one-third are located in wilderness and not available for harvest. Other acres are not suited for timber harvest due to other resource allocations or because of unstable soils. Refer to Table II-91, FEIS. By the end of the first decade, the old growth remaining on suitable lands will be about 122,000 (from a starting point of 140,800); by the end of the fifth decade, old growth on suitable acres will total about 32,400 acres, with a total old growth acreage of about 535,000 acres.

INADEQUATE CONSIDERATION IS GIVEN TO SCENIC QUALITY

The plan only addresses 17 of 55 viewsheds on the forest. This is too much of an urban forest with high recreation use to allow only these few viewsheds to be well done. Add the following viewsheds: Whitechuck River, Suiattle River, French Creek, North Fork Sauk River, Crystal Mountain (it receives 300,000 skiers), Cuyada Creek, and Corral Pass.

Response: Based on public response to the Draft Forest Plan, several viewsheds have been added to the "Scenic Viewshed" management areas 2A and 2B. These include the roads up the Cascade River (FR 23) and Whitechuck River, Crystal Mountain, and the route to Suntop Lookout.

Additionally, there are many other allocations which maintain high standards of scenic quality. These include 1A, 1B, 1C, 3A, 3C, 3D, 5, and 10, among others. More than 75% of the National Forest land base has a high standard for visual quality, either Preservation, Retention, or Partial Retention.

STATEMENT ABOUT VISUAL QUALITY OBJECTIVES FOR ALL NF LANDS IS MISLEADING

"Establish and implement visual quality objectives for all Forest lands." This is very misleading. It implies that the visual management system will be in affect on all lands, when in reality, a few management areas have restrictive visual guidelines, and most just say meet maximum modification.

Response: Modification and Maximum Modification are visual quality objectives which allow management activities to dominate. This does not mean that there is no consideration for the visual resource. Less than 25% of the National Forest land base has this visual quality level

HOW ARE VIEWSHED CORRIDORS AND DISTANCE ZONES DEFINED?

Visual corridors should be limited to a half mile, rather than the two miles that you suggest (III-99).

In none of your summary did I understand the distinction between foreground and middleground scenery

Response: The purpose of designating scenic corridors or "viewsheds" is to provide a recreation setting that meets the public's expectations for scenic quality. Seen areas define the boundary of the area of concern. Distance zones (foreground, middleground) are established to differentiate between importance of detail (close up) and perspective (further away).

Foreground begins at the viewer and extends 1/4 mile to 1/2 mile away. Middleground begins where foreground ends, and extends 3 to 5 miles away. The purpose of having a range is to accommodate variations in terrain without creating arbitrary lines across the landscape. In some cases, parallel viewsheds, i.e. a road and a river, are combined when mapped, producing a wider foreground. A narrower corridor is not sufficient to sustain visual quality over time. These terms are further explained in Agriculture Handbook # 462.

WHAT DETERMINES PRIMARY AND SECONDARY VIEWSHEDS?

Are your primary and secondary classifications of viewsheds based upon the amount of traffic or some subjective criteria (page III-99 in the DEIS)? If there is specific criteria, it should be made available to the public and reaction to it sought during the comment period.

Response: Identifying Primary and Secondary Viewsheds is one step in the process of establishing sensitivity levels, which are a measure of people's *concern for scenic quality in National Forests* Sensitivity levels are determined for areas viewed by people traveling through the Forest on developed roads and trails; using areas (campgrounds, visitor centers); or recreating at lakes, streams, or other water bodies. Some degree of visitor sensitivity is established for the entire land base All travel routes, use areas, and water bodies are identified as being of either primary or secondary importance. The following list provides a general method for determining into which category an area falls:

	Primary Importance	**Secondary Importance**
Travel Route	National importance	Local importance
	High use volume	Low use volume
	Long use duration	Short use duration
	Arterial/Collector	Local/Project roads
Use Areas	National importance	Local importance
	High use volume	Low use volume
	Long use duration	Short use duration
	Large Size	Small Size
Water Bodies	National importance	Local importance
	High fishing, boating, or swimming use.	Low fishing, boating, or swimming use

The Draft Forest Plan allocated some of these viewsheds to management areas providing for protection of the scenic resource. The Forest Plan added several other viewsheds to this category See Chapter II, FEIS, Alternative Descriptions, for further information.

DON'T UNDERSTAND THE HARVEST REDUCTIONS FOR MEETING VISUAL QUALITY OBJECTIVES

I don't see how we can harvest 65% in foreground Retention, and 86% in background Partial Retention if we expect to have any trees in a large size class, and are on a very long rotation

We need more information about the rationale used to determine the length of extended rotation of vegetation; the 65% reduction in timber volume is a rotation twice as long as normal It seems very arbitrary.

Response: These figures have been misinterpreted. Sixty-five percent of full yield does not equal 65% harvest, nor is it a 65% reduction in timber volume. Rather, it means that with an extended rotation (5-6% harvest per decade for foreground Retention), we will only achieve 65% of potential timber yield over a rotation The prescriptions are designed to meet the desired future condition for the management area; refer to Chapter III of Appendix B, FEIS for more information on modeling extended rotations.

MA 2A NEEDS MORE SPECIFIC STANDARDS AND GUIDELINES

In MA 2A Foreground, requiring that 10% of timber stands in foreground areas contain trees 30"-36" in diameter is not very much. Why isn't there an extended rotation age of 120, 200 or 250 years, or a stipulation that only 3-5% of area may be harvested in a decade? There is a minimum 125 year rotation in Roaded Natural, why not in MA 2A?

Response: The model used to predict timber yields to achieve a certain visual condition can be found in Agriculture Handbook #559. In areas managed for foreground retention the model assumes a 195 year rotation. This will vary for different sites, but assumes that approximately 5-6% of the land base will be harvested each decade. The 10% stands with trees of 30-36 inches DBH is a minimum. The amount of disturbance per decade and the rotation length have been added to the prescription for this management area; see Forest Plan, Chapter 4.

SEEN AREAS AND ROTATION LENGTHS ARE NOT SITE SPECIFIC

The length of extended rotations for visual management should be site specific. It is nearly impossible to rationally comment on visual management in this plan, because most was done with computers and topographic maps, rather than by looking at the sites.

We cannot determine the impact that visual management has on other resources on a site-by-site basis. There is no rationale given to explain why an area was dedicated to visual management and/or how many acres will be allocated.

Response: For the purpose of forest planning and the visual resource inventory, seen areas are generated by computer. However, when projects are designed to implement the forest plan, actual viewing conditions are used. General rotation length to meet visual quality objectives are based on guidelines in the "Timber Chapter" of the National Forest Landscape Management series (Agriculture Handbook #559). Project planning will recommend adjustment to this as needed to meet specific area conditions. Rotations are long term management schemes while this plan covers only 10 years.

The acres falling into each VQO class by alternative, are displayed in Chapter II, Table II-9f. The existing visual condition, and the expected visual condition of each viewshed on the forest is described, by alternative, in Chapter IV, Scenery, Direct Effects, in the FEIS.

"FOREGROUND" SHOULD BE ONE-QUARTER MILE WIDE

Foreground must be defined as a strip 1/4 mile wide, not up to two miles.

Response: Foreground is "based upon the distances at which details can be perceived. Normally in foreground views, individual boughs of trees form texture or the detail we perceive. It will usually be limited to areas within 1/4 to 1/2 mile of the observer, but must be determined on a case-by-case basis.. " (page 7, Agriculture Handbook #462) Foreground may have been confused with viewshed, which is the portion of the landscape "seen" by most visitors from roads, trails, and recreation areas. The

viewshed is a corridor 1/4 to about 2 miles wide on either side of a road, trail, or river. (DEIS and FEIS, Chapter III.)

VISUAL QUALITY OBJECTIVES FOR MA 2B MIDDLEGROUND SHOULD INCLUDE RETENTION

In the management prescription for MA 2B Middleground, why is only partial retention required? Why not retention?

Response: Please Refer to page 43 of the Visual Management System Handbook, Agriculture Handbook #462. Typically, those areas in management area 2B which are suitable for timber harvest are in variety class B or C. These variety classes specify Partial Retention or Modification for the visual quality objective.

MIDDLEGROUND SHOULD NOT BE PROTECTED.

We support foreground retention/partial retention in some areas, but oppose the concept of middleground partial retention/modification, as it restricts management activities.

Some consideration should be given to protecting the 1/4 to 1/2 mile (maximum) adjacent to the road, but evidence of multiple use forest management should not be hidden when it occurs "in the distance." The public is infinitely more tolerant than the forest's middleground visual policy intimates.

The use of middle ground is too restrictive. Timber harvest areas should not be restricted if the harvested areas cannot be revegetated in one year; this is also true for landings.

Response: Management of the middleground of viewsheds or seen areas is an integral part of the visual management system. Given the high degree of public concern over scenic quality, it is appropriate to include this intensity in the plan. Considerable public comment was received regarding "paying attention to both foreground and middleground of visually sensitive landscapes."

WHAT LEVEL OF VISUAL QUALITY CAN BE EXPECTED FROM "ROADED NATURAL"?

The plan on page, 4-129 states that in Roaded Natural, "...modifications noticed...however, from sensitive travel routes and use areas, these alterations will appear subordinate to the surrounding areas". What are "sensitive travel routes and areas"? I thought only the 17 selected viewsheds were managed, and nothing was done elsewhere?

Response: When the "roaded natural" allocation overlays a sensitivity level 1 Foreground or Middleground, or a Level 2 Foreground, the visual quality objective will be Partial Retention.

For level 2 Middleground, or level 3, any distance zone, the visual quality objective for roaded natural is Modification.

In the DEIS, the visual quality objectives were met in the 17 viewsheds allocated to management areas 2A and 2B The visual quality objectives for the rest of the forest are still in place, but they are overridden in some

instances by the management allocation. Thus, on some pieces of ground we are exceeding the VQO, and on others we are not meeting the suggested objective. The visual quality objectives are established to meet goals for the management of the visual resource only. To the extent possible, these objectives are met for all areas. In some instances - where resource objectives conflict - we may reduce the VQO for these areas.

WHAT ABOUT VIEWSHEDS FOR TRAILS?

It doesn't seem like there is any consideration to trail viewsheds or smaller scale areas.

Response: Trails take on the Visual Quality Level prescribed for the management area they pass through. Thus, a trail passing through a Research Natural Area (MA 18) would assume a VQL of preservation. Some small scale areas, such as fee campgrounds, are considered sensitivity level 1 areas, and thus, receive foreground retention. Consideration for the scenic quality of a trail corridor should also be a part of planning at the project level

VISUAL IMPACTS SHOULD BE CONSIDERED FROM NATIONAL PARKS

Timber harvest plans along National Park boundaries should be subject to site review to mitigate the visual impact of cuts as viewed from the park. An agreement should be instituted between the Forest and the Park to assess the effects of timber harvest and other development upon the viewshed of the park, and to propose mitigation.

Response: Coordination between the MBS and the National Park Service has been on-going since the Forest planning process began The NEPA process allows for involvement by the Department of Interior during project planning. Consultation is carefully considered in the development of alternatives

HIGHWAY 410 SHOULD HAVE A FOREGROUND SCREEN

The supposed foreground protection screen along Highway 410 east of Enumclaw is inadequate. Consider leaving a 400 foot strip on each side of the road. Within the first 100 feet, mature trees that could be felled or pulled onto the road would be selectively harvested on a 2 to 5 year cycle. Mature timber within 200 feet of the clearcut would be selectively harvested at the time of the clearcut, leaving the remaining 100 foot strip of trees within the corridor untouched. This design would alleviate most of the windfalls due to lack of windbreaks near both the clearcut and the road, and still provide an adequate visual screen for the motoring public.

Response: Highway 410 is largely in private or checkerboard ownership up to the boundary of the Mather Memorial Parkway. There has been little consideration for the visual resource on private lands along the highway, though Mather has had very little disturbance. In the Preferred Alternative, Mather Memorial Parkway is allocated to MA 8, Special Area. No scheduled harvest is proposed, with the management emphasis on enhancement of the scenic and recreational values of the Parkway. (Plan, Chapter 4) The Mather Memorial Parkway will retain its mature forest

character. The 400 foot strip concept proposed here would be inadequate for maintaining visual quality over time.

WHAT IS THE STANDARD FOR VISUAL QUALITY AT CRYSTAL MOUNTAIN?

In your expected visual condition categories, Crystal Mountain has been designated as High for both the 10 and 50-year time frames Does this category result from the normal resort development associated with the ski area, including its trails, or are there other higher impact timber sales planned for the immediate area?

Response: The existing permit area at Crystal Mountain Ski Area is allocated to MA 3C. The standards and guidelines for this area allow no scheduled timber harvest, only that needed to maintain an attractive, safe setting, or to clear new ski runs. Roads and trails are to be developed according to an approved site development plan. Since Crystal Mountain is a sensitivity level 1 recreation area, the VQO's would be foreground Retention and middleground Partial Retention.

Visual Quality Levels for the access road leading up to Crystal Mountain have been revised between draft and final. The expected visual condition for the Crystal Mountain road have also been revised. See Forest Plan, Chapter 4, Visual Resource Summary.

WHAT IS THE VQO FOR THE PACIFIC CREST TRAIL AS IT PASSES THROUGH THE GREEN RIVER WATERSHED?

Referring to the statement on the Green River Watershed: "Manage to maximum modification except in areas seen from the Pacific Crest Trail." What do you manage for on these seen lands?

Response: The standard from the Pacific Crest Trail is foreground retention; refer to element A.1.a. for Management Area 21A, Forest Plan, Chapter 4.

CHANGE THE MANAGEMENT OF THE CASCADE RIVER CORRIDOR

The alternative selected in the final plan should be sensitive to the potential for visual impacts from forest practices along Park access roads and from Park lands along common boundaries. The National Park Service is concerned with the designation of the South side of the Cascade River to MA 17 (timber management). This is a major access route to the park and use is expected to grow in the future. Area should be designated as 1D or 2AB, and the road included as a scenic viewshed. Senate Report No. 700, 90th Congress indicates Congressional concern for scenic viewshed management on this road

Response: We agree. The allocation of the south side of this road has been changed to MA 11 (Spotted Owl Management Area) and MA 2B (Scenic Viewshed) in the Plan.

DID YOU CONSIDER SCORP AND NATIONAL PARK SERVICE PLANS?

In making a cross check between SCORP and the Forest plan, it is quite evident that the plan provisions for recreation did not make use of this information as required in 36 CFR 219.36 CFR 219.21(e).

Response: National Park plans and the Statewide Comprehensive Outdoor Recreation Plan (SCORP) were considered in this planning effort. National Park Service Plans are referenced in Appendix G; we inadvertently neglected to list SCORP in the DEIS. This has been corrected.

SCENIC CORRIDOR ALONG MT. BAKER HIGHWAY MAY BE DIFFICULT TO PROVIDE FOR

I see a dichotomy in Alternative H that could be difficult to deal with. There is a significant commitment to the concept of a scenic corridor along the Mt. Baker Highway. This will, in conjunction with local tourism efforts, act as a magnet for the type of recreation needing more developed recreation services. Alternative H does not adequately provide for the type of service.

Response: The Mt. Baker Highway has been designated as a Scenic Byway by the Chief of the Forest Service. It will be managed primarily for its scenic values. Refer to Forest-wide Standards and Guidelines for Scenic Byways, Chapter 4, Forest Plan Developed recreation services are currently being expanded, as evidenced by the renovation and additional facilities at the Glacier Visitor Information Center and the Heather Meadows Area. Opportunities also exist for recreational facilities on private lands adjacent to the highway.

ALTERNATIVE C SHOULD NOT HAVE THE LOWEST DISCOUNTED RECREATION BENEFITS

I completely dispute the paragraph in the Summary, page S-43, that states "Alternative C has the lowest discounted recreation benefits...but the highest levels of primitive and semi-primitive nonmotorized recreation capacity." The paragraph conclusion is that motorized use is more valuable than non-motorized use. This portrays the ultimate folly of misdirected analysis that derives from ignoring the value of the human spirit.

Response: We believe the paragraph should be retained, as it explains the discounted recreation benefits for each alternative displayed in Table S-3. Within the paragraph, recognition is given that ". primitive and semi-primitive nonmotorized recreation use has a higher value per recreation visitor day than motorized use...."

WHY ARE CUT-OVER AREAS ALLOCATED TO MA 1A IN ALT.C?

In Alternative C, many extensively-harvested areas were allocated to MA 1AB. This seems odd, as the high impact of existing roads, etc. would contradict the given definitions of this category. Why call a cut-over area "primitive"? What primitive recreation can be done in a clearcut?

Response: The goal of Alternative C was to maximize primitive and semi-primitive recreation opportunities. This was done by closing over 300 miles of roads. Closing the roads allowed many of the existing roaded natural/modified areas to be allocated to semi-primitive non-motorized.

While the current conditions of these areas do not meet the semi-primitive criteria, the future conditions would.

DO WE NEED TO LIMIT NUMBER OF OUTFITTER GUIDES?

Do we need a statement about excessive outfitter-guide use in and outside wilderness? How do we determine if there is too much physical or social impact? If too much, do outfitters get booted out before the public is rationed?

Commercial outfitters and their attendant stock animals should be carefully regulated and monitored. Preservation of natural resources should take precedence over such commercial uses .

Response: Commercial outfitting and guide permits should be allowed where there is a demonstrated management and public need compatible with general public use. This use will be permitted if it does not generate unacceptable impacts on wilderness resources or cause changes which approach limits of acceptable change. The number of permits issued and the amount of use allocated to permit holders should be evaluated periodically to assure an appropriate balance of use between the general public and outfitter-guides. Outfitter guides should not be allowed to dominate the use of an area or occupy favored campsites to the point that use by the general public is limited or constrained. This has been clarified in the Forest Plan, Chapter 4, Forest-wide Standards and Guidelines for wilderness

ALLOW NO DEVELOPED SITES IN RIPARIAN AREAS OR CRITICAL WILDLIFE HABITAT

Developed sites should be located outside riparian management area boundaries and provided with developed trails to access water.

Keep developed sites outside of known critical wildlife habitats or riparian management area boundaries.

Response: Standards and Guidelines for Management Area 13 stipulate that activities within riparian areas will be permitted only when riparian objectives can be accomplished. Any conflict between riparian values and recreation use will be resolved in favor of the riparian values.

Developed sites, such as campgrounds and day use areas, are permitted within riparian areas. People are attracted to this type of environment and our experience has shown that riparian values can be better protected when facilities - including sanitation - are provided in a managed setting, compared to unrestricted use with no facilities. Critical wildlife habitat, such as that needed for threatened and endangered species, would preclude any development. Refer to MA 13, Chapter 4, Forest Plan.

ASSUMPTION THAT USE WILL NOT EXCEED ESTIMATED CAPACITY IS FLAWED

The assumption (page II-96, DEIS) that projected recreation use will not exceed the estimated capacity for any activity is strange. If this were valid, no area could experience overcrowding.

Assuming that projected use will not exceed estimated capacity for an activity may be good for modeling but it does not correspond with experience. It is more likely that the "quality" of the experience will simply be reduced. The FS has dealt with this problem for many years, but there are very few instances where overuse has been successfully controlled. Even then, controls have only been imposed as a last ditch resort and only after environmental damage is very evident.

Response: This statement refers to our decision not to value any expressed recreation demand beyond the estimated capacity for a particular zone or activity. For example. if the capacity for developed recreation is x and the demand is 5x, the FORPLAN model is constrained from accruing any value over x, as it is likely that use will be restricted and thus managed at or near this capacity level. This is done to more accurately portray the economic effects of recreational use as limited by capacity, instead of valuing all potential use, even that beyond capacity. Economically, the total value should be about the same - if use significantly exceeds capacity, all users will incur decreases in value because of deteriorating quality of experience. Thus, use greater than capacity times lower unit values should be approximately the same total value as that modeled.

Historically, overuse has been a problem as stated; however, with implementation of this plan, and the standards and guidelines - including monitoring the limits of acceptable change (LAC's) - the Forest is optimistic that site deterioration can be reversed

EXPLAIN TABLE S-1

Table S-1 shows zero potential recreation sites - what does this mean?

Response: Table S-1 shows acres allocated to various management areas, but does not show potential projects All proposed developed site construction are shown in the Forest Plan, Appendix D, Recreation Implementation Schedule. Additional sites will continue to be added to this implementation schedule, through Forest Plan Amendments, as the need arises and funds are available.

PLAN DOESN'T RESPOND TO DEMAND FOR DEVELOPED SITES

The lack of maintenance in many developed areas and associated use impacts has been apparent for at least a decade. This, along with the projected increase in demand for all types of recreation sites should be a primary focus of the plan.

Your figures are not realistic when you say there are ample campgrounds; we have been turned away from too many to believe that.

According to your estimates, population in the Puget Sound area is projected to grow by 16% to 26% from 1980 to 1990, and another 10% to 19% by 2000. While this is mentioned in the DEIS, the proposed plan does not respond to these widely recognized public needs for more sites and developed facilities to accommodate the obvious present and future demand. The plan states that new construction of sites will be needed later - why not now? The Plan also states the Forest has enough developed sites to meet demand in the short term - we disagree.

Response: We recognize that, while we can meet Forest-wide developed site demand over the short-term, some specific sites on the Forest are currently over-used and over-capacity, especially on high-use summer weekends. The priorities in the near future will focus on these areas, with reconstruction, expansion, and increased maintenance of the existing sites. In the next decade we intend to rehabilitate all of our campgrounds that are currently in need of maintenance. Late in the first decade, four new campgrounds, and 8 to 12 new day-use sites, like Heather Meadows and Deception Falls, will be constructed. The decision to construct new sites is dependant on demand and the availability of funding. Developed site construction and reconstruction schedules can be found in Appendix D of the Forest Plan.

DISPLAY OF DEVELOPED CAMPGROUND INFORMATION IS MISLEADING

The draft documents are misleading in portraying the number of campgrounds planned for construction by alternative The misprints in the Public Summary, which conflict directly with the DEIS, will leave people confused and unable to comment on the management of the MBS.

By lumping campgrounds with ski areas, it is difficult to determine the plan's effect on campground development and maintenance.

Response: The errors in the Public Summary has been corrected. Appendix D, Forest Plan shows the program for construction and reconstruction of campgrounds in the Preferred Alternative. Chapter II, FEIS shows the campground construction and reconstruction by alternative.

NEED A LIST OF DEVELOPED SITES

Please include a list of all existing and potential developed sites with their capacities and current experience level, along with desired future capacities and experience levels.

Response: This information has been included in the FEIS, Chapter III, and in the Forest Plan, Chapter 4 (Resource Summary). Future developed recreation construction and reconstruction is found in Appendix D of the Forest Plan.

NEED FOR IMPROVED AND UPDATED FACILITIES, AND A VARIETY OF DEVELOPED SITES

There is a need for more campgrounds with flush toilets, running water, hot showers, etc. However, do not make campgrounds into cities by making them all larger in order to reduce unit costs.

The Forest Service must realize that the demographics of national forest recreation clientele are rapidly changing as the visitor population is aging and changing their activity preference in favor of better facilities and easy access.

I would hate to see Forest Service campgrounds run KOA style, they should offer a more primitive setting.

Response: The FS recognizes there is a demand for a wide diversity of developed camping facilities and experiences. This is addressed in Chapter 4, Forest Management Goals for recreation, Forest Plan. Our goal is to provide a broad spectrum of recreation opportunities which require a natural setting and cannot be provided on non-National Forest Lands. To accomplish this, we will be upgrading some campgrounds and high use sites to include more amenities (like flush toilets) where water and power are economically available.

CAMPGROUND CLOSURES ARE NOT JUSTIFIED

Developed car campgrounds are in great need. Why are only half the original number of campgrounds open? We recommend you begin a program to reopen most of the campgrounds and/or identify future needs.

After closing campgrounds due to lack of funds, you are now proposing to build new ones or enlarge some, while many of the closed campgrounds are still sitting there in their closed condition. It would be judicious to make sure that adequate funding is available before committing to new ones.

Response: The decision to close a campground is not taken lightly. In 1984, a study was conducted of all developed recreational facilities on the Forest, it is described in Chapter III of the DEIS and FEIS. The goal of this study was to better utilize available funding and to identify opportunities for improved campground management. The study recommended altering management on 43 percent of the sites. Twenty-one sites were closed, most with less than 10 units/site, so the overall capacity of the Forest was not impacted. These sites will remain permanently closed as a developed site, but remain available for dispersed camping. New capacity will be added at existing sites and at new, economically efficient, locations.

IT IS A CRIME TO CLOSE FRENCH CREEK CAMPGROUND

I think it was a CRIME to beat up and close the beautiful campgrounds at French Creek. Citizens paid a lot of money to build that, and donated time to care for it. And now you are planning on spending $280,000 plus the cost of the facilities that are in place to destroy our other property.

Response: French Creek Campground had deteriorated to the point that the Forest was unable to effectively maintain and manage the facilities. A quality camping experience was not available there. In 1980, about one-third of the facilities were heavily damaged by flooding; vandalism followed. This destruction, coupled with limited financial resources, lead to the closure decision. The historic shelter and sanitation facilities have been retained for public use.

NEED YEAR-ROUND CAMPGROUNDS

We object to the arbitrary and unrealistically short use-season for developed campgrounds. We believe FS policy limiting use of most campgrounds to between around May 15 to September 15 is inappropriate, unjustifiable and without logical support, especially since the weather during the remaining 9 months is

often good. Especially onerous is the fact that access to the campgrounds is usually blocked by locked gates outside of the use season.

You should rewrite your plan recreational policy to provide unrestricted, year around access to developed campgrounds, except during the snow season, when use will be self-limiting. Year-round use need not include a water supply or garbage service outside the heavy use season.

Response: The Forest Plan does not dictate the season of use for recreation. This has traditionally been a function of the budget. We would be responsive to a longer season of use for developed campgrounds if solutions could be found to the problem of vandalism - and to a lesser extent inadequate funding - experienced during those months when use is down. Gates have been installed to offer some degree of protection of the site from vandals

Darrington Ranger District is currently experimenting with keeping 13 campgrounds along the Mountain Loop Highway open all year at reduced service levels. There is no security, water, or garbage pickup. This policy may be continued if campgrounds remain clean and free from vandalism.

GREATEST DEMAND IS FOR MOTORIZED DISPERSED RECREATION LIKE DRIVING FOR PLEASURE

The Forest has misinterpreted use data and has erroneously shown higher demand for non-motorized dispersed recreation than for motorized dispersed recreation. It must be kept in mind that "driving for pleasure" or "auto travel" is the most popular activity on the forest.

Response: While it is true that motorized dispersed recreation has a greater demand than non-motorized in absolute numbers, motorized recreation also has a greater surplus of capacity (supply) over demand (use). The plan shows that capacity is reached quicker for non-motorized recreation than for motorized dispersed. In part, this is due to the higher per acre carrying capacities for motorized recreation lands

Driving for pleasure can be a misleading statistic and needs clarification For instance, in 1983, 70% of the driving for pleasure RVD's occurred on I-90 over Snoqualmie Pass. This is typical; most of the currently reported auto travel/driving for pleasure RVD's occur on state or federal highways that pass through the national forests, a much smaller amount actually takes place on Forest Service system roads. The 1975-76 Outdoor Recreation Survey for Washington identified driving for pleasure as the number one activity in the state, but did not identify where this activity was occurring.

WHY DOES THE AMOUNT OF DEMAND SATISFIED VARY SO LITTLE AMONG ALTERNATIVES?

Why do tables B-65 and B-74 of the Appendices show the demand satified for non-motorized recreation varying so little among the alternatives when the amount of unroaded lands varies significantly?

Response: The percentages cited in Table B-65 include acres within wilderness as well as unroaded lands. The amount of non-wilderness unroaded lands does not vary greatly across the alternatives because

approximately 60% of these areas are unsuitable for timber harvest. The total acres of unroaded lands plus wilderness vary by only 18% across all alternatives. This table shows that the forest will only be able to satisfy 86% of the demand for these types of recreation at the end of the first decade. The small variance is due to the assumption that we are already at or near capacity for non-motorized dispersed recreation.

NEED TO ADDRESS SITE-SPECIFIC DEMAND

The plan should adequately address site-specific recreation demands and propose alternatives for dealing with those demands. The proposed plan discusses the expected increased demand for recreation but fails to address site specific solutions and impacts.

Response: This is a programmatic Plan that addresses the various resource programs on a forest-wide basis; however, potential site specific projects are identified in the appropriate appendices of the Plan. During the implementation of the Forest Plan, the decision on which site-specific projects will be needed to meet the intent of the forest-wide plan will be determined. The impacts from increased demand for recreation are addressed in Chapter IV of the FEIS.

DISCUSS THE EFFECTS OF RECREATION ON NATIVE ECOSYSTEMS

The effects of recreation on the native ecosystem need to be addressed, both in recreation use conflicts in Chapter III and elsewhere in the documents. Recreation can have a disproportionate impact on some areas/habitats (around lakes, and in alpine and subalpine meadows for instance), and indications are that recreational use will increase.

Response: The effects of recreation on all aspects of the environment are discussed in Chapter IV, FEIS. A specific discussion of the ecological impacts of wildland recreation has been added to the Wilderness section of Chapter IV.

PLAN DOES NOT INCLUDE ANY EDUCATION PROGRAMS

There is not provision for the development of education programs within the National Forest system. Was this an oversight? Just as important as any other topic that is covered here, we feel the Forest Service should integrate a very much needed public education program that would illustrate all the various aspects of multiple use and the National Forest System. Examples are displays in service centers, nature and interpretive walks, programs at campgrounds, etc.

Response: We recognize the importance of education programs and did address these programs in several places in the DEIS. In response to this and other comments, a new goal has been added to the Forest Management Goals, Chapter 4, Forest Plan· "Encourage a sense of ownership through expanded interpretation and education. ." The Forest also has an active program of wilderness education in several of the areas school districts. The Forest has also embarked on a greatly expanded interpretive program. Recent projects include Snoqualmie Pass Visitor Center, Skagit River Wild and Scenic River Interpretive Sites, John Muir Interpretive trail for the

handicapped, new displays at the Glacier Visitor Center, and the Fire and Ice Trail at Heather Meadows.

INCLUDE AN ANALYSIS OF RECREATION NEEDS IN A REGIONAL CONTEXT

The Plan should include an analysis of recreational needs in a regional context including all land management agencies. Some discussion should be given to the need for interpretation and information services.

Response: An analysis of recreational needs in a regional context is addressed in the Forest Service Regional Guide for the Pacific Northwest Region and the Washington Statewide Comprehensive Outdoor Recreation Plan (SCORP). Both of these documents were used in the preparation of this Forest Plan. A new goal was added to the recreation goals section of chapter IV of the plan dealing with increased interpretation and education.

SUGGEST CHANGES IN INDICATORS OF RESPONSE

Indicators of Response Should include an evaluation of actual recreational use rather than just some suitability criteria; i.e , some smaller areas could have good visual qualities, adequate roads, and other amenities, but could be too isolated to provide wildlife recreation or have and insect problem or some other nuisance that would keep people away, but that would not show up in a "qualitative analysis." We recommend that wildlife abundance and diversity be a parameter to judge these areas.

Response: Wildlife abundance and diversity are considered and addressed in the Indicators of Response for the issue of Old Growth Ecosystems and Fish/ Wildlife/Plant Diversity. Note that this issue has been re-titled since the DEIS. The indicators of how the FEIS alternatives respond to the issue of Recreation Opportunities have not been changed from the draft.

NONWILDERNESS PRIMITIVE AND SEMI-PRIMITIVE RECREATION OPPORTUNITIES LACKING

In the Summary, it is stated that the assumption was made that projected nonwilderness primitive and semi-primitive recreation use will not exceed capacity. It sounds like you are speaking of a net displacement of recreationists from the national forest. Since there are few alternatives for this type of use, it will become essentially unavailable to those who can't travel to another, less-developed forest. If the Forest chooses to further reduce the supply of this kind of recreation, people will have little choice but to abandon the activities they value. I don't see this as providing for a wide range of recreation opportunities, as required of NFMA.

Response: We believe a broad range of recreation opportunities has been displayed and analyzed among the various alternatives Due to the greatly increased population of the Puget Sound area, it will not be possible, under any alternative to meet the demand for Primitive and Semi-Primitive recreation. This will lead to a reduced experience level on these lands and displacement to other areas, or to increased regulations on the use of these lands.

JUST ASSUME CAPACITY EXPANDS AND CONTRACTS WITH DEMAND

Instead of making arbitrary judgements, isn't it just as rational to assume that capacity expands and contracts with visitor demands? If an area is too crowded either: 1) people will regulate themselves and not return or 2) the number of people there doesn't impact their experience.

Response: Your assumption that capacity expands and contracts with visitor demands assumes that wilderness was created solely for recreational use, and that use can continue to expand unchecked. This assumption is false. *The over-riding goal of wilderness management* is to protect and preserve the natural environment from human caused change. This is accomplished through the use of the LAC process.

Outside of the wilderness, the ROS system attempts to preserve a broad spectrum of recreational opportunities and experiences. It attempts to stop displacement of users. Displacement is a shift in behavioral patterns of resource users in response to adverse changes. Displacement is presumed to be differential among individuals; as the recreation setting changes such changes may alter the probability of users having desired recreation experiences (Anderson, 1980). Research on river users shows that crowding is the most frequently cited reason for not returning to an area (Dekker, 1976, Nielsen and Endo, 1977, Shelby, 1988.

TOO MUCH LAND ALLOCATED TO WILDERNESS, UNROADED RECREATION

Under the proposed land allocations, wilderness, Alpine Lakes area, and proposed unroaded areas total 1,233,445 acres, or 74.6% of the net forest acres. However, recreation use days for wilderness and unroaded areas constitute only 12.6% of all recreation-user days. PLUS feels that this is clearly an imbalance in land allocation.

There are numerous factual errors and false assumptions in the analysis and proposed management direction for the recreation resource on the forest. The draft plan presents a biased, hard-sell case for retaining non-wilderness roadless areas. There are many examples of the overly-enthusiastic case for roadless area retention

Response: We are unable to duplicate the 1,233,445 acre figure cited. The acres in MA 27, Alpine Lakes Management Area are not assigned solely to *unroaded recreation, but to a variety of uses, including general forest,* scenic forest etc. Refer to the discussion in Chapter II, Alternatives, FEIS.

Land was allocated in the Preferred (and all) alternatives to meet the objectives of the alternative and maximize net public benefits. A new alternative is displayed in the FEIS that was developed to meet to objectives of PLUS - Alternative I.

ADD THE POSITIVE EFFECTS OF BUILDING ROADS IN UNROADED AREAS

The discussion of cumulative effects and indirect effects of building roads in roadless areas (DEIS, page IV-120) is a fictionalized elaboration of the obvious It is interesting that only the perceived negative aspects are mentioned. There will be a change in use, resulting in increased RVD's and

other multiple-use benefits, but whether or not this would affect wilderness use on and off-Forest (negatively or positively)... this is unknown. Please elaborate, including the citation of pertinent research publications.

Response: There are a number of publications that speak directly to the behavior of the recreating public, this information and citations have been added to the FEIS. However, we acknowledge that opportunities would increase for those seeking recreational pursuits in a roaded setting. The cumulative effects on recreation has been revised accordingly (Chapter IV, FEIS).

MINIMIZE PRIVATE DEVELOPMENT ON NF LAND

Private development under special-use permits on the public forest lands should be minimized. The Forest does not have an obligation to provide profits to private industry, nor does it have an obligation to develop its lands for more sophisticated forms of recreation. Developed recreation is better developed by private industry on private lands. Primitive recreation is absolutely unavailable on private lands; this experience should be available for as many people and for as many years as possible.

On page 4-1, Forest Management Goals for recreation are addressed Paragraph 6 talks about encouraging private development under special use permits. This is highly objectionable and evidence of the unfortunate trend to "privatize" national forests.

Resorts and organization camps would constitute an exclusive use by my definition. It is, in a sense, providing "free land" for a very specialized elite user group while taking the land away from use by the general public. Recognizing the FS obligation to existing groups (Camp Shepard, etc.), I oppose additional "permittees" permanently changing the character of national forest land.

Response: The Forest Management Goals for Recreation found in Chapter 4, Forest Plan, have been revised. These goals now focus on providing recreational opportunities through partnerships and providing a broad spectrum of opportunities, with an emphasis on those opportunities which require a natural setting.

STATEMENT THAT THE MBS CANNOT MEET DEMAND FOR SPNM RECREATION IS UNFOUNDED, THE FOREST DOESN'T NEED MORE WILDERNESS-LIKE RECREATION.

According to the North Cascades Complex 1987 General Management Plan, 94% of the total 674,000 acres under Park Service jurisdiction is recommended as suitable for wilderness and will be so managed. This consideration should be weighted heavily in recreation planning on the Forest. It should indicate increasing demand for non-wilderness facilities and road access on the Forest. It should not be construed as a need for "more of the same" wilderness outside the park.

We can find no factual evidence to support the planning assumption that "the Forest cannot meet demand for unroaded, nonwilderness dispersed recreation without seriously altering the expected recreation experience on these lands."

The statement that SPNM demand exceeds supply is illogical and unfounded by any credible evidence presented in the plan documents. We believe the supply/demand analysis and projections for SPNM recreation are biased, erroneous, and skewed beyond reason relative to the supply and demand for accessible, developed and motorized dispersed recreation.

Response: Considerable discussion is offered in the FEIS (Chapters II and III) to substantiate our conclusion that demand for semi-primitive nonmotorized recreation outside of wilderness exceeds the supply. This conclusion generated several comments to our draft planning documents and warrants further explanation.

There may be a misunderstanding of just what lands are included in the ROS classes. *The ROS classes pertain only to those lands outside of* designated wilderness. There is much less primitive and semi-primitive recreation lands available since the 1984 wilderness legislation.

While wilderness can offer a primitive or semi-primitive setting, the management emphasis within wilderness is preserving natural conditions and provide outstanding opportunities for solitude. This contrasts with a management emphasis on recreation in semi-primitive areas outside wilderness, where a higher level of use can be accommodated with greater management flexibility.

The 1985 Washington State SCORP projected a shortage of backpacking, day hiking, camping, four wheel driving, and motorbike opportunities within the two regions of the State which include the Mt. Baker-Snoqualmie. The *national forests and parks have the most suitable lands for those* activities requiring a semi-primitive or primitive setting such as backpacking and day hiking. Those activities requiring a roaded setting are better met elsewhere in the state. Most camping opportunities are provided by the private sector. SCORP shows that state-wide, the demand can be met for roaded settings, but that we are falling farther behind in meeting those opportunities dependant on the unroaded setting. The Draft 1990 SCORP states "Approximately 1,169,000 acres in National Forests are currently designated for semi-primitive recreation. There should be no net loss of these acres". The State of the Environment 2010 report concludes that "overuse by humans currently poses the most serious ecological threat to recreation lands, esp. to primitive lands." The Preferred Alternative reflects these concerns in its allocation of land.

EXCESS ROADED RECREATION SHOULD NOT BE VALUED IN FORPLAN

There appears to be an over-supply of roaded recreation. Roaded recreation should not, therefore, be counted as a benefit in the FORPLAN calculations.

Response: We assume that you mean that the "excess" supply (that supply not currently being used) should not be counted as a benefit in the FORPLAN calculations. This is correct; FORPLAN only places a value on recreation which is currently occurring.

MISSING SPM ACRES

The current total acres of SPM zone is shown in the plan (2-6) as 9,714 acres. In contrast, the Preferred Alternative "H" shows 2,512 acres for SPM recreation. What became of the missing 7,200 acres of SPM zone?

Response: The 9,714 acres in the plan (page 2-6) refer to acres of semi-primitive motorized recreation opportunity located across the forest. The 2,512 acres referred to in Alternative H are acres allocated to management area 1C- Semi-Primitive Motorized. Alternative H actually allocated 1,667 acres of the existing SPM ROS acres to Management Area 1C. The other acres of SPM ROS were allocated as follows: 1,201 to scenic viewshed, 1,836 to semi-primitive non-motorized, 781 to developed recreation, 63 to special area, 1,095 to wildlife habitat, and 2,195 to timber harvest.

DEMAND FOR ROADLESS RECREATION IS NOT RISING

In the DEIS, following a glowing - albeit nonobjective - discourse that "many people feel that the remaining roadless areas should be retained...in recognition of the increasing interest in unroaded recreation and the shrinking land base", there is a statement that interest in this issue is part of a national trend. This statement is false, from the base year of 1980 to the last year of record, 1986. Dispersed, general undeveloped area recreation in the nation has increased only 0.7%. This is not a significant trend. Statewide, there is no such rising demand either, in the backcountry areas of North Cascades National Park recreation use has been steadily declining over the past decade.

Response: Updated recreation supply and demand information presented in the draft 1990 SCORP show that statewide, visits to Park Service sites have increased 24 percent between 1983 and 1988, surpassing the national visitation increase of 16 percent. Additionally, while "backcountry" (managed for primitive recreation) overnight stays have declined 37% nationally during those years, overnight backcountry use of our state's National Parks increased 17%. A significant difference between these Parks and others is their convenient location relative to large population centers. The 1990 SCORP identifies that the demand for primitive recreation is exceeding capacity in National Parks and Forests (Draft Washington Outdoors 1990 Assessment and Policy Plan)

PLANNED NEW AND RECONSTRUCTED TRAIL MILEAGE IS INADEQUATE

The Forest Service has acknowledged the continuing increase in demand for backcountry hiking and horseback recreation. The Draft Plan did not offer enough new/reconstructed trails to replace those lost to timber harvest and lack of maintenance. Planned new miles do not meet the increasing demand.

Response: Alternative J (Preferred) includes a total of 220 miles of new trail construction in Decade 1 and an additional 220 miles of new trail construction in Decade 2, a substantial increase over the DEIS. In the first decade, 493 miles of trail reconstruction will be completed. See FEIS, Chapter II, Table II-9f for a comparison of alternatives. Appendix E of the Forest Plan includes a total system trails inventory with planned year of construction. The MBS will not be able to meet the continued demand for "more recreation" because of the limited land base of the Forest. Other agencies and landowners will need to share in providing opportunities. Even then, there will be a point in time when demand will exceed opportunities.

NEED ADEQUATE MILES OF TRAILS FOR MULTIPLE USES

Is an adequate mileage of trails to serve various modes of travel provided? The Forest should not feel obligated to provide for all types of uses.

The proposed level of trails in primitive and semi-primitive areas is not adequate to meet projected demands. Incorporate the Trails 2000 proposal.

Build more trails throughout the Forest The only way to reduce conflict in a true multiple use system is to provide facilities that encourage natural separation without undue restrictions on one or two kinds of users

The final plan should propose improvement, expansion, and proper administration of trails to accommodate more users and a wider variety of uses.

Response: The Forest does not feel obligated to provide for all types of use. We do, however, seek to provide diverse recreation opportunities when and where that opportunity exists. Each "user type" (or primary objective) may not occur in all areas of the Forest. One area (or Ranger District) may, however, have more opportunities for a particular user type than another. The miles of trails in the Plan have been increased by 350 miles, in response to public comment on the draft plan. The vast majority of new trails are in dispersed recreation lands outside of wilderness. Between DEIS and FEIS, we incorporated many of the ideas and concepts of the Trails 2000 proposal.

Refer to Appendix E of the Plan for a list of trails by user type (primary objective) and level of difficulty. The Capital Investment Program (Table E-2) is a more aggressive program than that proposed in the draft plan.

NO TRAILS EXCEPT THE PCT AND TRAILS WITHIN WILDERNESS SHOULD BE RESTRICTED TO USER TYPES

No trail except the Pacific Crest Trail and those trails in Congressionally designated Wilderness should be restricted to certain types of users, unless preceded by a specific evaluation to determine that unacceptable and

irreversible resource damage is occurring. Even then, restrictions should involve closure of the whole area, not just restricting certain users

Response: It is our objective to provide trails designed for 1) Primary Objective (user type) and 2) Difficulty Level, within those user types. It is also our intent to NOT restrict any other uses unless resource damage is occurring or conflicts arise. This has been clarified in the Plan, Appendix E, Objectives

SHOULD MORE WILDERNESS TRAILS BE BUILT?

Why will trails in wilderness will be completed in two decades? (page B-40, DEIS) Later (B-102), it is suggested that most construction will be done by the end of Decade 1. Given the decrease in wilderness use, this does not seem either rational or supportable

Response: Because of the degradation and resource damage occurring on the wilderness trail system, we feel that reconstruction of existing trails is of high importance. To protect the wilderness resource, we have applied for funds to reconstruct those trails within the first decade. The actual money received will depend upon the allocation from Congress towards that effort.

TRAIL RECONSTRUCTION SHOULD BE A TOP PRIORITY

You identified 48 areas in alpine meadows and wetlands that suffer from overuse and resulting environmental damage. This is a serious issue that needs to be addressed in the management plan

The existing trail system should be maintained - a top priority.

Response: Appendix E of the Plan shows the miles of trails, by specific trail, that will be reconstructed Since the draft plan was issued, trail maintenance has been given even more priority. A total of 493 miles of trail will be reconstructed within the first decade, the remaining reconstruction will be completed mostly within the first three decades. We have applied for funds at a level to accomplish this work, as discussed above.

INCLUDE AN INVENTORY OF TRAIL RESOURCES, EFFECTS OF MANAGEMENT ON TRAILS

Include an inventory of trail resources and clearly indicate how each trail will be affected by the proposed management for that area. Also, discuss in detail how conflicts between motorized and non-motorized users will be resolved.

Response: Appendix E, Trail Management Plan of the Forest Plan, includes an inventory of existing and proposed trail resources. The environmental consequences of the plan alternatives on trails are discussed in general in Chapter IV of the FEIS The effects of site-specific, proposed projects on trails will be examined in the analysis done at project-level planning The EA process is open to public involvement, and it is encouraged.

Appendix E, Forest Plan, Table E-1, indicates how each trail will be managed, regardless of the management area. Conflicts between motorized and non-motorized uses are dealt with through designation of a "primary objective." Refer to Table E-1, Plan Appendix E. There are ten primary objectives; each trail is allocated to one of these, ie. hiker, snowmobile, cross-country. Any conflict is resolved in favor of the primary objective.

BUILD LOOP TRAILS THROUGHOUT THE TRAIL SYSTEM

Build more loop trails; they disperse use, enhance hiking, and provide better utilization of an area.

Response: In developing a preferred alternative, more emphasis was given to loop and connecting trails. Where loop/connecting trails were not detrimental to other resource values, more were included in the Plan. Refer to Appendix E, Plan.

ADD "INTERCONNECTING LINKS" TO LOOP TRAILS FOR MORE DAY HIKES

Draft Plan : Add "interconnecting links" after "loop trails" in Item 8, page E-4 - may be necessary to provide more day hikes and weekend backpack possibilities.

Response: This wording has been added; it is now on page E-4, Item 5.

CONCERN OVER THE LOSS OF TRAIL MILES FROM LOGGING, ROAD BUILDING

We are concerned over the loss of trail miles due to logging and road building activities. Also, if and when logging/road construction occurs, the contractor should rehabilitate the trail.

Response: It is Forest Service policy to restore or substitute trail miles interrupted by logging. Forest Service Manual 2405.12, R-6 Supp. 319, 1/84 refers to this. The Forest-wide Standards and Guidelines for Trails (Plan, Chapter 4) state that trail mileage will not be lost as a result of logging and/or road activities. Also, refer to the Resource Summary for Trails, Chapter 4, Forest Plan and Appendix E. The Forest Service receives substantial comment concerning the protection and expansion of the trail system after publication of the DEIS. In response, the Forest has reworded these sections in order to clarify the policy.

PROVIDE A LIST OF TRAILS THAT WILL NOT BE LOGGED OVER

Where is your list of trails? Which trails are to be logged? Which will never be logged? Please provide this information. Also, list trails leading into wilderness and provide a "clear statement" to assure that those trails will never be logged over.

Response: Appendix E of the Plan, Table E-1, shows each trail (wilderness and nonwilderness). Any trail that is located in an area assigned to timber management (either full yield or partial yield) may at some point be logged over. However, Item 3 (c), page E-6 in Appendix E and the Trails Resource Summary in Chapter 4 of the Plan have been reworded to further

clarify how trails located in timber harvest areas are to be handled and impacts mitigated.

SHOW EXISTING AND PROPOSED TRAILS ON MAPS

Trails throughout the forest should be shown on all maps.

There is no map showing the location of existing or proposed trails. Clearly mark by user type.

Response: Once Plan implementation begins, a map called the Control Map will be prepared at a scale of 2.64 inches to one mile, or larger. Included will be existing and proposed trails and their user type (or "primary objective").

WHEN WILL MAPS SHOWING TRAIL RESTRICTIONS BE AVAILABLE?

In the Plan, page B-4, you state that "Maps showing restrictions on the use of trails will be developed and made available to the public." When will these maps be issued?

Response: The Control map will list all trails; however, restrictions or closures may change, as often as yearly. This information will always be available at each Ranger District and the Supervisors office.

TRAIL LOCATION SHOULD BE ABLE TO CONFLICT WITH LONG-TERM MANAGEMENT

Page 4-189, Draft Plan standards and guidelines for MA 17, Item A.5.b: New trail location should be able to conflict with long-term management, but not short-term. For example, if scheduled timber harvest wouldn't be for another 40 to 60 years, this could be longer than the life expectancy of a trail anyway - at which point it could be relocated if necessary.

Response: New trails, or reconstructed trails, can be located in timber management areas. While the trail will remain, timber management activities will be seen and will dominate the forest area.

CLARIFY TRAIL CONSTRUCTION RESTRICTIONS IN SOHA'S

Referring to the standards and guidelines for MA 11: if trail construction and reconstruction work can only occur until August 15th, workers will have only two snow-free months.

Response: We have modified the wording in this management prescription to say: "Management activities will be scheduled to minimize disturbances between February 15 and August 15 throughout the SOHA **unless it can be determined that owls are not actively using the area for nesting when trail construction/reconstruction is scheduled.**"

TRAIL CONSTRUCTION GUIDELINES ARE TOO RESTRICTIVE IN MA 12

Restricting trail construction activities until September 31st is extremely restrictive, as winter can start in October. Unless it is proven that these activities disrupt the pine marten and pileated woodpecker, the guideline should be less restrictive.

Response: This standard and guideline (Plan, Chapter IV) has been modified to read "Trail construction and reconstruction activity should be restricted during the breeding period from April 1 - **June 15.**

TRAILS ARE NO LONGER "TRANSPORTATION FACILITIES"

Revamp your entire philosophy of trails management. Trails are no longer "transportation facilities." Each trail should be designed with the intended user in mind.

Response: Agree, and we are doing so. FSM 2405.12; R-6 Supplement #319, 1/84 states that "trails should be recognized as a recreational improvement rather than, or in addition to, being part of the transportation system." Trails are designed for the intended user (or "primary objective"); for guidelines, see the Trails Management Handbook, FSH 2309.18 In the FEIS, all trail discussions have been moved from "Facilities" to "Recreation" in various chapters.

CLARIFY OBJECTIVES IN THE TRAILS APPENDIX

In Appendix E of the Plan, page E-6, 3.g. - Does this mean that trails would be constructed primarily for administration and fire prevention and that these trails are not "system trails" and that therefore not on the map?

Item 6 a , page E-7 - "Areas where Public Use is Prohibited or Not Encouraged." What does "expansion of such use" mean? Does it mean that only the current level of use will be allowed? And if it increases, will permits be required?

Response: Item 3.g. has been deleted in response to this comment. Trails are considered recreational facilities. Item 6.a. means that additional use will not be encouraged. It is intended to keep the use at current levels. The area can be closed to public use if it is determined that use is detrimental to the resource and the management objectives for the area.

MAKING REMOTE AREAS ACCESSIBLE TO HIKERS IS A GOAL, NOT AN ENVIRONMENTAL IMPACT

In the discussion under Trail Construction, DEIS, IV-4, "to make remote areas accessible to hikers" is not an environmental impact (though it may lead to environmental impacts), it is a justification or goal.

Response: The definition of effect or impact includes..."ecological, aesthetic, historic, cultural, economic, social, or health, either direct, indirect, or cumulative . " (40 CFR 1508.8, the regulations for implementing the National Environmental Policy Act) Building trails in an attempt to spread concentrated use into areas of little or no use (make

remote areas accessible) may be a goal. However, any additional use that may result will be an environmental impact - both physical and social.

DO WE DESIGN THE TRAIL FOR THE MAJORITY OF THE USERS

The definition of primary objective is given as "the primary group that this trail is intended to serve." If 98% of a trail's use is foot and 2% is horse, do we design the trail for the primary user, foot, or upgrade the trail to accommodate the minority, horse, user?

Response: We clarified this definition in the Plan document; see Plan Appendix E. We design our trails to the "primary objective", ie. if the primary objective is hiker, then we design it to hiker standards. Note that the primary objective of a trail does necessarily not equal the primary user of trail; they may differ. A trail could have a primary objective of horse use though 80% of the current use is hikers. If a conflict between users ever arose, it would be resolved in favor of the primary objective, not user

STANDARDS FOR TRAIL MAINTENANCE ARE TOO HIGH

On a whole, the Forest Service trails are maintained to much higher standards than trails with similar use in the European Alps. Only beginner's trails and those used by horses need the high standards that the Forest Service has set.

Response: We agree that, in some cases, our policies include standards for trail maintenance that are too high. Trail maintenance will be accomplished according to the type of area served, the primary objective of the trail, and the difficulty level Refer to Table E-1 in the Plan.

WILL AREAS BE MANAGED BY THE SIZE OF THE PARKING LOT?

In the Forest-wide standards and guidelines, Trailheads, Item D: does this mean that an area is actually managed by the size of its parking lot?

Response: One tool we have to manage any area is by providing or not providing facilities. By managing the size of a trailhead parking lot, we can help in managing the "capacity" of the area or trail.

EMPHASIZE DRAINAGE MAINTENANCE FOR LESS TRAIL DAMAGE

Would like to see a greater emphasis on drainage and fixing trails each summer so that winter rains and spring melt would run-off with less trail damage.

Response: The MBS trail maintenance program does emphasize drainage; on the west side of the Cascades, it is the most important aspect of trail maintenance. Maintenance is done according to the type of user the trail is primarily designed to serve Refer to the Plan appendices, Trail Management Plan and Implementation Schedule for some additional information.

TRAILS SHOULD BE ALLOWED TO GROW IN WIDTH IN AREAS WHERE PEOPLE GATHER

Trails should be allowed to grow to a width of 48" at points where people stop and/or congregate, such as scenic viewpoints, trailside water sources, etc.

> **Response:** We agree that this is important. However, this type of use is taken into account during the construction and/or reconstruction of the trail. We like to "plan" for these places, rather than just letting them "grow." The Forest Service does not generally allow "wide spots" to occur if resource damage is a result.

HOW CAN THE FOREST SERVICE DISCOURAGE THE DEVELOPMENT OF INFORMAL TRAILS?

How will you discourage visitors from establishing additional "informal" trails?

> **Response:** We cannot prevent visitors from establishing informal trails but hopes to discourage this through education. Within wilderness, the land will be managed to meet the standards set under Limits of Acceptable Change (LAC). Refer to the discussion in Chapter 4 of the Plan, Resource Summaries. If resource damage is occurring, or when use approaches or exceeds the established LAC, consideration will be given to restricting use or reconstructing the trail. See next comment.

DON'T ELIMINATE USER-MADE WAY TRAILS

Destruction of way trails is a misguided concept. Trying to keep the public on the "officially designated" trails will never work because the objectives of climbers do not meet the objectives of the trail system. Climbers will use trails to the maximum extent possible but not at the expense of losing a mountaineering objective.

Climbers and scramblers routes and fishermen's way trails are an important form of recreation. Cross country travelers need to be responsible in treading lightly, but to eliminate way trails means the loss of such a marvelous form of recreation.

User-made trails exist because enough people want to use that particular route, we oppose abandonment or destruction of them.

> **Response:** The concept and management of user-made trails has been clarified in several sections of the Plan and FEIS. User-made trails will now be part of the trail system and managed as such. Management, however, may mean "do nothing" unless resource damage is occurring Standards for all trails are located in FSH 2309.18.
>
> In Management Area 10, Wilderness, Intensity 10C reads "If obvious user-made trails become well established, or are causing resource damage, consideration will be given to restricting use or, reconstructing these trails to protect the wilderness resource from further damage."

THERE SHOULD BE A STANDARD FOR "WAY TRAILS"

We want to be sure that "construction" does not necessarily mean engineered. There should be standards for "way trails" which have been established by boots.

Somewhere I must protect the reconstruction of fine vigorous trails merely to change the grade.

> **Response:** Reconstruction is generally based on the need to protect the resource and not necessarily for the ease of travel. The Most Difficult level in each primary objective category (hiker trail, ORV trail, pack and saddle trail, etc.) is, in our opinion, a "way trail" standard. It is nearly a user-made trail, but designed for resource protection.

WE DISAGREE THAT, WHERE TRAIL USER CONFLICTS EXIST, USE IS GIVEN TO HIKERS ONLY

We agree that protection of the environment is first and foremost, but we take exception to the idea that, where conflicts between user groups exist, use is given to hikers only. (Draft Plan, page E-4)

> **Response:** Items 2, 3, and 4 on this page, Plan, Appendix E have been modified for clarification, in response to this comment.

IF A HIKER TRAIL DEAD-ENDS ON A STOCK TRAIL, DON'T ELIMINATE THE STOCK USE

We agree that it would be nice to have trails dedicated for each user groups (Plan, page E-4), but it is not practical. We strongly disagree with the idea that if a hiker-only trail dead ends onto a stock trail, stock use is eliminated and the whole trail reverts to hiker-only We are willing to ride our trail out-and-back rather than lose the use of it.

> **Response:** It is not the intent for hiker-only trails (or any other user type) to become the primary objective when they "dead end" with another trail. This has been clarified some in the Trail Management Plan and Implementation Schedule, Forest Plan, Appendix E (Item 4, page E-4). Trail closures are a last resort, management measure. We will only close trails to different user types when one causes undue conflicts and these conflicts cannot be resolved through education

THERE ARE NOT ENOUGH TRAILS OPEN TO HORSE USE

The MBS appears to be acting against the intent of Congress by severely limiting the number of trails open to horses. Because horsepeople are being increasingly shut-out of wilderness, more trails outside (and inside) of wilderness must be maintained for them.

Page E-9, Items 3 a. and b. state that the percent of trails open to horse use is "considered to be an adequate share of the Forest trail system " I take exception to this and suggest more trails be opened to pack and saddle stock use.

> **Response:** Several new miles of trails for horses have been included in the Forest Plan over the 527 miles listed as open to horse use in the draft.

When the total trail system is completed (by the end of Decade 2, or sooner), there will be 783 miles of Primary Objective, hiker-only trails and 612 miles of Primary Objective, pack and saddle stock trails. However, opportunities for horse use may not exist equally forest-wide.

INCLUDE TRAILS CLOSED TO HORSE USE IN TABLE E-1

Add a final column to Table E-1, Appendix E of the Plan, showing trails with year-around pack and saddle stock closures.

Response: Agree; this has been added to Table H-1, and this section now covers all closures, not just ORV's.

APPENDIX E SHOWS ITEMS BEING ADVOCATED BY HORSEMEN FOR YEARS

Appendix E, Trails Management Plan, Item 7 on page E-4: this makes me wonder if the planners have ever been out in the field. We have been making requests for some of the items listed for 15 years!

Response: Appendix E, Trails Management Plan is an update of the 1979 Interim Trails Plan, which was developed with full public involvement. Appendix E updates include changes to meet present trail management philosophy and the MA allocations for the Preferred Alternative. We have revised Item 7 to better meet the needs of horsemen as well as protect the resources.

OBJECT TO DISTANCE RESTRICTIONS FOR PACK AND SADDLE STOCK AROUND LAKES

Item 7, page E-4. the concept of trails for pack and saddle stock bypassing lakes etc. is well taken but too restrictive. This statement should include "where topographically possible" and the distance restrictions should be reduced to the standard used on the Okanogan National Forest. With the current distances, we are unable to observe and control our animals if necessary.

Response: We agree that the distances make it hard for horsemen to control their stock Item 7 has been reworded to state: "Trails for pack and saddle use should, where topographically possible, bypass focal areas, such as alpine lakes, by at least 200 feet elevation or 500 yards horizontally."

USE ABANDONED ROADS FOR STOCK TRAILS

Strongly request that all possible sections of abandoned roads be open for stock use.

Response: The Forest is in the process of evaluating all of our abandoned roads for trail opportunities. The evaluation, however, may not make roads available for just horse use All user types will be considered when making this evaluation.

WE NEED MORE TRAILS THAT ARE ACCESSIBLE TO WHEELCHAIRS

The Sauk River trail would be ideal for wheelchair use. Ramps to access the river could be built, along with a shelter and restrooms. Myrtle Lake is also ideal as is Kalcema Lake - leave the roads open for ORV access.

Response: In developing a Preferred Alternative, the Forest Management Team found that the Forest is lacking in "barrier free" trails. Based on this analysis and in response to this comment and others, several miles of barrier-free trails have been added; a total of 20.5 miles will be built, primarily in Decade 1. Refer to Appendix E, Plan. The Team will continue to look for more barrier-free opportunities.

For the lakes mentioned above· Kalcema Lake is located within the Boulder River Wilderness and no motorized use (ORV access) is permitted; however, if a wheelchair is an individual's "only mode of travel" it could be allowed. Kalcema Lake would be a good, easy place for such an activity if it were not for existing overuse and resource damage. We will strongly consider a barrier-free option during the the reconstruction of this trail. In the Preferred Alternative, the area immediately surrounding Myrtle Lake is allocated to MA 1B - Semi-primitive Nonmotorized Recreation; no motorized access is permitted.

THERE IS NO MENTION OF DESIGNATED CROSS-COUNTRY SKI AREAS

I did not see any mention of designated cross-country ski areas. With the large number of participants each weekend, there are far too few areas. We don't need groomed trails - just mark existing trails and roads for skiing or multiple use.

Response: The Forest has approximately 150 miles of marked cross-country ski trails with additional mileage provided in the developed alpine ski areas (particularly Stevens and Snoqualmie Pass) While cross-country skiers may travel anywhere on National Forest lands, terrain on the Mt. Baker-Snoqualmie is limited because of the steep slopes and the potential for avalanche. While any slope may avalanche under the right conditions, it is our policy not to mark trails and invite skiers and/or snowmobilers into known avalanche potential areas

NO ORV TRAILS IN RIPARIAN ZONES EXCEPT TO CROSS ZONE OR ACCESS FACILITIES

ORV trails should be located in riparian zones only to access facilities or to cross the zone. (Reference to Plan, Chapter 4, Item A 5.a. page 4-170.)

Response: This section was unclear on the construction of new ORV trails within riparian zones. It has been clarified in the Plan: existing trails and roads may remain and cross, however, new construction will be permitted "only when stated riparian area objectives can be accomplished." Refer to Item 5 a and b.

CAN MOTORIZED TRAIL USE CROSS THE PACIFIC CREST TRAIL?

The statement on page E-7 (Draft Plan) states that no motorized use is allowed on any trail that terminates at the Pacific Crest Trail. Since the Naches

Trail crosses the PCT, but does not terminate at it, we assume that motorized use is acceptable.

The trail standard and guideline (Item 2.d.3. page E-7) should be changed to read that motorizes use shall not be allowed on any trail segment that terminates at, or crosses, the PCT, per Executive Order 11644. Also, add a new standard and guideline to say that motorized use trails should not terminate at or cross wilderness boundaries.

Mountain bikes should be added to motorized uses that will not be allowed on any trails that terminated at the PCT; it should be clear that they are not allowed on the PCT.

Response: If trails which are appropriate for motorized use cross the PCT, this motorized "crossing" is allowed. This policy, however, may be changed if management problems occur and public education is not successful. Item 2.d.4. has been clarified to read: "Motorized and mountain bike use shall not be allowed on any trail or segment of trail that terminates or intersects the Pacific Crest National Scenic Trail, unless there is a logical "destination" point or attraction before the PCNST."

This statement is applicable to both roaded management areas and unroaded management areas outside of wilderness, and to designated wilderness. It has been added as Item 1.b.13. and 2.a.8. in the Forest-wide Objectives for Trails. Also, refer to the new wording of Appendix E, Item 4.D.

PACIFIC CREST NATIONAL SCENIC TRAIL SHOULD BE CLOSED TO MOUNTAIN BIKES

Urge you to close all parts of the Pacific Crest Trail to mountain bikes.

Response: A closure notice was signed by the Regional Foresters of Regions 5 and 6 on August 31, 1988: the Pacific Crest Trail is closed to mountain bike use except by special-use authorization. Additional wording has been added to clarify this; see page E-7, Appendix E, Forest Plan.

NEED MANAGEMENT DIRECTION FOR MOUNTAIN BIKES

A list of acceptable non-wilderness trails and roads for mountain bikes should be developed, along with a snazzy brochure on mountain bike etiquette.

Mountain bicyclists should formally be given the same rights, responsibilities, and access to trails as other foot-powered traffic.

There is little current management direction and policy on mountain bike use. We recommend the following guidelines if mountain bikes must share multiple-use trails: trails must have gentle grade, adequate sight distance (500 feet), and adequate braking surface to minimize erosion. Bicycle-only trails can be steeper and rougher, as there is not the threat of biker-hiker collision.

Response: The Draft Plan did not adequately address mountain bikes. In the Trails Appendix E, Forest Plan, standards and guidelines for management have been added. Briefly, mountain bikes are a legitimate recreational activity on National Forest lands, except in designated wilderness and on the Pacific Crest National Scenic Trail. Mountain bikes will generally be

allowed on all other trails unless they are found to be incompatible with the primary objective of that trail. Refer to Chapter 4, Forest Plan, Forest-wide Standards and Guidelines for Trails, Item 2.a.(8) Refer to Table H-2, Forest Plan, Appendix H for specific trail closures. In addition, management standards for mountain bikes can be found in FSH 2309.18

GOOD AREAS FOR MOUNTAIN BIKES

The Mountain Loop Highway has the appearance of becoming a popular place to ride mountain bikes; the Monte Cristo area also has good access for mountain bikes.

Response: The Forest Service and the Federal Highways are presently planning some reconstruction and paving of the Mountain Loop Highway within the next five years. Included are plans to accommodate mountain bike travel. The road to Monte Cristo is presently a county road and the county has sole jurisdiction over its use and maintenance.

EXPLORE LOW-ELEVATION RECREATION POTENTIAL NEAR ISSAQUAH

The Forest Service has failed to exploit the low-elevation recreation potential of the area near Issaquah area. Many State, County, other groups are engaged in a coordinated program for trail recreation on the I-90 Corridor. The Forest Service should join this program and develop its trail system to tie into the forest. Above all, the Pratt River offers opportunity for low-elevation, all-year quiet recreation.

Response: The Forest is now working with the State on a trail through Snoqualie Pass, that will pass within the recently-designated Iron Horse State Park. Both the park and the new trail will cross the entire state, passing through the I-90 corridor. This trail will provide a link to several trails on National Forest land. There are no other NF lands within 25 *miles of Issaquah. In the Middle Fork Snoqualmie River area,* trail construction is in progress. A bridge will cross Dingford Creek and the trail will run up the full length of the river, from the Pratt east. No trails are planned along the river, west of the mouth of the Pratt The Pratt River trail will be retained, links are planned with trails going south into the Alpine Lakes Wilderness.

THE COST OF $200,000 TO CONSTRUCT 7.6 MILES OF "IRON GOAT" TRAIL SEEMS EXCESSIVE

Table E-2 lists $200,000 to construct 7.6 miles of Iron Goat trail for hikers; this seems excessive, especially because the trail can be built on the old road bed used as a transcontinental railway from 1892-1929.

Response: The trail cost estimate is based on the application of standard formulas used to estimate the capital investment costs of all trails shown in Table E-2. Costs are preliminary and are revised at the time of trail design. Some costs are expected to be less than the estimate, as some portions of the trail will be "brushed out" with volunteer labor if available. Some costs will be greater than the estimate; for example, portions of the trail may be constructed using "access for all" design;

interpretive signs may be installed along this historic route; and extra funds may be required to stabilize or close snow sheds and abandoned tunnels. It is likely that the final estimate may exceed $200,000.

NEED TRAIL ACCESS TO JORDAN, GRANITE, AND FALLS LAKES

In the Draft Forest Plan, you did not show trail access to Jordan, Granite and Falls Lake; it is needed.

Response: The Preferred Alternative now includes a trail (#627) from the end of road #16 to Jordan and Upper Jordan Lakes. Refer to Table E-1. Also, trail #635 has been added from Slide Lake to Enjas Lake. With these two main access trails, the remainder of the north lakes area will remain in a more primitive WROS setting to provide a challenge for those wishing to go there.

SPECIAL TRAIL CONSTRUCTION NEEDED AT EAGLE LAKE AND PARADISE MEADOWS

Eagle Lake and Paradise Meadows are very fragile areas, characterized as a Sphagnum-Ledum wet meadow. This is a very rare vegetation type and very vulnerable to heavy traffic. Trails in the area should be designed to avoid the wet meadows or special construction techniques, such as boardwalking or turnpiking, should be used. The area around Eagle Lake and the shortcut from Eagle Lake to road #6517 through Paradise Meadows is already showing signs of damage.

Response: Trail construction or reconstruction will normally avoid all wet and fragile areas (FSH); if they cannot be avoided, turnpike, puncheon, and/or boardwalks are installed. Access to Eagle Lake will be via the extension of the Barclay Lake Trail, #1055. Reconstruction is planned for the user-made trail to Eagle Lake from road #6517 to minimize resource damage to the meadows and wet areas.

PUBLIC INVOLVEMENT NEEDED ON TRAIL PROJECTS

To insure that the trail system meets the needs of the user, there needs to be a process for users to comment on abandonment, construction and reconstruction, etc. before the project has gone beyond the planning stage.

Appendix E, Plan, page E-6, Item 3.e: Will users be provided an opportunity to comment upon the abandoned or closed portion of a road system considered for management as trails? Hiking an abandoned road through a clearcut would only be desirable when the destination is superb.

Response: In accordance with the National Environmental Policy Act, and FS implementing regulations (FSM 1950), an environmental analysis will be conducted for all ground-disturbing projects. All trail actions, with the exception of annual trail maintenance plan, are analyzed separately. A key step in the NEPA process is "scoping" or determining at the beginning of each proposed project, what issues and concerns exist and who, among the public, should be contacted for input For some projects, notification might be quite informal; for others, notice published in the Federal Register is appropriate. (The yearly maintenance plan is available for public review at each Ranger Station.)

On roads that will be closed: generally, roads that will be permanently abandoned will be allowed to grow in with brush until they are trail-width, thus giving the feeling of being on a trail instead of a road.

CLOSE THE ROAD AT RUTH CREEK (#34) AND ROAD #3065

To enhance the trail system, the North Fork Nooksack road (#34) at Ruth Creek and the Twin Lakes Road (#3065) should be closed. This is an excellent day ride (horse) opportunity.

Response: Presently, Road #3065 to the Twin Lakes area is a "mine-to market" road and cannot be closed without concurrence of the mine interest and the county. Most of the trail system in and out of Twin Lakes is open to horse use; there are no plans to close these trails to horses.

KEEP THESE TRAILS OPEN TO HORSE USE

We strongly oppose your proposed closure of Trails #630, 670, and 698, Excelsior Pass-High Divide-Welcome Pass to horse use. These trails provide an excellent day riding opportunity, with about 12 miles of sound trails with access from two points.

These trails need only minor work; much could be done by volunteers (under the direction of the FS).

Response: Trail #630, from Highway 540 to Road 3060, is not closed to horse use; its primary objective is pack and saddle. Trail #670 and 698 are now part of trail #630 and the old numbers are deleted. This system was not closed in the DEIS, nor is it closed in the Preferred Alternative.

INCLUDE A TRAIL INVENTORY; INDICATE HOW TRAILS WILL BE AFFECTED BY PROPOSED MANAGEMENT

The Forest Plan should include a thorough inventory of trail resources and a clear indication of how each trail will be affected by the proposed management of that particular area. The documents should also discuss in detail how conflicts between motorized and non-motorized users will be resolved.

Response: Refer to Appendix E, Forest Plan and Table E-1. It shows a complete inventory of the trails system and indicates, for this Forest Plan, how each trail will be managed. Trail planning and management is also addressed in each management area prescription, Chapter 4, Plan.

MOTORIZED RECREATIONAL OPPORTUNITIES WERE NEVER ADDRESSED

We found, while reading the planning documents, that capability for motorized recreational opportunities was never assessed. The result is an unfair and arbitrary exclusion of a legitimate form of recreation

Response: Motorized recreational opportunities, supply, and demand are discussed in Chapter III of the EIS, under the Recreation section. The issue and concern is described in Chapter I, and miles of road open to passenger vehicles are a key output of Table II-9f. Motorized recreation opportunities were also addressed in the Forest Plan, Appendix H. This section states that all forest roads, trails and areas will remain open, except as noted in Table H-1. Table H-1 shows roads, trails and areas closed to motorized use and the reason for such closure. The National Forest operates on the principle that "everything" is open to motorized use unless a closure is needed to protect some resource.

THERE IS A LACK OF 3- AND 4-WHEEL ATV TRAILS

We are concerned about the lack of riding trails built specifically for three and four-wheeled ATV's. These vehicles cannot be ridden on motorcycle trails and jeep trails generally are not challenging enough.

Response: In the Forest Plan, Appendix H, Table H-1, we have indicated which roads, trails and areas are closed to 3- and 4-wheeled ATV's. As discussed above, the Forest is open to such use, unless specifically closed by a closure order. Much of the MBS is steep and wet and does not led itself to this type of recreational opportunity

THE 1987 STATE ORV PLAN INDICATES A NEED FOR MORE MILES OF TRAIL

The 1987 Washington State Off-Road Vehicle Plan indicates there are facility needs for motorized recreation activities in both Planning Districts 3 and 4.

The planners should understand that 4x4 use of a road does not mean the user is gaining satisfaction. The ORV trail and 4-wheel drive travelway are, in their own right, the attraction. They must be interesting to drive, reasonable to maintain, and there must be an adequate supply to meet the demand. We encourage the MBS to recognize our use and make a positive accommodation for it in the Forest Plan.

Response: As discussed in Chapter III, DEIS and FEIS, while we recognize the need for more ORV trail miles, the Forest is limited in it's suitability to provide more miles to meet that demand. A total of 43% of the land base is designated wilderness and much of the remainder of the Forest trails are not suitable for ORV use, due to steep terrain, with fragile soils and vegetation. In addition, most of the unroaded portion of the Forest is not well suited to cross-country vehicle use, for the same reasons. Refer to the Recreation section, Chapter III of this FEIS for more information. The validity of this type of recreation use is recognized and all areas and/or trails are open to such use, unless specifically closed. Refer to the Forest Plan, Appendix H, Table H-1

THE PERCEPTION OF ROADS/TRAILS OPEN TO ORV'S UNLESS CLOSED IS WRONG

The most flagrant instance of mis-statement in the MBS documents is: "Unless specifically prohibited by a formal closure or Congressional designation...all roads and trails are available for motorized recreation." These statements seem to be saying that all roads and trails are open to ORV's unless designated closed. Executive Order 11644 says that areas and trails shall be designated open or closed to ORV's based on certain criteria; thus, a presumption of open unless designated closed is wrong. These points are made abundantly clear in a case brought to federal district court, National Wildlife Federation v Morton (393 F. Supp. 1286). In this case, the BLM had issued regulations designating as officially open to ORV's all its land not otherwise restricted or closed. The court held the E.O. required all designations be based upon criteria set forth therein and the criteria are to be applied to a designation of both use and non-use.

The final plan should state the mandatory designation criteria in full per E.O. 11644, not in the highly abridged or paraphrase form, as in the Standard and Guideline 1. Also, print E.O. 11644 and 11989 in their entirities Since ORV closures far exceed openings on the MBS, redo Table H-1 as a list of specific openings rather than closures.

Response: The introduction of Appendix H, Forest Plan now includes specific references to E.O. 11644 and 11989. These orders have not been reprinted, to comply with regulations for implementing NEPA (40 CFR 1500.4) for reducing paperwork and incorporting be reference (1500.4(j)).

FSM 2303 Item 7 states; "Enhance recreation experiences through a minimum of regulations and law enforcement." In theory, ORV use is allowed anywhere on the MBS (except in designated areas such as wilderness, research natural areas, etc.) unless closed for specific reasons. In reality, much of the Forest is very steep and rocky, limiting the ORV opportunities except for trails and roads. Should ORV use be found incompatible with land allocations and use, through monitoring, the closure list will be modified (through a Plan amendment, with public notification, and in a NEPA document).

RE-EVALUATE CLOSURE CRITERIA

We call for a re-evaluation of closure criteria of public lands to 4-wheel drive and ORV use. Many of the current closure policies are inconsistent, arbitrary, and capricious. The cumulative impact of these policies is the

destruction of a previously well-used and well-distributed recreational asset which further dwindles from over-management.

Response: We feel the MBS has sufficiently evaluated ORV use on this forest. In 1977, the MBS published, with a NEPA document and public participation, a Forest-wide ORV plan. This plan was developed in response to E O. 11644. The Forest Plan revises this Plan, based on the land allocations in the Preferred Alternative and additions to the wilderness system from the 1984 Washington State Wilderness Act. Through monitoring, plus meeting standards and guidelines (Forest-wide and management area), any resource damage and/or user conflicts will be identified and resolved.

WHEN CONFLICT ARISES, IT SEEMS TRAILS ARE ALWAYS CLOSED TO ORV'S

It seems that whenever user conflict is even suggested, the road or trail in question is always closed to 4-wheel drive or ORV use. It is ludicrous when a previously open and existing jeep road must be closed because of "user conflict" when someone decides to route a hiking trail onto this route.

Response: Refer to Table H-1, Forest Plan, for the specific list of trail, areas, etc. closures to various uses. Also see the Forest Trail inventory, Appendix E; the "primary objective" for each trail is noted: hiker, motorbike, etc. Trails will be managed for the primary user type; should other users conflict with the **primary objective** user and the conflict cannot be resolved through education or other means, all uses except the primary user will be restricted

CONSIDER LOGGING ROADS FOR ORV USE

Your plan does not recognize the large network of existing and previously open network of old forest roads, logging roads, etc. (shown on maps as "jeep trails") as the substantial opportunity they are. These primitive roads are a good candidate for multi-use travelways for several types of ORV's and 4-wheel drive use. Neither the trails or transportation sections address this available and low cost resource.

I agree that soil and terrain limit the opportunities for trail use of motor vehicles, but what about old logging roads that have been closed? Are there no opportunities for use of these roads by trail vehicles and mountain bikes? What about development of old roads as a desired output of the forest plan.

Your plan does not provide for four-wheel drive recreation on the vast network of primitive travelways. We request that you manage 4-wheel drive roads (primitive travelways over 40" wide) open unless posted/gated closed, as most were in the past.

Response: We agree that old logging roads and spurs are good candidates for ORV and 4-wheel drive use. The Forest-wide Standards and Guidelines for Off-Road Vehicle Use state that ORV closures are to be used "...only when needed to minimize disturbance of wildlife, minimize recreation use conflicts, or to protect soil and water resources." Otherwise, these roads are open; refer to Table H-1 for specific closures (Forest Plan). Where old roads or travelways cross acres allocated to nonmotorized management, OVR use is not compatible and would not be permitted.

WEYERHAEUSER IS CONCERNED THAT LOGGING ROADS ARE ONLY ROADS OPEN TO ORV'S

The Proposed Plan acknowledges the need for a continuing Cooperative Road Agreement program between the Forest and intermingled landowners. Weyerhaeuser supports this. Our concern: the direction of the FS in making these logging roads the only roads open to ORV's The Plan intends to close all other roads to ORV's. This should be reversed in the Greenwater drainage, one of the most heavily-used drainages in the National Forest system. One remote area should be reserved and dedicated to the exclusive use of ORV enthusiasts.

Response: It is not our intent to close all trails to ORV use; only those listed in the closure table H-1, Forest Plan are closed. Note that all national forest roads in Washington State are closed to "non-street legal" ORV's Evans Creek area remains open to ORV's, as does the rest of the Forest, unless specifically closed.

ORV'S NOT COMPATIBLE WITH RIPARIAN AREAS

We do not consider ORV's a compatible use within riparian management areas, unless on designated trails to cross a stream.

Response: The standards and guidelines for MA 13 speak directly to ORV's in riparian areas; they have been strengthened since the proposed plan was issued. Refer to new Item A.5.b.. In addition, ORV use is not to cause ground or water channel disturbance. Existing use is permitted on roads or trails designated for ORV use. Any conflicts will be resolved "in favor of the dependent riparian resources and values (soil, water, fish, and wildlife). (MA 13D Item A 1.a.)

MOTORIZED USE OF TRAILS ENCOURAGES ADVERSE EFFECTS ON NATIVE PLANTS, ANIMALS

Motorized use of trails encourages adverse effects on native plant and wildlife communities by providing basically unregulated access to sensitive areas such as wet meadows, rare plant habitats, and erosive or fragile soil areas, that are easily degraded by ORV's. This impact seems to have been ignored in the DEIS. The final plan should specifically prohibit ORV's in sensitive areas.

Response: Appendix H, Table H-1 (Forest Plan) shows trails, roads, and areas closed to ORV (and other) use. In most cases, these closures were established to protect the land and sensitive resources, and are adequate at this time. The closure list will be reviewed at least annually, with changes handled through a plan amendment, including public notification If, through monitoring, we find that protection is not adequate, on any part of the Forest, action (such as additional closures) will be taken to protect resources, minimize conflicts, and provide for public safety

CHANGE MANAGEMENT DEFINITION OF ORV TO REFLECT ACTUAL USE OF FOREST

We respectfully request that you modify the national ORV/4-wheel drive policy to reflect the following: manage primitive forest roads open unless signed closed; use cooperative programs, such as Adopt-a-Trail/Road.

Response: It is FS policy that lands are open to multiple uses (such as ORV's) unless specifically closed (FSM 2300, Item 7 under policy: "enhance

recreation experiences through a minimum of regulation and law enforcement.") Based on this, we view that the Forest is open for all types of recreational uses unless the uses are in conflict with other use or land resources. The MBS has an "Adopt-a-Trail" program and it will be continued.

KEEP "EVANS CREEK ORV AREA" OPEN FOR MOTORIZED USE

The established intensive ORV use at Evans Creek ORV Area should continue to operate without undue restriction because of water production. The water system for the Fairfax area was in existence when the ORV area was established. Planning to accommodate both uses was a paramount consideration; that direction is still valid.

Response: The MBS intends to continue the use of Evans Creek as an ORV area; however, timber management activities are not precluded, and temporary closures may be instituted during harvest activities for safety. A monitoring plan for the Evans Creek ORV Area has been completed. If during monitoring, water or other resource damage is found, management action will be taken. This may include closure of portions of the Area to ORV use.

IS MOTORIZED USE ON THE NACHES TRAIL ACCEPTABLE?

The statement in Appendix E, page E-7 states: "No motorized use on any trail that terminates at the PCNST." Since the Naches Trail crosses the Pacific Crest Trail, and does not terminate at it, we assume that motorized use over Naches Pass is acceptable.

Response: If a trail, like the Naches Trail, is designated for motorized use and crosses the PCNST, that use will be acceptable, provided that motorized use can be eliminated from the PCNST. Motorized use is not allowed on trails that terminate at the PCNST "...unless then is a logical destination point or an attraction before the PCNST." Refer to Chapter 4, Forest-wide Standards and Guidelines, in the Forest Plan.

FORMALLY RECOGNIZE NACHES PASS AS A 4-WHEEL DRIVE TRAIL

We encourage the MBS to formally recognize the Naches Trail as a 4-wheel drive travelway and to provide for its protection in all management activities.

The Naches Trail is one of the best-known 4WD routes in the nation; we encourage you to acquire permanent right-of-way. Also, provide interpretation of the cliff and its historic uses.

Response: This is part of the MBS trail inventory and has a primary objective of jeep trail (10 - see Appendix E, Forest Plan). It will be protected and maintained as a trail. Refer to the discussion on "significant trail opportunities in the Forest Plan, Appendix E. Naches Trail is presently being inventoried for the Washington State Historic Preservation Office for potential historical designation; refer to the cultural resources implementation schedule, Appendix D.

IS NACHES PASS A ROAD OR A TRAIL?

Is Naches Pass west a road or a trail? Its primary objective is listed as 10, Jeep Use and 1 Hiker, a mix not suitable for an historic trail.

> **Response:** The Naches Pass West route, #1175, is a jeep "trail"; however, other users are not restricted from the route. The first 0 7 mile, between raods #7033 and 706521, is closed to jeep travel. This section is an actual cliff and too dangerous for jeeps.

OPPOSE SNOWMOBILE USE IN SEMI-PRIMITIVE NONMOTORZIED AREAS

We vigorously reject and ask you to delete the guideline allowing snowmobile use in SPNM MA # 1B. This is inappropriate and is a completely unjustified abuse of the goal of SPNM management

> **Response:** Appendix H, Forest Plan, discusses the standards, guidelines, and evaluation process for closure of areas to snowmobiles if necessary. A winter ROS inventory has not been completed. Our position is that areas will be evaluated and closed if the need arises.

NO WHEELED MOTORIZED USE ON GROOMED SNOWMOBILE TRAILS

In the Forest Plan, page 4-73, add that four-wheel drive vehicles and motorcycles use will not be permitted on groomed snowmobile trails.

> **Response:** We agree. This statement has been added to the Plan Appendix E, Specific Policies Applicable to the Entire Forest, Item 15.

OPEN AREAS TO SNOWMOBILE USE

Artist Ridge and Church Mountain trails #669 and 671 pass through current roadless snowmobile use areas beyond the end of F.S. road #3170. There is no conflict with hikers in the winter thus closure should not apply to snowmobiles

> **Response:** Snowmobiles are currently restricted from the Artist Ridge area because they would have to pass through the Mt. Baker Ski Area, a conflict with the intent of the ski area and cross-country skiers This closure will remain in effect. Church Mountain, from the north, accessible side, is open and receiving snowmobile use. The area beyond road #3170, Bearpaw Mountain area, will be accessible except inside wilderness. A snowmobile loop system will be provided outside of the wilderness to accommodate snowmobiles

KEEP TRAIL OPEN TO SNOWMOBILES

Mazama Park, trail 603.2 should remain open to smowmobile use, as prescribed in the Washington State Wilderness Act of 1984, where the trail passes through the Mt Baker NRA.

> **Response:** As stated in Table H-1, under specific closures for areas on the Mt. Baker Ranger District: this area is open to snowmobiles when the snow

reaches a depth of at least two (2) feet, when measured at Schriber's Meadow. The fragile alpine vegetation will be damaged if snowmobiles use the area when snow depths are less than two feet.

THE ISSUE OF A NEW HIGH ELEVATION SKI AREA IN WASHINGTON SHOULD BE ADDRESSED

The Greenhouse effect is driving temperatures up and the population boom in Puget Sound is crowding our recreation areas. We must realize that a new high elevation ski area is needed soon. Several of the only feasible sites in the state are located on the MBS Forest. Most of these sites are located within Wilderness and would have to be removed. I urge you to consider this when planning near these sites. The sites are. Coleman Basin, Sloan Peak, Hidden Lake Peak, and Heliotrope Ridge. Let me know if any studies have been done on these sites.

Response· The Forest believes that the immediate (in the near future) need for additional skiing opportunities can be met by the expansion of existing areas such as Stevens Pass and Crystal Mountain. A new ski area is also being developed at Early Winters on the Okanogan National Forest. Three of the sites mentioned are within Wilderness; the fourth, Hidden Lakes Peak, is within North Cascades National Park. It is not within the Forest Service or Park Service power to declassify wilderness to allow development of any kind This can only be done by Congress. The North Cascades Winter Sports Study of 1970 identified 13 sites for potential ski area development. These were. Glacier Basin, Twin Sisters, Schriebers Meadows, Dock Butte Basin, Snowking Mtn , Gabrielhorn, Cutthroat Pass, Liberty Bell, Harts Pass, Sandy Butte (Early Winters), Tiffany Mtn., Marten Lake Basin, and Stormy Mtn. Of these only Glacier Basin, Tiffany Mtn. and Sandy Butte were found to be good locations, all others were marginal or unacceptable.

CORRECT CAPACITY FIGURES FOR CRYSTAL MOUNTAIN AND PACIFIC WEST

The column labeled "Additional Potential Downhill Capacity" is in error. Current calculations indicate that Crystal Mtns. additional downhill capacity is more in the range of 5,000 skiers per day.

There is a considerable amount of additional downhill capacity on NF land at the Pacific West Ski area. The NF figures shown in the last two columns of this table are erroneous and need to be corrected.

Response: These figures have been corrected. See Chapter III, table III-52 in the FEIS.

DEVELOPMENT OF SNO-PARK SOUTH OF HYAK CREEK

There has been some discussion and public support for excluding from Pacific West's permit area that area south of Hyak Creek and allowing a public sno-park to be constructed. This would be a mistake. There is very little nordic terrain in this portion of Section 16, and the area is almost completely surrounded by existing alpine ski development and private land. A sno-park in this vicinity would result in numerous conflicts with the alpine operations and trespass onto private lands.

Response: The concerns are noted and will be a consideration if the area described is ever proposed for development by the ski area, or by sno-park supporters. A project environmental analysis would be done which would examine these issues.

MODIFY POLICY TO ALLOW HOUSING AT SKI AREAS

The Forest Service must modify its housing policy to attract private capital to help the development of ski-area housing.

Much of our tourism opportunity in the winter recreation field is stifled by the Forest Service policy concerning private residences on its property. The single factor that will most significantly enhance winter recreation in Washington is the ability to build private residences at the ski area baselands.

Response: National policy allows public lodging accommodations on National Forest lands at ski areas, but only where there is a public need for the facilities and where there is not suitable private land for such facilities within a reasonable commuting distance. In addition, the general public must have full access and use privileges to such facilities. Ski area permit holders, their employees, families, friends, partners, stockholders, lenders, or others with a monetary interest in the facility do not have preferential use rights over the general public. The existing policy was recently examined by a national task force and was upheld. The Forest Plan must comply with national agency policies.

30-YEAR PERMIT SYSTEM IS TOO RESTRICTIVE FOR LONG-TERM FINANCING

The special use permit system is an impediment to the successful development of the winter recreation tourism industry in Washington. The thirty-year permit does not offer a long enough period or secure enough commitment to attract the long-term financing needed to build and operate successful destination ski resorts. We would prefer an opportunity to obtain a long-term commercial lease.

Response: A new ski area permit, which increases the term to 40 years, became available in 1989. Almost all ski areas are eligible for conversion to this permit. The 40-year permit is mandatory at the expiration of any existing permit, and for any new ski areas

WHAT ARE THE MANAGEMENT STANDARDS FOR SKI AREAS?

Under Winter Sports Resorts, the management standards for water, soil and air state simply "Meet Forest-Wide Standards and Guidelines. Give extra attention to erosion prevention and control on areas cleared for ski runs." This does not indicate what air and water quality standards must be met. Nothing identifies what visual quality and riparian zone guidelines must be followed

Response: The standards and guidelines for the management of air, water and riparian resources within ski areas can be found in the Forest Plan, Chapter 4, Forest Wide Standards and Guidelines. Direction for visual quality management in ski areas has been revised. Generally, the goal will be foreground retention and middleground partial retention. It is recognized that existing base area facilities are a developed environment.

RETAIN UNDEVELOPED NORDIC SKI OPPORTUNITIES

The best ski terrain should not always be developed into downhill skiing, thus shutting out the mountain skiers and snowshoers. The same pattern is evident with the growth of "developed" nordic ski areas. Private interests are given a land use permit for a popular ski touring area and they groom and patrol it, and then charge a fee for the use of our public lands. They must not be allowed to develop all skiable terrain at these sites.

Response: The decision to incorporate nordic skiing into the operation of alpine ski areas will be made on a case-by-case basis with full public input. We anticipate that both groomed fee and nonfee backcountry nordic opportunities will be available.

THERE IS NO MENTION OF DESIGNATED CROSS-COUNTRY SKI AREAS

I did not see any mention of designated cross-country ski areas. With the large number of participants each weekend, there are far too few areas. We don't need groomed trails - just mark existing trails and roads for skiing or multiple use.

Response: The Forest has approximately 150 miles of marked cross-country ski trails with additional mileage provided in the developed alpine ski areas (particularly Stevens and Snoqualmie Pass). While cross-country skiers may travel anywhere on National Forest lands, terrain on the Mt Baker-Snoqualmie is limited because of the steep slopes and the potential for avalanche. While any slope may avalanche under the right conditions, it is our policy not to mark trails and invite skiers and/or snowmobilers into known avalanche potential areas.

THE GOAL OF WILDERNESS MANAGEMENT SEEMS HEAVILY WEIGHTED TOWARDS HUMAN USE

The goals for wilderness seem heavily weighted toward human use. Consideration of other values should have equal emphasis, such as wolf or grizzly bear habitat Given that perspective, it puts a new twist on the "spontaneity of use".

Response: Editorial changes have been made to Chapter 4, Desired Future Condition statement for wilderness (MA 10) to reflect that recreational use is only one of many resources for which wilderness is managed. Recreational use is allowed to continue within the wilderness as long as it does not compromise or degrade other resource values, such as wildlife habitat, water quality, or solitude.

EXPLAIN THE INCREASE IN WILDERNESS VISITS BETWEEN 1976-77

Was the increase in visitor use between 1976-77 due to a change in definition of area to be included in the tally for use or actual use? Please explain to your readers your guess as to why the sudden dramatic increase. Advertisement? Other changes?

Response: As stated on page III-134 of the DEIS, this increase was due to the designation of the Alpine Lakes Wilderness and resulting transfer of RVD's that would have been tallied as general dispersed recreation to wilderness recreation.

CONCEPT OF PROJECTED RECREATION USE NOT EXCEEDING CAPACITY IS STRANGE

It seems strange that "Projected recreation use will not exceed the estimated capacity for any particular activity." (II-96) If this quoted assumption were valid, no area could experience overcrowding. PLUS supports the concept, but finds it difficulty to believe that the Forest Service does Otherwise, why are formulas developed which state that people can only tolerate a given number of people/acre/year? We think that most forest users are much more tolerant than these formulas give them credit for.

Response: This statement refers to the MBS decision not to value expressed recreation demand beyond the estimated capacity (which includes a assumed experience quality level as defined by an ROS zone) for that particular zone or activity. For example: if the capacity for wilderness recreation was X and the demand for wilderness was 9X, then we restrain the FORPLAN model from accruing value for future estimated wilderness use (demand) beyond X, as it was likely that use would be restricted near this level. This was done to more accurately portray the economic effects of recreational use as limited by capacity, instead of valuing all potential use, even that beyond capacity

In reality, overcrowding can occur in any area outside of wilderness, with a resulting lowered quality of recreation experience and a change in the ROS level toward a more developed setting. FORPLAN modeling limited the total value; if overcrowding actually occurred, you could get a lower per unit value, but a higher number of users. Thus, the total value (output x unit value) remains about the same.

DISCUSS VOLUME OF TIMBER IN WILDERNESS

It would be of interest to many readers if you discussed the volume of timber in wilderness. This may dispel some of the myths being perpetrated by the preservationist groups about wilderness being all rock and ice.

Please provide a realistic picture of commercial forest land foregone in wilderness. Don't add to the hysteria and emotionalism of the forest industry.

Response: There are 721,718 acres of wilderness on the Forest; 440,196 acres are forested with trees (61%). There are 284,922 acres with a productivity of 20 cubic feet per acre per year (40% of the total wilderness acres, and 16% of the forested wilderness acres). These 284,922 acres have a standing volume of 2,309.38 MMCF or 11,564.95 MMBF (1995 standing volume). Chapter III has been amended to reflect this.

OVERLAPPING RNA AND WILDERNESS MAY CAUSE PROBLEMS

Wilderness Use Conflicts· Chapter III, DEIS, page III-135 needs to recognize the special conflicts that may arise in RNA's within wildernesses. One established RNA and three proposed RNA's occur in wildernesses.

Response: In the Preferred Alternative, where wilderness and RNA classification coincide, the most "restrictive" management prescription (wilderness intensity or RNA) regarding development and use shall be applied in those portions of the RNA which fall within wilderness.

WHERE DID THE TERM "UNIMPAIRED" ORIGINATE?

Where does the phrase "manage wilderness for the use and enjoyment of people in such a manner as will leave it unimpaired for future use and enjoyment...so as to provide for the protection of these areas, the preservation of their wilderness character...." come from? Are these words in the Wilderness Act?

Response: This first phrase is taken from Section 2 of the Wilderness Act of 1964. This section made it clear that Congress fully intended wilderness to be for the people's use and enjoyment; it is also apparent that such use and enjoyment was to be contingent upon maintenance of these areas "as wilderness," a condition the Act later defines in the final subsection of Section 2. Here, wilderness is defined as an "area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." The word "untrammeled" was specifically chosen by the Act's authors and means "not subject to human controls and manipulations that hamper the free play of natural forces."

THE NONDEGREDATION POLICY VIOLATES THE 1984 WILDERNESS ACT

The R-6 Supplement 81 and nondegradation policy is in direct violation of the 1984 Wilderness Act. It is appalling to see how wilderness is being managed; it is too restrictive and does not allow full use of the wilderness. We can have twice as many users and still meet reasonable wilderness requirements.

Response: It is from Section 2 of the Wilderness Act, discussed above,

that the nondegradation policy has its origins. The concept seeks to recognize the variation in the level of naturalness and solitude available in individual wildernesses. It calls for maintenance of present environmental conditions if they equal or exceed minimum standards, and the restoration of below-minimum levels, rather than letting all areas in the Wilderness System deteriorate to a minimum standard. To a reasonable degree, the conditions prevailing in each wilderness when it was classified establish the benchmark of naturalness and solitude to be sought by management. The Regional Forester's "Forest Planning Wilderness Management Direction Clarification" letter of August 4, 1986 stated: "Wilderness must be managed to prevent degradation. The nondegradation principle directs that each Wilderness must essentially be as wild as it was at the time of classification... Nondegradation applies to all values of wilderness: social, physical, and biological."

PLAN IGNORES THE NEED TO INCREASE WILDERNESS ACRES

I think that it's an accurate reflection of the Forest Service that the plan doesn't recommend any areas for wilderness designation. While not necessitating such recommendations, the Washington State Wilderness Act of 1984 certainly doesn't preclude it

One puzzling aspect of the plan is that none of the alternatives, including those such as Alternative C emphasizing dispersed recreation, include recommendations for new wilderness acreage. The demand for wilderness use is increasing to the point of discussion of restricting use; it's arbitrary and imprudent for the Forest Service not the recommend additional wilderness areas from the existing roadless areas to help meet these needs.

I support the increase in dedicated trailless areas and increased regulation of certain wilderness areas, but I think some provisions should be made for the future designation of wilderness. By excluding wilderness designation in the first phase of the plan, you are sending a clear signal that there will be little future designation of wilderness.

Response: In this first round of planning, an alternative that considered additions to the wilderness system was considered, but not developed in detail Refer to the discussion, Chapter II, FEIS (and DEIS) on Alternatives Considered But Eliminated From Detailed Study.

During the deliberations on the Washington State Wilderness Act of 1984, Congress considered all the roadless areas on the Forest. They received many recommendations from diverse segments of the public and the Act represents their judgement on which areas should be designated wilderness. The Act contains specific language to the effect that the Forest Service is not required to consider wilderness recommendations for those "released" roadless parcels in the first generation of Forest Plans. The statute does not prohibit the Forest Service from doing so, but for the MBS, it was not considered reasonable so soon after the 1984 Act. All lands remaining unroaded and undeveloped may be considered for future wilderness designation, when the Forest Plan is revised.

ACTIVITIES AFFECTING WILDERNESS AIR QUALITY SHOULD NOT BE RESTRICTED

"Designation of Class I airsheds in the new wildernesses should not have any effect on outside activities occurring outside of wilderness". As quoted above in the Washington Wilderness Act no buffers were to be established and activities outside of wilderness were not to be altered due to wilderness creation. Therefore, activities affecting wilderness air quality within the 1984 additions should not be limited.

Response: The Clean Air Act of 1977 designated the Alpine Lakes and Glacier Peak Wildernesses as Class I airsheds. The wilderness acres added by the Washington State Wilderness Act of 1984 were automatically designated as Class II airsheds as provided by the Clean Air Act. The Act allows the State of Washington to redesignate Class II areas to Class I to protect wilderness-related values. The purpose of the Class I and Class II areas is to protect the air quality related values of sensitive areas such as wilderness and national parks. Some of the key values being protected are visibility, vegetation, water quality, and clarity. Some of the threats to these areas are acid rain and other air-bourne depositions, ozone, and the smoke columns from fires. There is no relation between the provisions of the Washington Wilderness Act and the requirements of the Clean Air Act of 1977. See Chapter III, FEIS, Air and Fires section.

THE COST OF WILDERNESS REHABILITATION IS INCORRECT, NEEDS FURTHER DEFINITION

The funding levels for wilderness rehabilitation in Appendix F need to be explained. Are they proposed, minimum, or allocated levels? If the money is not available, it should be explained.

I'm not sure I understand your "wilderness rehabilitation" proposals. Do all sites cost $5,000 to repair? This seems quite exorbitant and is obviously not based on any real analysis, but is just an arbitrary formula.

The wilderness rehabilitation section is in need of revision. It states a $5,000 cost/site for restoration/rehabilitation. This cost is naively low when you examine what has gone on in the past at Image Lake, Lake Dorothy, or Snow Lake. The dollar amount needed depends on the length of the project, and it also varies greatly based on techniques used, how much source material is (or isn't) on site, how eroded the site is, and how far it is from water.

Response: Appendix F of the Forest Plan has been revised to indicate that, on many of these sites, rehabilitation will be an on-going process over several use-seasons A large portion of the cost of rehabilitation includes on-site monitoring and maintenance A range of from $2,000 to $5,000 per site has been used for general budget projection, recognizing that each site will be unique in the amount of restoration needed and the cost of the rehabilitation

NEED TO CLARIFY THE "CAMPSITES VISIBLE" LAC

"Campsites visible" needs to be clarified to indicate whether this means campsites visible if occupied, or if it means that human-caused impacts are visible from site to site.

Response: The Limits of Acceptable Change indicator for campsites visible refers to the number of occupied campsites visible to another person from their campsite. The Forest Plan, Chapter 4, has been reworded to clarify this point.

ANNUAL PERMIT SYSTEM IS NEEDED/NOT NEEDED TO PROTECT WILDERNESS VALUES

I recommend an annual region-wide wilderness permit system for hikers traveling 3 miles (each way) and all overnight use. The permit fee would make the program self-supporting. Each permit holder would receive a booklet, listing wilderness ethics etc The 3 miles is arbitrary; its purpose is to differentiate between the serious overnight user and the more casual, day hiker.

The plan does not address the need to limit the numbers of people impacting the wilderness through the implementation of a permit system

It is time that the MBS instituted a system of restrictions on visitor numbers in the wilderness. In too many areas, resource degradation due to excessive use has become a serious problem.

Response: At the present time, none of the wildernesses on the Forest require a permit for entry or use. Several areas are currently being studied and considered for possible application of a permit system to protect wilderness values from overuse. In any situation where overuse is a concern, permits will be considered as a management option along with other techniques like road closures, restricted parking at trailheads, or education to disperse use into different areas or different times. Permits will usually be considered as a "last option."

DON'T LIMIT CAMPFIRES ABOVE 4,000 FEET ELEVATION

Wilderness should foster an independent, natural encounter with nature. To limit campfires above 4,000 feet means that only those people with the money and desire to carry a stove will be allowed. This is discriminatory and does not allow for a primitive experience

It is unrealistic to prohibit campfires above 4,000 feet in elevation in wilderness areas. Most travelers in wilderness really don't know what elevation they are at. A campfire is part of the experience of camping-out in wilderness. It would be more realistic to restrict campfires in specific areas, where scavenging for fuel has become harmful to the environment.

An elevation restriction will be hard to administer when users plead ignorance, but in general I feel that 4,000 feet in the correct cut-off for most areas. Additional prohibitions should still be allowed at lower elevations if necessary, such as at Talapus and Olallie Lakes.

Prohibiting campfires above 4,000 feet elevation is an excellent and much needed move. Olympic National Park has done this for many years and most visitors rely on stoves.

Response: This provision has been changed to limit campfires in all Dedicated Trailless areas, and in other areas - regardless of elevation - where natural dead fuel is limiting or where dead trees are a part of the natural beauty. This often occurs at higher elevations. Refer to the

Forest Plan, Chapter 4. The intent of this rule is to protect the wilderness resource for others to enjoy.

WHY IS IT ASSUMED THAT ALL WILDERNESS TRAIL CONSTRUCTION WILL BE COMPLETED WITHIN TWO DECADES; CAN'T THIS CONTINUE FOREVER?

Why can it be assumed that trails in wilderness will be completed in two decades (Appendix B-40)? Later (Appendix B-102), it is suggested that most will actually be done by the end of the first decade. Given the population assumptions, this does not seem either rational or supportable. We encourage the Forest Service to build and maintain trails forever if needed.

Response: We state that most of the wilderness trail development will be completed within two decades, based on the assumption that most of the wilderness trail system is in place already, and that there are few opportunities for further construction. Wilderness trail construction and reconstruction is undertaken to protect the character of the wilderness and not to promote additional recreational use. The Wilderness Act intends that wilderness areas not be managed primarily as recreational areas, even though recreation usually comprises the highest amount of use within wilderness. There are many other uses and values within the wilderness. Recreation use is promoted and allowed until it begins to impact these other values, such as solitude, wildlife habitat, and unrestricted ecological succession.

The issuance of FSM 2320, R6 supplement 56 in 1981 (updated by supplement 81) established a Wilderness Recreation Opportunity Spectrum (WROS) for the region which established a nondegradation policy for wilderness planning and management. It is the intent of this policy to assure that appropriate diversity and wilderness character are maintained, and that primitive trailless areas do not become trailed or reduced to a trailed condition.

MORE SIGNS ON WILDERNESS TRAILS

The limit of two signs per trail junction assumes the junction of two trails. What about a limit of one per trail so if there is a junction of three trails, there can be sign for each trail.

Response: Agree. This standard and guideline for wilderness has been revised Refer to Forest Plan, Chapter 4, Forest-wide Standards and Guidelines.

DON'T USE TRAIL SIGNS IN "GENERAL TRAILLESS"

Forest-wide Standard and Guideline for signs in wilderness, #8: directional signs should not be used in the General Trailless zone.

Response: Agree. This has been revised in the Forest Plan, Chapter 4.

LIMITING TREE BLAZES LIMITS WINTER TRAIL USE

By limiting tree blazes, you are discouraging winter use of your trails With snowfall, trails are obliterated and only by tree blazes can a path be found

Response: As Guideline #7, Trails in the Wilderness Forest-wide Standards and Guidelines states, tree blazes "...may not be used for pre-construction trail location." This guideline also states that tree blazes should to avoided in marking existing trail locations except where absolutely necessary. This provision reinforces a code of Federal Regulation which states that it is against the law to cut or other wise damage any timber, tree, or other forest product, except as authorized by a special use authorization. Special trail signs, instead of tree blazes, may be used to mark winter trails; they are placed above snow lines for visibility.

SKI TOURING TRAIL MARKERS SHOULD BE USED IN WILDERNESS

The standards and guidelines for wilderness management should allow for the use of ski touring trail markers. These signs can be life saving in a whiteout and reassuring at other times. The nationally recognized ski trail marker should be used.

Response: Normally this type of sign is not appropriate within the wilderness. As discussed in the response to the comment on tree blazes, special trail signs may be used to mark winter trails. However, there are currently no existing or proposed designated cross-country ski trails within the wilderness.

DON'T DESTROY SUMMIT CAIRNS

Summit cairns and registers should not be destroyed under the guise of carrying out the policy of nondegredation. The information contained in the registers could be useful, and some old registers are historical landmarks.

Response: It was not the intent to include historical summit cairns under this direction. The wording in the Forest Plan, Chapter 4, has been revised to clarify this.

CONCERNED THAT HORSES WILL BE LIMITED FROM WILDERNESS

We are concerned with the implications scattered throughout your wilderness guidelines that horse use will be limited first. Horses were specifically guaranteed access to the wilderness during negotiations for the 1984 Wilderness additions.

Response: Horses are permitted in wilderness; however, they may be prohibited from certain trails or areas to avoid unacceptable damage to the wilderness resource. The guideline is in line with the Wilderness Act, which states, "... the imprint of man's work (shall remain) substantially unnoticable." Horse use can be damaging in high-elevation, shallow soils; coupled with the short growing season, natural recovery of vegetation can be slow. In these situations, horse use will be limited first. Where damage is extreme, the trail may be relocated or all use curtailed.

THERE SHOULD / SHOULD NOT BE RESTRICTIONS ON THE NUMBER OF PEOPLE AND STOCK ALLOWED IN THE WILDERNESS.

The MBS should institute restrictions on the number of people and stock traveling as a group in the wilderness. A limit of 12 persons and stock is the upper margin of what is environmentally responsible. This should apply to all groups, including mountaineers, and should be implemented in all wildernesses.

I feel the "12 heartbeats rule" is unrealistic for most wilderness groups...we don't want to take in more animals than necessary, for most groups two riders and three horses make a good workable unit, with combinations of this unit as the party size increases to six riders and nine horse = 15 heartbeats.

> **Response:** Party or group size limits for all of the wilderness areas in the Cascade Mountains of Washington State are currently regulated by a CFR which states: "Entering or being in all Wilderness, except the Lake Chelan Sawtooth and Pasayten Wildernesses, with a group consisting of a *combination of persons and pack or sadle stock exceeding 12 in total number* except as approved by permit specifically authorizing a higher number, 36 CFR 261.58(f)."

WILL PELETIZED FOOD BE MANDATED?

Draft Plan, page 4-85, Livestock: will peletized food be mandated?

> **Response:** The use of processed hay or grain or livestock feed that is certified weed-free will be required. Refer to Forest-wide Standards and Guidelines, Chapter 4, Forest Plan. It is currently against the law to possess or transport unprocessed hay or grain in wilderness. The intent is to protect the wilderness resource from noxious weeds, non-native plants, or other undesirable plants.

HOW CAN CAMPERS MEET THE GUIDELINE OF AVOIDING THERMAL COVER?

How can campers avoid thermal cover? By FS definition, all low-elevation old growth provides thermal comer for deer and elk Travel corridors are usually found along bodies of water, so hikers are also expected to stay away from water. These guidelines certainly will make for interesting hiking.

> **Response:** This direction is not meant to cover all thermal cover, but rather thermal cover and other important wildlife habitat where human activity has been identified as disrupting the use of the habitat or harassing animals. Even where this occurs, it may mean avoiding areas only during certain critical portions of the year. This Guideline has been clarified in the Forest Plan.

HOW CAN T & E SPECIES RECEIVE SPECIAL TREATMENT WITHIN WILDERNESS?

How can "special emphasis" be given to threatened or endangered species when the environment within wilderness cannot be manipulated? How can you tell if human influence has caused their demise?

> **Response:** As discussed in the wilderness Forest-wide Standards and Guideline, Forest Plan, Chapter 4, a number of techniques are available to

help preserve threatened and endangered species. Certain species can be re-introduced to areas where they once existed, or human or pack and saddle stock can be curtailed In certain instances, fish/wildlife habitat improvements are permitted. The latter is allowed where the improvement existed before the area was designated wilderness; any habitat manipulation must be done with minimal impact on the resource. The work requires approval from the Chief of the Forest Service.

PROTECT WILDERNESS FROM THE INTRODUCTION OF NON-NATIVE SPECIES

The Forest's concern for the introduction of non-native species of plants is laudable and we support it. The Forest should use the same attitude toward the introduction of non-native fish species and grazers (sheep and cattle) in the wilderness.

Response: The introduction of non-native fish species is not allowed under the Forest Wide Standards and Guidelines for wilderness management (Plan, Chapter 4). These guidelines call for management of native species only, and only species indigenous to an area may be reintroduced into that area. Since only one grazing allotment for sheep exists within the wilderness of the MBS (within Glacier Peak), and is only sporadically used, grazing is not a problem for wilderness managers.

THE FORMULA FOR DETERMINING THE NUMBER OF WILDERNESS RANGERS IS INAPPROPRIATE

The parameters for determining the number of wilderness rangers seem excessively broad and will probably not provide for adequate ranger/visitor contact. The figures should be reworked to provide at least one wilderness ranger per 62,500 acres and 15,000 Recreation Visitor Days (RVD's).

The National Park Service determines the number of wilderness rangers based on factors such as number of entry portals, hot spots where damage is occurring, or the need for search and rescue contact, rather than acreage or visitation figures. In other words, real reasons rather than an automatic formula.

Response: We agree that there are other ways to determine the number of wilderness rangers needed. In reality, the number of rangers is driven by the annual budget, while the number of positions requested is determined by on-the-ground factors such as "hot spots" and desired visitor contacts. These figures were included to serve as a guide to the minimum number of persons needed for wilderness management. The MBS currently does not meet this minimum number due to lack of funds.

DON'T SET LIMITS ON NUMBER OF CLIMBERS PERMITTED ON WILDERNESS ROUTES UNLESS ECOLOGICAL CONCERNS EXIST

It has been the position of the climbing community that wilderness plans should not set limits on the number of climbers permitted onto mountaineering routes, unless legitimate ecological concerns exist. Thus, the number of social encounters, or the number of camps which are visible from other sites should not be a limiting factor on access to major mountains.

Attempting to provide a range of recreational opportunities, including solitude may be an appropriate goal when dealing with trail or trailless areas within

wilderness. However, on a mountain, there are usually only a few choices of routes or bivouac sites A peak such as Mt Baker is a significant endeavor, and climbing is a unique experience. The climbing experience far outweighs the desire for solitude.

At Mount St. Helens, in the FEIS, the Regional Forester designated the upper portion of the mountain as "Primitive", in part, to limit the number of climbers. The AAC and other climbing organizations appealed and, in a decision issued on July 16, 1986, the Chief upheld the appeal, concluding that "because of the uniqueness of this particular mountain, we feel that the number of social encounters should not be a limiting criteria in determining the use of the mountain."

Response: The FS agrees that climbing a major peak is a unique experience. Fortunately for the citizens of the Pacific Northwest, Mt. Baker is not the only location for this recreation opportunity Glacier Peak, Mt. Rainier, Mt. Adams, Mt Hood, and Mt. St. Helens all provide the opportunity for a major climb. All of these climbs also have some restrictions on the number of climbers, or on the camping locations along the routes. Generally, only overnight use is restricted, with no restrictions placed on day use.

The recent resolution of the appeal on climbing numbers on Mt. St. Helens is not relevant to the situation on Mt Baker. Mt. St. Helens is not located within a wilderness area and therefore, solitude or maintenance of a primitive character is not a primary goal of management. It should be noted that there still is a limit of 100 permits per day issued on Mt. St. Helens, based primarily on controlling physical impacts to the environment.

The primary concerns with the recreation use of the Mt Baker routes focus on defining at what point the human use begins to impact the other resource values that the wilderness provides. Recreation is only one component of wilderness management. The disposal of human waste above timberline is a primary physical impact of the heavy recreational use of the climbing route. Protection of the "primitive" social character of a mountain within wilderness is also a concern which must be balanced against the recreational use. It is important to note that "outstanding opportunities for solitude" are required by the Wilderness Act. Due to the history of heavy use prior to wilderness designation, and the uniqueness of the climbing opportunity, levels of use higher than would typically be found in *the core of a wilderness will be accepted.*

The Draft Plan proposed 16 parties encountered while traveling and 15 campsites visible for this area. Generally, the highest intensity use areas of a wilderness would allow 10-12 encounters on the trail and a maximum of two campsites visible. The Forest Plan did not change these standards. The Forest hopes to work with the climbing and recreating communites to find a satisfactory middleground for these limits Mt. Baker Ranger District is currently forming an ID team to review this issue. Members of the climbing community will be included on this team

CHANGE THE ALLOCATION OF THE COLEMAN GLACIER CLIMBING ROUTE

Change the land management designation of Mt. Baker's north side on the Roosevelt and Coleman glaciers to 10A Transition or 10B Trailed I think you can do it and still remain within the definition of "wilderness."

The FS should interpret the Wilderness Act in such a way as to maintain the historical levels of climbing and hiking in the area on the northwest side of Mt. Baker (Coleman and Roosevelt Glaciers, slopes below western lobe of Coleman Glacier, and the drainage from east side of Heliotrope Ridge to south side of Bastille Ridge). The Alternative A map has a serious error in its portrayal of current use of the Coleman climbing routes. The entire Coleman should have been classified 10A Transition to reflect current use.

Amend the preferred alternative to place all climbing routes, all of the Roosevelt Glacier and all the Coleman Glacier in MA 10A rather than 10C, which better describes the area's current use.

Response: At the small scale of the DEIS maps, the allocation of the Coleman Glacier area was confusing. The Alternative J (Preferred) map now clearly shows that, below timberline, the climbing route at Coleman Glacier is allocated to Management Area 10A Transition. Above timberline, the 10E Special Area allocation is applied. Regulations and Limits of Acceptable Change for this portion of the route will be developed during Forest Plan implementation by the Forest Service and a broad spectrum of user groups, including representatives of the climbing community. This is necessitated by the growing number of climbers on this route and the ever-worsening sanitation problems above timberline.

BOULDER BASIN AND GLACIER PEAK CLIMBING ROUTE

The Boulder Basin climbing route has been the "most popular climbing route on Glacier Peak" only since the extending of the Whitechuck Road, to Owl Creek, made it accessible. This hardly sets an historical precedent for climbers. The area is often inundated with campers (presumably climbers) with every possible campsite occupied - not a wilderness experience in any sense of the term. As the basin is mostly talus fields, every campsite is visible from almost every other campsite in the basin. The visual impact is incredible.

To quote the plan: "Areas do not qualify for this (special area) class for administrative convenience in dealing with overuse." I suggest that this is exactly the reason Boulder basin has been designated a special area. The area is overused. The FS is taking the easy route when it designates Boulder Basin as a Special Area, rather than limiting use. Manage it as General Trailless rather than sacrificing it to sport mountaineering.

Response: We agree. In the Preferred Alternative, the special area allocation (MA 10E) has been dropped for the Boulder Basin area. This area will now be managed as 10 B (Trailled).

EXCESSIVE EMPHASIS PLACED ON ENCOUNTERS AND SOLITUDE IN THE WILDERNESS

The Forest is placing excessive emphasis on encounter avoidance and the opportunity for solitude. Studies of wilderness visitor behavior indicated that most activities involve preferred social interactions.

Response: Wilderness is defined in section 2 (c)(2) of the 1964 Wilderness Act as an area "having outstanding opportunities for solitude or a primitive and unconfined type of recreation". The protection of solitude is therefore one of the core elements in wilderness management.

While it is true that social interaction is a positive part of many wilderness activities, many of our visitors desire low levels of interparty contact (Stankey 1973, 1980). Interaction between parties is a frequently cited source of visitor dissatisfaction (Stankey and Schreyer 1987). A basic assumption of wilderness management is that as interaction between wilderness visitors increases, opportunities for solitude and therefore the quality of the experience decreases. The number of encounters judged to be "too many" differs between visitors and with a number of situational factors. Mode of travel is one important variable Interactions between hiker and stock parties are more dissatisfying, particularly to the hikers, than interactions between similar groups (Stankey 1973).

Party size is another factor, Stankey also reports that visitors prefer seeing many small groups to a single large group. Location of the encounters is another important variable. Interaction between parties camped close to each other is generally more of a problem than contacts along the trails or elsewhere (Stankey and Schreyer 1987). Encounters that occur in more remote sections of the wilderness also tend to be more troubling than encounters close to the edge of the wilderness.

Existing encounter levels and suggested encounter levels in the LAC's will continue to be monitored and adjustments made if necessary.

DEFINITION OF ENCOUNTERS

We used the classification system and found problems with the definitions of encounters per day. We do not know how this is arrived at Encounters per weekend day? Average per person? Average for all the year?

Response: *Encounters are measured in two settings - on the trail and at* occupied campsites In both situations encounters are an average per day over the season of use. The Forest Plan does not specify how this will be implemented. Additional investigation is required before encounters can be used to monitor use

GRAZING IN THE WILDERNESS

It should be the MBS policy to not renew livestock grazing leases in wilderness areas when they expire, as livestock directly conflict with the primary wilderness resources. We are particularly concerned that strict monitoring and regulation of the effects of livestock grazing on wilderness plant communities be instituted.

Response: The demand for grazing has historically been very low on the MBS. Portions of two sheep grazing allotments administered by the Wenatchee NF are located on the forest. These portions contain 10,000 *acres, of which 4,000 are suitable for grazing. Neither permit has been* used for some time. It is possible that someone could apply to reopen these allotments since they are still valid, as they were in place prior to the establishment of the Glacier Peak Wilderness. An application would go through the NEPA process with public review, and it is unlikely that a *permit would be issued if it conflicted with wilderness resources.*

TEMPORARY ELECTRIC FENCES SHOULD NOT BE ALLOWED IN THE WILDERNESS

Temporary electric fences shouldn't be allowed in the wilderness. Such fences would severely conflict with the wilderness setting, and might require generators. If animals are being grazed at an intensity to require these fences, then you are probably exceeding the capacity for the area.

Response: This reference has been removed from the Forest Plan wilderness standards and guidelines.

LIVESTOCK SETBACK STANDARDS ARE NEEDED FOR ALL WATER BODIES

Stringent livestock set-back standards should be established in the Forest Plan for all wilderness areas. These standards should apply to all creeks, springs, and other wetlands, not just lakes.

Response: These standards currently exist in the form of a closure order on Cascade forests This order reads: ..."The following acts...are prohibited within all Wilderness .. (6) Grazing, hitching, tethering, or hobbling any pack or saddle livestock within 200 feet slope distance of the shoreline of any lake, stream, or pond.."

FOREST SERVICE SHOULDN'T CONTINUE TO GIVE HIKERS PREFERENCE OVER OTHER USERS

"Less than half of the recreation in the wilderness is hiking"-- and the majority of that is day hiking. That is an interesting find. It means that the Forest Service should not continue in its current direction toward giving hikers preference over all other users, if they aren't even the majority of users in an area which caters primarily to them

Response: The chart which this comment is based on shows the primary reasons for entering two wildernesses on the forest. It does not show the absolute numbers engaged in any activity. It shows that 41% of users go to the wilderness to hike, 25% to camp, two percent to ride horses, etc.

WHY WAS CODE-A-SITE SPECIFIED AS A MANAGEMENT TOOL IN WILDERNESS?

In the wilderness monitoring section why are code-a-site and photo points *mentioned. These techniques won't adequately document LAC standards.*

Response: We agree, this reference has been dropped from the monitoring plan and replaced with the direction to measure changes in the LAC's in the wilderness. Specific tools to be used are not specified. David Cole's "Wilderness Campsite Monitoring Methods" should be used as a source.

DEDICATED TRAILLESS ZONE SHOULD ALLOW WAY TRAILS AND ROUTES

The description for Dedicated Trailless says that "existing trails will be returned to a natural state" and "user made trails are not permitted." The Forest Service has already destroyed countless trail miles by logging, and here you propose to destroy way-trails and routes in a area I thought was protected.

Climber trails cross glaciers and talus slope to merge with game trails on the way to summits. We see no trend that these will develop into more than that. The Mountaineers approve of the designation of this classification as "forever trailless with the proviso that climbers trails are a reality, and they will continue to exist. People who climb and fish will continue to use them and to remove them would create a far greater impact than the way-trail.

Dedicated Trailless zones within wilderness need to be more clearly defined. If this means users will be prohibited from the area so they can't leave a boot trail then the NCCC is opposed to the concept. It it means that it is an area of user-defined routes only, which are unmarked and not obvious, then the NCCC would approve. Cross country travel through trailless zones is a supreme experience.

Response: The intent for management of this zone is to preserve an area where the presence of humans is not evident. The description of this area has been rewritten to say that "obvious travelways are not permitted". The class may include way-trails and routes not discernible as human caused, the condition to be avoided is vegetation and soil loss along a continuos tread.

PLAN SHOULD SHOW RVD'S PER SQUARE MILE INSTEAD OF PER ACRE

I concur with the climbers that recreation visitor days per square mile provides a more meaningful and understandable measure of the number of people in the area than persons per acre.

Response: A RVD per square mile, per year figure has been added to the appropriate sections of the plan.

THE COEFFICIENTS FOR DEDICATED TRAILLESS AND GENERAL TRAILLESS MUST BE WRONG

The Dedicated Trailless areas are very important to the climbing community. The proposed coefficient of 0.64 RVD's per square mile for this area is too low to permit flexibility in current use for these areas. In view of current climbing use in North Cascades National Park of 32 RVD's per year, we propose a level of 50 RVD's per year per square mile would be more appropriate.

I thought the .001 RVD's of use per acre per year in General Trailless was a typographic error. The standards and guidelines for human impact are less stringent than on Dedicated Trailless, yet the RVD's for Dedicated Trailless are much higher. Obviously, the RVD's for this class should be higher than for Dedicated Trailless.

The dedicated trailless zone is to be managed forever trailless, and user made trails are not permitted. Human impact is minimal, isolation and solitude are outstanding, and user restrictions may be necessary to insure that trailless experience remain. With these guidelines, we cannot understand how this zone is projected for 85,688 RVD's.

Response: The coefficients for General Trailless and Dedicated Trailless WROS zones have been revised in the Forest Plan. The Dedicated Trailless zone now has a coefficient of .078 RVD's/acre/year or 50 RVD's/square mile /year. The General Trailless zone coefficient was raised to .25 RVD's /acre/year or 160 RVD's/square mile/year. Forest Wide Standards and

Guidelines, Chapter 4, Forest Plan have been revised to better explain carrying capacity. With the implementation of the Limits of Acceptable Change process, carrying capacity estimates based on coefficients will no longer be necessary; although they still may be useful for comparison purposes.

The presence or degree of wilderness resource deterioration will be determined through the analysis of the condition and trend of the measured changes in LAC indicators. Carrying capacities determined through the LAC process will be expressed in PAOT's at individual sites or locations within the wilderness.

CONSIDER EFFECTS OF MANAGEMENT ACTIVITIES ON ALL ASPECTS OF WILDERNESS

The documents should consider how management activities in all areas of the Forest impact wildlife, air, water quality, and other aspects of wilderness.

Response: Chapter IV, FEIS, Environmental Effects includes a discussion on the effects of management activities on wilderness.

PLAN IGNORES THE LAW WHEN IT SAYS THE STATUTE DOES NOT PROHIBIT MANAGING ROADLESS AREAS TO PROTECT WILDERNESS SUITABILITY

Only Congress can create wilderness but the MBS is attempting to set aside substantial areas of administrative quasi-wilderness in this plan. When you state (as on page III-137 of the DEIS) that "areas remaining roadless will be studied in the next round of planning... all resources, including wilderness, will be evaluated..." the Forest needs to be reminded that these remaining roadless areas have been "evaluated" over the last 30 years. The statement in the DEIS is an intent to ignore the admonitions of the letter and legislative history of P.L. 98-339.

Response: Section 5 of the Washington Wilderness Act speaks to "released" roadless areas and says, "...that such areas need not be managed for the purposes of protecting their suitability for wilderness. ." [emphasis added]. The Forest Service is given discretion to either protect suitability or not. Using this discretion, the MBS chose not to manage any roadless areas for the sole purpose of protecting wilderness suitability. This is explained in the FEIS, Chapter II, Alternatives Eliminated From Detailed Study In the preferred alternative, some roadless areas or portions of roadless areas are allocated to management prescriptions that will keep them in an undeveloped condition. Allocations were made based on the suitability of land for various uses and resource outputs, and also on the objective of the alternative and public comment. Allocations were not made to protect wilderness suitability, though they may have that effect.

Part (b)(2) of Section 5 states: "...the Department of Agriculture shall not be required to review the wilderness option prior to the revisions of the plans, but shall review the wilderness option when the plans are revised...ordinarily...on a ten-year cycle, or at least every fifteen years. ."

"RELEASED" LANDS ARE RELEASED FOR TIMBER PRODUCTION

The MBS "Analysis of the Management Situation" document (AMS, May 1985) explained how the roadless acres had been unavailable for timber management but now are released for timber production. Since additional wilderness was rejected in the AMS for this planning period, to place virtually all of the roadless acres into a wilderness type classification violates: the direction set in the AMS, the release of these acres from RARE II in 1983, and the release of the roadless areas by the Washington State Wilderness Act of 1984.

We are concerned that areas now classified as roadless, not considered by Congress for wilderness, will not be managed for a range of resources other than for their scenic quality.

Response: The AMS is an informational document, rather than direction. It states: "...these acres are now available for a full-range of resource uses; wilderness designation will not be considered in this Forest Plan. Wilderness classification may be considered during future revisions" (AMS, 1985). The Washington State Wilderness Act says these lands:

> "...shall be managed for multiple use in accordance with land management plans pursuant to section 6 of the Forest and Rangeland Renewable Resources Act of 1974, as amended by the National Forest Planning Act of 1976. Provided, That such areas need not be managed

> for the purpose of protecting their suitability for wilderness designation prior to or during revision of the initial land management plans."

Accordingly, these roadless lands are available for multiple uses, including outdoor recreation, range, timber, watershed, wildlife, and fish. Only wilderness (one of the multiple uses) has been excluded or "released" from consideration. The Act does not state the roadless lands are released solely for timber production; in fact, 60% of the released roadless areas are not tentatively suitable for timber production.

Appendix C shows, by each roadless parcel, the acres of roadless area allocated to each management area (see the table at the end of each section). Depending on the alternative, roadless acres are assigned to a variety of management, not solely scenic allocations

APPROPRIATE ALLOCATION OF ROADLESS AREAS MUST BE BASED ON A DEMONSTRATION OF HIGHEST AND BEST USE. DOCUMENT OPPORTUNITY COSTS.

The 1984 Senate Committee Report recognized the Forest Service has the authority to manage [the roadless] lands in an undeveloped condition, if and when appropriate. "Appropriate" use specifically applies to well-defined areas of undeveloped lands where the Forest Service can clearly demonstrate that such limited use management is the highest and best use, with attendant opportunity costs well-documented. In the proposed MBS Plan, the necessary justification and documentation is not done.

> **Response:** The Washington State Wilderness Act of 1984 did not include direction to allocate the "released" roadless lands based on economic "highest and best use." The preferred alternative, in the Forest Plan, is that which - in the considered opinion of the Forest Service - provides for a level of multiple uses, goods, and services that best maximize long-term, net public benefits while responding effectively to all the public issues.
>
> Opportunity costs for all alternatives displayed in the FEIS may be found in Chapter II. Resource outputs and environmental effects, and economic tradeoffs are also discussed in Chapter II. Appendix C presents outputs and effects for individual roadless areas. This appendix has been modified in the FEIS, with more discussion of the environmental consequences of implementing each alternative on the roadless areas

ALL TENTATIVELY SUITABLE ROADLESS ACRES SHOULD BE MANAGED FOR TIMBER PRODUCTION

The 40% of the roadless acres (164,500 acres) that are currently tentatively suitable for timber production should be managed for timber under the release language of the Washington State Wilderness Act.

> **Response:** As discussed above, the "release" language only states that the roadless areas are available for multiple uses, and that the Department of Agriculture shall not be required to review the wilderness option prior to Forest Plan revisions. Table C-1 in Appendix C, FEIS shows the updated acres of tentatively suitable land; also refer to the general discussion in Chapter III, FEIS. When the acres of inaccessible land and those lands allocated for wildlife and riparian management requirements are removed, fewer acres are remaining as tentatively suitable for timber production;

again, see Table C-1, Appendix C. Refer to the narrative for each roadless area parcel for the disposition, by alternative, of that parcel.

FOREST SERVICE FAILS TO COMPLY WITH RPA BY FAILING TO OPEN ROADLESS AREAS TO TIMBER HARVEST

By failing to open the roadless areas to timber harvest beyond a mere token level over the next 15 years, the MBS Plan has failed to comply with Section 10 of the Resources Planning Act.

Response: The Forest Plan presents a full range of utilization of the roadless areas for lands that are suitable for timber production. Section 10 of the RPA Act directs that ".. installation of a proper system of transportation to service the National Forest System...shall be carried forward in time to meet anticipated needs on an economically and environmentally sound basis..." It also states that any roads constructed be designed to standards appropriate for the intended uses. If any piece of land is assigned to a management use and prescription that precludes road construction, Section 10 of the RPA would be met, as the anticipated needs of an area would be unroaded use.

ROADLESS AREAS NOT DESIGNATED WILDERNESS IN 1984 SHOULD BE OPEN TO MULTIPLE USE

The 1984 Washington State Wilderness Act was tailored and heradled as the bill to close the wilderness questions for at least 10 years. It also stated that all other roadless areas should be opened up to multiple use, with no buffers around wilderness. The MBS has ignored the Act in the management of the released roadless areas, and has set up quasi wilderness. If these areas are not developed, they will probably be put into the wilderness system in the next planning phase.

Response: In this round of planning, an alternative that considered additions to the wilderness system was considered, but not developed in detail. The roadless areas (see Appendix C) were evaluated for a number of values, including wildlife, timber, recreation, cultural/historical, minerals, water, and wilderness. Sixty percent of the roadless acres are unsuitable for timber production, 17% of the area that is **tentatively** suitable is inaccessible or contains wildlife management requirements. In summary, 77% of the roadless area acres are not suitable for timber harvest. On the remaining acres, timber production was considered along with other values, resulting in a differing mix of allocations - except wilderness - in the various alternatives.

CONTRARY TO LAW AND POLICY, THE FOREST SERVICE IS CREATING BUFFER ZONES AROUND WILDERNESS

The map of the proposed alternative shows a majority of wilderness boundary miles classified in MA 1A or 1B - wilderness buffers. This is in direct conflict with the spirit and intent of Section 9, P.L. 98-339 [1984 Wilderness Act].

Holding areas as potential wilderness in the next generation of plans and creating buffer zones are not acceptable direction for this plan. The Washington State Wilderness Act of 1984 bestowed Congressional approval on the

RARE II results with sufficiency and release language...and it deemed that the remaining roadless areas be managed for nonwilderness multiple uses.

Response: Lands adjacent to wilderness are evaluated along with other National Forest lands for the potential to produce goods and/or services. No attempt is made to create a "buffer" around wilderness. Through the forest planning process - including public comment - some lands adjacent to wilderness will be designated for timber harvest, while other lands are not suitable, or have other more valuable resources that will be the focus of management in one alternative or another. In the Preferred Alternative, over 50% of the lands adjacent to the wilderness boundary are allocated to management areas that allow road construction and timber harvest.

PROTECT ROADLESS AREAS SO THEY CAN BE CONSIDERED FOR WILDERNESS AT A FIRST REVISION OF THE PLAN.

The Plan completely ignores a management option· protecting additional roadless areas for the express purpose of recommending them for wilderness at the first revision of the Plan. Reconsideration of roadless areas for wilderness is required by release language in the Washington Wilderness Act.

Response: The Washington State Wilderness Act of 1984 states that "...the Department of Agriculture shall not be required to review the wilderness option prior to the revisions of the plans,but shall review the wilderness option when the plans are revised...' (Sec. 5(b)(2). In Sec. 5(b)(3) areas not designated wilderness'...shall be managed for multiple use ... provided, that such areas need not be managed for the purpose of protecting trees suitability for wilderness designation prior to or during revision of the initial land management plans."

NEED BETTER DEFINITION OF "ROADLESS"

You need a realistic definition of "roadless." We have seen areas with improved gravel roads designated wilderness by bureaucratic fiat by merely gating the road in question, then imagining it no longer exists. The classification of "roadless areas" must be made consistent with FS policy of classing any primitive travelway (over 40" wide) as a road; if there are any roads within "roadless" areas, consider them for use - will help disperse users over more of the forest. Where an area is genuinely roadless, we strongly prefer that the area remain roadless, and undeveloped.

Response: The Forest Planning process attempts to determine how each acre shall be managed. The existence of a primitive travelway indicates the existing condition which may or may not be in conflict with the selected management for the area. If the selected management allows for roads, the area will be classified as roaded. Otherwise the "road" is non-conforming and shall be allowed to return to its more natural state. The object of the definition of "roadless" or "roaded" is to define the future desired condition of use, rather than soley to define the current existing condition.

WHAT CRITERION WAS USED TO DETERMINE A ROADLESS AREA?

I cannot determine from the documents what criterion is used to determine when an area is "roadless". Exactly what standards and criteria did the FS use for calling an area "roadless?" How big do such areas have to be? How far from roads?

> **Response:** "Roadless" as used in Appendix C, Roadless Area Analysis, are remnants of the Roadless Area Review and Evaluation (RARE II) that were not legislated into wilderness by Congress in 1984. Size on the MBS ranges from 21 acres to 51,400 acres; there was no other criterion. The definition appears in Glossary of the EIS. Refer to MA 1A and 1B prescriptions, Forest Plan Chapter 4. 1A or primitive areas are generally 3 miles from roads while 1B, semi-primitive nonmotorized areas are 1/4 mile from roads. There are no minimum size criteria, but characteristics listed under "Desired Future Condition" define other factors.

FOREST SERVICE IS OVER-CONCERNED WITH CLOSENESS OF NEARBY ROADS

The plan process tends to examine each remnant parcel in isolation from other areas and political boundaries (specifically those of Mt. Rainier National Park), with over-concern with the distance to nearby roads There are several locations at the Clearwater roadless areas where existing roads are closer to the wilderness than to the roadless area. This does not negate the wilderness status; why should it negate the worth of the roadless area?

> **Response:** Closeness of a roadless area to roads does not negate the worth of the area. It is presented as inventory information to give planners and the public a mental picture of the existing situation on the ground. The format of Appendix C was standardized for all Forests in Region 6 (Washington and Oregon) to facilitate understanding and consistency. One of the items required for each roadless parcel was "opportunity for solitude " Close proximity to a road was often cited as offering low solitude.

ROADLESS AREAS HAVE NOT BEEN INVENTORIED FOR SENSITIVE PLANT SPECIES

In general, DEIS Appendix C Roadless Area evaluations are thorough and well-presented. However, one major omission in the analysis is that at most of the areas have not been adequately inventoried for sensitive plant species or unique plant communities. This should be corrected in the FEIS.

> **Response:** An inventory was not attempted for the Forest Plan. However, this important issue is addressed in the Forest-wide Standards and Guidelines, Chapter 4 of the Forest Plan. Current direction includes consultation with the Washington National Heritage program before starting any ground-disturbing activities. The wording of this standard has been clarified in the Forest Plan and made stronger.

ESTIMATE LONG-TERM SUSTAINED YIELD OF ALL ROADLESS AREAS

Develop long-term, sustained yields estimates for timber harvest from roadless areas.

Response: Table C-1 in Appendix C shows the maximum, long-term sustained yield for the roadless areas. This number was estimated without regard to accessibility, or other legal constraints on harvest. Refer to the final section of Appendix C for the management of each parcel, by alternative.

IDENTIFY FOREST LAND AND VALUABLE MINERAL DEPOSITS IN ROADLESS AREAS

There are sites in many of the remaining roadless areas that are commercially valuable for timber and minerals. We insist that they be identified, so that they can contribute to the economy.

Response: FEIS, Appendix C presents the extent of commercial forest lands and mineral deposits for each roadless area. Whether or not these lands and deposits are developed depends on other factors such as soil, water, wildlife, fisheries, cultural/historical, recreation and other values. These other factors also contribute to the economy.

HIGH PROPORTION OF ROADLESS ACRES ALLOCATED TO UNDEVELOPED ACTIVITIES IS CONTRARY TO INTENT OF LAW

The proposed plan implementation schedule would leave over 61 percent of the total 407,000 acres of released unroaded areas in an undeveloped condition with no planned road access. With 132,247 acres not to be developed for the next 15 years, it appears that only 25,000 acres of existing roadless lands (6% of the total unroaded area) would receive any additional use whatsoever. We believe this potential situation is contrary to the intent of the Washington Wilderness Act of 1984 and the direction of the Resources Planning Act (RPA) program pursuant to the Amended RPA It does not lend credibility to the plan analysis and conclusions to note that most of the projections of recreation and Wilderness use are already obsolete.

Response: The intent of the Washington Wilderness Act and Resources Planning Act was to allow for a process to consider alternative uses of roadless areas outside wilderness. This did not constitute a decision to harvest timber or open these lands for roaded or developed recreation. The allocations recommended in the preferred alternative are, in the opinion of the Forest Service and tempered by public input, the best use of the land.

NO BELOW COST TIMBER SALES IN ROADLESS AREAS

A study should be conducted to determine whether each particular sale in a roadless area would be a below cost sale. No below cost timber sales should occur.

Response: Many roadless acres will never be harvested (see above responses regarding the percent of roadless acres that are tentatively suitable for timber harvest. Costs and revenues from timber sales will be part of an extensive evaluation during the site specific planning phase of each sale These type of analysis is beyond the scope of the forest plan, but will be completed during the environmental analysis for each proposed project. Refer to the Forest Plan, Forest-wide Standards and Guidelines, General Procedures #1.

MULTI-AGENCY AND PUBLIC COMMENT NEEDED PRIOR TO ANY ROADLESS AREA DEVELOPMENT

Existing roadless areas should be developed for recreation uses and such development only after multi-agency professional critique of site specific plans and public comment period.

Response: Refer to the Forest-wide Standards and Guidelines, General Procedures #1 and 4, Chapter 4, Forest Plan. These provide for further agency and public comment on site-specific developments. The Forest Planning process has benefited from comment and evaluation of many different disciplines and other agencies. As a result of this input, plus public comment on the Draft Forest Plan, the roadless areas have been considered for all forms of forest use, including recreation.

DELETE SEATTLE CITY LIGHT GEOTHERMAL LEASE DESCRIPTIONS FROM APPENDIX C

The FS should review current data on geothermal leases in Mt. Baker MN. Seattle City Light recently allowed their leases to expire.

Response: These leases have expired. References to them have been deleted from the narratives for Mt. Baker (west block), and Mt. Baker (south block), and Mt Baker (Noisy - Diobsud block). These appear in Appendix C.

ADD TO THE ROADLESS AREAS DESCRIPTIONS

Descriptions are sometimes incomplete. For example, Silver Creek roadless area (App. p. C-213) fails to mention it includes part of the Mather Parkway.

Response: The descriptions in Appendix C have been improved between the draft and final plans; all wildlife and mineral/geothermal lease information has been updated. Regarding Silver Creek: the roadless area boundary was placed very close to any existing roads. Mather Memorial Parkway extends one-half mile on either side of State Highway 410, therefore there is a slight overlap with a portion of the Silver Creek area on the northwest side. This information has been added to the "Description" and to the "Contribution to Primitive Dispersed Recreation" sections of the Silver Creek narrative.

NINE ROADLESS AREAS [LISTED BELOW] VALUABLE FOR RECREATION PURSUITS

[. .the State of Washington's...] Attachment D contains a non-prioritized listing by the IAC of nine roadless areas which the state sees as valuable for recreation pursuits...[they also] benefit other values on the Forest such as critical habitat, water quality and fisheries. These values and those of recreation may over-lap and enhance the decision-making process.

Response: The areas listed by IAC are shown in the table below. Also shown are the acres of each allocated to nondevelopment in the DEIS preferred alternative compared to the Preferred Alternative J. These acres will be available for primitive and semi-primitive recreation plus protection of other values as well. The Pratt, which is not an inventoried roadless area, is allocated to a combination of Scenic Forest (which include timber harvest), General Forest, MA 14 Deer and Elk Winter Range Enhancement (reduced yield timber harvest), Recommended Wild and Scenic

River, SOHA (no timber harvest), and Dispersed Recreation (no harvest). Refer to the map for Alternative J, Preferred.

Roadless Area	RARE II Parcel Number	Acres	DEIS Pref. Alt. Acres of No Devel.	%	FEIS Pref. Alt. Acres of No Devel.	%
Boulder River	6050 (BJ)	27,369	22,427	82	26,728	83
Eagle Rock	6054	33,177	30,093	91	30,746	93
Glacier Peak H	H6031 (HA,HB)	7,941	3,441	43	4,876	61
Glacier Peak K	K6031(KA)	43,362	33,472	77	32,922	76
Hidden Lake	6045	6,652	6,229	94	6,080	91
Mt Baker (Canyon Creek)	6041 (MA)	25,046	19,766	79	21,834	87
Mt Baker (Noisy-Diobsud)	6041 (MA)	51,402	32,627	63	44,894	89
Norse Peak	6034 (NA,ND)	9,312	1,625	17	5,572	59
Pratt River	None	16,200	9,600	59	see above text	
Total		**220,461**	**159,280**	**72**		

INVENTORY ALL ROADLESS AREAS ON THE FOREST, INCLUDING PRIVATE LAND

Some roadless areas, such as Annette Lake, were not inventoried in the RARE II process because they were less than 5,000 acres. Since wilderness is not an issue, the Forest should inventory and include the disposition of all roadless areas greater than 1,000 acres

Several roadless areas of the Cedar River Watershed are connected to other roadless areas...(sections near Abiel Peak and Meadow Mountain). These areas should be added to the inventory and considered for protection.

The DEIS fails to consider all the roadless land on the Forest. The review was limited by the RARE II inventory of 407,389 acres. However, in Alternative H (DEIS Preferred), the Forest Service allocates several areas to semi-primitive roadless recreation that were not inventoried. We feel that all existing roadless areas by themselves or contiguous with wilderness that are 500 acres or greater should be inventoried. Precluding private lands, especially checkerboard, as was done in RARE II is not appropriate here

Response: Areas that are undeveloped (essentially unroaded) and outside of special designation (such as wilderness, research natural area, etc.) fall into two categories· areas or portions of areas identified in the Roadless Area Review and Evaluation (RARE II) process, and all those lands not meeting the roadless/undeveloped criteria for potential wilderness designation used in RARE II

The purpose of Appendix C "Roadless Area Analysis" is to provide a detailed and site-specific analysis of the RARE II roadless areas not designated wilderness in the 1984 Washington State Wilderness Act This analysis will be used to help develop, design, and reach decisions on site-specific projects that implement the direction of the Forest Plan.

Although undeveloped lands throughout the Forest were not analyzed in Appendix C, they were considered for a wide range of alternative uses, ranging from roadless recreation to varying levels of resource development.

The areas near Abiel Peak and Meadow Mountain were both considered for nondeveloped uses in Alternatives C and G-Modified. The Preferred Alternative allocates Abiel Peak to MA 20D, Cedar River Watershed (Negociate a New Cooperative Agreement) and Meadow Mountain to MA 20D and 21A (Green River Watershed, Current Direction - which allows timber harvest).

Annette Lake was not included in the RARE II process, nor presented in Appendix C for the following reason: the area is part of the Alpine Lakes Management Unit. In 1981, after receiving extensive public comment, the Forest Service issued a FEIS and, as directed by Congress, a Management Plan for Alpine Lakes. In the Annette Lake area, 2,456 acres were set aside as a Special Recreation Area. The area is to be "...managed principally for recreation in a substantially natural condition. The area will be roadless with no motorized vehicles permitted except snowmobiles, where determined suitable.. " The Alpine Lakes Management Plan is incorporated into the Forest Plan and the designation of Annette Lake will not change.

ROADLESS AREAS SHOULD NOT BE MANAGED FOR "NON-MOTORIZED DISPERSED" ACTIVITIES

The final plan should not include any area designated as "non-motorized dispersed." The Wilderness system provides adequate opportunity for this type of planning allocation. Remaining roadless areas should be open for motorized access to ease the great demand for scenic driving on the forest.

Response: The roadless areas have been allocated to a variety of uses, in each alternative. The allocations best meet both the objective of that alternative and the resource capability of the area. SCORP has identified deficits for a number of recreation opportunities in the Puget Sound region; one of these is primitive and semi-primitive recreation. Refer to Appendix C for a more detailed discussion of each roadless parcel.

ROADLESS PARCELS SHOULD BE RE-COMBINED

The maps and narratives on the roadless areas adjacent to Glacier Peak and Henry M. Jackson Wilderness Areas are hopelessly confusing and needlessly complicated In discussing roadless areas, rational decisions to lump small, fragmented pieces together seem to have been avoided. It is hoped that this confusion will be cleared up in the FEIS.

Response: We recognize the validity of the comment. However, regional direction requires that we address each parcel separately. The current numbering system was retained to maintain consistency with the system used in Rare II.

ROADLESS AREA INFORMATION IN APPENDIX C WAS NO BETTER THAN RARE II

The roadless area evaluation was no better than in RARE II. All forested areas were termed "typical" inferring they are unimportant. Potential vehicle

trespass, "unmanageable boundaries," and other problems were used to argue against wilderness values. The FS has a responsibility to manage these areas, not shirk that duty it it seems to tough.

Response: Between Draft and Final, we have updated the resource information for all of the roadless parcels in Appendix C. We have also added a section on the environmental consequences of implementing any alternative on the roadless parcels.

PARCEL ALLOCATION CONFLICTS WITH TABLE

The data on page C-114 is confusing. Alternative H map shows all of Glacier Peak Parcels AA and AC allocated to MA 1AB. However, the table shows 105 acres of the units in "moderate development." Which is correct?

Response: In the FEIS, Appendix C, this table has been replaced with a table (for each roadless parcel) showing the exact management area allocations. In the Preferred Alternative, Glacier Peak AA and AC are both allocated to MA 1B, Semi-Primitive Nonmotorized Dispersed Recreation.

NO RIVERS SHOULD BE RECOMMENDED FOR WILD AND SCENIC STATUS

No rivers should be recommended for Wild and Scenic designation. With riparian management guidelines, further protection is unnecessary. Such a designation could well impact private property owners along the river.

Response: Riparian management guidelines are not a substitute for Wild and Scenic River designation for several reasons. Riparian management only regulates activities within 75 to 100 feet of the river; wild and scenic classification applies to an average 1/4-mile corridor on each side of the river. Secondly, riparian guidelines do not insure the continuation of the "free-flowing" character of a river. Riparian management attempts to lessen the impacts of management activities on the aquatic environment, while wild and scenic classification preserves the river and it's resources in the present condition. The impact of designation on private property owners is typically minimal - farms, homes, and cabins along a river can continue to be used as they were before designation. When scenic or access easements are necessary to protect river values, the property owner is paid for these rights. In some circumstances, the government is prohibited from acquiring private property rights from an unwilling owner.

WHAT IS THE EFFECT OF WILD AND SCENIC RIVER DESIGNATION ON PROPERTY VALUES

I own land in a proposed wild and scenic river corridor and am concerned with the effects of the Forest Service zoning on my properties values.

Response: Wild and Scenic Rivers enjoy a measure of protection from future incompatible land uses and development, there fore, designation can have a positive impact on property values and marketability. Other factors such as location of the river, type and location of the property, an advertising can have a significant influence on property values.

Recent studies on two Wild and Scenic Rivers, the Upper Delaware and the Rogue, have shown property values in the designated corridors to raise at a higher rate than those for adjacent lands The ability to buy and sell land will not be affected by designation.

INADEQUATE ELIGIBILITY ANALYSIS

Studies conducted to date have been of minimal extent and there is inadequate information to exclude any of the 47 rivers from eligibility for study to determine their suitability for future designation as "Wild Rivers" or "Scenic Rivers".

Response: Between draft and final, and based on considerable public response, we formed a special team to re-evaluate Wild and Scenic River eligibility. This group was composed of Forest Service planners, State of Washington Fishery Biologists, and outside interest group representatives. The group added to the original 47 rivers under study, for a total of 51 rivers. Rivers added were South Fork of the Tolt, South and North Forks of the Snoqualmie, and Lennox Creek. Following reassessment, 47 rivers were found to be eligible. Bar Creek, South Fork of the Cascade, Suiattle River Extension, and Jim Creek were found not to possess any "outstandingly remarkable" values and were thus dropped from further evaluation. Refer to Appendix E of the FEIS for more detail.

OUTDATED ELIGIBILITY CRITERIA USED IN WILD AND SCENIC RIVER ASSESSMENT

The evaluation process is flawed because outdated eligibility criteria are used. The Forest Service used 1970 guidelines, which were superseded by 1982 guidelines.

Response: The 1970 eligibility guidelines were presented in the DEIS, but they were not used as limiting factors for eligibility. To remove the confusion, the criteria for minimum flow, minimum length, and water quality have been removed. All rivers were re-evaluated using the 1982 guidelines, which included an assessment of the potentially "outstandingly remarkable" values of a rivers ecological setting. See Appendix E, FEIS for details.

RIVERS HAVE BEEN RATED ON A LOCAL RATHER THAN A NATIONAL PERSPECTIVE

Caution is needed in determining outstanding qualities when considered on a local versus national perspective. The river corridors on the MBS are exceptional in general and outstanding in most respects when compared to other river resources within the country. This results in downgrading river features, since you are rating the most outstanding within a field of outstanding rivers.

Response: Between the DEIS and FEIS, the Forest re-evaluated eligibility criteria for wild and scenic rivers. This resulted in a recommendation of many more rivers as eligible for classification. Refer to Appendix E, FEIS

NOT CLEAR WHAT "RECOMMENDATION FOR SUITABILITY STUDY" MEANS

The DEIS is not clear on what a "recommendation for suitability study" for potential Wild and Scenic Rivers consists of.

Response: The "recommendation for suitability study" has been removed from the Forest Plan and replaced with a complete suitability analysis. See Appendix E, FEIS.

DEIS LACKS SUITABILITY ANALYSIS ON WILD AND SCENIC RIVERS

The Draft EIS lacks a suitability analysis for wild and scenic rivers. Without an explicit discussion of the suitability criteria defined in section 8.23 of the Land and Resource Management Planning Handbook, it is unclear if the required evaluation was accomplished.

Response: Between the draft and final plans, a complete suitability analysis was completed for all eligible rivers; it is included in Appendix E, FEIS. Suitability of rivers may vary by alternative to retain the option for a high level of recreational development (campgrounds, paved roads, trails, bridges) along several rivers.

LACK OF DOCUMENTATION FOR CLASSIFICATION OF RIVERS

There is a lack of documentation for the classification of rivers; no information was provided on how each river was classified. Without this, it is impossible to determine if river segments were deleted or downgraded correctly.

Response: The information needed for classification of rivers is now included in Appendix E, FEIS, along with the criteria used to classify rivers into wild, scenic, or recreational segments. The recommendation, after suitability study, may be at a level lower than the original classification at the eligibility stage in various alternatives. However, as stated in the Forest Plan, Forest-wide Standards and Guidelines for wild and scenic rivers, all recommended rivers must be managed at the highest classification level until Congress makes a decision.

MORE PUBLIC AND AGENCY REVIEW IS NEEDED IF RIVERS ARE RE-ANALYZED

If revisions in the wild and scenic river recommendations are made, it is important that the public and other agencies be given an opportunity to review the revised analysis before it is finalized. Consider one of the following options· revise the assessment and republish is as an amendment to the draft plan and DEIS; or defer the entire Wild and Scenic River analysis until after the final plan is released. In the interim, manage the 47 rivers in accordance with section 8.12 of the Planning Handbook.

Response: A primary purpose of a draft EIS is to allow public review and comment on analysis, evaluation, and proposed actions and to give an agency an opportunity to be responsive to those comments in their decision. As a result of public comments on the DEIS and proposed Forest Plan, we made a number of changes in the Forest Plan, including changes in the Wild and Scenic Rivers analysis and recommendations for classification. Refer to the description of alternatives considered (Chapter II, FEIS); Chapter IV, FEIS, Environmental Consequences; Appendix E, FEIS; and the Record of Decision.

We did not prepare a supplemental DEIS. In evaluating changes made between draft and final, we determined that all 47 rivers had been analyzed in detail in at least one alternative in the DEIS; thus, the changes were not significant as defined in the CEQ regulations, and a supplement was not required.

MIDDLE FORK OF SNOQUALMIE INCORRECTLY CLASSIFIED

The MBS was correct to find the Middle Fork Snoqualmie River to be eligible (the proper classification should be Scenic, not Recreational) and now should reevaluate its major tributaries, the Taylor and the Pratt Rivers.

Response: Between draft and final, the potential classification of all rivers was re-evaluated. The Middle Fork Snoqualmie, Taylor, Pratt and portions of the North Fork Snoqualmie were found to be eligible and suitable for designation under the management direction of the Preferred Alternative. A scenic classification is recommended for the Middle Fork Snoqualmie River, from the wilderness boundary to the confluence of the Taylor River. Refer to the alternatives section, Chapter II, FEIS and Appendix E

SOUTH FORK STILLAQUAMISH SHOULD BE ELIGIBLE

The South Fork Stillaguamish River should be added to the list of candidates for wild and scenic river status. It possesses outstanding fisheries, wildlife, and water quality resources, and contrary to the description, receives very high recreational fishing pressure, and is a critical salmonid production area. It also contains outstanding scenic qualities, and is an important cultural use area.

Response: In re-analyzing potential Wild and Scenic Rivers, the South Fork Stillaguamish was determined to possess outstandingly remarkable values for fisheries, scenery, recreational, wildlife, historical, and ecological resources. It was thus determined to be an "eligible" river. It was further determined to be suitable for inclusion in the Preferred Alternative; rivers included here will be recommended to Congress for designation as Wild and Scenic Rivers. Refer to Chapter II, FEIS and Appendix E.

DEIS UNDERCLASSIFIES SEVERAL RIVERS

The DEIS underclassifies the North Fork Nooksack below Nooksack Falls, the North Fork Skykomish between Goblin Creek and Troublesome Creek, and the Middle Fork Snoqualmie. The draft classifies these segments as recreational when they qualify as scenic. All of these rivers were included on the first round of the Nationwide Rivers Inventory done by the Heritage, Conservation and Recreation Service (HCRS) in 1980. It was the intent of this phase of the inventory to include only rivers eligible to be wild or scenic Thus, in 1980, HCRS found these rivers eligible to be scenic. If the Forest Service intends to downgrade them to recreational, it should document the reasons for doing so in its EIS

Response: The potential classification of these river segments have been re-evaluated The North Fork Nooksack below Nooksack Falls was changed to a Scenic Classification down to the Salmon Hatchery near river mile 46. The North Fork Skykomish River between Goblin and Troublesome Creeks, and the Middle Fork Snoqualmie were also changed to a Scenic Classification. For a further discussion of river eligibility, refer to Appendix E

VALUES ALONG PRATT RIVER MUST BE PROTECTED

Since the Pratt River has been identified as a study river in Alternative G, its values must be protected, and its eligibility potential cannot be affected.

There is an outstandingly abundant flora of lower vascular plants within 200 to 300 yards of the Pratt River which is richer than that along the much wetter Elwha on the Olympic Peninsula. It is for the protection of this riparian habitat that I particularly feel that the Pratt River should be designated as a Wild and Scenic River.

Response: The Forest Service has re-evaluated the Pratt River for eligibility. It is now eligible and we are recommending for designation as a Wild and Scenic River. See Appendix E of the FEIS.

CHANGE VISUAL QUALITY OBJECTIVE IN RECREATION RIVERS

The prescription for management area 5A Recreation River should be rewritten to call for a visual quality objective ranging from retention to modification, instead of retention to partial retention. This would make it less cumbersome for the Forest Service to allow for timber harvest that may be the result of some catastrophic event.

Response: This prescription is written for the normal day-to-day management, a catastrophic event is a rarity. Forest Service Manual 2354.42 establishes the visual quality objectives for Wild, Scenic, and Recreation rivers. Within the classified river corridor (1/4 mile foreground), Partial Retention is the norm. For the viewsheds beyond classified foreground, Partial Retention is the norm for both middle and background of sensitivity level 1 corridors. In sensitivity level 2 corridors, modification is the norm.

ILLABOT CREEK HAS IMPORTANT SALMON SPAWNING, EAGLE USE

The Illabot Creek area has important salmon-spawning reaches, eagle roosting areas, winter range for mountain goats and deer, and low-elevation old growth forest. It should be added to the Wild and Scenic Rivers system.

As a major tributary to the Skagit, Illabot Creek supports significant native runs of pink, chinook, coho, chum salmon, steelhead, and Dolly Varden char. These anadromous fish ascend to about river mile 9, just below the confluence of Arrow Creek. The watershed also supports an important wintering night roost for bald eagles; there is a large contingent of Roosevelt Elk, spotted owl, and deer. These values argue for more protection.

Timber management in Illabot drainage should be scaled down to protect the eagle roosting sites. Include in the Wild and Scenic rivers system.

Response: In the FEIS Preferred Alternative, 15.3 miles of Illabot Creek are recommended for inclusion in the Wild and Scenic Rivers system. From the headwaters to the Glacier Peak Wilderness boundary is recommended as a Wild River; from the boundary to the confluence with the Skagit River is recommended as a Recreation River. Refer to Table 4-14, Forest Plan Chapter 4.

ESTABLISH SPECIAL INTEREST AREAS, ESPECIALLY AT TWIN SISTERS

These four areas - Baker Lake, Twin Sisters, Monte Cristo, and Naches Pass - should be allocated to Special Interest Areas. The one at Twin Sisters is especially significant, since the olivine substrate and its associated plant community is highly unusual.

Response: These four areas were considered for special interest areas in Alternative G. The Preferred Alternative assigns most of the Baker Lake, Twin Sisters and Monte Cristo areas to Management Areas 1A, Primitive Recreation, and 1B, Semi-Primitive Nonmotorized Recreation. The balance of the Twin Sisters area is assigned to MA 23A, Other Municipal Watersheds. The rest of the Monte Cristo area is assigned to MA 1D, Roaded Natural, and 2A, Scenic Viewshed. Allocation of these areas to MA's with an emphasis other than timber harvest will protect their unique scenic, biological, and geological features.

The Preferred Alternative assigns the Naches Pass Special Interest Area to MA 17, Timber Management Emphasis. The historic values of the area will be protected through preparation of a Historic Preservation Plan (see Appendix D, Forest Plan) and application of the Forest-wide Standards and Guidelines, Chapter 4, Forest Plan.

NEED A SUPPLEMENT TO ADDRESS ALPINE LAKES UNIT

A supplement must be issued to address the Alpine Lakes Management Unit, unfairly excluded from consideration under the Forest Plan.

Response: As discussed in "Alternatives Considered But Eliminated From Detailed Study (Chap. II, FEIS), the management direction in the Alpine Lakes plan provided for collection of certain data (not available when its Record of Decision was issued in 1981) and its incorporation into the Forest Plan. This was completed for the Proposed Plan and DEIS. In all alternatives considered in detail, provisions are made to maintain viable populations of spotted owls; protect mountain goat; wild and scenic rivers; protection of riparian areas; and incorporating timber producing lands from the Alpine Lakes Management Area into the ASQ for the final Plan. The existing Alpine Lakes Plan has not been a major issue or concern, therefore the decision was made to incorporate it into the Forest Plan without modification, except as noted above.

THE ALPINE LAKES PLAN IS OUTDATED

Since the Alpine Lakes Plan took five years to write and has been partially implemented for at least seven years, it probably should be updated and included in the LMP during this present planning exercise.

Response: As the Alpine Lakes Plan is fairly new, is consistent with the intent of NFMA, and provisions were made to incorporate some additional data (see above), the decision was made not to update it at this time Refer to Chapter II, FEIS, Alternatives Considered But Eliminated From Detailed Study Once the Final Plan and ROD are issued, all elements of the Forest Plan may be amended through a supplement. In addition, the Alpine Lakes Management Area Plan will be updated along with the Forest Plan in the next round of Forest Planning, 10 to 15 years from the ROD.

THE PUBLIC SHOULD BE ABLE TO COMMENT ON ALPINE LAKES

A major complaint I have with the Plan is its complete exclusion of the Alpine Lakes Management Area from the documents. No opportunity is open for people to voice their opinions on vital old growth areas.

We feel we have a right to comment on the proposed use of non-wilderness designated land which falls under the Alpine Lakes Management Plan. The use of this land was not specifically defined and the Forest Service is assuming that it should be used for timber harvest; the public should not be excluded from decisions on its use

Response: During the development of the 1981 Management Plan for the Alpine Lakes area, public comment was solicited and extensive effort was made to involve people in the planning effort. We have added the allocations within the Management Unit, as defined in the Alpine Lakes Preferred Alternative map, to all the FEIS alternative maps for this Forest PLan. In the draft plan, the Alpine Lakes Management Unit was defined only as MA 27. Also, refer to the MA descriptions in Chapter II, FEIS.

ADDRESS OLD-GROWTH DEPENDENT WILDLIFE; WAS IGNORED IN ALPINE LAKES

Wildlife that is dependent on old growth was given inadequate attention under the Alpine Lakes Plan and it should therefore be addressed in the current forest-wide plan.

The Forest should explain in detail the methodology and efforts of implementing MMR's within the context of the Alpine Lakes Plan.

Response: The Forest Plan provides for additions to be made to the Alpine Lakes Management Plan for wildlife habitat. Management Areas for old growth habitat (MA 11) and mature and old growth habitat (MA 12) have been added. Refer to MA 27 description, Chapter 4, Forest Plan.

CONCERNED ABOUT ROADED NATURAL ALLOCATION IN THE PRATT

The ROS map of Alternative E of the Alpine Lakes Plan shows the Pratt Valley as "Roaded Natural"...defined in part as..."areas less than 1/4 mile from roads open to public travel..." There is no road there now, and the proposed road is required to be gated to exclude public travel; indeed, the successful enforcement of this closure is one of the concerns of the current plans for the area.

Response: Page 86 of the Alpine Lakes FEIS states: "The Pratt River road system (which would be necessary for timber management) would be closed to recreation passenger car traffic." The important distinction is that there is an implied difference between the public's commercial traffic and recreational traffic. The Forest Plan carries through the intent to bar recreational traffic from this potential road system.

LITTLE OLD GROWTH PROTECTION IN ALPINE LAKES MANAGEMENT AREA

The Alpine Lakes Management Area plan did not address old growth either as a resource or wildlife habitat The draft Forest Plan indicates little additional old growth protection over the Alpine Lakes plan. A significant old growth resource exists in the Pratt drainage, particularly the "bridge" of old growth across the river between the valley side slopes. This is some of the lowest elevation stands remaining on the Forest (below 1500 feet).

Response: The issue of old growth is addressed in several sections of the the Alpine Lakes Land Management Plan FEIS; see short versus long term effects (page 88) and the response to public comments, page 118.

As stated on page 118 of that FEIS: "Low elevation old growth forest were considered when the Alpine Lakes Wilderness boundary was drawn in 1976. There are over 950 acres below 2000 feet elevation and over 21,211 acres between 2000 and 3000 feet elevation in the Wilderness...In addition to the wilderness, the management unit contains over 3,300 acres below 2000 feet elevation and 5,252 acres between 2000 and 3000 feet elevation in the Dispersed Recreation Allocation. Asahel Curtis Area at 2,400 feet elevation is dedicated to remain old growth forest. This topic will be addressed further in the Wenatchee and Mt. Baker-Snoqualmie Forest Plans..."

The "bridge" of old growth (mentioned in the comment) was actually logged (by railroad) in the 1940's. Most of the old growth was removed, but scattered old growth trees were left. Since that time, the area has regenerated to a dense stand of understory hemlock with scattered old growth above it. This stand is partially located within the General Forest allocation of the Alpine Lakes FEIS, and can be considered for timber harvest. However, any value of the stand as a "bridge" for old-growth dependent wildlife would have to be considered in the project environmental analysis, with full opportunity for public input.

At the lower end of the Pratt, the stand often referred to as "old growth" is actually less than 160 years old. The old growth overstory was removed from this area in the 1940's when it was railroad logged. There are about two dozen very large, old trees scattered over several hundred acres, left after the original logging. There are no plans to remove these large trees.

THE PLAN SHOULD ALLOW AND ENCOURAGE ACCESS TO CLAIMS.

In Alternative H, the land available to prospecting is reduced to 71% on the MBS. This is not reasonable at all, especially when part of the Forest Service charter is to promote mineral exploration and development.

The final plan should allow and encourage access to claims (as provided by existing mining laws) and should remove unnecessary restriction and regulation which discourage prospecting and rockhounding. Access to both riparian and upland areas is critical.

Response: Under the U.S. Mining Law of 1897 the public has the right to enter onto open public lands to explore for mineral resources. The Wilderness Act legislated 721,216 acres or 42 percent of the lands administered by the MBS be withdrawn from mineral entry. In the Preferred Alternative, only an additional 11,000 acres or 0.6 percent is recommended for withdrawal from mineral entry for management objectives such as Developed Recreation Sites or Research Natural Areas.

In designated Wilderness, only valid rights filed prior to December 31, 1983 retain rights to access and development. These withdrawn lands are a Congressional designation and are outside the decision space of the Forest Plan.

Excluding wilderness, 99% of the Forest is available for mineral entry. The MBS Forest Plan Forest-wide Standards and Guidelines (Plan, Chapter 4) provide for exploration, development, and production of mineral and energy resources while minimizing effects on the surface resources. The Preferred Alternative identifies 22% of the area available for mineral entry as environmentally sensitive. Mineral entry is not precluded in these areas, but activities will be relatively restrictive in nature or somewhat expensive to implement in order to minimize adverse effects on the environment.

National Environmental Policy Act (NEPA) legislated that all effects on the environment be evaluated prior to undertaking management activities. Therefore, the FS must complete an environmental analysis (with documentation either in a Decision Memo, environmental assessment, or environmental impact statement) prior to the undertaking any site disturbing mineral activity. In wilderness and other sensitive areas, this analysis can be expensive and time consuming because of complexity of issues and risk of effects

EXISTING CLAIMS WITHIN WILDERNESS NEED ACCESS

Miners, both recreational and commercial, with claims existing before the Wilderness designation must continue to be allowed rights of entry and access to these claims.

Response: According to 36 CFR 228.15(b), holders of unpatented mining claims **validly** established in wilderness prior to inclusion shall be accorded the rights provided by the US mining laws. Part (c) states that persons with valid mining claims within wilderness shall be permitted access by means consistent with the preservation of wilderness. A validity investigation by a qualified Forest Service mineral examiner is necessary

to establish validity as defined by mining laws and in compliance with 36 CFR 228.

NEW ALTERNATIVE RECOMMENDED TO MEET MINERALS NEEDS

As the Plan relates to minerals, the principles of Alternatives D, B, and H are the most desirable, in this order; G is completely unacceptable. The newly-created PLUS alternative (as outlined in this document) is the one which most fully meets our needs.

Response: A new alternative, Alternative I, has been developed in detail and displayed in the FEIS, based on the objectives and goals of PLUS

WHAT PROCESS IS USED TO EVALUATE DANGEROUS MINING WASTE, ENVIRONMENTAL IMPACTS, COMPATIBILITY, ETC.

For the mineral resource the "appropriate environmental analysis" to be conducted needs to be explored. If this refers to NEPA, such should be clearly stated. The procedures, criteria, and relationships of future site-specific activities to the overall plan need discussion/explanation. Without these, it is difficult to assess future and cumulative impacts. Further, the monitoring protocol for periodic inspections to ensure compliance with approved operation plans should be included.

What are the "minimal to moderate" restriction on the mineral resource activities that the Plan allows? Again, there should be discussion of NEPA.

Response: As described in the FEIS and the DEIS, Chapter I, the Plan guides all natural resource management activities and describes resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management. This Plan embodies the provisions of NFMA and other laws pertinent to natural resource management. Chapter 1, Forest Plan includes a discussion of the relationship of the Plan to Project Planning. The plan is not intended to encompass or replace the environmental analysis at the project level. The type of NEPA document prepared (EIS, EA, or Categorical Exclusion) is determined at the project level based on the issues, concerns, and sensitivity of the proposal. Refer to Forest-wide Standards and Guidelines, *General Procedures, Item 1., Forest Plan Chapter 4*

This selection of the type of NEPA documentation is most appropriately done on a case-by-case basis. Mining-related activities are usually initiated by industry which is dependent upon supply/demand. Prediction of mining interest, location, kind, etc. under such a dynamic, market-based industry is difficult and presents a question to whether this effort is an effective use of time/budget. It is most appropriate at the time when proposals are known that cumulative effects be addressed (Operating Plans required per 36 CFR 228 as stated in Chapter 4) At this time, we know the scope and location of the activities proposed and are better able to evaluate the environmental consequences. Forest-wide and management area standards and guidelines as documented in the Plan will guide the evaluation, analysis, mitigation, and implementation plans.

Monitoring of operations is an integral part of implementation of the Plan. Direction for monitoring of mineral activities is include in Chapter 5 of the Plan.

STATE THE PROCESS THE FS WILL USE WHEN MINING IS INCOMPATIBLE

The process the FS will follow when mineral activities will be incompatible with the management objectives should be identified in the plan. As presented, it is unclear who carries what responsibilities and whether or not there is a threshold above which the project scope needs to be reassessed. It is also important to explain the requirements placed on the proponents of the mineral activities.

Response: It is not the purpose of the Forest Plan to restate policy and procedure that is currently referenced in Forest Service Manual and Handbook direction. If mineral activities are incompatible with law they will not be approved. If mineral activities are incompatible with management objectives and cannot be made compatible, the proponent can request a review of the objectives to see if they can be amended to allow the activity. Any such amendment to Plan objectives would first be subject to analysis, review, and documentation following NEPA regulations.

DISCUSS THE IMPACTS OF MINERAL INTERESTS

With respect to mineral interest's activities varying from that which has been predicted, the Plan needs to discuss the impacts of this to the plan, the process, and cumulative effects analysis, etc. As the ensuing impacts may be significant, they need to be discussed, despite the uncertainty.

We support efforts to "be directed toward minimizing adverse environmental impacts on the surface resources and toward reclaiming the site." But what will be done to specifically carry this out? This needs to be discussed.

Response: The FEIS addressed the impacts of mineral interests to the degree of certainty that we have in our projections. Project-level planning on proposals is the most appropriate level for environmental analysis of effects and rehabilitation plans. FS policy, as referenced in FSM 2800, provides for securing performance bonds, which are used to reclaim areas disturbed by unauthorized activity when reclamation was not *appropriately completed by the operator per the approved operating plan.* For further discussion, see above response.

DISCUSS CONTRACT CONDITIONS

The contract conditions for mineral/energy exploration and development need to be discussed.

Response: A discussion of contract conditions for exploration and development is outside the scope of the Forest Plan. These conditions are most appropriately treated on a case-by-case basis per discussion above.

HOW IS "BEST USE" DETERMINED IN REGARD TO WITHDRAWALS

What standards specifically will be used to help determine whether mineral development is the highest and best use and whether a withdrawn area should be revoked? What is meant by "withdrawal" in this instance?

Response: Withdrawal in this instance means that the area is not open to entry under one or all of the mining, mineral leasing or land laws of the United States.

As directed in FSM 2760, requests for new withdrawal from mineral leasing should be made rarely. New withdrawals will be evaluated by assessing mineral potential, displaying a range of alternatives, conducting an analysis showing that the use or special features of the area cannot be adequately preserved or protected through other means, include in the withdrawal the minimum area needed for the intended use and revoke withdrawals where protection is no longer needed or appropriate.

Existing withdrawals, except for wilderness, will be periodically reviewed Withdrawals will be revoke where no longer needed and revocation will be given priority in highly mineralized areas where National Forest surface resources would not be seriously damaged or could be reclaimed.

CLEARLY STATE THE OBJECTIVES OF THE PROGRAM

Clearly state the objectives of the program, which I assume is to encourage development. Specify the types of stipulations on leases and permits that are mentioned as goals of the minerals program. I think that the statement regarding confidence in the industry's ability to conduct activities in sensitive areas should be eliminated. The FS should not suggest that mere confidence in the industry will direct mining activities in sensitive areas.

Response: The goal for the mineral program is stated in the Forest-wide Standards and Guidelines in Chapter 4 of the Plan. The statement regarding "confidence in the industry's...." has been modified.

ELEMENTS TO CONSIDER IN THE PLANNING PROCESS

The MBS should consider the following elements in the planning process. 1. Mineral Potential Map. .2.A comparison of mineral potential with availability ..3. A discussion of how minerals are affected by each alternative ..4. A point-counterpoint discussion of how minerals affects the other resources...5. A narrative section on minerals containing a history of development and mineral production, value of past production, projected mineral demand, and current operations...6. A list of current mineral withdrawals, acres involved, and mineral potential for locatable and leasable minerals...7. A narrative section on definitions of mining exploration ..

Response: A mineral resource overview and mineral potential map for locatable and leasable mineral resources were prepared using the R-2 mapping system. These maps were prepared using the most recent information available through US Geologic Service, US Bureau of Mines, and State literature and reports. This base information was used in analysis of the alternatives and used in developing the Preferred Alternative. These maps are available upon request.

Chapter IV, FEIS provides a discussion of direct effects on minerals by alternative. Rating the restrictive nature that management objectives will have on mining activities (e g. low through highly restrictive) illustrates a relative degree of expense and effort needed to carry out a proposed activity.

Effects of mineral activity on other resources is described in each resource section of Chapter IV, FEIS. A narrative of the existing situation and potential production is presented in Chapter III, FEIS.

Withdrawals are displayed as a direct effect to mining activities in Chapter IV, FEIS. Withdrawals are displayed by acreage and type by alternative. Refer to the glossary for a definition of mining terms.

INDICATE HOW MANY LEASE APPLICATIONS FOR MINERALS

How many lease applications for minerals? Acres don't mean as much.

In the Summary, it is stated that "a number" of mineral lease applications are currently in the system. For a report with many variables quantified, it seems strange that this number would not be easily obtained and inserted in this summary. Obviously, the quantity of these applications and the size of the operations that they propose is of great concern to the public interest.

Response: The number of lease applications was provided in Chapter III, DEIS, pages 156 to 157. These figures have been updated; see Chapter III, FEIS At this writing, the Forest has received 76 geothermal leases applications, with 25 applications pending A total of 18 oil and gas leases have been received by the Forest. The Summary has also been updated, with exact numbers as of the time these documents went to press.

INDIVIDUAL MINING SHOULD BE CALLED "RECREATIONAL MINING"

Since there is controversy between commercial mining and the individual who mines for recreation a different term should be used for the individual who mines for recreation in order that the layman does not confuse big business with recreation. I suggest the term "recreational prospecting" be adopted to fill this need

Response: The FS is in the process of developing a regional policy on this particular recreational activity. The term recommended for use currently is recreational collection of minerals. This policy will more clearly define what degree and level of collection or prospecting activities are considered recreational.

ALLOW ROCK COLLECTING IN RECREATIONAL AND SCENIC RIVERS

In "recreational" and "scenic" designated river sections, you should allow primitive gold panning, ore float, and rock collecting, as it is presently for mineral tracing and specimen collecting purposes.

Response: Only "wild" designated river sections will be withdrawn from mineral entry; refer to MA 5C standards and guidelines, Chapter 4, Forest Plan. "Recreational" and "scenic" designated sections will not be

withdrawn. However, mining activities may be highly restricted in these designations to meet compatibility requirements of Wild and Scenic River designation.

Gold panning, ore float, and rock collecting fall under recreational collection of minerals, provided that these activities are conducted for a non-commercial, recreational purpose. Recreational collection of minerals may not be not restricted by a withdrawal from mineral entry if such activities are compatible with the purposes of the withdrawal. Usually, only filing of mining claims, exploration, and development are precluded by withdrawal.

ADDRESS RECREATIONAL PROSPECTING IN THE FINAL PLAN

Recreational prospecting has not been addressed in the forest plan. The final plan must consider this important form of recreation.

Response: The direction in the Plan for recreational collection of minerals is in Chapter 4, Forest-wide Standards and Guides for Recreation. The recreational collecting of locatable minerals is a legitimate use of a mining claim. The Mining Law of 1872 provides for this activity on Federal Lands and also provides protection to existing claims from recreational collection.

ADOPT STRINGENT REGULATIONS FOR RECREATIONAL MINING

We are very concerned about the recent increase in "recreational" mining on the national forests. We urge you to adopt stringent regulations for such activities, particularly for such destructive techniques as suction dredging. We question whether such activities are appropriate at all on public lands. What are the specific guidelines that will be used to regulate "recreational" mining?

The DEIS and Forest Plan are deficient in discussing management options and strategies for controlling the impact of recreation mining. This has become a real problem in such areas as around Green Ridge lake in the Alpine Lakes Wilderness and Hansen Creek in the I-90 corridor. Does recreation mining come under the mining laws? If the staking of new claims is banned in wilderness, why is there no prohibition on recreation mining? The parties responsible for damage may be different, but the results are the same.

Response: The U.S. Mining Law provides for all valuable mineral deposits on Federal lands to be free and open to exploration. Only when prospectors wish to file for a reserved right or claim can other legislation regulate mineral entry. The Wilderness Act withdrew designated wilderness areas from mineral entry after December 31, 1983. All claims located within wilderness areas prior to this date must be found valid by a certified Forest Service mineral examiner before development-type operations will be approved. Prospecting and certain types of assessment work are permitted activities in Wilderness as stated in Section 4d(2) of the Wilderness Act.

Management direction for mineral entry and development is clearly defined by these two laws. Prospecting and recreational collection of minerals is also permitted as long as the activity is being conducted in a manner that is compatible with wilderness or with the purpose for other types of

withdrawals. However, there is less of a clear distinction, as we are experiencing on a localized level, when recreational collection of minerals is practiced so intensely on a area that significant resource damage begins to occur. This degree of activity is not compatible with Forest-wide Recreational Goals or Standards and Guides and will be dealt with administratively. At this time, we are developing a regional policy to more clearly define how we will deal with this form of recreation in the future to reduce resource impacts and still provide for this recreational opportunity.

PLAN MAKES LITTLE MENTION ON EVALUATION CRITERIA OR PROCESS OF SMALL HYDROPOWER APPLICATIONS

The MBS Plan makes little mention of how it intends to address applications for small hydroelectric power development within the forest boundaries. In fact, the Plan only mentions the number of applications pending and their current disposition.

Hydroelectric power development severely impacts fish and fish habitat. Many of the problems associated with proposed hydroelectric development go well beyond an instream flow issue. The FS should identify its policies and standards related to hydroelectric development and take an active role in the quantification of these impacts and use its permitting authority to protect fish, soils, wildlife, and water quality.

The process for issuing FERC licenses and permits needs to be more thoroughly discussed, including the minimum standards that are required.

> **Response:** The Plan does address minimum standards for management of all activities, including small hydropower development. See Chapter 4, Forest Plan, Forest-wide Standards and Guidelines and specific MA standards and guidelines. As stated in the Minerals and Energy Section of Chapter 4, an appropriate environmental analysis will be the basis for making recommendations and determining necessary stipulations for protection of other resources. In this analysis, all hydropower proposals will be evaluated by the standards set by the Forest Plan.
>
> Some MA prescriptions purposely exclude small hydropower development due to incompatibility with management goals for the area e.g. Management Area 1A, Primitive. Other allocations provide for small hydropower development in compliment with maintaining other resource values as specified in that MA.
>
> The Forest Plan is only the first and very broad level of analysis for small hydropower development. Except where management allocation precludes small hydropower development, proposals are evaluated on a site-by-site basis. Extensive studies are performed to address issues surrounding effects on fish, soils, watershed, wildlife, recreation, etc. The FS makes their recommendation to the Federal Energy Regulatory Commission (FERC) on approval to license based on the involvement in and the findings of these studies. Our recommendation is based on compatibility of the proposed project with the Forest-wide Standards and Guidelines and all site-specific requirements. The authorities, roles, and process for issuing FERC licenses and the Forest Service's participation in the overall process is outlined in Forest Service policy direction FSH 2709.15. This document is the most appropriate instrument to address this subject.

TABLE IV-5 IS UNCLEAR AS TO THE INFORMATION IT REPRESENTS

Table IV-5 of the Draft EIS states that hydro projects may be precluded by land allocation. The Preferred Alternative H only allocates five small hydro projects on the entire Forest. Projects should be precluded based on project design and not on allowable projects. Small hydro projects should be evaluated on a site-specific basis. Benefits of each project should be weighed along with impacts resulting from construction and operation. The assumptions used

in selecting the allowed number of projects as portrayed in the Table IV-5 are unexplained.

Alternative C allows only three hydropower projects. From the standpoint of fish/wildlife benefits (lack of impacts), this is preferred. The State of Washington supports a low level of hydropower development on the MBS.

Response: We have added text to the narrative for Table IV-5 in FEIS, to better explain it. The table displays the number of potential hydropower projects that would be precluded by allocation versus not precluded within each alternative. Both "allowed by allocation" and "questionable" are numbers of projects that would not necessarily be precluded. "Questionable" category refers to projects that would undergo more expensive mitigation for resource protection or to meet compatibility with management objectives. The MA prescriptions with which hydropower development is not compatible include: 1A - primitive dispersed recreation, 1B SPNM, 1C SPM, 5, and 10 Wilderness. The number of allowed projects vary by the MA in which they are located, by alternative. Refer to the text for Table IV-5, Chapter IV, FEIS. It has been updated, and an error in Alternative C corrected.

All projects will be evaluated on a site by site basis upon specific project design, through a detailed environmental analysis tiered to the Forest Plan. No projects will be recommended for license that have known significant impacts to fish/wildlife that are incompatible with law, the Forest-wide Standards and Guidelines or management area standards and guidelines.

LOCATION OF EXISTING UTILITY CORRIDORS

What is the existing utility corridor coming from Mt. Rainier National Park and going north along Highway 410?

Response: Figure III-31 in the DEIS displayed a corridor in the most southern portion of the forest, crossing Highway 410 and connecting into a east/west corridor. This corridor was intended to display the transmission line that services Crystal Mountain ski area As this is a service line not a utility corridor, it has been deleted from the map.

ARE UTILITY CORRIDORS DESIGNATED IN THE PLAN?

The Plan should identify specifically the utility corridors that have been designated, and if none have been designated, explain why. Reference could be made to Figure III-31, Utility Corridors, found in the DEIS.

Response: The scale of the page-sized map, Figure III-31 in the DEIS made showing accurate corridor locations difficult. In the FEIS, utility corridors are displayed on the Preferred Alternative map. Locations should be more readily identifiable at the larger scale. Management of all proposed and existing corridors displayed on this map will be guided by the Utility Corridors (MA 25A) standards and guidelines. The corridors are shown as a line; the actual width of the corridor is not mapped.

THE FOREST PLAN SHOULD ADDRESS ENERGY IN FOREST MANAGEMENT GOALS

Page 4-1, Forest Management Goals: these goals should address energy, including corridors and renewable energy resources. The Standards/Guidelines on page IV-103 should reference the Project Plan and Right-of-Way Maintenance plan as important documents which guide the construction and maintenance of BPA transmission rights-of-way within Management Area 25. These are documents required by the BPA/Forest Service Memorandum of Understanding.

Response: The Plan does address energy in the Forest-wide Goals in the minerals and energy section of the Forest-wide Standard and Guidelines section of Chapter 4.

A discussion of the current management agreements between BPA and Forest Service is noted in the Affected Environment section, Chapter III, FEIS. A reference has been added to the "The Built Environment - Utility Corridors" section, FEIS, to reflect that the existing BPA corridors are under memorandum of understanding agreements and the existing Utility Corridor Project Plan and Rights-of-Way Maintenance Plan guide construction and maintenance activities. Also see new Item 1. under Forest-wide Standards and Guidelines, Utility and Transportation Corridors, Chapter 4.

ADDITIONAL ANALYSIS ON EFFECTS OF ALTERNATIVES ON UTILITY CORRIDORS IS NEEDED

The DEIS has also done a good job of addressing corridors. We particularly like the use of a corridor and the descriptions of the built environment. For decisionmaking purposes, we suggest that the FEIS identify, in table form, the effect of the alternatives on the acreage available for corridors (exclusion area and avoidance area). This should also be done for renewable energy resources such as small hydro, and geothermal. Chapter IV, "Environmental Consequence," should analyze the affect of the alternate plans on both existing and planned corridors.

Response: The Northern Cascades Corridor Availability Study, prepared by Bonneville Power Administration and , in draft at this writing, provides an analysis of corridor availability by avoidance and exclusion areas. The Forest Service believes this is the appropriate vehicle to address this subject.

Table IV-42, Chapter IV FEIS displays the effect to energy balance by each alternative. Because existing utility corridors and one potential corridor are allocated in all alternatives (see Forest Plan Chapter 4, Utility and Transportation Corridors), the effects by alternative to utility corridors allocated is negligible.

Table IV-5, Chapter IV is again included in the FEIS; it contains an analysis of effects of each alternative to small hydropower development. FEIS Chapter IV, Minerals - Direct Effects Section contains a discussion on effects by alternative on the acres available for geothermal development.

CORRECTION IN SURPLUS ENERGY AND DEMAND PROJECTION

The statement of the duration of the energy surplus attributed to BPA, page III-17, DEIS is incorrect. BPA currently projects the regional energy surplus to last until 1994, assuming medium load growth.

On Page III-168 the load growth information should be revised to show an annual growth rate of 0.3 to 2.7 (BPA Forecast of Electric Consumption in the Pacific Northwest, October 1986). It should be noted that BPA's/NW annual load growth is from the 1986 forecast. On page III-168, last paragraph, it should be noted that BPA is currently evaluating transmission requirements (loads and reliability) for serving the Puget Sound Area. Expansion of transmission capacity on the Stevens Pass Corridor is being considered and could be needed prior to the year 2000 rather than after the year 2000 as mentioned.

Response: Corrections have been made in Chapter III of FEIS.

ADD REFERENCE ON CORRIDOR STUDY

The Plan and FEIS should also reference the 1986 Western Regional Corridor Study for information on corridors. The corridor study was prepared by the Western Utility Group, an ad hoc group of western utilities. It was intended to describe consolidated utility corridors for the Western United States and was originally published in 1980. The 1986 edition was recently transmitted to all Forests.

Response: This reference has been added to the general list of references in the FEIS.

WHAT ARE THE IMPACTS FROM THE INCREASE IN BTU'S?

There is a big jump in the production of energy materials over five decades: from 0 to 477 billion BTUs per year. What kinds of environmental impacts and environmental analyses are to be expected from this?

Response: Chapter IV, FEIS contains, by resource section, a discussion on environmental effects relating to energy production. This discussion format provides for a more detailed treatment of the subject instead of summarizing in the energy section of Chapter IV.

FOREST SHOULD CONSIDER LAND EXCHANGE IN GREENWATER DRAINAGE

The MBS should consider land exchange in the Greenwater drainage, to acquire private lands from Weyerhaeuser Company that can effectively improve the opportunity for off-road vehicle (two, three, and four wheel) facilities. This drainage contains one of the most significant areas on the Forest (outside watersheds) suitable for this type of recreation. Because of this, and proximity to population, the area is currently heavily used by ORV's, but much of the use is without sanction, on private lands.

Response: Negotiations are underway to acquire Weyerhaeuser Company lands in the Greenwater drainage. In September, 1984 the U.S acquired 1300 acres from Weyerhaeuser Co. in the Greenwater Lakes area. This has been noted in Chapter III, Affected Environment, FEIS.

SUPPORT FOR ACQUISITION OF NON-FEDERAL LANDS IN THE ALPINE LAKES AREA

Alpine Lakes Management Area (DEIS, III-161): there are "three land exchange cases in progress for acquisition of 8,000 acres of non-federal land... all districts except White River." PLUS supports federal acquisition of intended wilderness pursuant to the direction of the Alpine Lakes legislation.

Response: The acquisition of intended wilderness lands on the MBS has been completed.

SULTAN RIVER LAND EXCHANGE OPPOSED

PLUS opposes the proposed Sultan River land exchange. The selected land is covered with active mineral claims. We are confident that mineral sources do exist. Prospectors have spent much time and money developing these claims. Currently, there is very limited access to this area and little non-prospecting activity.

Response: The mineral resources of the area will be examined and the mineral situation considered in the NEPA process for specific exchange proposals.

EXCHANGES SHOULD BE BASED ON EQUALITY OF SITES

The final plan should recommend land exchanges only if they do not significantly reduce either the lands available for developed recreation, motorized recreation, mineral development, or timber harvest. Instead of using the equal value policy, the MBS should exchange based only on equality of sites.

Response: The Federal Land Policy and Management Act of 1976 requires that the value of the lands exchanged by the Secretary of Agriculture shall be equal or equalized by cash payment Land exchange proposals are developed for a number of reasons. Specific land exchanges will be developed in accordance with the standards and guidelines of the Forest Plan. The final decision as to whether to proceed with an exchange is done through the NEPA process and a site-specific analysis. All resource uses are analyzed as well as public comment in development of alternatives. Exchanges will not be made unless they are in the public interest.

PRIVATE LANDS IN THE SNOQUALMIE PASS AND GREENWATER AREAS SHOULD BE PURCHASED

There is next to nothing in the Plan concerning the checkerboard ownership in the Snoqualmie Pass and Greenwater areas. These land should be purchased as soon as possible.

Response: The Forest Plan provides general land ownership direction for these areas in Chapter 4. The appropriation of funds for the purchase of these lands has not been given priority. More specific project analysis will be done as land exchanges are proposed. A land exchange to acquire land in the Snoqualmie Pass and Greenwater areas is currently being developed.

MINING CLAIM ON THE SULTAN SHOULD BE RETAINED

The mining claim on the Sultan held by the Boeing Rockhounders and New West Prospectors Club provides recreation for club members and associates. If this area is traded to the Watershed, existing mineral rights and access to the claim should be retained. The Everett Water District does not need this area to maintain their water supply.

Response: The mineral resources of the area will be examined and the mineral situation considered in the NEPA process for specific exchange proposals.

CERTAIN WETLANDS ALONG NORTH FORK NOOKSACK RIVER SHOULD BE ACQUIRED

A beaver pond and associated wetlands near the Nooksack River are very important to wildlife in the Glacier area. It is within the Forest boundary, SW1/4SW1/4 Section 6, T.39 N., R.7 E. The wetlands cover a broader area and flow mostly north and west. Would Federal acquisition of this land would be possible?

Response: Acquisition of this parcel is legally possible. Proceeding with acquisition depends on availability of funds and of course the desire of the landowner to sell. We have not requested funds for acquisition of this parcel but are currently making an examination of it's potential value for Threatened and Endangered Species habitat.

DON'T EXCHANGE LANDS ADJACENT TO NATIONAL PARK UNLESS RESOURCES PROTECTED

Regarding the land adjustment map (Plan, Appendix G): lands adjacent to National Park Service areas should not be available for exchange to private interests unless specific safeguards of National Park Service resources are included in the exchange.

Response: National Forest lands adjacent to the National Park boundaries will be managed in accordance with the standards and guidelines, goals and objectives for the respective management area. Direction will vary; some adjacent lands are allocation to MA 1B, Semi-primitive Nonmotorized Dispersed Recreation, some to Wilderness (MA 10), while others may be allocated to MA 17, Timber Emphasis. Any proposed project in lands adjacent to Park Service lands will, in the environmental analysis,

consider the adjacent National Park as an issue and concern, with appropriate agency involvement.

MAINTAIN FORESTED LAND BASE

Because of the limited land base on the MBS, the goal statement in the Forest Plan for Land Adjustments should include a statement requiring maintenance of the existing suitable land base for timber harvest. Over the years, whether mandated by Congress or not, the MBS forest land base has been decreasing because of land exchanges. Generally, what the FS receives is cut-over lands with younger trees in exchange for mature timber.

Response: The General Exchange Act of March 20, 1922 requires the Secretary of Agriculture to base exchanges on equal values. Land exchange proposals are developed for a number of reasons. Specific land exchanges will be developed in accordance with the standards and guidelines of the Forest Plan. Refer to the Land Classification groups under each MA, Chapter 4, Forest Plan The final decision as to whether to proceed with an exchange is done through the NEPA process and a site-specific analysis. Scoping will include contacts with all interested public groups, individuals, etc All resource uses are analyzed as well as public comment in development of alternatives.

OPPOSE PURCHASER CREDIT FOR TIMBER SALE ROADS, ESPECIALLY WITH CURRENT DETRIMENTAL EFFECTS

In these times of federal budgetary crises, it seems indefensible to promote land management practices such as providing free road construction to logging companies, especially considering the negative aspects of the excessive timber harvest levels: increased soil erosion and siltation with its effects on fisheries, increased highway maintenance costs from flooding and washouts, etc.

Response: Between draft and final plans, and in response to public comments, a method for meeting water quality and riparian management requirements was developed. Meeting these management requirements results in a set maximum number of acres available for timber harvest, per decade, by watershed, based on their current condition (acceptable or unacceptable). Refer to new Appendix H; management requirements are also discussed in Chapter II, FEIS, and Appendix B. Additionally, refer to the Forest-wide and MA specific standards and guidelines for water, soils, and riparian areas.

As far as free road construction for the logging companies is concerned, on the MBS, timber sale roads are primarily financed with Purchaser Credit, i.e. the timber stumpage values are offset by the costs of road constructed by the timber purchaser. Few roads are constructed with appropriated funds for timber access exclusively.

MAINTAIN TRANSPORTATION SYSTEM AT LOWEST DENSITY REQUIRED

Add to the Goals (Chapter 4, Forest Plan) under Facilities: "Maintain the transportation system at the lowest density required to meet administrative needs and to access facilities."

Response: The transportation system maintained is that which supports the overall goals and objectives of the Preferred Alternative. One recreational use of the MBS, which continues to be in demand, is driving for pleasure. The system planned will meet the needs of all resources, under the Preferred Alternative, while protecting soil, water, and other resources.

CONFLICTING STATEMENT RE: ROADS IN MOUNTAIN GOAT WINTER HABITAT

In the introduction of MA 15, "Desired Future Condition," it says no new roads will be constructed to access winter range. Under Facilities, later in the management prescription, it states: "construction and reconstruction activities shall be timed to avoid conflict with mountain goat winter habitat use." These statement appear to be in conflict; can we or can't we construct roads in mountain goat winter range?

Response: This statement has been clarified in the Forest Plan. The MA 15 Mountain Goat Habitat MR prescription states: "No new roads permitted which access mountain goat winter habitat." The standards and guidelines also speak to timing reconstruction activities so as not to conflict with goat winter use. See Chapter 4, Forest Plan.

ACKNOWLEDGE NEED TO ACQUIRE RIGHT-OF-WAYS; ALLOW SUFFICIENT RIGHT-OF-WAY WIDTH

The DEIS needs to acknowledge the need to acquire right-of-way for all Federal and Forest highway routes.

Designated recreation areas should have sufficient right-of-way width to allow for reconstruction of bridges and other needed improvements.

> **Response:** Rights-of-way are discussed in the Forest-wide Standards and Guidelines for Land Uses, Forest Plan, Chapter 4. The appropriate regulations (36 CFR 212.8, 9, 10, and 11) are also mentioned.

LET ROADS CLOSE NATURALLY

Let roads close and revegetate naturally instead of by machine. Sign them "drive at your own risk" etc.

> **Response:** CRF 223.37 states that "All temporary roads will be revegetated within 10 years by artificial or natural means." In each site-specific NEPA document, this standard is addressed. The type of closure method varies, depending upon potential safety problems and the need to provide drainage and control sedimentation. Refer to the Forest Plan, Chapter 4, Forest-wide Standards and Guidelines for facilities. Road closures for certain management areas are discussed under the specific MA standards and guidelines (such as MA 1A and 1B, which specify how temporary roads to access catastrophic timber loss must be returned to near natural condition). We do not sign roads "drive at your own risk" as this does not reduce our liability for accidents that may occur

DESCRIBE PLANNED ROAD MAINTENANCE

Describe planned road maintenance, i.e. priorities, types, erosion control measures, structures, culvert cleanout, etc.

> **Response:** Refer to the Forest Plan, Chapter 4, Forest-wide Standards and Guidelines for facilities In addition, planned maintenance is discussed in project-level environmental analysis documents.

WHY DOES ROAD MILEAGE VARY LITTLE BY ALTERNATIVE?

I don't understand why the road mileage, except for Alternative C, varies little by alternative, even though the timber harvest level varies.

> **Response:** Referring to Table II-9a, Chapter II, FEIS: the actual miles of *roads constructed - especially local, timber purchaser roads - varies* considerably, from 18 miles of arterial/collector roads in Decade 1, Alternative I to 6 miles, Decade 1 in Alternative G-Modified. Local roads vary from 174 miles of construction, Decade 1 in Alternative A to 75 miles of new local roads, Decade 1 in G-Modified. The road miles for each alternative are a function of the allowable timber harvest and the other objectives of the alternative.

ROAD CLOSURES

Which roads will be closed beyond those listed? What is the criteria?

Response: The closing and opening of roads is dynamic process that is constantly changing. It is impossible at this time to list those roads that may be closed or reopened in the future. The criteria for closing roads are based on the need(s) for access balanced against the need to protect the various resources. Some typical reasons for closure are:

1. Protection of threatened and/or endangered species.
2. Protection of winter range habitat for deer, elk, and goats.
3. Short term timber sale roads that are no longer needed.
4. To reduce use pressure on sensitive areas.
5. To reduce maintenance costs on low use roads.

Refer to Chapter 4, Forest Plan, individual MA standards and guidelines for guidelines on road closures to meet the objectives of various MA's.

WHAT MILES OF ROADS WILL REALLY BE BUILT?

There appear to be inconsistencies between the miles of road construction and reconstruction developed by FORPLAN (Chapter II, DEIS) and the road mileage listed in the 10-year implementation schedule in the Plan.

The numbers for road construction appear inconsistent. Does "ultimately" mean after five decades?

When is the Plan considered implemented? I.e. How does the decade rate of construction of 185 miles of roads contribute to the 823 miles expected to be completed as a result of implementation of the Plan?

Response: The numbers in Chapter II (based on FORPLAN runs) and in Appendix A, the Timber Sale Ten-Year Schedule are different. FORPLAN miles are based on a theoretical rate and density of road construction that is appropriate over the long term. The 10-year implementation schedule is based on a proposed timber sale plan that is subject to adjustment as time passes. The actual miles for each sale will be adjusted at least annually, in Forest Plan amendments, as the environmental analysis and NEPA documents for site-specific projects are completed.

Ultimately" for the arterial and collector roads means at the end of Decade 2. Local roads will continue to be built as projects are scheduled, over the planning period.

NEW ROAD MANAGEMENT

What strategy will be used to manage new roads?

Response: This will vary on a road by road basis. The management strategy for each road depends on the purpose the road is built as well as the impacts of the road on the adjacent resources. Refer the Resource Summary for Roads, Chapter 4, Forest Plan and also to each MA prescription, Chapter 4, Forest Plan. In addition, the NEPA document for proposed, site-specific projects will include more information.

EXPLAIN 10-YEAR ROAD SCHEDULE

Discuss the 10-year road construction schedule in Appendix B, Plan. How and why were projects selected? What is the order of project activity?

Response: Projects were identified in the following categories:

1. Recreation access needs.
2. Timber access needs.
3. Correction of safety problems.

Projects were then prioritized, based on a combination of factors that included each District Ranger's priority rating, amount of recreation traffic, amount of timber traffic, benefits of correction of road related fish habitat and other resource problems, and significance of any safety problems to be corrected. Also, refer to Resource Summaries, Chapter 4, Forest Plan.

ANALYZE AND ADOPT A PLAN TO CLOSE NON-ARTERIAL ROADS NOT IN USE

Adopt a policy that will close all non-arterial roads that are not being actively used for resource management; this will protect wildlife values and prevent resource abuse, such as wildlife poaching, and theft of timber and snags. Why was such a plan not analyzed in the draft? It makes economic and environmental sense and would help mitigate impacts of road construction.

Response: Local roads not actively in use (for any type of activity) are generally closed. Road closures are also used in various management areas to meet the objectives of wildlife use, etc. The Resource Summary for Roads (Chapter 4, Forest Plan) discusses the general use of road closures; also, refer to Forest-wide Standards and Guidelines for facilities, and Element L. Facilities for each Management Area, Chapter 4, Forest Plan.

DISCUSS EFFECTS OF ROADS

Are roads on the MBS contributing to adverse environmental impacts, especially water quality?

Road construction probably results in the greatest amount of ground disturbance. This section of the DEIS (Chapter IV) only identifies the number of miles and types, but no mention of condition.

Response: Chapter IV, FEIS, Soil, Water, and Road sections have been rewritten, and the sediment tables updated.

DISCUSS EFFORTS TO PREVENT ADVERSE EFFECTS

Need to discuss current conditions and efforts to prevent adverse effects of roads and road construction.

Response: Refer to Chapter II, FEIS, Mitigation measures common to all alternatives. Also, see the specific mitigation discussion at the end of each resource section in Chapter IV, FEIS. Current conditions of Forest roads are discussed in Chapter III, Affected Environment, FEIS. The condition of the Forest's watersheds is discussed in Chapter IV and the

procedure to meet water quality and riparian MR's is discussed in Chapter IV and new Appendix H.

ADD TO FOREST MANAGEMENT GOALS

Under the Forest Management Goals for Facilities, the State recommends adding Item 6, which could read. "Maintain the transportation system at lowest density required to meet administrative needs and to access facilities." Referring to page 4-4, Plan.

Response: No wording changes were made in the Forest Plan, as the above suggestions are already incorporated within Items 1, 2, and 4, Forest Management Goals for facilities.

NO DISCUSSION OF FERTILIZERS, PESTICIDES

There is no discussion in the plan of whether fertilizers and/or herbicides will be used as part of logging practices.

We are highly concerned that the issues of pesticides, herbicides, and fertilizer use in the forest did not appear to be addressed in the DEIS.

It is not clear what methods for vegetation management are currently being carried out on the Forest since 1984, as the injunction on pesticide use continues. This should be discussed.

How will the MBS proceed in the event the injunction on herbicides is lifted? The programmatic EIS is not sufficiently specific to cover the MBS, and does not sufficiently document the potential use of various pest management techniques once the injunction is lifted. Will further environmental analyses be conducted when the injunction is lifted?

Response: The use of fertilizer as one option in managing for timber was (in the DEIS) and is (in the FEIS) is discussed in the following sections: Appendix B, Chapter III, Development of Timber Options for FORPLAN; Forest Plan, Chapter 4, Resource Summaries for vegetative management; Forest-wide Standards and Guidelines, Chapter 4, Plan; and MA 17, Item E. The latter gives general direction on where fertilizers may be prescribed. The exact practices will vary by site, and will be determined at the project-level environmental analysis.

As discussed in Chapter III of the FEIS, the Record of Decision for the Final Environmental Impact Statement (FEIS) for Managing Competing or Unwanted Vegetation was signed on 12/8/88. The court injunction against herbicides was lifted May 24, 1989; however, the Forest Service is under an administrative stay, imposed by the Chief, not to use herbicides. When the stay is lifted, the MBS will incorporate the direction from ROD and Mediated Agreement. Regional Interim Instructions are provided in my [Regional Forester's] 2150 memo, dated July 21, 1989, or as updated. Further, site-specific environmental analysis with full and on-going public involvement are key parts of the Regional direction.

As for methods currently in use, Chapter III of the DEIS discussed the various hand and mechanical methods currently in use - refer to the Commercial Timber and Built Environment sections. Prior to 1984, the chemical program on the MBS was very small. These sections have been updated.

THE REFERENCE TO THE REGION 6 VEGETATION MANAGEMENT EIS IS NOT SUFFICIENT TIERING - MORE SITE-SPECIFIC ANALYSIS MUST BE DONE

Reference is made (page IV-2 DEIS) to the vegetation management DEIS. You go on to state that in Chapter IV " ..the environmental effect of herbicides will not be discussed; their effects are examined, in detail, in October 1987 DEIS." If the intent is to incorporate information by reference, this must be made more clear. Further, this is not sufficient tiering - the vegetation management EIS is for all the Forests in Region 6 and describes the pesticides to be used, health effects, and typical environmental risks and effects. However, it does not lay out the specific nor the unique characteristics of the MBS.

Chemicals, Herbicides

Response: This section of Chapter IV has been updated in the FEIS to reflect the current situation of the Region 6, Final Vegetation Management FEIS. Refer to the Plan, MA 17, Item E. for general direction on where fertilizers may be prescribed. The exact practices will vary by site, and will be determined at the project-level environmental analysis. Each analysis will tier to the Regional Programmatic EIS and will have full and on-going public involvement. A separate analysis may be appropriate, rather than including the methods of vegetation management in a timber sale or road project environmental analysis.

FEIS SHOULD INCLUDE MORE DISCUSSION OF PESTICIDE USE IN THE N.W.

We suggest that the EIS include a comprehensive discussion of the status of pesticide use on Federal lands in the Pacific Northwest. This could tie in the references to pesticides made throughout the documents.

Response: The references to the Region 6 Programmatic FEIS for Managing Competing and Unwanted Vegetation have been updated in the Final EIS and added to the Plan. A more in-depth discussion of a regional situation is is outside the scope of this Forest Plan.

QUESTION ABOUT THE PRESCRIPTION FOR MA 17, ITEM E. 16.

Under E. 16. for MA 17: what is the connection to the vegetation management EIS?

Response: The methods of vegetation management listed in E. (now item) 15 represent various tools which may be used to achieve this activity. Their application or use will be guided or constrained by direction from the FEIS, Managing Competing and Unwanted Vegetation, R-6, November 1988. A site-specific environmental analysis will also be done.

MBS SHOULD GOVERN ITS VEGETATION MANAGEMENT PROGRAM ACCORDING TO THE R-6 FEIS

In Forest-wide Standards and Guidelines for Pest Management: we suggest the MBS will govern its vegetation management program according to the final programmatic EIS.

There needs to be reference to the vegetation management EIS, which is in the final stages of development.

Response: Wording to this effect has been added to the Forest-wide Standards and Guidelines for Vegetation Management; see Chapter 4, Plan.

WHAT ARE "PROPER CONTROLS" FOR CHEMICALS?

In Chapter IV, page IV-28 of the DEIS: what are "proper controls" for chemicals? Are buffer zones required around spray application? What procedures are used to minimize entry of fertilizers into streams? Is there a monitoring procedure to evaluate impacts of chemical application?

Response: This discussion has been modified in the FEIS. References have been added to the discussion on Forest-wide Mitigation Measures for Water

and Riparian Resources (Chapter II, FEIS), the discussion on Best Management Practices in Appendix I, FEIS, and the Region 6 FEIS on Managing Competing and Unwanted Vegetation.

CLARIFY STATEMENT THAT "CHEMICALS ARE RELATIVELY IMMOBILE IN THE SOIL"

It is stated that "Chemicals used in forestry are relatively immobile in the soil." (DEIS, page IV-17. This statement needs clarification and should be expanded upon. For example, the herbicide "tordon" was identified as being used in forestry practices in a recent FS document entitled "Draft EIS for Managing Competing and Unwanted Vegetation." The EPA claims this chemical is mobile in soil and could therefore move to the groundwater and surface water.

Response: The referenced comment has been amended, with more specific discussion of chemical mobility in soil plus reference to the Final EIS for Region 6 vegetation management, which discusses the topic in greater detail.

WHEN USE IS LEGAL, ASSURE THAT NON-TARGET NATIVE PLANTS ARE NOT AFFECTED

Should the use of chemical herbicides again become legal on the MBS, a careful set of application guidelines and monitoring safeguards should be implemented to assure that a minimum of non-target, native plant species are affected incidentally. Broadcast application of all biocides should only be employed in the last resort. Application areas should be field-censused prior to application to determine the presence or absence of any sensitive species.

Response: If and when the administrative stay is lifted and herbicides are again one of the vegetative management tools available, the above listed concerns will be addressed at the project-level environmental analysis, including tiering to the regional programmatic FEIS, where appropriate.

OPPORTUNITY COST ANALYSIS FOR RIPARIAN MR'S IS INCOMPLETE

The discussion beginning under "Opportunity Costs Analysis" (DEIS, Chapter 2, Page 14) should be deleted. The planning process did not establish any quantified link between environmental change and fish production; therefore, the riparian MR opportunity cost analysis only considered the cost to timber with and without the riparian MR, but not any offsetting benefit for fish production.

Response: The commenter makes a valid point. While we stated that the riparian MR was being applied to protect against loss of fish production, no change in fish production between the "with" and "without" riparian MR runs was included (because of a lack of any predictive model of fish response to environmental change). The text in the FEIS, Chapter II, and in Appendix B (Chapter VI, Section E) has been changed to indicate that the quantified opportunity cost analysis is for the timber program only, and does not include a quantified value change for fish.

ALT. C HAS THE HIGHEST RATIO OF DISCOUNTED BENEFITS TO DISCOUNTED COSTS

If one works through DEIS Table S-3 and calculates the return on dollars invested, Alternative C comes out a hands-down winner at $3.92 returned per dollar spent, compared to Alternative H with $2.95 returned per dollar spent, and A and E-Departure tied for last at $2.60 returned per dollar spent.

Response: When considering alternatives that are mutually exclusive (if one is implemented, none of the others can be implemented) the economic criterion of choice is maximum present net value (PNV), not maximum benefit/cost ratio (i.e., maximum dollars returned per dollar invested). The point of maximum PNV is the point at which the change in discounted benefits just equals the change in discounted costs. Up to that point, each additional dollar spent yields more than one dollar in return. After that point, each dollar spent yields less than that dollar in return. As long as investments continue to be made up to the point of maximum PNV, the returns to society are greater than the costs, and the net value to society continues to increase. Two implicit assumptions are that the budget needed is available to spend up to that point, and that the discount rate used represents the marginal rate of return that would be achieved in the next best use of the funds. (Therefore, as long as PNV is greater than or equal to zero, money could not be spent elsewhere on the next marginal project and receive a greater return.)

Maximizing the benefit/cost ratio, or returns per dollar spent, is the appropriate economic criterion when there are several alternative projects available to pursue that are independent of each other, and the question is which one should be done first, second, etc., until available budget is exhausted. In this case, one would want to carry out first the project that returns the greatest amount per dollar spent; then do the project that provides the next greatest return per dollar spent; and so on down the list, until ones budget is used up.

The Forest Plan alternatives are mutually exclusive. They are formulated so that they fall within a reasonably expected budget range. Therefore, from a strictly economic standpoint, to provide the most value to society that we can from managing the Forest we should choose the alternative that maximizes present net value to society. Of course, as discussed in the

DEIS Chapter 2, Section A, and more thoroughly in Appendix B Chapter IV, Section A, the choice of alternatives is not made based strictly on the economics in the analysis. There are other nonpriced and nonquantified factors that come into play that are outside the scope of the economic analysis, but which are taken into consideration for the final decision. The combination of the economic and other factors is termed the "net public benefit." But the same principle applies. As the Plan alternatives are mutually exclusive, we want to choose that alternative that contributes the most to society, or maximizes "net public benefit."

DISCOUNT RATE USED IS TOO HIGH; DISCOUNT RATE USED IS TOO LOW

The interest rate used by the Forest Service is 4%. That rate is far too high. The range of real rates used by economists in my business (litigation) extends between 1 25% and 2%, or 3% at the very most. The Forest Service rate is apparently derived from corporate security rates in the early 1980's, which was an anomalous period in the nation's economy.

The discount rate used in determining the economical land base is 4%; a truer representation of a market-established discount rate is 7-1/2%.

Response: Forest Service planning regulations require the use of a 4% discount rate for long-term investments (FSM 1971.71). The 4% rate was derived in 1979 by Forest Service economists from Federal Reserve data for after-tax returns on long-term Aaa-rated corporate bonds over the period 1960-1978. The average real return over this time period, reflecting long-term expectations in the capital markets of returns to new productive (marginal) investments, was about 2.25% to 2.33%. This figure was adjusted by the average tax rate on corporations of (at that time) about 40% to obtain a pre-tax marginal return rate of about 3.9%. This was rounded off to 4% in the proposal made, and later codified in the Forest planning regulations, for use as the appropriate discount rate for long-term resource investments.

STATE STATISTICAL ERROR; COSTS OF UNCERTAINTY NOT CONSIDERED

Your failure to state some reasonable error with all your data is an egregious omission which must be corrected before the validity of any of your predictions can be evaluated.

The costs of uncertainty are not well considered in the Plan; e g., inclusion of the allowable cut effect, expected gains from thinning and genetic improvement, etc.

Response: Unfortunately, the data available to work with for this planning effort vary widely in detail and completeness. Many of the numbers used are from small data samples or based on professional experience working in the field on this Forest. Some inventory data are old. Many of the cause and effect relationships (production functions) are newly developed and will not really be tested until monitoring occurs after Plan implementation. Therefore, to attempt to attach statistical error estimates to all the numbers used in the FEIS and Plan would be relatively meaningless. The important point to note is that all the numbers, particularly those projected several decades into the future, are indicators of relative magnitude and direction. They are not to be taken

as absolutes. But in that all alternatives are evaluated with a consistent set of numbers and relationships, the relative merit of the various alternatives can still be assessed. This is the reason that the decision-making process is based on a consideration of all relevant factors - quantitative and qualitative - not just strictly on numbers.

The costs of uncertainty were dealt with explicitly in some instances and implicitly in many others. Specific sensitivity analyses were done for timber costs, stumpage price trends, and the discount rate (Appendix B, Chapter VI, Section F) using the Benchmark runs. Implicit considerations of uncertainty occurred all through the development of the data and functions to use in the analytical process because of the data problems noted above. Resource specialists and IDT members worked to stay on the conservative side and to check results for reasonableness when dealing with sketchy data and untested relationships.

USE AND DISPLAY SOIL EXPECTATION VALUES (SEV) FOR TIMBER ANALYSIS

Timber analysis based on soil expectation values should be presented.

Response: Soil expectation value (SEV) is the present net value of an infinite series of rotations for a timber stand, beginning with bare ground. Similar to calculating the economic potential of an acre of farmland for growing corn every year into the indefinite future, the SEV calculation indicates the economic potential of an acre of timberland for growing trees. The SEV calculation assumes that the same management practices, timing, and relative costs and benefits will apply to all rotations.

A financial analysis of various timber management regimes that are the basis for the Forest's timber management prescriptions are discussed in Appendix B, Chapter III.E of the FEIS. This analysis was part of the process of developing the intensities and yield tables for the managed stand prescriptions. The analysis does not show SEV; rather, it shows the PNV for just the first rotation from bare ground This actually encompasses the bulk of the SEV (sum of the PNV over the infinite series of rotations), especially for longer rotations. For instance, at 70 year rotations, the PNV of the first rotation is about 93% of the SEV. At 100 year rotations, the PNV of the first rotation is over 98% of the SEV for the infinite series. Therefore, the PNV values shown in the section reference above are adequate proxies for SEV because of the length of the rotations on this Forest.

PRICE/DIAMETER ADJUSTMENTS TO TIMBER VALUES PROBABLY BIASED

The Forest adjusted the stumpage values by diameter class, based on PNW Experiment Station research which is questionable for accuracy we have since learned. It is unlikely that the MBS tailored the actual price variations using timber sold from the Forest.

Response: We used the price/diameter adjustments for the Forest specified in the 4/27/84 Regional Office memo with revised direction for economic analysis for Forest planning, applied to selling values for timber (mill pond value plus manufacturing cost). The 100% value ratios were indexed to 24" logs, which was the best estimate we had of the average of all timber

harvested on the Forest over the period we used for timber value data. After creating the price/diameter value series at the sell value level, manufacturing costs were subtracted to get mill pond prices for use in the model.

Because the predominant harvest historically on the Forest had been larger diameter trees, we had no other transactions data from which to derive the price/diameter relationships. We did make one adjustment in the application of the RO direction after talking with the PNW researchers who developed the price/diameter estimates: we developed sell values and applied the price/diameter ratios at that level rather than to the mill pond values, as that was the original data source for the PNW work. Refer to the planning records for more detail.

USE OF HORIZONTAL DEMAND CURVES FOR TIMBER IS INAPPROPRIATE

The FS makes the assumption that the demand curve for timber is flat, that is, that the price of timber from individual forests will remain unaffected by the amount of timber sold annually. This assumption may be erroneous with the proposed reductions in timber harvests for the National Forests in Washington and Oregon.

The reliance of the MBS Forest Plan on the Washington Office directive (2/3/81) to use only horizontal demand curves in the plan inevitably leads to irrational conclusions.

Response: The debate over whether or not to use horizontal timber demand curves (functions) in Forest planning has been a long and vigorous one. We used horizontal demand functions for timber in response to Washington Office and Regional Office direction. However, to more completely respond to this comment:

If a horizontal demand function for stumpage is used at the Forest level, the implication is that no matter how much the Forest's timber harvest level increases or decreases, there will be no change in the unit price of stumpage in the market into which the Forest sells its timber. I.e., the Forest is essentially operating in a perfectly competitive market for stumpage.

On the other hand, use of a downward-sloping demand function implies that as the Forest sells more stumpage into the market, stumpage prices will go down, as buyers are willing to pay less for each additional unit of stumpage on the market Conversely, if the Forest reduces its sale of timber into the market, stumpage prices will rise as buyers are willing to pay more for smaller quantities of stumpage.

The concerned or interested reader is referred to the Pacific Northwest Regional Office's series of LMP Task Force Reports - specifically, Report #8-97 "Use of Horizontal Demand Curves for Timber Pricing" (K.Greer and K.Connaughton) - for the FS rationale to use horizontal demand functions at the local Forest level for planning purposes. Basically, the issue revolves around whether the local Forest can actually affect prices of stumpage in the market into which it sells. Further, there is the problem of the accurate specification of the demand function. Demand functions for any good are notoriously difficult to specify. There are a number of factors ("demand shifters") other than quantity of timber on the market

that will affect the price at any given time. These must be defined and appropriately accounted for in the demand function specification. These other variables may or may not vary in concert with the variations in quantity of stumpage supplied into the market. The degree to which substitutes are available also affects prices.

The MBS sells stumpage into a market that is regional in nature, much larger than the five-county area defined as the Forest's primary zone of influence, stretching from Canada into Oregon. Stumpage demand in the Pacific Northwest is derived from the demand for finished wood products (including paper), with the largest demand coming from lumber needed for housing and other construction. Wood product prices are established across a much broader region than that encompassed by an individual Forest's area of influence. Demand for stumpage reflects those regional or national price levels. Changes in output by an individual Forest will likely have little effect on stumpage prices because of the relatively undifferentiated nature of stumpage, available substitutes, and the ability for mills to shift their buying areas in order to acquire needed raw material input. Also affecting the regional picture are imports - primarily from Canada; and exports - primarily to Pacific Rim countries.

The MBS currently provides between 10% and 20% of the timber supply in it's five-county area of influence. That percentage falls off rapidly in the broader regional timber market. Because of fluid market boundaries and substitutability, there is little indication that changes in the timber output from the Forest, all other things being constant, will affect prices over the long term in the regional stumpage market and in the broader finished wood products market. It is true that short term localized price changes could take place in initial response to changes in the Forest's timber sell level. But over time these localized changes would disappear as the regional market adjusted: if prices dropped, buyers from further away would be attracted and bid the prices back up; if prices rose, local purchasers would seek supplies further out until the decrease in local demand helped bring prices back down

In summary, the Forest used horizontal demand functions for timber in its planning process in accord with Washington Office and Regional Office direction. However, given the nature of the local and regional timber markets, and the difficulty in adequately specifying a demand function, we would have used horizontal demand functions for timber anyway at the Forest level.

Aggregation of timber outputs from the National Forests at the Regional level presents a somewhat different picture. At that scale, it is more likely that changes, in total, of stumpage supplied from the Forests could affect the regional timber markets. I.e., it is more likely that there exists a downward-sloping demand function for stumpage at the regional level, and it is somewhat less problematic to specify a demand function at that scale. This was not an issue that the individual Forests could deal with in the process of preparing their Forest Plans. It was necessary to wait until there was an indication of the magnitude and direction of timber supply from the Forests in aggregate, as reported through the draft Forest Plans, before an assessment of the Regional change and potential price effects could be estimated. The Regional Office conducted that assessment in June 1989, using the anticipated timber outputs as reported in the draft Plans ("Timber Supply in the Pacific Northwest: Aggregate Implications of Forest Plans," USDA Forest Service, PNW Region, June 1989). (For a more

detailed discussion of that report and its findings, see the comments and responses under "Timber Supply and Demand" in this Appendix.)

REAL PRICE TRENDS SHOULD BE USED; SHOULD NOT BE USED; SHOULD BE USED ON VALUES OTHER THAN JUST TIMBER; REAL PRICE TREND SENSITIVITY SHOULD BE TESTED

The FS discussion about the selection of 1% as the [real] price growth for timber is disturbing. The "compromise" contradicts long-standing historical evidence of 2%-3% annual price rises for timber. Selection of a 1% timber price growth trend skews the analysis away from commodity forest outputs to amenity outputs.

While we disagree that an arbitrary 1% trend is a true reflection of the future price appreciation rate, we agree to the use of a 1% rate if its implications are fully evaluated for significance in the "benchmarks" and alternatives. The trends significantly affect land allocations and timber values, and it is imperative that these effects are shown in relation to, at least, the Preferred Alternative.

If the overoptimistic assumption of a 1% real annual increase in timber values has been retained in this plan, it should be dropped forthwith.

Timber stumpage is given a real price trend of 1% while other resources are given no such trend. The result is to increase timber prices 65.4% over beginning prices after 50 years. There is no justifiable basis for such a trend being given solely to timber stumpage except to mislead the reviewer by altering the outcome of the economic analysis.

Given the potential effect of the different stumpage price trends on the Mt. Baker-Snoqualmie's outputs and timber economics, there should be a sensitivity analysis of how price trends affect the maximum present net value benchmark and the Preferred Alternative.

The limited results of the price trend benchmark analysis are significant. The trends have a major bearing on the management intensities, PNV, thinning and probably total harvest. Therefore each alternative and especially the Preferred Alternative, must fully analyze the implications of the assumed price trend.

Response: Just like the debate over horizontal demand functions, so too was the debate over use of real price trends long and vigorous. The responses quoted above indicate the range of opinion on the subject. Again, the Forest followed Washington Office and Regional Office direction by using the 1% price trend for stumpage over the first fifty years of the planning horizon, and no price trends on other resource costs and values. Again, a somewhat more in depth response is warranted.

The argument for using real price trends on timber was based on historical data that showed a long-term average trend for stumpage (primarily Douglas fir) of around 2%-3% annually, with some short-term fluctuations. Those in favor of this approach wanted that trend extrapolated into the future. A 2% trend would result in prices after 50 years 169% higher than the beginning point. A 3% trend applied over 50 years would result in prices 338% higher than the beginning point. These are compared to the 64% real increase after 50 years from a 1% trend. The end figures go up exponentially because the rates are compounded annually.

The argument against using real price trends on timber was based on a belief that extrapolation of past trends that far into the future carried enormous amounts of uncertainty with it, particularly in the face of new product technology, increasing substitutability of other materials for wood in construction, and a leveling off of demand for demographic reasons. A small error in a trend that is compounded annually can have enormous consequences if carried many years out into the future. Persons supporting the use of no real price trend (0% trend) argued that the conservative approach was to evaluate all alternatives on the same basis of constant real prices and costs. Estimated future real price increases could be tested through sensitivity analysis, and information derived from that analysis, if significant, incorporated into the final decisions on land allocations and degree of intensive management.

In addition, another group argued that it was not appropriate to apply a real price trend to timber values without also using real price trends for other resource values expected to rise in real terms in the future -- particularly primitive-type dispersed recreation and anadromous fishing. And they argued that real increases in costs, particularly labor costs, had caused and would continue to cause real price increases in costs that should be applied on the cost side of the equation.

These arguments were presented to the Regional and Washington Offices by various proponents of the different views. After much deliberation, a relatively conservative compromise approach was adopted. A real price trend for timber of 1% would be applied as the base case. Sensitivity analyses using 0%, 2%, and 3% trends would be done with the benchmarks during the analysis of the management situation (AMS) process. If sensitivity analysis over a reasonable range of rates showed major effects on allocations, outputs and economics, similar sensitivity analyses would be shown for the alternatives to provide more complete information for the decision-maker in choosing a preferred alternative for the Forest Plan.

The compromise rate of 1% was chosen to acknowledge the high probability of some real increase in timber prices over the first part of the planning horizon. But it is less than the historical rate, reflecting expectations about changing technology, demographics and demand in the future. And the lower rate minimizes compounding error if the rate is overstated.

It was also decided that trends would not be applied to costs or other resources in Region 6. Earlier attempts to derive such trends had resulted in a large degree of variability and some unacceptable results when applied in FORPLAN runs. It was felt that there simply were not good enough data to develop either cost trends, or trends for goods and services that have traditionally been nonmarketed.

The sensitivity analyses run during the AMS process on the maximum PNV with management requirements benchmark (BM Run #7) showed changes of less than 5% in harvest acres and volumes over the first five decades, and in long-term sustained yield for the planning horizon for both 0% and 2% trends; PNV changed by less than 10%. The 3% trend caused significantly higher increases in acres and volumes harvested, long-term sustained yield, and PNV. But tentatively suitable acres brought into solution increased by on 0.2%. See FEIS Appendix B, Chapter VI.F for a more thorough discussion of these sensitivity runs.

Although the 3% trend caused some significant changes in benchmark results, it was felt that application of this rate over 50 years was simply unrealistic under just about any scenario. As noted earlier, timber prices after 50 years increase by 169% with a 2% trend; with the 3% trend, that increase after 50 years jumps to 338%. On the other hand, the 0% and 2% trends caused changes that were relatively minor, particularly in drawing any more tentatively suitable lands into solution. Therefore, we did not carry the sensitivity analysis of price trends over into the evaluation of the alternatives in the DEIS and FEIS.

In reality, use of real price trends would have even less effect in the alternative runs than in the benchmarks. In the benchmarks FORPLAN was allowed to allocate lands to timber or nontimber management. For the actual alternatives, most of the land allocations were made to best respond to the planning issues and concerns, and to provide contiguous and spatially feasible management areas to the extent possible

The major effects that real price trends would have in the evaluation of the management alternatives would be in timber harvest scheduling and in intensities assigned for timber management. In the sensitivity analyses, application of trends was directly correlated with increases or decreases in acres subject to increased management intensity, such as applying precommercial thinning or commercial thinning prescriptions. However, in all cases, the higher the trend, the lower the first decade harvest. FORPLAN will tend to hold back harvest as much as possible if the combination of growth rate and price trend is greater than the discount rate. So while the application of timber price trends may lead to higher overall harvest levels for the 150-year planning horizon, harvests in the first decade or two will not increase.

Adams and Haynes (1989) have projected that real prices increases for stumpage in the Douglas fir region (primarily western Washington and Oregon) will be in the range of 2.5%-4% over the next 20 years, then will drop to near zero. The range depends on the timber supply situation during that time; after 2010, the supply is expected to increase substantially while demand levels off (see the discussion under "Timber Supply and Demand" in this Appendix). A 2.5% real increase over 20 years results in prices at that time about 64% higher than today - just about the same increase as a 1% real trend applied over 50 years. They predict that these higher real prices will be achieved more rapidly, but will intersect with the price trend used in the Forest's modeling at about 50 years

The higher price trends would result from a more significant reduction in public timber harvests than was apparent from the levels reported in the draft Forest Plans at the time Adams and Haynes did their analysis This situation will be monitored during Forest Plan implementation. The most immediate effect would be to assess on a site-by-site basis the feasibility of increasing the management intensity being applied for timber prescriptions. In particular, more rapidly rising real timber prices could make commercial thinning economically viable in more areas. The standards and guidelines in the Plan are written so as to be able to take advantage of those opportunities as they occur.

APPROPRIATION OF FULL REQUIRED BUDGET TO IMPLEMENT PLAN UNLIKELY

Projected outputs for timber volume and revenue achieved under each alternative reflect an ideal maximum which assumes that the full required budget is appropriated each year. Experience is that the federal government is not likely to continuously and reliably budget for programs and measures for many years into the future The Plan must commit to an automatic triggering of an amendment process, or otherwise commit to an automatic correction of the ASQ and other operations in the face of the absence of sufficient funding to carry out the Plan and operations.

Response: As stated in Chapter 1 of the Forest Plan, and reiterated in Chapter 5, the activity and output levels displayed in the planning documents are estimates; achieving those levels will depend on the annual budgeting process.

We believe the concern expressed by this comment is that the Forest will not carry out a balanced resource management program if budgets are less than required to carry out fully the direction of the Forest Plan. In particular, the concern is that the timber management portion of the Plan will be budgeted at higher levels than other resource areas and will be implemented the same way, resulting in a timber-dominant program.

There is no "automatic trigger" built into the Plan to respond to differing budgetary levels. However, a paragraph in the section "Implementation Direction" in Chapter 5 of the Plan (Chapter 5.B) speaks to the concern over unbalanced programs and possible undesirable effects from that imbalance: "Projects are scheduled in response to the management direction in the Plan, planned outputs of goods and services, near-term management needs and opportunities, and the annual budgeting process. **If there is a conflict between standards and guidelines and program outputs, projects will be in full compliance with standards and guidelines set forth in this Forest Plan."** (Emphasis added.)

The intent of this Forest Plan is to provide a balanced program of land and resource management that responds to the issues, concerns and opportunities identified during the planning process, that is sensitive to public needs and resource demands; that achieves the management goals set out in Chapter 4 of the Plan, and that will proceed toward the desired future condition defined for the Forest. The degree to which that intent is met will be assessed as implementation proceeds and monitoring is accomplished Major deviations, whether for budgetary or for other reasons, may require an amendment or revision of the Forest Plan.

PRESENT NET VALUE ANALYSIS DOESN'T INCLUDE ALL COSTS AND BENEFITS

On the topic of PNV, it looks to me as though timber receipts are the only monetary benefits considered, and timber jobs the only sector of the economy considered. I think PNV is a bogus indicator of value unless ALL costs and benefits are considered, and not a few selected ones.

Benefits such as maintenance of quality and quantity of recreation, preservation of visual amenities, ecological communities and habitat for species of concern were not considered in the Net Present Value analysis. Similarly, environmental cost of noise, soil erosion, and visual impacts due to activities such as logging were not considered in the NPV analysis. If it is

not possible to attach a dollar figure to these types of costs and benefits, the EIS should say as much in the discussion of NPV.

Response: Costs, benefits, present net value and net public benefits were discussed in the DEIS, Chapter II.F.4, in some detail. Detailed discussion and displays of the economic concepts and variables used in the planning process can be found in Appendix B of the DEIS and FEIS, Chapter IV. See also the FS responses to the comments "RECREATION VISITOR DAYS DON'T MEASURE TOTAL RECREATION VALUE" and "ADDRESS NONCASH BENEFITS" under the "Values" section of this Appendix.

OUTDATED INFORMATION USED

The proposed Plan utilizes outdated information to assess what economic values are foregone should the Plan be implemented. It does not recognize the recovery of the forest products industry from the 1981-1982 depression to the present.

Response: We have made every attempt to use the best available information for the planning process, given time and budgetary constraints. Information that was gathered and used in the early part of the planning process, and which has changed significantly over the past ten years, has been updated to the extent possible for the FEIS. We are just now into the beginning of a new Integrated Resource Inventory, which will replace the old timber-only inventory. Because this was dictated by budget and Regional Office priorities, we were not able to accomplish it sooner. For a discussion of why we have continued to use timber values and costs developed earlier in the process, see the "Values" section, "MARKET AND NONMARKET VALUES ARE INCORRECTLY DEVELOPED AND USED" and the "Costs" section, "COSTS ARE OUTDATED...."

INCLUDE ROAD MAINTENANCE COSTS

An additional cost accounting apparently not used is the maintenance cost of logging roads. Only the asset value of the roads seems to be presented (e.g., DEIS Table III-20) Unless a road is completely abandoned, it is not an asset; it is a liability. You must include the maintenance costs of each road when you analyze its economic "benefits."

Response: There are two different cases involved here. The first is the net cash flow related to timber sales in a given year -- what is now reported in the TSPIRS "Statement of Timber Sale Revenues and Expenses" (Report 1) This case is the related to Table III-20 cited above. The second case is the contribution of road maintenance costs to the net economic value calculations of timber and other management activities for the Forest.

In the first case, the Forest Service considers the capital costs of road construction and the costs of timber purchasers' road maintenance activities in a given year as timber sale-related costs. In the section discussing this issue (Sale Cost Accounting) and Tables III-18 through III-20, road asset values from capital investment (Table III-20) are shown separately, while the timber sale receipts and costs are net of road construction costs. Purchasers' road maintenance costs related to timber sale activity are included in the timber sale costs. Timber purchasers pay for all sale area road maintenance costs during the operation of the sale. The Forest Service considers ongoing road maintenance costs from appropriated funds as basic land stewardship costs. Once a sale is completed but the permanent roads are left open, the annual maintenance costs are not considered to be necessarily timber related; rather, they are part of the costs of the overall management of the Forest.

In the second case of overall economic net benefit calculations, the ongoing road maintenance costs were included for all types of roads that remain open. These costs for the government average $300/mile/year (1982$). DEIS Table III-68 displays road construction and maintenance costs. (The Maintenance Costs - Appropriated Funds line should have been tagged "cost/mile, arterial-collector-local/year." The "local" was inadvertently omitted.)

EVALUATE HIDDEN COSTS TO OTHER RECREATION SITES OF LOGGING ROADLESS AREAS

Also evaluate in the EIS the hidden costs of logging roadless areas where forcing more people into fewer trails elsewhere will cause more money to be spent to repair trail, campground, lake shore, and meadow damage.

Response: One of the purposes of developing the Forest Plan and its associated monitoring requirements is to have a better basis for managing resource use and damage. In some cases, additional trails will be provided to offset, at least to some degree, those lost in roadless areas that are logged The intent of the Plan would be not to allow resource damage to occur in alternative recreation areas, through whatever management means required. If the Forest is successful in this regard during Plan implementation, there should not be additional budget costs that were not anticipated in the development of the Plan.

There may be economic costs to recreation users of primitive areas who are no longer able to use certain roadless areas for that type of recreation because of logging and roading. This will be the case if there are few or no alternative sites that can be substituted for the lost site. In general, if more users are crowded onto fewer trails, the congestion and reduction in quality of experience will mean a loss of value to those users. This loss in proxied in the Forest Plan economic modeling by not valuing recreation use past the estimated capacity of the land to support a given level of recreation experience. In actuality, if congestion occurs because that capacity is exceeded, the value to the users will decline. The modeling assumes that the total value of users over capacity times reduced value for all user would be about equal to the total value of users up to capacity times full value for all users.

COSTS USED ARE OUTDATED, OF UNCLEAR DERIVATION, AND INCONSISTENT W/BENEFITS

The fixed and variable costs used in the economic efficiency analysis, listed in Appendix Table B-15, are old (based on 1975-1980 data), and their source is not documented.

All the costs and values are outdated and based on inconsistent years and data; for example, stumpage values are based on "cut" sales from FY1977-FY1983, while logging costs are based on "sold" sales from calendar years 1973-1982.

Response: The five pages following Table B-15 discuss the source and derivation of each cost category, what activities are included in each cost category, and some of the problems and limitations encountered. Specific numbers, worksheets and equations may be found in the planning records.

As much as possible, costs were developed using a multi-year data series, weighted where appropriate and indexed to a base year, in order to get a reasonable average figure for planning purposes. Data years actually ranged from 1977 through 1985, depending on the cost category and available data. We believe that these average costs are a good representation, in real dollar terms, of the costs of Forest management activities. Some adjustments were made to costs prior to the publication of the Draft EIS that were known to have shifted significantly since their initial development in the earlier part of the decade. We do not believe that there have been significant shifts in the multi-year averages, when adjusted for inflation, that would deem it necessary to revise those costs for the FEIS.

The fact that the data series for logging costs and stumpage values were somewhat different does not create any serious bias or distortion in the economic analysis. Both were taken from multi-year series of seven to ten years in length, were weighted for appropriate factors such as volumes, diameter, species, etc., and were indexed to a common base year. These series are long enough to catch business cycles as well as technological trends. They picked up the economic highs of the late 1970's as well as the lows of the early 1980's They picked up the major changes in fuel prices of the 1970's and the increases and then decreases in real labor costs across the late '70's and early '80's. We are not aware of any significant trends in the past four to five years that would cause major shifts in these values in real dollar terms.

CLARIFY WHO INCURS THE COSTS FOR THE TIMBER SALE-RELATED ROADS

On page III-51, it's very unclear as to whether or not the road costs in Table III-20 are road costs that contractors bear in harvesting timber or are costs that the Forest Service incurs. If incurred by the Forest Service, it appears from looking at the Table III-18 (Timber Sale Costs, Receipts, and Cash Flow -Harvest Basis) that selling trees is a losing proposition.

Another major consideration is the cost of these roads - who pays for them? Not the timber companies - the taxpayer does.

Response: The roads shown in Table III-20 are timber sale-related roads built by the timber purchasers. The roads are built at the purchaser's cost, but the purchaser receives a credit, up to a maximum stated at the time the sale was bid, against the price that has to be paid to the Forest Service for the timber harvested -- hence, the term "purchaser credit roads." These costs are not included in the "Timber Sale Costs" columns of Tables III-18 and 19, but are also netted out of the "Receipts" column in the same tables. Therefore the "Cash Flow" figures would not be reduced again by the road asset values in Table III-20; to do so would be double-counting costs. The positive cash flows shown in Tables III-18 and 19 are correct.

JUSTIFY APPARENT DISPARITY BETWEEN COSTS OF LOGGING AND RECREATION ROADS

Lumber roads are estimated to cost $20,000/mile, while secondary recreation roads cost $150,000/mile. Both types of roads must carry heavy vehicles, so the great difference in cost strikes me as inappropriate.

Response: Table III-68 on page III-65 of the DEIS shows construction costs for roads of different standards. This table lists "Temporary" roads with a construction cost of $21,000/mile, "Local" roads costing $145,000/mile, and "Arterial and Collector" roads at $280,000/mile (all in 1982$). The reader has apparently correlated "lumber roads" to temporaries and "secondary recreation roads" to locals This is a misperception.

Temporary roads are those roads that are built to a very low standard, generally within a sale area, that gives logging equipment and trucks access to various working areas for the sale. They typically consists of spurs and short lengths of road connecting landings. As soon as the sale is complete the roads are "put to bed"; that is, they are closed off, recontoured, waterbarred if necessary, and revegetated. They rarely become part of the permanent road system.

Local roads are fairly low-standard, one-lane roads that connect destination points such as timber sale areas, trailheads, or campgrounds to larger, higher-standard roads (collectors or arterials). These are the roads by which trucks haul logs away from timber sale areas, and which later recreationists may drive. Local roads built to a timber sale area or to a trailhead will average about the same cost and be built to about the same standard. Temporary roads, on the other hand, are built only for short-term use by heavy, high-clearance vehicles and equipment within a sale area. Because they are built to a much lower standard, are generally quite short segments, and are designed for very short-term use, temporary roads cost significantly less than locals.

Costs of temporary roads in the economic analysis are included in the logging costs. The $21,000/mile converts to an average cost of about $8.00/MCF. These costs are borne by the timber purchaser. Local roads associated with timber harvest ($145,000/mile) are modeled partly as miles built and partly on a per acre harvested basis. Local roads required for recreation use are modeled as miles built and are also priced at $145,000/mile. See Appendix B, Chapter III, Sections B.2 and F.4 for additional details.

COSTS FOR ROAD CLOSURES

Were costs for [road] closures, permanent or temporary, included in order to keep road densities low enough for other resource protection?

Response: Yes; the Plan calls for many roads to be built to a lower standard than used to be the case, then either closing them outright until needed again for timber management activities, or maintaining them at a low maintenance level during that interim period In the model, annual costs of low standard maintenance were used to represent either case. The assumption was that the costs of closing and later re-opening a road and bringing it up to useable standard would be approximately the same as the costs of annual low standard maintenance (essentially keeping culverts cleaned out and arresting any erosion problems that develop)

LOGGING COSTS BY DIAMETER AND VOLUME

It seems more reasonable to use historical costs with empirical yield tables and the new method with DF-SIM; otherwise values would be inflated.

Response: The logging costs differentiated by diameter and per acre volume, as developed from the paper by Fight, LaDoux and Ortman (1984), were indexed to the Forest's historical values This tied the logging cost for the average diameter and volume to existing stand conditions, allowed for diameter and volume differentiated costs for use in managed stands (both of which will typically be smaller than for existing stands), and reflected the conditions on the MBS that differ from the Coast Range where the Fight, et al. cost model was developed.

INCLUDE LOSSES OF FISH AND WILDLIFE AS COSTS

The losses of fish and wildlife need to be modeled accurately, and those due to activities need to be charged as costs, and evaluated in calculation of PNV.

Response: Changes in fish and wildlife populations in response to other management activities, as well as to habitat enhancement programs, have been modeled to the extent our current knowledge allows. Losses of fish and wildlife populations are not calculated directly as costs; rather, they show up as decreased benefits. When two alternatives are compared that have differing levels of fish and wildlife populations, the alternative with lower populations (assuming values greater than zero and relatively marginal changes) will show a lower overall PNV than the alternative with larger populations. The difference in PNV between the two alternatives is the cost (more precisely, the opportunity cost) of the reduction in

population levels. Adding that reduction of benefits into the alternative with lower populations as an additional cost would be double-counting.

CONCERNED ABOUT BELOW COST SALES

Another major consideration: isn't it true that in 76 out of 123 national forests in the U.S., the government has consistently lost money selling timber? This may not be entirely true here in the Northwest, but why should the American taxpayer subsidize the timber industry to cut the trees from the public lands which are supposed to belong to everyone for multiple use?

From the high amount of acreage declared suitable for harvest, it appears that below cost timber sales are likely.

Response: The Timber Sale Program Information Reporting System, TSPIRS, was developed to provide information on the "below cost timber sales" issue. The 1987 and 1988 Draft TSPIRS Reports show the following information, (stated in $1000):

	1987	1988
Total Timber Sale Revenues	$29,378	$36,245
Total Operating Expenses	$16,989	$13,422
Remaining Value Before Payments To State	$12,389	$22,823
Payment To States	$ 7,021	$ 8,014
Net Gain	$ 5,368	$14,809

Costs for Timber Access Roads are included as one of the items under "Operating Expenses "

MBS SHOULD END DEFICIT TIMBER SALES BEFORE IMPOSING USER FEES

We hear much about user fees, the recreation initiative, and other ways to pay for recreation on the national forests. But it is not extreme to ask the Forest Service to put an end to deficit timber sales before imposing user fees on the recreating public.

Response: The MBS has not had any deficit timber sales. In fact, timber sales experienced a net gain (before payments to counties), as shown in the table of the previous response. (Annual TSPIRS Reports)

The only user fees charged to the recreating public on this Forest are those for fee campgrounds, recreation residences, special forest products (Christmas trees, firewood, transplants, etc.) and those fees paid to the Forest's Special Use permittee's (ski areas, outfitter guides, etc.)

MOTORIZED VS. NONMOTORIZED RECREATION VALUES NOT RIGHT

Our skepticism over your valuation of recreation outputs of the MBS is confirmed in the statement on DEIS p. II-119 that "on a per acre basis, motorized use is more valuable than nonmotorized use." This is a ridiculous conclusion to draw and is merely the result of the "linear thinking" of FORPLAN, which recognizes merely quantity, not quality.

Response: The capability of lands on the Forest to support various types and qualities of recreation were assessed using the criteria from the ROS Handbook. These criteria take into account the factors necessary to achieve and maintain the quality of recreation experiences at various levels. Estimates of the maximum number of RVD's per acre that can be supported by various lands on the Forest for various types of recreation (recreation capacity) resulted from that assessment process. As an example of the differences in needs to achieve recreation experiences of different types that are satisfactory to the users, Roaded Modified recreation can tolerate a higher level of use on an area basis (e.g., 3.1 RVD's per acre), while Semi-primitive Nonmotorized recreation experience requires a lower maximum density use (e.g , 0.6 RVD's per acre) to provide a satisfactory experience of that type. Thus, there was a quality variable built into the recreation capacity coefficients.

The Forest is required to use RPA values specified for Region 6 unless other more region-specific values are available and have been evaluated and approved by the Washington Office. The latter was not the case, so we used the RPA values as required. The RPA values represent the value that people would be willing to pay, over and above their current expenditures, to access and use the recreation resource itself. In other words, these values represent what a person would pay to the owner of the recreation resource for access and use, after arriving at the site - if such a market actually existed.

The statement that motorized use is worth more economically than nonmotorized use on a per acre basis is the result of multiplying the capacity coefficient in RVD's per acre times the economic value per RVD. So, for Roaded Modified recreation, this would be:

3.08 RVD's/ac x $9.38/ac = $28.89/ac.

For Semi-primitive Nonmotorized recreation, the figures would be:

0.58 RVD's/ac x $13.25/ac = $7.68/ac.

These results have to be kept in proper perspective. First, to say that the former is more valuable than the latter in Forest planning requires that all capacity on the Forest is in demand. If demand is less than capacity (total available acres for the recreation type times capacity per acre), then the RVD's of supply in excess of demand would have zero value. The Forest incorporated this factor through the use of demand curves applied to recreation in the FORPLAN modeling. Recreation was only valued up to the point of expected demand (use). Any capacity in excess of that expected use was not valued in the model. Primitive and semi-primitive recreation use received full value, as demand is at least as great as capacity. Roaded recreation was not valued at full capacity in the first decade or two, as expected demand is not currently as large as capacity on the Forest

Second, these results are all dependent on changes in use and land allocations being marginal. If major changes occur -- for instance, most or all of the lands available for one type of recreation are eliminated - then the relative values would change, unless there were available substitutes within a reasonable travel distance.

The uncertainty surrounding all these numbers is one of the reasons that economics is used as a tool in the planning process, rather than seen as giving the answer. Economics helps guide the analysis and decision-making process. But other factors are also taken into account, such as the

inability in the modeling process to account for demand potentially exceeding capacity in reality, leading either to deterioration of the quality of experience, or to rationing schemes that would drive up the willingness to pay for the experience.

RECREATION VALUES SHOULD VARY WITH DEMAND AND SUPPLY

Roaded recreation evaluation doesn't appear to take into account that "value" changes with scarcity, and that there is a point of diminishing returns. The value of unroaded recreation should increase as demand is not met [demand exceeds supply], and the value of roaded recreation should decrease as demand is exceeded.

Response: While the comment is conceptually correct, the ability to define a continuum of quality and associated values within each step of the Recreation Opportunity Spectrum (ROS) system is beyond both the available data and the modeling capabilities we currently have.

We attempted to proxy this situation in a "lumpy" manner in two ways. First, the ROS classes reflect gross differences between experiences of roaded and unroaded dispersed recreation, and, within those two broad categories, several steps of experience levels going from more to less influence by development and other human activities. These ROS levels have different economic values associated with them in the planning process. The lower end of the value range is associated with those experiences that are more common, have many available substitutes, and for which there is abundant supply. The higher end of the value range is associated with those experiences that are less common, have few available substitutes, and for which there is limited supply in relation to demand.

The second part of our approach to dealing with this problem was to limit the recreation valued in the planning process to the levels of expected demand. If that projected use is below capacity - for instance, roaded recreation opportunity in the first and second decades exceeds expected demand - a dollar value was assigned only to the level of use, not to total capacity. Conversely, if projected use exceeds available supply, only the projected use is valued.

This process gives some recognition both to variations in recreation quality/type and to the interaction of recreation demand and supply. But if projected use exceeds supply, it does not allow for an increase in the dollar value assigned to that type of recreation. And if supply far exceeds projected demand, the dollar value assigned to that type of recreation does not decrease for planning purposes.

These types of limitations on data and modeling capability occur throughout the planning process. Nothing is perfect, and assumptions have to be made. The value of using a formal analytical and economic process is that approaches are structured and standardized, assumptions are stated "up front" and treated consistently, and quantification is used to the extend possible to help guide the evaluation and decision-making processes. Beyond the limitations of data and the capabilities of analytical tools, it is the decision-maker's responsibility to make the best judgement possible, accounting for all relevant information as best possible.

RECREATION VISITOR DAYS DON'T MEASURE TOTAL RECREATION VALUE

I object to the economic analysis in the Plan of simply measuring recreation use days. We believe this understates the present and future economic recreational impact of conservation and protection of the forests.

> **Response:** See "ADDRESS NONCASH BENEFITS" which follows later in this section for a discussion of noncash benefits that are priced (RVD values) and those that are nonpriced Some of the nonpriced benefits related to recreation are discussed there In addition, option and existence values *for present and future recreation opportunities, wildlife-related* activities, etc. are part of the total value of recreation. Finally, there are distributional benefits (and costs) that accrue in terms of employment and income effects.
>
> The economic efficiency analysis part of the planning process quantifies to the extent possible the cash and priced noncash benefits (and costs). The employment and income effects are part of the economic impact (distributional or equity) analysis that looks at who benefits and who pays the costs of management programs and activities. These two analyses are *separate processes and are not additive.*
>
> Nonpriced noncash benefits are discussed throughout the planning documents in qualitative terms. The final decision process brings together the information from the economic efficiency analysis, the economic impact analysis, nonpriced noncash benefits, and any other pertinent factors relating to the decision to be made in an assessment of the "net public benefit" that will result from choosing one alternative or another. The economic efficiency analysis results (present net value), of which the RVD priced values are a part, are only a subset of the total set of values and conditions that make up the "net public benefit."

DISPERSED RECREATION VALUES TIED TO CAPACITY, NOT USE

It should also be noted that you tie dispersed recreation values to capacity, not estimated use. It seems that the most appropriate and quantifiable [approach] would be use rather than capacity.

> **Response:** It is true that, in the FORPLAN model, recreation values ($/RVD) are attached to RVD's of capacity This was for modeling convenience as much as anything, as RVD's of capacity by ROS class are the primary recreation variable in the model that vary by alternative. However, *recreation capacity was given a positive economic value* ***only*** *up to the* point of expected demand (use) for that ROS class in a given decade. Any capacity in excess of that expected use was not valued in the model.

RECREATION WILLINGNESS-TO-PAY VALUES ARE NOT COMPARABLE WITH TIMBER VALUES

The MBS timber values are not comparable to the other resources since they fail to reflect finished lumber prices to the consumer.

The MBS *incorrectly tries to justify the incorrect mixing of valuation by* saying that the point of valuation is the Forest The timber values used in the analysis are stumpage values which reflect the value added as the trees are harvested, processed, and eventually distributed in finished form to the

ultimate consumer. On the other hand, the RPA non-market values are comparable to a "finished product" price valued at delivery to the consumer. Recreation and wildlife user days are consumed in the woods and were developed by adding what people pay (in travel and expenditures) to reflect the value of the resource. So, the stumpage value excludes all the costs and values that accrue to the resource, but recreation is valued at its consumptive point with all of the costs and revenues included.

Response: The values used for timber and for recreation/wildlife are conceptually comparable. Each measures the willingness to pay for the land/resource taken as an input on the Forest. The value of recreation is not the **total** value of the recreation "finished product " Rather, it measures what people would be willing to pay to use the land (or wildlife) as an input into the total recreation experience if they had to pay some sort of access or use fee. The total value of the recreation experience encompasses the costs in time, travel and equipment that people expend, along with the nonpriced value represented by access/use of the land or resource on the Forest. Only the last part - the net willingness to pay over and above actual expenditures - is represented in the Forest Service values for recreation and fish/wildlife user days in the planning process. These values are comparable to timber stumpage values - the value at first point of access on the Forest prior to processing into a finished product.

RPA FISH VALUES ARE NOT APPROPRIATE FOR THE PACIFIC NORTHWEST

It is our understanding that RPA values are not based on local ex-vessel price of fish or regional studies determining the value of anadromous fish to commercial and noncommercial fisheries. The RPA values are based on national averages; therefore, the Forest Service has neglected to apply the best available data and most reasonable information based on local economic conditions.

Response: RPA values are developed at the national level, but they are adjusted by Region, given the best available data. Also affecting prices among Regions are differences in the quality and comparability of similar activities and outputs, and the extent to which the outputs and opportunities from the National Forests are a large enough part of total regional supplies to affect regional prices.

CALCULATION AND VALUATION OF WILDLIFE/FISH USER DAYS UNCLEAR

How did the Forest calculate WFUD's and value them?

Response: The derivation, projection and valuation of WFUD's followed the same general process as that for other recreation, as discussed in some detail in Appendix B, Chapter III.F.5&6. On the demand side, historic data were used as the basis for projecting recreation use of fish and wildlife (WFUD's). On the supply side, recreation capacity was developed in terms of the ROS system. This system defines recreation in terms of type and quality of experience (primitive, roaded natural, etc.) rather than as types of activity (hunting, fishing, camping, hiking, etc.).

[NOTE: All recreation activity in the planning and modeling process is expressed in terms of standardized 12-hour days. RVD's are used for all recreation not related to fish and wildlife. Recreation associated with

the latter are expressed as Wildlife/Fish User Days (WFUD's) which are also standardized 12-hour days. If the average duration of a wildlife observation activity day is 4 hours, it takes three such activity days to make up one nonconsumptive WFUD. On the other hand, if a big game hunting day on the average occupies 8 hours, it takes only 1.5 such days to make up one hunting WFUD. One ramification of this standardization is that the economic value of a nonconsumptive wildlife activity day will be multiplied by three to get the WFUD value, while the economic value of a big game hunting activity day will only be multiplied by 1.5 to get its associated WFUD value.]

It was necessary to develop a "crosswalk," using historical data, between the activity types and the ROS class. Up until 1981, the Recreation Information Management (RIM) system did not track recreation use by ROS, but only by activity type. Since the original use projections were based primarily on historical data from the 1970's, the "crosswalk" was necessary to convert the projected recreation use by activity type into projected use by ROS class.

In the planning and modeling process, recreation in terms of ROS class was the primary focus for mapping, tracking and reporting. However, economic values of recreation use are defined in terms of activity type -- hunting, fishing, camping, hiking, etc. For purposes of economics, it was necessary to keep a parallel accounting of recreation supply and projected use by broad activity types, varying primarily by major differences in economic value. For instance, general dispersed recreation activity may have similar economic values per visitor day, but hunting, fishing, wilderness use, and nonconsumptive wildlife use all have significantly higher values. In order to reflect those higher-valued recreation activities, RVD's and WFUD's by those activity types were tracked along with ROS class.

It should be noted that the recreation (RVD and WFUD) projections used in planning and modeling are specifically for on-Forest activities. Historical use patterns and best estimates of future activity were used to derive the projected supply and future use There are places in the planning documents where broader contexts of demand and supply are discussed that go beyond Forest, or even Puget Sound area, boundaries. For instance, demand for nonconsumptive wildlife use is said to be running significantly higher than for consumptive wildlife use That projection, though, was made in terms of all types of nonconsumptive wildlife use *occurring a mile or more from peoples' residences (USFWS, 1980 National* Survey of Fishing, Hunting and Wildlife-Associated Recreation). Yet, historical data for the Forest, sketchy though it was, indicated that nonconsumptive wildlife use was a much smaller relative portion of total wildlife use on the Forest. This is not surprising, in that people can find many nonconsumptive wildlife-related activities much closer to home than the Forest, while the number of substitute opportunities for hunting off-Forest are much smaller.

Economic values used for WFUD's were the RPA values for Region 6, as required by Regional and Washington Office direction. At the time that the modeling and analysis were done, there were no Washington Office-approved alternative values more specific to the Forest that were developed in a manner methodologically consistent with the RPA values.

For additional details on the development and modeling of WFUD's, consult the Forest's LMP planning records. Derivations of the 1985 RPA values are discussed in Appendix F of the 1985-2030 RPA Program FEIS (USDA, 1986).

WILDLIFE AND FISH USER DAYS (WFUD'S) ARE DOUBLE-COUNTED

There is a double-count in the wildlife and fish user days. Consumptive or nonconsumptive use can be found in all four types of recreation use [developed, roaded dispersed, unroaded dispersed, and wilderness].

Response: Table II-9f of the FEIS (Table II-7f in the DEIS) shows estimated recreation outputs by alternative for developed, nonwilderness roaded dispersed, nonwilderness unroaded dispersed, and wilderness recreation. Each of these categories except developed recreation includes wildlife and fish-related recreation use. Also shown separately in the table is a summary of wildlife and fish use. This is for informational purposes and are not double-added into the total recreation use.

In the actual modeling of recreation capacity and use, WFUD's - both consumptive and nonconsumptive - were tracked as a subset of the major recreation breakdowns (developed, roaded, unroaded, and wilderness). WFUD's have higher economic values than general dispersed recreation. They were tracked and modeled separately in order to reflect those relative value differences. See Appendix B, Chapter IV.D for further discussion on development and use of RVD and WFUD values in the planning process.

DISAGREE WITH VALUES USED FOR FISH AND WILDLIFE

By State standards, all wildlife-oriented recreation carries with it a value to the State. This true value needs to be recognized in the Forest's Plan. ..[commercial] fishing costs are a multiplier which drives the State's economy and need to be included in the price (value) of our resources. Each commodity should be valued at its market place.

Response: The FS examines economic efficiency from the standpoint of the national economy. The value of goods and services produced from the Forest is the value they have at the time they are harvested, caught, experienced or whatever on the Forest (or in the ocean or rivers in the case of anadromous fish). This is the economic **addition** to the national economy. While processing adds to the value at intermediate or final markets, that value added is also a cost to the economy in terms of using land, labor and capital that could have been directed elsewhere, potentially to a higher use.

The values used in the Forest planning process for economic efficiency analysis reflect the value of the resource as an initial input to a production process that will produce a final good In the case of recreation, that final good is created primarily at the point of experience - the access to and use of the land is incorporated by the person, along with whatever expenditures it took to get there, to create the recreational experience. The value of the resource is the net willingness to pay to use the resource, over and above the expenditures made to get to the site and back. This is the value used in the economic efficiency analysis for recreation. The expenditures are incorporated into the impact or

distributional analysis, which uses the input-output model (IMPLAN) to display how those expenditures on recreation multiply to drive the economy.

In a similar vein, the commercial ocean fishery for salmon brings salmon from the water into the boat and to the dock at a cost, just as there is a logging cost to get the tree cut down, onto the truck, and to the mill. In the latter case, mill price minus haul costs and logging costs (stumpage) is the recognized value of the tree in the woods. Likewise, the net value of the fish in the water is its dockside price minus the costs of hauling the fish to the dock and catching it in the first place. Here, too, the expenditures that add value through processing to the final market are not reflected in the economic efficiency analysis, but rather their effects on the local and regional economy are reflected through the impact analysis that shows how catching the fish leads to a whole series of expenditures that multiply through the economy, provide income and support employment.

WILDLIFE AND SPORT FISHERIES VALUES AS NONCASH BENEFITS

Are wildlife and sport fisheries increases included as noncash benefits?

Response: Yes; it is assumed that all of the supply of fishing and hunting opportunities, as well as opportunities for appreciative (nonconsumptive) wildlife use, will be taken up by visitors to the Forest, whether above or below the current situation. It is also assumed that all increases or decreases will be relatively marginal, so that assigned values are not affected Increases in fishing RVD's are derived directly from expected fish production A series of calculations relate production to harvestable fish; harvestable fish available, through angler effort per fish caught, to WFUD's; and thence to the economic (noncash) value of the recreational use of the increased fish production. We do not have similar direct relationships established for hunting or nonconsumptive use. For these activities, values are applied directly to the projected increase in hunter and nonconsumptive user days, with the assumption that the habitat maintenance and enhancement will provide the necessary resource base to fulfill those anticipated use levels. Value (demand) cutoff points are used to avoid assigning values to projected hunter and nonconsumptive user days that exceed the capacity for those uses reported by the model. (See previous response to comment for additional discussion of use of value or demand cutoff points.

MARKET AND NONMARKET VALUES ARE INCORRECTLY DEVELOPED AND USED

We believe the values used for market goods have been incorrectly derived and the costs used are overstated. Also, the nonmarket values are incorrectly developed and used. The methodology used to combine market and nonmarket values is fundamentally incorrect.

These [nonmarket] values appear to be based on a highly theoretical economic study. A simple, common-sense review of the values assigned to various recreational activities suggests that they are skewed. For example, $8.47 per RVD for alpine skiing is belied by the substantial sums of money that people pay in transportation, equipment, lift tickets, accommodations, food and other costs associated with downhill skiing. Under such circumstances, recreational resources should simply be excluded, like other amenities, from the calculation

of PNV, which should be limited to commodities with readily ascertainable market values.

Response: We believe that the development of timber values (see Appendix B, Chapter VI.D.a) is appropriate and reflects reasonable average stumpage values that would occur over a typical timber industry business cycle (e.g., the highs of the late 1970's, through the lows of the early 1980's, and back on the upswing by the mid 1980's).

Derivation of costs, and responses to questions about whether or not they were biased or overstated, are discussed under in responses to comments above.

It is true that values of nonmarketed goods and services cannot be specified as precisely as those for goods and services that are exchanged in a marketplace. However, the methodology for estimating nonmarket values has been developing and evolving for at least 30 years. In the last 10 years, much more consensus has been reached on both the appropriate methodologies and on the meaning of the values derived. While there is still some disagreement over specific values obtained (the same is often true with derivations of the "right" stumpage value - a market good - as well), the methodology used by the FS to develop values for nonmarketed goods and services is in accord with the latest techniques in the economics profession. See Appendix F in the 1985 RPA Program Update (USDA, 1986) and the same appendix in the draft 1990 RPA Program (USDA, 1990) for thorough discussions of these methods. The 1990 draft also has a good references section. The reader who pursues these references will find that the example quoted in the comment above concerning value of alpine skiing is confusing expenditure values with net economic value. See also the discussion earlier in this section concerning the comparability of recreation and timber values.

The purpose of combining market and nonmarket values is not to end up with a number that is accurate in the same way as a financial statement or short-term financial analysis would be. This would be impossible, even using only market values, given the lengthy planning horizon and the uncertainties surrounding any projections over that time period. Rather, it serves to provide an **index** of the relative values of various alternatives. The economics do not provide the entire picture of all the values associated with the management of the Forest. There are many that still are beyond quantification. But the economic values, both market and nonmarket, do provide a picture of the relative magnitude of the measurable values involved, and of the relative tradeoffs in value as management goals, objectives and activities change among alternatives.

The Preferred Alternative is based only in part on the economic analysis. The issues, concerns and opportunities defined during the planning process, as well as legal management requirements, are major drivers of the Forest Plan goals and objectives, the subsequent standards and guidelines, and the land allocations. The decision is based on the Regional Forester's estimate of that mix of land allocations, activities and outputs that gives the greatest "net public benefit" of all the management alternatives considered. The economic present net value is a major subset of the net public benefit, but is not by any means the entire picture.

ADDRESS NONCASH BENEFITS

Noncash benefits, particularly of the spiritual values of the forest, need to be more specifically addressed in your plan and in the accompanying EIS. Even if these are difficult to measure, they should be at least given thought and words.

Response: *Noncash benefits include both those that are quantified, such as* the net economic value of an RVD, and those that are not quantified, such as the value of preserving wildlife species or the aesthetic values associated with maintenance of high quality scenic views. Part of the value of spiritual renewal experienced by recreationists is reflected in the net willingness to pay by people for the recreation experience, and is part of the economic value quantified through the planning process. Part of the value of spiritual renewal experienced is not priced; there is no known way at present to derive and put a number on aspects such as higher productivity resulting from rest and relaxation, or from reduced propensity to commit crimes because of the availability of more open space and natural landscapes.

Many of these nonpriced, noncash benefits are recognized in the planning, evaluation and decision-making process. They are referenced throughout the documents in sections on wildlife, wilderness, scenery, etc. These values are part of the "net public benefit" referred to in an earlier response in this section. The decision-maker takes into account the <u>full</u> set of values, not only those on which we have actually been able to put some price. Again, the economic present net value is a subset of the overall "net public benefit," which encompasses all the factors, quantified and nonquantified, that relate to the decision to be made.

DON'T LIKE RPA VALUES

Use of the 1985 RPA program assessment values has been consistently criticized by resource management agencies in the Pacific Northwest. These arbitrary valuations are really only the opinion of one group of economists (and on a national perspective).

Response: Appendix F of the 1985-2030 RPA Program FEIS, and the same appendix of the 1990 Draft RPA Program, give thorough discussions of the development of the RPA values, as well as provide additional references. Review, discussion and critique have provided continual stimulation to improve and refine the values, both conceptually and empirically. A large number of economists have been involved in one way or another in the development of the values. Not surprisingly, various resource advocates generally argue that the values for "their" resource are generally too low, while values of other (often competing) resources are generally too high.

RESIDENT AND ANADROMOUS FISHERIES NOT ADEQUATELY CONSIDERED IN BENCHMARKS

The Forest Service assumed that its benchmark analysis provided appropriate "decision space" for evaluating alternative management scenarios and evaluating associated resource impacts, based on the belief that anadromous fishery value and yields would not alter benchmark outputs, the planners elected to omit this information from the FORPLAN model. Resident fishery values and potential values are not included in the benchmark analysis.

Response: Fish modeling was one of the weaker points in our benchmark analysis during the "Analysis of the Management Situation" process, primarily because of the difficulty on this Forest of defining with any confidence any direct connections between marginal changes in other management activity levels and fish production. This difficulty of defining production relationships, particularly with regard to stream sediment loading, is primarily a result of the topography of the Forest as it affects streams. In the Puget Sound basin, anadromous fish spawning occurs more in steeper stream segments with swifter-moving water than it does on slower-moving stretches. Therefore, the damaging factor for spawning gravel tends to be streambed scouring with larger material rather than siltation with fine sediments. Differentiating between natural and management-related sources of large scouring materials has been more difficult that defining those sources for fine sediments, as has been done on other Forests. See additional discussion that has been added to Chapter III, Fish in this FEIS.

It is true that a benchmark run was not included that maximized resident and/or anadromous fish production capability on the Forest. However, the maximum primitive and semiprimitive nonmotorized recreation benchmark should have served as a proxy for the maximum opportunity for protecting and restoring fish habitat. What was not included at that point in the process was a dollar estimate for maximizing fish production, nor an estimate of the fish production coming from the benchmark.

The inclusion of three investment and production levels in the DEIS and FEIS for the Forest Plan was built on the assumption, discussed above, that there is not a direct connection between levels of management activity and fish habitat, **assuming all BMP's and Standards & Guidelines are applied.** That last caveat is critical, for if any BMP's or S&G's are not applied, then current levels of fish habitat and production will not be maintained, and the assumption of production levels relying solely on investment levels in habitat restoration and enhancement breaks down.

Given all the above, the lack of a fish maximization benchmark was not critical for adequate consideration of anadromous and resident fish production in the decision-making process. Monitoring and additional research over the next five to ten years should improve the available information in this area greatly, allowing much better modeling of fisheries during future Plan revisions. See Chapter 5, Forest Plan.

FORPLAN WAS NOT PROPERLY VALIDATED

The Forest Service never made its decision to employ the FORPLAN system on a national basis subject to any public notice and comment. Furthermore, the FORPLAN system was not properly validated before implementing this mandatory tool. The few documents surrounding this decision suggest that the selection of the FORPLAN system was made quietly and quickly.

Response: FORPLAN is the analysis tool adopted by the Forest Service to help develop plans for the National Forest system. FORPLAN was adopted for use nationally in 1979 to ensure a degree of consistency among Forests in their planning and modeling efforts. It was adopted after considering the only other viable candidate optimization and scheduling model available at the time -- the Integrated Resource Planning Model (IRPM). FORPLAN is simply a tool to assist in the analysis for forest planning - it does not make decisions, nor select the alternative that best meets net public benefits.

Appendix B of the DEIS included a discussion of the model and its use; a summarized discussion of FORPLAN was and is included in Chapter II. Additional documentation of the decision is available in the planning records. (Refer to the Public Involvement section of this appendix for additional comments/responses.)

MODEL SHOULD BE EXPLAINED IN DETAIL

The model itself should be explained in some detail, including how it will be used as a management tool (not to dictate the outputs of the Forest, but to direct management decisions and evaluate alternative activities). I hope this is true; it's bad management to let computer models dictate decisions.

Response: As explained in Chapter II, DEIS and FEIS, the FORPLAN model was used as an analytic tool. It is used to optimiza the design of each alternative (after the goals and objectives of the alternative are determined by the Forest Service, to respond to various public issues and concerns). The results of FORPLAN outputs help guide the decision-making process; the model itself, however, does not make decisions. Refer to Section B, Chapter II, FEIS and Chapter III of Appendix B for more information.

"ECONOMIC EFFICIENCY" NOT MEANINGFUL FOR DEVELOPING FISH PRESCRIPTIONS

The DEIS states (Appendix B, Chapter III.D.2) that "Though these [Category II - Management Requirements] prescriptions were designed to meet minimum constraints, they were still developed considering economic efficiency." The subsequent discussion indicates that this was really done only for wildlife, not fish. Since no benchmarks or quantitative linkages to environmental change were developed for fish, it is impossible to have any meaningful analysis for "economic efficiency "

Response: The "Riparian and Fish Habitat Management Requirements" prescription (13A) was developed in response to the planning regulations (36 CFR 219.27) that require protection of riparian areas and fish habitat from unacceptable degradation. Because the regulations specify a minimum level of resource protection that has to be met under any circumstance, the

economic efficiency question become one of "cost-effectiveness" - i e., *what is the least-cost way of achieving that resource protection. In this* case, the opportunity cost of meeting the riparian and fish management requirements is timber harvest foregone. So the economic question considered was how to meet the management requirements for protection of riparian and fish resources while minimizing the amount of timber harvest foregone.

INAPPROPRIATE USE OF DFSIM MODEL FOR OTHER THAN DOUGLAS FIR SPECIES

Also [object to] the MBS's inappropriate use of the DFSIM model when the current state of the art is the SPS model. The Forest Service use of DFSIM has forced the use of incorrect information into FORPLAN. Please review the technical report which is a part of this total response.

Was DFSIM adjusted for the slower growth rate of silver fir and others?

Response: DFSIM was used to project all yields for the DEIS. After consideration of public input -- specifically the group of timber technical issues -- and further review of available and suggested yield simulators, the Stand Projection System (SPS) was used to develop projected yields for western hemlock and true fir portions of the working groups for the FEIS. See Appendix B Chapter III.E.2 for details on how new SPS model was incorporated into the development of FEIS yield tables.

NO DISCUSSION OF WILDLIFE MODELING

Appendix B, page B-92 states wildlife as being one of the yield coefficient developments discussed in the section. Nowhere in the documents can we find *any explanation of models used to predict wildlife responses to activities.*

Response: Additional information has been incorporated into the FEIS, Appendix B concerning the wildlife habitat and population response models. See FEIS Appendix B, Chapter III.B.

QUESTION WILDLIFE MODELING

[The way wildlife habitat changes were modeled] (page B-46) doesn't allow for fragmentation, size or spacing of patches. This results in an inflated inventory. There should be a coefficient of reduction calculated and ground-truthed as has been done to allow calculation of dispersion factor

Response: The separate programs used to estimate wildlife habitat changes did take into account the effects and rate of harvest by management areas. The standards and guidelines for wildlife management areas were modeled to take into account fragmentation, size and spacing characteristics.

NEED MORE INFORMATION ON CONSTRAINING COEFFICIENTS

The development of various constraining coefficients for input into FORPLAN is *not presented, and a complete discussion of how these coefficients were*

developed is requested. Also, a discussion of any sensitivity analysis conducted with these coefficients is requested.

Response: Development of modeling coefficients and constraints is discussed in Appendix B, Chapter III.F. For a discussion of sensitivity analyses carried out on a limited number of variables, see FEIS Appendix B, Chapter VI, Sections F and H.

HOW WERE AZ'S USED?

Were allocation zones used to predict changes in wildlife and fish or just analysis areas? We would like to see population estimates for alternatives by drainage

Response: AZ's were not used to predict changes in wildlife and fish; these changes (except for WFUD's) were handled outside the FORPLAN model and consequently estimations for populations by drainage are not available at this time.

QUESTION USE OF SINGLE MODEL, DFSIM

I am concerned that your calculations are based on use of single computer model developed for Douglas Fir forest between 3,000' and 4,000' elevations ("Douglas Fir Simulated Intensive Management" Model), which is then extrapolated to other forest types and elevations. I am also concerned about the fact your models are based on assumptions about regrowth, including 10-15% enhancements based upon genetics and 10% enhancements based upon increased use of fertilizers and pesticides. It is disturbing that there is little actual field data to support such assumed enhancements

The structure of the forest model is inaccurate because it fails to stratify the forest by species, even though the forest will be managed for about 40 percent Douglas fir and 60 percent hemlock/true fir in the future, with management prescriptions as well as yields of these species differing significantly.

Response: Many of these assumptions have changed in the FEIS; refer to Appendix B, Chapter III, section 2.

ALLOCATION ZONES PREVENTED FORPLAN FROM DEVELOPING AN OPTIMAL PLAN

FORPLAN makes use of a concept called allocation zones to ensure that all the lands in an area defined as a zone are managed in a compatible manner. Normally, several alterative packages of management prescriptions are input for each zone, and FORPLAN allowed to select the optimal package, i.e., the one that best contributes to the objective of maximizing net present value of the overall plan. However on this forest, the planning team input only a single predetermined package of prescriptions for each zone, thereby preventing FORPLAN from developing an optimal plan.

Response: The allocation zone feature of the FORPLAN model was used to carry forth the objectives and spatial concerns of the alternatives. The model was then called upon to chose from a wide range of silvicultural and scheduling choices to optimize the objective function. By modeling both

spatial integrity and optimization, FORPLAN was able to more realistically estimate outputs and meet the objectives and goals of the alternatives. Each of the nearly one dozen alternatives analyzed in detail for the DEIS and FEIS had a separate package of prescriptions specified by zone. The results of evaluating multiple alternatives, within the decision space defined by the benchmarks, helped us develop the best possible plan for the Forest. This use of FORPLAN also was in accord with our approach of using FORPLAN as a tool to assist in the evaluation and decision-making processes, rather than for making the actual decisions.

CONSTRAINT FOR HARWOOD MANAGEMENT?

Page B-90: was such a constraint ever applied in the development of any alternative? If not, why not?

Response: *No. Ruffed grouse was dropped from the planning process as a* wildlife indicator species, and hardwood management on the Forest was not identified as an ICO.

SELECTION OF LEVEL IDENTIFIERS

Page B-27: had the Forest opted to use other, non-timber oriented identifiers, wildlife and other resources could also have been modeled. With the appropriate link between activities, sediment and fish production, fish *populations could have been modeled.*

Response: To a certain degree, this is true; however most other outputs and activities are unrealistic to handle on a per acre basis and can be better dealt with on an AZ basis Careful choice is required in selecting identifiers. They need to be relevant across a number of resources and issues. Too many combinations can lead to unmanageable model size. Some identifiers may also prove not to be effective or beneficial in the modeling process, primarily because of data limitations. For instance, in our initial FORPLAN formulations, deer winter range was used as an identifier in Level 2. However, we found that it simply did not add anything to the information coming out of FORPLAN; rather, we could get better results using models external to FORPLAN for wildlife habitat and population responses. See FEIS, Appendix B, Chapter III C. (Fish projection modeling and problems are discussed in Appendix B, Chapter III.B)

EXPLAIN COEFFICIENT DEVELOPMENT

Explain coefficient development, especially road-related.

Response: Development of coefficients is discussed in FEIS Appendix B, Chapter III.F. *Additional detail not included in the Appendix B discussion* can be found in the Forest's planning records.

THERE IS NO INTERAGENCY COOPERATION BETWEEN FOREST SERVICE, NATIONAL PARKS

A serious deficiency exists in the Forest Plan in its treatment of management directions for lands adjacent to the North Cascades National Park. There is no systematic documentation of existing cooperation between the USFS and the NPS and there is only vague reference to the types of cooperation envisioned in the future under the Plan This is indeed unfortunate since adjacent federal lands under different jurisdictions offer many opportunities for complimentary management.

There should be mention of cooperative efforts in terms of recreation, visual resource management, wilderness, and vegetation.

> **Response:** As documented in Appendix A, DEIS and FEIS, the Forest coordinated with the National Park Service in developing issues and concerns, and throughout the planning effort (as per NFMA regulations, 36 CFR 219.7). Additional data on supply has been added to the Recreation section of Chapter III, FEIS in response to this and other public comments. The first goal statement, under Forest-wide Standards and Guidelines for recreation is "encourage public and agency participation in recreation planning." Cooperative efforts in other resource areas (such as protection, wild and scenic rivers, wilderness, etc.) are included throughout Chapter 4, Forest Plan. Also built into the monitoring plan (Chapter 5, Forest Plan) is a planned, annual monitoring/management review with adjacent agencies, including the National Park Service. Additionally, National Park Service participation and input regarding management issues and concerns is invited by the Ranger District interdisciplinary teams during the scoping phase of all proposed projects adjacent to National Park lands.

UPDATE APPENDIX G REGARDING NORTH CASCADES NATIONAL PARK

Appendix G should be updated with respect to the management plan issued in 1987 for the North Cascades National Park Complex In addition, attention should be drawn to conflicts between that Plan and the MBSNF Plan. In our view these relate to the management directions set by the NPS Plan for developing an approach to ecosystem management with adjacent land managers and the lack of recognition of this need in the MBS Plan.

> **Response:** Appendix G has been updated, including the conflicts with plans and policies of others section, in this FEIS.

PLAN DOES NOT DISCUSS ECOSYSTEM MANAGEMENT

The MBS Forest Plan is to be commended on representing a good example of current management according to the prevailing management paradigm, i.e., the RPA. In the next decade, the emerging management paradigm will be ecosystem management. The Plan is deficient in its failure to recognize the changes that will come under the new management concept. There is not an obvious and explicit connection of Plans by the multiple managers of the North Cascades Ecosystem (including those in Canada). This must be the next planning effort; it would be a step forward to recognize, in this plan, the evolution toward ecosystem management that must take place.

Interagency Cooperation

I would recommend joint management of the North Cascades ecosystem between the MBS, North Cascades National Park, Okanogan and Wenatchee Forests, and Manning Provincial Park, in Canada, to ensure the survival and biological requirements of wildlife.

The final plan should consider the role of the MBS in the Greater North Cascades Ecosystem. Instead you approach management with a dark-ages state of knowledge of ecosystem functioning and planning. You even state (Appendix D-35) that you will only use the minimum of cooperation with other state and federal agencies necessary to achieve wildlife around the National Forest!

Response: The addition of discussions focusing on diversity and long-term productivity in Chapter III, FEIS and in a new section in the Forest-wide Standards and Guidelines (Chapter 4, Forest Plan) responds to this comment The elements of diversity considered include, but are not limited to: viability, distribution, and abundance of wildlife and plant communities; the structure and composition of forest; the role of agents *such as fire and insects; long-term productivity; and fragmentation of* scarce community types. In addition, the new Integrated Resource Inventory, which is currently underway, is designed to measure physical and biological attributes of vegetation, not simply tree size and class The old growth component of the inventory should be completed in 1991.

The referenced page in Appendix D is from Management Area 24, Minimum Management, a prescription developed to meet NFMA and regional planning direction. No lands in any alternative displayed in the FEIS are allocated to MA 24; it is not selected in the Preferred Alternative.

FAVOR MORE PROTECTION OF LANDS AROUND MT. RAINIER NATIONAL PARK

Another concern I have is for the protection of Mt Rainier National Park. Mt. Rainier National Park is a small park and is severely impacted by the ecological conditions prevailing on the lands surrounding its boundaries. In addition, Mt. Rainier National park is subject to very high visitor loads, but a large part of what every visitor sees during any visit to Mt. Rainier National Park is the land surrounding the National Park. For these reasons, the FS cannot ignore Mt Rainier National Park nor its visitors when managing the lands surrounding the park.

Response: Cooperative efforts in other resource areas (such as protection, wild and scenic rivers, wilderness, etc) are included throughout Chapter 4, Forest Plan. Also built into the monitoring plan (Chapter 5, Forest Plan) is a planned, annual monitoring/management review with adjacent agencies, including the National Park Service. Additionally, National Park Service participation and input regarding management issues and concerns is invited by the Ranger District interdisciplinary teams during the scoping phase of all proposed projects adjacent to National Park lands.

NO TIMBER HARVEST NEAR MT. RAINIER NATIONAL PARK

The excessive timber cutting right up to the National Park boundaries is making Mt. Rainier National Park an island in a sea of clearcuts.

Areas adjacent to Mt. Rainier National Park that are slated for logging under alternative H should be spared in some locations, so that there will not be obviously incompatible uses immediately adjacent to the park.

National forest policy should be coordinated with national park policy to prevent their working at cross-purposes. So far, this has not been done with any positive effect. Clearcuts exist right up to the boundary of Mt. Rainier National Park. No effort has been made to protect whole ecosystems, as they actually exist on the ground.

Response: In the Preferred Alternative, based on public comment and to meet the objectives of the alternative, lands near Chenuis Creek and adjacent to Mt Rainier National Park have been allocated to MA 1B, semi-primitive nonmotorized dispersed recreation. Mather Memorial Parkway, one major travel-route into the Park, is allocated to MA 8, Special Area with emphasis on scenery (and no scheduled timber harvest). While other acres adjacent to the park are allocated to MA's that permit timber harvesting, National Park Service participation and input regarding management issues and concerns is invited by the Ranger District interdisciplinary teams during the scoping phase of all proposed projects adjacent to National Park lands. The Forest-wide Standards and Guidelines for visual resource management (see Chapter 4, Forest Plan) also apply.

PLAN VIOLATES MULTIPLE-USE SUSTAINED YIELD ACT

Plan is in violation of multiple use-sustained yield act because it does not provide for sustained yield, it isolates the timber resource from the remainder of the Forest, it does not provide for multiple use of all lands, and it violates the established function of the Forest by harvesting at 17% below potential yield.

Since the Organic Act clearly establishes at the outset that a "continuous supply of timber for the use and necessities of citizens of the United States" was preeminent, U.S. v. New Mexico, 98 s. Ct. 3012, 3017 (1978), and later Congressional policy embodied in MUSY Act directed the Secretary of Agriculture "to develop and administer" renewable resources, including the renewable timber resource, in order to obtain "the products and services" produced by such resources, at a minimum it can be said that the clear intent of both these laws is to emphasize timber outputs from the forest while still balancing other uses. In short, the additional resource uses of the forest created by the MUSY Act did not detract from the primary forest uses, timber and water. Sierra Club v. Block, 622 F. Supp. 843, 859, 860 (D.C. Colo 1985). The timber resource must not be subordinated to other forest use.

The allowable timber sale quantity (ASQ) in the MBS Plan for the next decade will be 17% lower each year than the current potential yield, that is, 170 MMBF down from 203.8 MMBF. The cumulative effect over ten years of a 17% reduction in the annual timber sale program is the total loss of 338 MMBF. This violates the established function of the MBS as clearly stated in the Organic Act and transgresses the fundamental policy of the MUSY Act of developing and administering the renewable timber resources for its products and services.

Response: *Sustained yield of timber for all alternatives can be found in* the FEIS The Multiple Use-Sustained Yield Act declares that National Forests be "administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes." and defines multiple use as "the management of all the various renewable surface resources of the National Forests so that they are utilized in the combination that will best meet the needs of the American people." It also allows "that some lands will be used for less than all of the resources" and that those uses are "not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output."

While the goals and objectives of the alternatives presented in the FEIS differ, they are all consistent with the Organic Administration Act of 1897, the Multiple-Use Sustained-Yield Act, and - except for Alternative NC (No Change) - NFMA. The range of alternatives addresses public concerns about multiple use management, as well as many other concerns The Preferred Alternative maximizes the net public benefits.

NEITHER ALTERNATIVE NC OR A ARE TRUE "NO ACTION" ALTERNATIVES

Alternative NC was included to comply with an order to include a "true no-action alternative" and Alternative A is referred to as a no-action alternative. Neither of these is a no-action alternative, both are "continued action" alternatives. As such, we do not believe they comply with NEPA.

A No-Action Alternative should be modeled using minimal level management regimes. Presenting as analysis of minimum level effects would give a much truer "baseline" against which to compare your other alternatives.

Response: As defined in the Council of Environmental Quality's "Forty Most Asked Questions" (Federal Register, 3/23/81), the "no action" alternative when "an action, such as updating a land management plan where ongoing programs initiated under existing regulations will continue, even as new plans are developed. In these cases "no action" is "no change from current management direction or level of management intensity" and the "no action" alternative may be thought of in terms of continuing with the present course of action until the action is changed " In addition, NFMA implementing regulations (36 CFR 219.12 (f)(7)) state that "At least one alternative shall reflect the current level of goods and services provided by the unit and the most likely amount of goods and services expected to be provided in the future if current management direction continues. Pursuant to NEPA procedures this Alternative shall be called the "No Action" alternative." For all forest plans, this alternative is labeled "Alternative A" and is the No-Action Alternative required by NEPA

Alternative NC (No Change) was developed in response to decisions made regarding a 1986 appeal; the substance of the appeal was that a true no-action alternative representing current management plans (and without MR's) was not included in Forest Plan EIS's Refer to discussion in Chapter II, DEIS. Alternative NC emulates the existing Timber Management Plan, with its Potential Yield as the timber output; coordination with other resources is guided by the Ranger District Multiple Use Plans. Alternative NC does not incorporate the management requirements noted in the NFMA regulations. Implementation of this alternative would require modification of the regulations.

A minimum-level management benchmark was formulated and is displayed in Appendix B.

INCLUSION OF MR'S IN EVERY ALTERNATIVE LIMITS THE DECISION SPACE

Decision space is limited by including MR's in every alternative, thus violating the direction of the National Environmental Policy Act which requires "examination of a wide range of alternatives."

Response: As stated in Chapter II, the imposition of management requirements in all alternatives considered in detail is a NFMA requirement. One alternative, the No Change Alternative, has been developed which does not include Management Requirements. Management Requirements can be viewed as assuring that we are meeting Multiple-Use Sustained-Yield of all of the resources as noted in the MUSY Act of 1960.

ALTERNATIVE G SHOULD NOT HAVE BEEN INCLUDED IN THE DEIS

Portraying an alternative developed by a special interest group does not conform with the NEPA requirement that the responsible federal official prepare and include the alternatives to the proposed action. Alternative G was not authored by the government.

Including Alternative G, the selected choice of a vested interest group, does not meet the standard of "full and fair discussion of significant environmental impacts" as required by 40 CFR 1502.1.

Forest Service has "committed it's resources" by including Alternative G in the various alternatives to the proposed action, and to this extent has violated 40 CFR 1502.2(f) which states. "Agency shall not commit resources prejudicing selection of an alternative before making a final decision (1506.1)""

Response: NEPA requires that public participation in the process begin "as early as possible" in the preparation of an EIS; the scoping process, a first step after publishing the Notice of Intent in the Federal Register, is a first point for public involvement. Refer to the discussion on Appendix A, FEIS, for public involvement efforts, including formation of the MBS public Liaison Groups.

NFMA at 16 U.S.C. 1601.(b) requires the Secretary to "provide for public participation in the development, review and revision of land management plans". In light of this requirement, and as provided for in FSH 1909.15, each Liaison Group was invited to provide information and suggestions in the development of alternatives More discussion is available in the MBS planning records. Two of the three groups declined, the Conservation Liaison Group suggested goals and objectives and, using the same standards and guidelines and available allocations as used in all DEIS alternatives, worked with MBS staff in developing Alternative G.

In the public response to the DEIS, several additional alternatives were submitted by the public. These were all considered (Chapter II, FEIS) and one was developed as an alternative considered in detail. Alternative I. Members of the Public Land User's Society worked with MBS planning staff in the mapping of Alternative I.

Note that 40 CFR 1506.1 defines a "commitment of resources" as a) an action that will have an adverse environmental impact on the human environment, or b) an action that will limit the choice of a reasonable alternative.

NO ALTERNATIVE ALLOCATES OVER 75% OF TENTATIVELY SUITABLE LANDS TO TIMBER PRODUCTION

The range of alternatives in DEIS is inadequate because no alternative manages over 75% of the tentatively suitable lands for timber production

The DEIS range of alternatives is inadequate because all alternatives maintain too much roadless area.

Response: Several alternatives not considered in detail, and benchmarks not developed into alternatives, did develop more of the roadless areas and manage more of the tentatively suitable lands for timber production. See Chapter II and Appendix B, FEIS for further discussion of these

alternatives/benchmarks and why they were not developed into alternatives considered in detail.

THE RANGE OF ALTERNATIVES IS UNDULY RESTRICTED

The range of alternatives is unduly restricted. First, no alternative in the DEIS contains an ASQ above 208.3 MMBF. Each alternative requires a significant reduction in the annual allowable sale quantity, as compared to the Potential Yield in the current plan. It is obvious the range of alternatives has been restricted and there is no "reasoned choice " (California v. Block)

A comprehensive range of alternatives was not provided. For example, an alternative that maximizes fish and wildlife resources was not included; this would be very useful for comparative purposes.

The DEIS should consider a broader range of alternatives in terms of impacts on native American religious uses of the national forest. For example, not one alternative protects more than 46% of the cedar areas.

The alternatives presented do not represent a reasonable range of alternatives, as is required by NEPA The most appropriate alternative available is the PLUS alternative, with an annual nt timber sale level of at least 220 MMBF.

There isn't a single alternative I can support; they are not balanced to provide the needs of all Forest users. The plan drafted by the Public Land Users Society is a fair as possible to all user groups.

Response: NFMA (36 CFR 219.12) states that alternatives shall be distributed between the minimum and maximum resource potential to reflect, to the extent practicable, the full range of major commodity and environmental resources uses and values that could be produced. The alternatives in the FEIS provide, in comparative form, a range of options. They allow the issues to be sharply defined and provide the Regional Forester and the public a clear basis for choice among them. Refer to Chapter II, FEIS for discussion of the alternatives that were not examined in detail, as well as the alternatives considered in detail in this FEIS.

An ASQ of 203.8 is based on the existing Timber Management Plan, which does not incorporate the provisions of the National Forest Management Act, including identifying lands which are not suited for timber production (36 CFR 219.14) and development of management requirements (36 CFR 219.27. The range of alternatives considered in the FEIS includes alternatives that assign a high percentage of the tentatively suitable acres to a timber harvest prescription (Alternatives NC, A, B, and I). Refer to Alternatives Described in Detail, Chapter II.

Alternatives C and G-Modified, with lower annual timber harvests/road construction and high levels of fish production and dedicated and effective acres for wildlife respond to the "maximum fish and wildlife" end of the range of alternatives. Protection of inventoried American Indian religious and cultural use areas is also highest in Alternatives C and G-Modified. Because expected frequency of human encounters was the criterion used to develop the percentages (Table II-9o, Chapter II, FEIS), even lands allocated to MA 1B Semi-primitive Nonmotorized dispersed recreation do not offer the highest level of protection. Within the minimum and maximum resource potential, the range of alternatives considered is broad.

Alternative I was developed in response to public comment on the DEIS, with a goal of producing 220 MMBF annually, producing big game animals, more trails and more roaded recreation opportunities (goals of the PLUS plan). Refer to Chapter II, Alternatives, FEIS.

NO ALTERNATIVE HARVESTS THE OLD GROWTH FAST ENOUGH

None of the alternatives harvest the remaining old growth quickly enough, in the first decade. These stands need to be converted to young, fast growing stands.

Response: The MBS a deficit-inventory forest, meaning that old-growth stands available for harvest must be metered out for 70-80 years before the second growth on the Forest is ready for harvest. If the harvest of old growth is accelerated in the early decades, future harvest levels must decline until the younger stands are ready for harvest. This option of departing from the non-declining flow policy was evaluated in the departure alternatives (E-Departure, H-Departure) in the DEIS.

NO ALTERNATIVE INCREASES THE AMOUNT OF OLD GROWTH ON THE FOREST

The range of alternatives is inadequate in that no alternative proposes an increase in the amount of old-growth forest. Why not allow some previously harvested areas to revert to old growth ?

Response: The intent of Alternative C is to allow some of the acreage that is presently in an ROS class of Roaded Natural to revert to an ROS class of Primitive. This would be accomplished by road closures and halting timber harvest activities. Over time, through the natural process of vegetative succession, these areas could eventually revert to "old growth".

NO ALTERNATIVE RETAINS ALL ROADLESS ACRES IN UNROADED CONDITION

No alternative allocated all the roadless lands to retain their unroaded character.

Response: As explained (page II-27) in Chapter II of the DEIS, "an alternative where 100 percent of the roadless areas would remain undeveloped was not considered practical because of the size and location of a number of the individual roadless parcels." In the FEIS, 93% of the roadless areas would remain undeveloped in Alternative C, and 92% would remain undeveloped in Alternative G-Modified.

FINAL SHOULD INCLUDE AN "INTRINSIC RIGHTS OF NATURE" ALTERNATIVE

While a range of alternatives is presented in the DEIS, that range is nowhere near complete. Every one of the alternatives, including C and G, are *utilitarian in nature. People need to know that they do have the choice of* leaving the world alone! The final should include an "intrinsic rights of nature alternative."

Response: An alternative that comes close to this respondents wishes was considered, but not developed in detail: the Earth First! Alternative. Elements of this alternative, including rehabilitation of habitat for anadromous fish, more recommended wild and scenic rivers, and larger, unfragmented acres of old growth remaining, were incorporated into the alternative recommended as the preferred - Alternative J. See Chapter II, FEIS, Alternatives Considered But Eliminated From Detailed Study.

NO CLEAR PICTURE OF THE ROLE OR OVERALL GOAL OF THE FOREST

The chapter (Forest Management Direction, Chapter 4, Plan) seems to address the management goals of user groups without ever stating the role or overall goal of the Forest in managing the forest landscape as a whole.

Response: The goal or objective of the Forest Plan (the Preferred Alternative) as a whole is summarized in Chapter II, FEIS, Alternatives Considered in Detail. While Chapter 4 of the Plan does not repeat this goal or theme statement, the various goals, standards, and guidelines in the Plan reflect the more specific management that will lead to this desired future condition for the entire Forest. Since the proposed plan was released, Section B, Chapter 4, Plan, the Desired Future Condition, has been revised; this should provide a better idea of the overall "look" of the Forest as a whole (in ten years and in 50 years).

INCLUDE A FEED-BACK LOOP TO DETERMINE WHEN GOALS ARE/ARE NOT BEING MET

For the Management Goals to be meaningful, the EIS needs to includes something to help determine when goals are met, and note when they are slipping behind some schedule. This is essential for accountability, documentation, and evaluating results.

Response: See the discussion under Plan Implementation, Chapter 5, Forest Plan. This section explains the connection between Goals, the monitoring plan, and amendments to the Plan. In addition, Table 5-1, the Monitoring Plan includes a "threshold of variability" for each item monitored, along with the method of monitoring, measure, frequency, etc.

REWRITE THE GOAL FOR OLD GROWTH

The Department recommends the Forest Goal for old growth be rewritten as follows: Goal: "To provide naturally-evolved old growth ecosystems for the preservation of natural genetic pools; for habitat for plants and wildlife species associated with old-growth ecosystems; and for contributions to the diversity spectrum."

Response: While we have not incorporated this exact recommendation, new Forest Management Goals and Forest-wide Standards and Guidelines have been included for Diversity and Long-Term Productivity. Refer to Chapter 4, Forest Plan.

WILDLIFE AND FISH FOREST MANAGEMENT GOALS ARE TOO NARROW, DON'T INCLUDE PLANTS

Under Wildlife and Fish: the Forest Management Goal is limited vertebrate species and is therefore too narrow. The FS mandate is to manage "habitats for all existing native and non-native and desired non-native plants, fish, and wildlife species in order to maintain at least viable populations of such species." (FSM 2670.12) The goal statement should reflect this.

Response: Forest Management Goals for Diversity and Long-Term Productivity have been added to Chapter 4, Forest Plan, responding to this comment.

NO ALTERNATIVE MEETS THE FIRST WILDLIFE GOAL

The first Forest Management Goal for wildlife comes directly out of the language of the Planning regulations - maintain viable populations of existing native and desired non-native vertebrate species - yet the MBS does not display any alternative that meets this goal.

Response: The Preferred Alternative, and others, will maintain viable populations of all vertebrate species on the Forest, through application of wildlife management requirements (MR's), and by maintaining and improving habitat for Management Indicator Species See Chapter 4, Forest Plan: Forest Management Goals and Forest-wide Standards and Guidelines

ADD TO THE RECREATION FOREST-WIDE GOALS

Add a goal to recreation: coordinate with and consider the views of public and private sector agencies and organizations to develop partnerships between these groups and the Forest Service toward better satisfying public needs

Response: We agree; a similar statement has been added to the Forest Management Goals, Section A of Chapter 4, Forest Plan.

ADD TO RANGE MANAGEMENT GOAL

On page 4-2, Forest Plan: add to the Range goal "where they don't conflict with other resource goals, including those for wildlife, riparian management "

Response: This suggested modification has been made

ADD TO FOREST-WIDE GOAL STATEMENT

Forest-wide Standards and Guidelines for Threatened, Endangered, and Sensitive Species: add to the goal statement that the Forest will consult with DNR - Washington Natural Heritage Program in determining protection for State listed threatened, endangered, and sensitive plant species

Response: The Forest has no authority for State listed species. We will, *however, continue our frequent coordination, sharing of information, etc.* Refer to Item 5, under Threatened, Endangered, Sensitive Species

ADD DEVELOPMENT OF SPECIES MANAGEMENT GUIDES AS A GOAL

The development of species management guides for sensitive species is required and important; it should be stated as a separate goal

Response: The development of management guides for sensitive species is included in the Forest-wide Standards and Guidelines for Threatened, Endangered, and Sensitive Species, Item #5, Chapter 4, Forest Plan.

STANDARDS AND GUIDELINES SHOULD BE MORE/LESS RESTRICTIVE

The language in the Forest-Wide Standards and Guidelines, and the management area prescriptions is too broad, allowing for too much discretion on the part of the land managers.

For the most part, the prescriptions for each MA do not contain the level of specificity necessary to be of real guidance to the federal land manager They are very general, leaving room for a wide span of interpretation. Without question, the land manager must be given room to allow for special circumstances; however, a minimum level of specific guidance must be provided.

The language in the Forest Wide Standards and Guidelines, and management area prescriptions is too restrictive, much more so than required by law. In certain areas, the terms "must" and "shall" are used; more permissive language should be inserted to maintain flexibility to manage the forest.

The DEIS and Plan violate the Resources Planning Act, NFMA, and NEPA by establishing Forest-wide Standards and Guidelines and individual management prescriptions that are inflexible, and do not result in multiple use or sustained yield of the timber resource.

Most of the guidelines can be interpreted in different ways, depending on who is reading them I would like the guidelines to be more "black and white "

These Standards and Guidelines are written more like a wish list than standards Words such as "should and could" are not sufficient guidance to insure that on-the-ground results meet management goals.

> **Response:** The standards and guidelines for each management area include language (such as "shall") determined necessary to meet the objectives of the MA, and that will achieve the Desired Future Condition. The level of detail provided is very specific in some cases, such as "no scheduled timber harvest." In other MA's, the exact practice to be used will be determined at the project level, site-specific environmental analysis. In all cases, additional direction is determined and prescribed in the project-level NEPA document.

STANDARDS AND GUIDELINES AND PRESCRIPTIONS CONTRAVENE RPA, NFMA, NEPA

The Forest-wide Standards and Guidelines and the management area prescriptions contravene RPA, NFMA, and NEPA since they pre-determine forest practices without public participation and preclude achievement of timber harvest levels.

> **Response:** The standards, guidelines, and prescriptions are designed and written to allow multiple-use management while meeting the objectives of each management area, laws, policy, and regulation. During the process of developing final management prescriptions, the planning team presented the proposed prescriptions to the three Liaison Groups, whose membership represented a wide-range, diverse number of interest groups, organizations, and timber industries. (Refer to Appendix A, FEIS for more information about the Liaison Groups) During 1984 and 1985, a number of meetings were held with each Group; the comments and suggestions received were used to finalize prescriptions for the DEIS. These are documented in the Planning Records.

We also received considerable public input on the Forest-wide and management area standards and guidelines during the comment period for the DEIS. A number of changes have been made in the Forest Plan in response to these comments. In addition, the planning team involved members of the Public Land Users Society to work with us in developing and mapping an alternative to reflect the goals, objectives, and land allocations of PLUS. The results of these working meetings are displayed as Alternative I in the FEIS.

STANDARDS AND GUIDELINES PURPOSE OBSCURES WHAT SHOULD BE THEIR INTENT

The FS DEIS Preparation Guide (1985) states that standards and guidelines "provide the description of how things will be done on the ground." This is inconsistent with the stated purpose of standards and guidelinas found in the Plan. The two purposes listed obscure the basic intent to provide specifics.

Response: The introduction to the Forest-wide Standards and Guidelines section has been revised, based on this and other comments We believe the wording now in the Forest Plan is more specific.

ADD CONSULTATION WITH STATE FOR STATE-LISTED T, E, & S PLANTS

For Forest-wide Standards and Guidelines for Threatened, Endangered, and Sensitive Plants: add to the goal statement, consultation with DNR-Washington Natural Heritage Program in determining protection for state listed plant species.

Response: The Forest-wide Standards and Guidelines for Threatened, Endangered, and Sensitive Species includes consultation with the Washington *Natural Heritage Program for technical information. For state-listed* plants, the Forest Service has no authority. We will continue the relationship of frequent coordination and sharing of information.

CONSIDER STANDARD FOR NATURALLY FISH-FREE SYSTEMS WITHIN WILDERNESS

In standards and guidelines: some consideration should be given to maintenance of naturally Fish-Free systems in wilderness.

Response: This section has been changed; see Forest-Wide Standards and Guidelines for Wilderness, Fish and Wildlife subsection, Plan Chapter 4

CLARIFY FOREST-WIDE STANDARD AND GUIDELINE UNDER RECREATION

The standard and guideline (page 4-71) under Recreation states: "Appropriate recreational facilities will be considered for all water impoundment projects." Neither the type of projects nor type of recreational facilities viewed as "appropriate" were defined. Please clarify the intent and the likely impact on Crystal Mountain.

Response: In the Forest Plan, this Forest-wide Standard and Guideline has been reworded to state. "Appropriate recreation facilities will be *evaluated for recreation mitigation for all proposed hydroelectric* projects." This should clarify the type of water impoundment projects intended. The type of facility will vary by site.

PLAN DOES NOT REPRESENT ALL INTENSITIES OF MANAGEMENT AREAS

Intensity 13C is full represented, but where are 13A, 13B, and 13D.

Response: The intensity selected for the Preferred Alternative's Desired Future Condition is displayed in the Forest Plan. This was 13C in the proposed plan; 13D is applied in the Preferred Alternative, Forest Plan. The other intensities in this management area were applied to other alternatives and are described in Appendix D, FEIS. The Plan document contains only those prescriptions selected for the Preferred Alternative.

CHANGE WORDING FOR DESIRED FUTURE IN MA 1A AND 1B

The management prescription for 1A and 1B should prohibit timber management, not just describe it as "not appropriate."

Response: The standard and guideline under element E. Timber does state that there is no scheduled timber harvest. The wording in the Desired Future Condition for MA 1A and 1B (where "not appropriate" appeared) has been changed in the Forest Plan, in response to this comment.

WILL ROADS BE PROVIDED IN MA 1A AND 1B FOR CATASTROPHIC SALVAGE

Under the dispersed recreation prescription, timber harvest may take place in the event of catastrophic events. The roads are generally 1/4 to three miles away; the need for quick access to utilize the salvage is essential and should be added to the prescription.

Response: Under Facilities, Program Element L. for both management areas 1A and 1B, provisions have been made for temporary road development to salvage catastrophic timber loss. These roads are to be returned to a near natural condition the the harvest project is complete.

SCENIC LANDSCAPE AREAS NOT ADEQUATELY DEFINED

Scenic landscapes areas (yellow) with timber managed at less-than-full yield are not adequately defined.

Response: Some rewording has been added to the standards and guidelines for both MA 2A and 2B since the DEIS was released Refer to the Forest Plan, Chapter 4. In addition, foreground (2A) and middleground (2B) are mapped in different colors on the FEIS alternative maps.

STANDARDS FOR LOCATION OF ROCK PITS IN MA 2B IS TOO RESTRICTIVE

We are not convinced that rock pits and stockpile sites must be relocated away from all seen areas, as stated in MA 2B. This seems excessive, and possibly very costly for road building and mining activities.

Response: The prescription for MA 2B (Scenic Middleground) regarding the location of rock pits is not absolute. It reads "should be located" not "must be located."

STANDARDS FOR WINTER SPORTS (3C) NEED STRONGER MINERAL WITHDRAWAL LANGUAGE

The mineral withdrawal language in MA 3C (Winter Sports Areas) should be stronger, similar to specific language in MA 3D (Private Sector sites) section G, a through f. We believe this language to be more appropriate.

Response: We feel the language in MA 3C, Minerals and Geology is appropriate for the goals and objectives of this management area. The standards and guidelines provide for analysis of areas not previously withdrawn, with withdrawal action initiated if appropriate. Any proposed mineral entry must be considered on a case-by-case basis, with appropriate environmental analysis and NEPA documentation. All Forest-wide Standards and Guidelines plus those for MA 3C must be met, prior to any mineral entry.

CLARIFY HOW INTENSITY LEVELS A THROUGH F ARE DETERMINED FOR MA 17

It is not clear how intensity levels 17A through 17F are determined for a specific area mapped 17. We realize this is set at project level planning, but the wording under the management area prescription could be clarified by adding "the intensity level selected for any acres allocated to MA 17 will vary with site productivity, timber type, accessibility by road, and other objectives."

Response: This statement is already included in the Forest-wide Standards and Guidelines, but has now been added to MA 17, Forest Plan.

CLARIFY WILDLIFE MAINTENANCE/ENHANCEMENT IN MA 17

Under Item C. for MA 17: you should refer to how MA 17 relates to maintaining wildlife habitat, not just enhancement of habitat. The Forest-wide Standard and Guideline, page 4-88 seems to apply to all lands The way MA 17 is written it seems to preclude maintenance of wildlife habitat, but it isn't clear.

Response: In response to this and several similar comments, we have added Item C 1.b. which repeats the Forest-wide standard and guideline for maintaining, protecting, and improving habitat of management indicator wildlife species.

UNDER MA 17, WHAT CRITERIA WILL BE USED TO DETERMINE DEGRADATION?

Under Timber Element E.10 c. for MA 17: what criteria will determine or be used to determine the prevention of degradation? What are the selected methods available for site-specific analysis?

Response: All activities must meet at least the Forest-wide Standards and Guidelines, in this case for the soil resource. Specific and quantifiable standards are listed there; see Chapter 4, Forest Plan. Also, refer to the Monitoring Plan, which includes the method of monitoring, frequency etc. for the soil resource Refer to new Appendix I, Best Management Practices, which will be selected and applied for each project; these are site-specific. Chapter II, FEIS includes the mitigation measures that apply Forest-wide, in each alternative.

INCLUDE INFORMATION ON TRANSMISSIONS FACILITIES IN MA PRESCRIPTIONS

Management Area prescriptions should describe whether those areas are classified as avoidance or exclusion areas for transmission facilities.

Response: Avoidance and exclusion classifications have been inserted in the Forest-Wide Standards and Guidelines for Utility and Transportation Corridors, Chapter 4, PLan.

MBS INTERPRETATION OF MMR'S FAR EXCEEDS INTENT OF NFMA

Mt. Baker-Snoqualmie's interpretation of MMR's has resulted in restrictive land-use prescriptions that far exceed what was intended by NFMA.

Response: The National Forest Management Act (NFMA) set legal guidelines for management of the National Forests. The guidelines were interpreted by the Secretary of Agriculture, in cooperation with the Committee of Scientists and with public and professional involvement, to develop regulations. Direction from the Chief of the Forest Service and Region 6 resulted in management requirements (MR's) which reflect the requirements of the laws and regulations in NFMA. The MR direction ensures that minimum legal requirements are applied to all alternatives in Forest plans consistently across all National Forests. MR's exist for dispersal of created openings, water quality, riparian, and wildlife habitat, as required by NFMA. (Refer to 36 CFR 219.27.) The Forest management team strove to select the most efficient prescriptions to meet the management requirements. The explanation of MR's and their development has been expanded; see new Appendix H, FEIS.

MMR'S WERE DEVELOPED WITHOUT PUBLIC INVOLVEMENT

Minimum Management Requirements (MMR's) were developed and implemented without public comment, as required by NEPA and NFMA. The true opportunity costs of the MMR's were bypassed

Thorough public involvement and participation in all phases of planning is required by NFMA. The MBS's lack of involvement, particularly in the development and use of the MMR's is a clear violation of this intent.

Response: The National Forest Management Act (NFMA) set legal guidelines for management of the National Forests. The guidelines were interpreted by the Secretary of Agriculture, in cooperation with a Committee of Scientists and with public and professional involvement, to develop regulations. Direction from the Chief of the Forest Service and Region 6 resulted in MR's which reflect the requirements of the laws and regulations in NFMA. The MR direction ensures that minimum legal requirements are applied to all alternatives in Forest Plans consistently across all National Forests. MR's exist for dispersal of created openings, water quality, riparian and wildlife habitat as required by NFMA.

The general concept of management requirements was presented and questions entertained during a series of Liaison Group meetings held in 1984. Refer to the planning records.

In the DEIS, documentation in Appendix B, Appendix J, and Chapter II of the DEIS explained how the MR's were developed. These documents provided reviewers with the information needed to comment on the development of Management Requirements. Comments received on the draft documents were considered in preparation of the FEIS.

Appendix J - now called Appendix H - has been revised in the FEIS and now includes some of the information from Appendix B related to the selection of the most efficient methods of meeting the necessary requirements. The hydrologic cumulative effects analysis was completed, in response to agency, tribal, and public comments. The resulting method to meet water

quality and riparian management requirements is documented in new Appendix H. Also, see Chapter II, FEIS, Appendix B, and the Forest Plan, Forest-wide Standards and Guidelines for Water Resources and Riparian Areas, Chapter 4.

INCLUDING MANAGEMENT REQUIREMENTS IN EVERY ALTERNATIVE LIMITS DECISION SPACE

The decision space is limited by including MR's in every alternative, thus violating the directive of the National Environmental Policy Act, which requires "examination of a wide range of alternatives".

Response: As stated in Chapter II, the imposition of management requirements in all alternatives considered in detail is a NFMA requirement. One alternative, Alternative NC (No Change), displayed in detail in both the draft and final plans, does not include management requirements. The No Change Alternative emulates the existing Timber Management Plan, with its Potential Yield as the timber output.

OLD GROWTH AND RIPARIAN INVENTORIES NEEDED

Despite having acknowledged a need for old growth and riparian habitat inventories, you plan timber harvesting in both areas. To adequately assess the impacts of this activity, the inventories should be done first.

Response: The information needs section of the Plan has been revised. In response to public comment and in conjunction with the new Integrated Resource Inventory old growth/potential old growth characteristics will be inventoried and mapped. Mapping will be completed in 1990, with the entire inventory completed sometime after that. As new data is available, it will be used in project planning and in the next round of Forest Planning (or sooner, if the Plan is amended or supplemented.)

INFORMATION NEEDS SECTION NEEDS CLARIFICATION

The Information Needs section of the Plan is not clear How important is this information? Where will it eventually be gathered? What will the FS do in the meantime? How will the information be used?

While identifying needs for additional information is very important, the role of this information and the commitment to obtaining it needs to be discussed. Are the projects on-going or planned? Who is responsible and what is the time frame? Some sort of prioritization would also be helpful,

Response: The text of Chapter 2, Information Needs, Forest Plan has been clarified. Many individual "needs" are tied to activities that must be monitored (see the Monitoring Plan, Chapter 5, Plan). The information needs are part of the Forest Plan. As the Plan is implemented and program budgets sought, the information needs will be assessed, prioritized, and added to the various implementation schedules. Until such time, existing data will be used.

INFORMATION NEEDS SHOULD INCLUDE AN INVENTORY FOR RNA

Information Needs should include a current inventory for additional areas needed to fill unfilled Research Natural Area needs

Response: The Preferred Alternative provides for five new or additions to the national network of RNA's. Chapter III, FEIS includes a discussion on the potential for the MBS to supply additional RNA sites.

NEED AN INVENTORY OF THREATENED, ENDANGERED, SENSITIVE PLANTS

The Plan needs to include, in the Information Needs section, an inventory for threatened, endangered, and sensitive plants.

Response: During the life of this plan, the Forest will begin to gather a data base for rare plants. The Information Needs sections, Chapter 2, Plan now reflects this.

MORE RESEARCH ON THE IMPACTS OF LOGGING ON FISH AND WILDLIFE NEEDED

I believe that the FS needs to conduct additional research into the impact of logging on wildlife and fisheries. There are significant gaps in our knowledge; only after serious efforts are made to understand all components of the forest system can I be fully confident that the FS is acting in the national interests.

Response: In response to this comment, the MBS has conducted an extensive cumulative effects analysis (tied to impacts of activities on watersheds and fisheries - see Appendix H), added to the Information Needs section of Chapter 2, Forest Plan, and updated the monitoring plan (Chapter 5, Plan). Additional field monitoring and inventory on the northern spotted owl is documented in Chapter III, FEIS. It is our intent that this Forest Plan, with its planned inventories, research needs, and monitoring, will add considerably to the body of information on the effects of timber harvest activities on fish and wildlife. As we gain new insights, plan amendments will be considered, if necessary; and the Forest Plan will be revised in 10 to 15 years.

FISH DATA IS LACKING

Throughout both the Plan and DEIS, the FS announces its dedication to preserving fish habitat. They cannot achieve this goal without the information they acknowledge they lack. Frequently, supporting data constitutes general literature searches which are not geographically relevant to the MBS.

Response: In response to this (and other similar) comments, the Forest has completed additional research and rewritten the Fisheries sections of *Chapters III and IV, FEIS* *Additionally, the method developed to meet the* water quality and riparian management requirement (hydrologic cumulative effects analysis) is site-specific to the Forest, and serves to address effects to fisheries and fish habitat. Refer to new Appendix H. In addition, there are numerous items listed in the Information Needs section, Chapter 2, Forest Plan that will - when completed over the life of the plan - greatly increase our knowledge. Also, refer to the monitoring plan, Chapter 5, Plan.

SUGGEST CHANGES IN FISH-WATER-RIPARIAN INFORMATION NEEDS

Information Need #10 (Fish-Water-Riparian) should be rewritten to get rid of the impression that +/- 30% is something more than an arbitrary number picked out of the air.

Number 4 needs to be rewritten to omit the double negative, what does a -20% reduction in the percent of vegetation types?

What is the basis for the 15% loss described in Information Need #5?

Information Need #3 appears to be an inventory item but it reads like a research need.

Response: These changes/rewrites have been made in the Forest Plan.

ADD TO INFORMATION NEEDS LIST

I suggest adding the following to Chapter 2, Information Needs: 1) determine the extent of the transient snow zone and its probability of occurrence of rate of water delivery to soil during rain-on-snow conditions; 2) effects on different types of forest cover on rate of water delivery to soil during rain-on-snow conditions, 3) determine under what site conditions foret roads collect and redirect subsurface water; and 4) determine the relative importance of sediment from valley glaciolacustrine deposits reworked by major streams and Type 4, 5 streams in adversely affecting spawning gravels of anadromous fish.

Response: These have been added.

ALTERNATIVE H NOT APPLIED THE SAME ACROSS THE FOREST

Alternative H (DEIS preferred) was not applied to the Forest in the same way across the different Ranger Districts.

Response: The specific allocations do vary from District to District, depending on the land characteristics, soils, capability to provide outputs, goods, and services This does not mean that the goals of an alternative were not evenly applied. The Land and Resource Management Plan is a Forest-wide plan, and the Forest Management Goals and Forest-wide Standards and Guidelines (Chapter 4, Plan) are applied over the entire Forest. Each Ranger District is a unique combination of resources and opportunities, and the acres of each MA and intensity reflect those differences

CALLING LOSS OF LIMITING HABITAT TYPES REVERSIBLE IS AN ERROR

Because of the long regeneration time involved with timber production, loss of thermal cover, travel corridors, calving/fawning areas, and other limiting habitat types cannot be considered reversible.

Response: As defined in FSH 1909 15(05)(15), irreversible is "[A] term that describes the loss of future options. Applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity that are renewable only over long periods of time." Based on this definition, we feel the regeneration time you refer to (to recreate thermal cover) is not irreversible.

DIVIDING THE FOREST INTO MA'S ARTIFICIALLY SEPARATES THE ECOSYSTEM

The uses for which MA's are designated very often conflict, which presents the major problem in forest planning for multiple use. The division of the natural landscape into management areas artificially compartmentalizes and separates ecosystem components, which actually exist as interwoven parts of a whole. The Pratt River is an example; it's been divided up into mutually exclusive units, that only really exist on paper.

Address the guidelines for coordination of wildlife management with timber management; do the same for sensitive areas for fish.

Response: The Multiple Use Sustained Yield Act defines multiple use as "the management of all the various renewable resources of the National Forests so that they are utilized in the combination that will best meet the needs of the American people." In the alternatives displayed and analyzed in this FEIS, we have developed a number of ways to best meet the "needs" of the people, as expressed in the public issues and concerns Each alternative presents a different combination to meet various ICO's in different ways. Refer to Chapter II, FEIS. Not all uses will occur in every management area, but many activities and uses (deer and elk winter range, for example) will occur across a number of management areas. In MA 14, deer and elk winter range is expressly managed for, but not to the exclusion of many other uses and activities. Enhancement of deer and elk winter range may also occur in - for example - MA 17 timber Emphasis or MA 2 Scenic Viewshed. It is not the **primary** objective of those MA's, but is

still a compatible use. Some activities are not compatible; refer to the specific standards and guidelines for management areas, Chapter 4, Forest Plan. These are also summarized in Chapter II, MA Descriptions, in the FEIS.

The coordination of fish and wildlife management within timber management areas is addressed in the Forest-wide Standards and Guidelines, which apply across the entire forest, and in the specific standards and guidelines for MA 17. Each project will include a site-specific environmental analysis, documented in a NEPA decision document. In this and the analysis file, the specific coordination of, for example, a timber sale plus stream rehabilitation project for fisheries, is documented. Public participation is a key element in project-level planning. Refer to Chapter 5, Implementation, Forest Plan.

NO WORST CASE ANALYSIS PRESENTED

This EIS does not present worse case scenarios.

The MBS admits a clear lack of information on a variety of resource issues that would be affected by the preferred alternative, yet no worst case analyses are *presented. These include native plant communities, listed species of plants* and animals, old growth communities, effects on water quality and fish, etc/

Response: NEPA regulations (40 CFR 1502 22) state that when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an EIS and there is incomplete or unavailable information, the agency should make it clear that the information is lacking. Refer to these regulations (CEQ, 40 CFR Parts 1500-1508, April 1986) for additional information.

In many cases, lack of information does not necessarily mean that an evaluation of reasonable foreseeable significant adverse effects can not be made, or that the information is essential to a reasoned choice among alternatives in the FEIS. Disclosures of this nature have been done throughout the FEIS, Appendices, and Forest Plan. Refer to Part G. of Chapter IV, FEIS for a discussion of the adverse environmental effects that cannot be avoided (though many can and will be reduced through mitigation).

FS WILL NOT RESPOND TO PUBLIC COMMENTS IN GOOD FAITH

The Forest Service has no intention of responding to public comments in good faith; you have already decided what to do.

Will the final plan be the most popular alternative? How the final is decided is crucial; the draft plan seems to be more of a smokescreen to absorb public comment than an actual proposal which can be commented on.

FS chief Dale Robertson stated recently that half of the old growth remaining in the Pacific Northwest will have to be harvested in the next 50 years. He is quoted as stating; "alternatives just don't exist if you want to maintain the Forest industry in the Northwest." We wonder why the Forest service provides a public comment period when they, at the national level, seem to have determined the outcome anyway.

Robertson's statement reflects an attitude that the Timber industry has the *overwhelming preference, no matter what any opposing arguments may indicate...* I believe that it is entirely probable that the acceptance of public comment is designed to serve as a public pressure "relief valve."

Response: The National Environmental Policy Act Implementing Regulations require an agency preparing a Final EIS "shall assess and consider comments both individually and collectively, and shall respond by one or more of the means listed below: (1) modify alternatives including the proposed action; (2) develop and evaluate alternatives not previously given consideration by the agency, (3) supplement, improve, or modify it's analyses, (4) make factual corrections; or (5) Explain why the comments do not warrant further agency response, citing the sources authorities and reasons which support the agency's position and, if appropriate, indicate those circumstances which would trigger agency reappraisal or further response."

The introduction of this Appendix explains, briefly, the in-depth analysis of public response to the DEIS and displays some of the results. Nearly 12,000 forms, letters, and reports were received, read and re-read, and analyzed. It also explains that the analysis was not a vote count. The overall and site-specific comments were used, extensively, by the Forest Management Team to set a course for the final plan.

The MBS plan has been modified substantially since the draft was issued, primarily in response to public comment. Some of the areas in which we have modified the alternatives/the planning process include:

- corrected or adjusted a number of the "timber technical issues" including: new site index values, new managed and empirical yield tables, new genetic gain values, and more;
- the management requirement for riparian areas and water quality will be met through the method developed in the hydrologic cumulative effects analysis; need for this was noted in comments from agencies and Tribes (see Appendix H);
- developed and displayed in detail in the FEIS an alternative that reflects the goals and objectives of the PLUS organization (Alternative I);

- developed a new Preferred Alternative that responds better to public comments received on the draft plan, including more miles of trails, adjustments in site-specific land allocations (such as Damfino Creek), more wild and scenic rivers recommended, etc.;

- re-evaluated eligibility criteria for wild and scenic rivers, in response to public and organization comments; this resulted in 30 rivers recommended as suitable for designation in the National System in the Preferred Alternative; and more.

Refer to Chapter II, FEIS plus the first page of each chapter in that document - "Changes Made Between Draft and Final" - for more detail. In addition, we are committed to continued, meaningful public involvement as we begin plan implementation, and project-level environmental analysis.

TIMING OF PUBLIC REVIEW PERIOD IS POOR

The timing of the public review of this plan is not conducive to field study by members of the public. Snowpack over most of the MBS this time of year precludes visiting areas, thus we are severly limited in the quality of our response. Site-specific comments should be accepted through the fall for the purposes of identifying more specific "boundaries" between management areas.

The time line for public comment is too short and has been in the winter when access to independent study was not possible.

Response: Based on public requests, the Regional Forester extended the review period from 90 to 115 days, a time frame that was felt to be adequate Refer to the Forest Plan, Chapter 5, for a discussion on the boundaries of management areas. The boundaries for management areas that are legally established and described, such as wilderness, NRA, Skagit Wild and Scenic River, and Alpine Lakes Management Unit are fixed. The exact boundaries of other management areas will be field verified, during plan implementation. During site-specific project planning, there will continue to be opportunities for public involvement, from scoping of issues, to providing information for alternatives. Again, refer to the Forest Plan, Chapter 5, Implementation Direction.

THE PUBLIC WAS NOT VERY WELL INFORMED OF MEETINGS

The method of securing input on these proposed alternatives was very limited. Little publicity was given, meetings were held but not well advertised. The public should be kept better informed in simple, direct language

Response: Refer to the Summary of Public Participation, Appendix J for a discussion of the media activities, newspaper press releases, etc held to advertise the 11 open houses and other activities In addition, a Public Summary of the DEIS was printed as well as a small, fold-out brochure "Forest Planning...A Blueprint for the Future" in an attempt to present the draft plan and EIS in simpler language While we did not hold hearings or accept oral input, cards, reports, letters, and response forms were received from nearly 12,000 respondents. The public comment period was extended, in response to public requests.

WE WANT TO WORK WITH THE FS TO DEVELOP AN ALTERNATIVE

We request, by this letter, an opportunity to work with the Forest planning team, before publication of a final plan, to fully develop a viable, implementable alternative based on the broad concepts outlined in the PLUS Alternative.

Response: This was accomplished, during the spring of 1989. Detailed documentation of these working/mapping meetings is available in the planning records. To be fully implementable, the alternative was to meet all laws and regulation (including management requirements (as per 36 CFR 219.27)) was to utilize the same management areas and prescriptions as the other alternatives. The results of this effort are displayed in the FEIS as Alternative I.

NO PUBLIC REVIEW AND COMMENT ON THE VEGETATION MANAGEMENT AND SPOTTED OWL EIS

The Plan and DEIS do not consider the environmental impacts of the vegetation management DEIS or the proposed Pacific Northwest regional guide spotted owl supplement. To the extent that either of these outside environmental impact statements impact the MBS Plan and DEIS at a later date, the public has been denied the opportunity for meaningful public review and comment.

Response: Appendix H of the DEIS did discuss the potential effects of the Spotted Owl SEIS on several alternatives. The potential effects of the Managing Competing and Unwanted Vegetation EIS were discussed in Chapter III of the DEIS, pages III-34, -164, and -167. Both Regional EIS's had extensive public review periods and opportunities for questions/answers at public meetings held throughout Oregon and Washington The Record of Decision, Managing Competing and Unwanted Vegetation FEIS has been published, and this plan will meet the conditions of that document, plus the mediated agreements, as discussed in Chapters I and III, FEIS. In the Preferred Alternative, spotted owl habitat is inventoried, identified, and protected following the direction in the Supplemental Final EIS amending the Regional Guide.

WILL THE PUBLIC BE INVOLVED IN PROJECT PLANNING?

Will the public be involved in the early stages of project Planning ?

Response: Yes. All proposed projects are subject to an environmental analysis, as per the National Environmental Policy Act. The first step in this process is "scoping", which requires the responsible official to inform interested and affected individuals, agencies, Tribes, adjacent landowners, etc. about the proposed project and invite participation in the planning process. If a person is concerned about specific areas or types of projects, they may write to the District Ranger or Forest Supervisor and request notification of any projects that might fall within their area of concern.

STATE NEEDS TIME TO REVIEW STATE-WIDE IMPACT OF ALL WASHINGTON FOREST PLANS

Do not adopt the Forest Plan until the State has had the time to comment on the state-wide aggregate impact of all Draft National Forest Plans for Forests in Washington, and to make recommendations.

Response: The 90-day review period on the MBS plan was extended to 115 days, in response to public requests. The Forest management team has made a number of presentations to various State agencies since the DEIS was released (Refer to Appendix J, Public Participation since the DEIS.) Included in these was a briefing for Brian Boyle and officials at the Department of Natural Resources regarding the analysis completed between draft and final plans for a better method to meet water quality and riparian management requirements We feel that since the DEIS and Proposed Plan were released, in December 1987, there has been adequate time to receive all comments and meet and work with all interested State agencies. As of March, 1990, no state-wide aggregate response has been received.

THE FORPLAN RUNS FOR ALTERNATIVES SHOULD HAVE BEEN AVAILABLE TO THE PUBLIC

Prior to publication of the draft EIS, only the FORPLAN computer runs for benchmarks were available The same was not true for alternatives The MBS, in following regional policy, prohibited the public from examining the FORPLAN computer runs for alternatives, which are the heart of Forest Service assertions about the level of sustained yield and the economics of timber production To provide informed comment on these important issues requires a computer programming expert to interpret reams of printouts. We do not think NFMA was designed to put the public and local communities at the mercy of a computer programmer.

The short, 90-day period in which to respond to the MBS draft documents does not provide the public with any opportunity to determine to what extent the FORPLAN system and forest FORPLAN model have actually resulted in formulation of reasonable alternatives and maximizing long-term net public benefits in an environmentally sound manner (required 36 CFR 219 1)

Response: The benchmark runs were available because they were part of a previously released document, the Analysis of the Management Situation. Refer to "Steps in the Planning Process" DEIS, Chapter I (also FEIS, Chapter I) The FORPLAN runs for the DEIS are necessarily part of that document. Prior to publication and release of the DEIS, all FORPLAN runs were considered "pre-decisional, working papers "

The planning team held a number of meetings with the Liaison Groups (see Appendix A, FEIS for description of these groups) in 1981, and the agendas included discussion of FORPLAN and our forest plan model. Documentation is available in the planning records

After the release of the DEIS, the FORPLAN runs for alternatives were made available to the public. The public review period was extended to 115 days, in response to public requests. There does exist, outside of the Forest Service, a considerable knowledge of FORPLAN, and we received a number of comments that focused on the FORPLAN model We did attempt to answer all FORPLAN/modeling questions at the series of open houses (informational meetings) held throughout the Puget Sound area in February, 1988, after the DEIS was released

PLAN INCORRECTLY MAPPED MOUNTAIN HEMLOCK; INCLUDE IT IN TENTATIVELY SUITABLE

The following modifications should be made to the tentatively suitable timber base: the area to the ridge top in parcel MK is suitable, as is the remainder in Section 12,T.38N., R.7E Also Sections 3 and 10 of T.37N.,R.6E, and all of the Loomis Mountain area are suitable, but are not shown as such.

Response: Current information indicates that these sections are unsuitable as mapped. Continued field verification of timber suitability is an integral part of forest plan implementation.

THERE ARE INCONSISTENCIES BETWEEN TABLES AND MAPPED AREAS FOR GLACIER PEAK

The table on page C-122 shows parcel LI with 190 acres of moderate development, but the map shows all of LI allocated to MA 1AB. The same discrepancy may also apply to parcel LJ

The table on C-114 shows 105 acres of parcel AC allocated to "moderate development while the Alternative H map shows them as MA 1AB.

Response: The table entry for parcel "LI" was in error; the area is allocated to MA 1AB in Preferred Alternative. Both the table and map for Parcel LJ was correct. The map for parcel AC is correct; the table was in error. These tables have been reformatted (to show acres allocated by alternative by management area) and the errors corrected in Appendix C of the FEIS.

MAP SHOWING OLD GROWTH, TIMBER SUITABILITY IS INCORRECT

The old growth map (your definition) shows an old growth stand from the edge of the Mt Baker Highway to nearly the ridge-top of Church Mountain, and that this slope is also tentatively suitable. Slope and soil conditions (as evidenced by the regular flooding and earth slides in Fossil Creek) show the sensitive character of this area. There is similar flawed information for the slopes of Dock Butte, and the west and east shores of Baker Lake.

Response: At the scale of the old growth and tentatively suitable maps, it is difficult to discern the actual boundaries. In the areas you mention, there is old growth in a number of sections. The area immediately around Church Mountain is not tentatively suitable. A large-scale Control Map will be prepared as one of the first steps of Plan implementation. In addition, the new old growth inventory - part of the Integrated Resource Inventory - will be completed in fall, 1990.

UNSUITABLE LAND IS ALLOCATED TO MA 17

I am concerned that the preferred alternative includes areas as MA 17 Timber Emphasis that are shown as unsuitable on the timber suitability map.

In Jackman, Thunder, and Watson Creek area alone there is about 2.5 square miles of MA 17 in mapped unsuitable land. Have you truly removed the unsuitable areas in MA 17?

Response: There may, in fact, be some acres of unsuitable land within the boundaries of MA 17. Not every acre allocated to MA 17 will necessarily be harvested; parcels of highly unstable soil or rock cliffs - which will be identified at the project-level planning stage - will not be harvested. Where small parcels of unsuitable land were surrounded by suitable land that, to meet the goals and objectives of the alternative, were allocated to MA 17, the unsuitable parcels were included. However, these lands will not be harvested. Generally, allocations of 20 or 50 acres of dispersed recreation were avoided, for practicality of management. In the Preferred Alternative, most of the Jackman, Thunder, and Watson Creek area is now allocated to management area 1A Primitive Dispersed Recreation. Refer to Chapter III, FEIS, Commercial Timber section for a discussion of the timber land suitability classification

DISCREPANCY IN MAPPING TIMBER RESOURCES FOR THOMPSON CREEK AREA

The maps with the Alpine Lakes Management Plan show Thompson Creek and all of the Lower Pratt River (area adjacent to the river) as General Forest and within the commercial forest base. The North Bend Ranger district is proceeding with timber sales based on this plan. However, the Draft Forest Plan maps show much of these areas as unsuitable. Which map is correct?

Response: To some extent both maps are correct. The Alpine Lakes Plan mapped areas where timber harvest was generally appropriate. The Timber Component map broke the commercial forest land into standard, special, and marginal components. The Forest Plan has taken this planning one step further by mapping timber suitability. The marginal timber component lands along Thompson Creek are not suitable for timber harvest under the Forest Plan. For the Lower Pratt, planning is still at a very cursory stage, with only broad, general areas identified for possible timber harvest. Due to the map scales for both Alpine Lakes and the Forest Plan, it is hard to get very site specific, and neither of these maps are field verified. Field verification for timber suitability is an essential step in the process.

WINTER RANGE MAP INACCURATE

In T.37 N., R.9 E., on the east side of Baker Lake, the deer and elk winter range map appears to be incomplete.

Response: District wildlife biologists updated and remapped deer and elk winter range between draft and final. As the Plan is implemented, and the Integrated Resource Inventory completed (1995), additional corrections may be necessary.

THE MR MAP FOR WILDLIFE SHOWS LESS OLD GROWTH THAN IS ON-THE-GROUND

The MR map for wildlife shows less mature/old growth habitat than we think is actually on the ground This should be adjusted, based on ground-verified information, as available.

Response: Changes made for the FEIS included updated the old growth information for old growth harvested through 1988. As these harvest units would not show at the scale of the resources maps, the updates have not been made on the old growth resource map. The accelerated old growth

inventory will be completed by fall of 1990, and amendments/corrections to the plan will begin at that time.

CLARIFY THE MOUNTAIN GOAT HABITAT ON THE MAP

You should clarify the mountain goat habitat shown on the Deer and Elk Winter Range and Mountain Goat Habitat map. Is this only winter range? Also, change the name of the map to clarify this.

There are inaccuracies in the mountain goat habitat map; specific sites where goats have been observed include the back side of Three fingers, Big Bear and Liberty Peaks. Observations were made here in July, 1985 by a study team representing the Washington State Department of Wildlife.

Response: As noted in the Forest-wide Standards and Guidelines, and in the MA 15 prescription, standards and guidelines, current and historically used mountain goat winter range is in the process of being identified and verified As actual winter range is identified, the Plan may be amended and the standards and guidelines for MA 15 Mountain Goat Habitat applied.

The FEIS wildlife map includes that mountain goat habitat which is optimal thermal cover, plus cliffs. These areas may be used year-around.

MA 1A-B SHOULD BE DIFFERENT COLORS; MAP AREAS FOR DEER AND/OR GOATS CONFUSING

Probably the single most confusing portion of the Public Summary was the maps, which attempted to depict management use by color code. Prescription 1A and 1B (which allows snowmobiling) are shown in the same color This glitch renders the packet virtually useless to the snowmobiler.

I couldn't tell which of the orange areas (for deer and/or goats) would allow timber harvest and which would not; the symbols were identical.

Response: In response to a number of comments from the public, we have improved the color scheme for the FEIS alternative and resource maps. MA 1A and 1B are shown in different colors on the alternative maps. Also, MA 14 (Deer and Elk Enhancement - which was 14B in the DEIS) plus 15A and 15B (Mountain Goat MR and Mountain Goat Habitat Improvement) are now shown in different colors.

DEVELOPED RECREATION SITES SHOULD BE MAPPED

The maps indicate that existing developed recreation sites...are not mapped due to small acreage. Given the importance of these sites to large segments of the public, they should be large and easy to identify on all maps.

Response: Unfortunately, the scale of the alternative maps makes mapping sites the size of most developed campgrounds, picnic areas, trailheads, etc. difficult to impossible. As we begin to implement the Forest Plan, the team will prepare a "Control Map" of the Preferred Alternative; this map will be produced at a larger scale than the current 3/8 inch = 1 mile. At the larger scale, developed sites will be mapped. In addition, all existing campgrounds, etc. are shown on the Forest Recreation map, available at all Forest Service offices in the Puget Sound region.

ALL TRAILS SHOULD BE MAPPED

Under the requirements of full disclosure, we request that you publish a map of all system trails, all known abandoned trails, and all new or rehabilitated trails proposed in the Forest Plan.

Response: The proposed new trails inside Wilderness is shown on the alternative maps accompanying the Forest Plan. A map of all system trails, plus proposed trails is part of the Planning Records, available at the Forest Supervisor's office. As we complete the control map for the Forest Plan, this trail map will be incorporated. Additionally, all trail construction and reconstruction projects will include appropriate public involvement and follow the NEPA process.

MAPS SHOULD SHOW ROAD CLOSURES

Showing proposed road closures on the alternative maps will be very useful. Also, note whether the road will be simply gated or obliterated/revegetated, so that it more easily returns to the natural landscape.

Response: Which miles of particular roads, by alternative, has been added to the text of Chapter IV, FEIS. On the maps, these closures can be determined by comparing unroaded management areas (such as 1A or 1B) and the location of the named road. Any more graphic description is impossible at the scale of the alternative maps. The 25 miles of system roads that will be closed in the Preferred Alternative because of land allocations will be returned to the planned resource use (such as semi-primitive, nonmotorized recreation) Refer to the Forest Plan, Forest-wide Standards and Guidelines for Roads, Chapter 4 Seasonal road closures (to protect wildlife habitat, for example) will usually be accomplished by a gate or sign.

CLARIFY ALTERNATIVE C MAP

The Alternative C map appears to have several roaded areas allocated to MA 1A and 1B; was this the intent?

Response: Yes; see the response to the previous comment.

PROTECT GREENWATER TRAIL AND LAKES AREA

The Greenwater Trail and Greenwater Lakes area are not protected as an entrance to the Norse Peak Wilderness. Congress directed the Forest Service to acquire these lands (1984 Wilderness Act) to protect the trail.

There is no indication in the DEIS of the roadless land along Greenwater Lakes. This qualifies and is all federal ownership, due to provisions of the Washington State Wilderness Act. This was enacted specifically to provide for a protected trail corridor outside the wilderness.

Response: In the Preferred Alternative, this area has been allocated to MA 1B, Semi-Primitive Nonmotorized Recreation, a change from the draft plan. Refer to the standards and guidelines in Chapter 4, Plan for MA 1B; there is no scheduled timber harvest or road construction in MA 1B.

INTEGRATE THE ALPINE LAKES PLAN BETTER

You should integrate the Alpine Lakes Management Area Plan better, showing similar colors as the other allocations on the maps.

> **Response:** Because the allocations in the Alpine Lakes Management Area do not "fit" those in the Forest Plan, we choose to show the Area (MA 27) all in one color. However, on the FEIS maps, the allocation codes (such as GF for General Forest) from the Alpine Lakes Plan are shown.

GIVE MORE VISUAL PROTECTION TO CARBON RIVER AND MOWICH RIVER ROAD

In the final plan, the Carbon River and Mowich River roads should be given more visual protection.

> **Response:** The Carbon River road corridor has been reallocated to MA 1D, Roaded Natural, which will provide higher visual protection than provided in the draft plan.

DON'T HARVEST TIMBER IN THE MT. BAKER NRA

The Forest Service cannot be trusted to manage areas without detailed and specific instructions. Here we have an area that clearly was deleted from any wilderness consideration for the purpose of retaining a snowmobile route to the summit of Mt. Baker. We do not support the interpretation that Congress gave the Forest Service the flexibility to harvest timber in the National Recreation Area.

> **Response:** The Washington Wilderness Act of 1984 states that "The Secretary shall administer the recreation area in accordance with the laws, rules and regulations applicable to the national forests in suck a manner as will best provide for (1) public outdoor recreation (including but not limited to recreation use); (2) conservation of scenic, natural, historic, and other values contributing to public enjoyment; and (3) such management, utilization, and disposal of natural resources on federally owned lands within the recreation area which are compatible with and which do not significantly impair the purposes for which the recreation is established." Congress clearly intended, when it established the NRA, that outdoor recreation was to be the preeminent use in the NRA, and other uses (including timber harvest) could be allowed if they did not significantly impair use of the recreation resource or other natural values of the NRA.
>
> There are (in R2MAP acres) 8,740 acres within the NRA; approximately 443 acres are tentatively suitable (the most acreage within which timber harvest activities **could** be proposed). The Standards and Guidelines in the management prescription for the MA 4, Mt. Baker NRA, coupled with the site-specific analysis that will accompany any project-level activity in the NRA, will ensure that those resources for which the NRA was established will not be significantly impaired.

CONSIDER MAINTAINING AREAS NEAR MT. RAINIER NATIONAL PARK AS ROADLESS

Consider maintaining roadless areas in the following locations near Mt. Rainier National Park: 1) the area south of the Carbon River Road (1 3/4 miles in length); 2) the area contiguous to the park boundary from the Carbon River to the wilderness; 3) Section 31, small part of Section 36 east of the wilderness boundary; 4) area due north of Northern Lakes; 5) area contiguous with the park boundary along Huckleberry Creek, Lost Creek, and up to Fawn Creek; and 6) area along the east boundary in Sections 3 and 11.

Response: In the Preferred Alternative, the sites listed above have been allocated to the following management areas: 1) this area is in MA 1D, Roaded Natural; 2) the area south of Chenuis Creek is in MA 1B, Semi-Primitive Nonmotorized [no timber harvest or road construction]; 3) Sections 31 and 36 are allocated to MA 17, Timber Management Emphasis; 4) in this area, land is allocated to MA 17, 1B, and 2B Scenic Viewshed - refer to the Alternative J map; 5) Huckleberry Creek to Lost Creek is in MA 2B Scenic Viewshed with the rest of the area allocated to MA 17, 1B, 2B, 15 Deer and Elk Winter Range Enhancement, and MA 8 Special Area (Mather Memorial Parkway); and 6) the west half of Section 3 is in MA 8 Special Area (Mather) with the rest of this area either allocation to MA 1B Semi-primitive Nonmotorized or 2A Scenic Viewshed.

BROCK ADAMS
WASHINGTON

United States Senate

WASHINGTON DC 20510-4702

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APR 19 [illegible]

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April 13, 1988

Doug MacWilliams
Forest Supervisor
Mt. Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, Washington 98104

Dear Mr. MacWilliams:

I would like to congratulate you on your excellent work writing the Mt. Baker-Snoqualmie National Forest Plan. I know from personal experience the difficulties of satisfying competing demands. I am confident you and your staff will produce a document that strikes the proper balance for sustained yield and true multiple use of the nation's resources.

I would like to address an issue that has been brought to my attention and pass along my comments to you. The recently proposed Backcountry Areas and Trails 2000 concepts are, I believe, excellent programs that should be given careful consideration in the Forest Plan. These programs promise to provide the casual forest visitor with a valuable recreational experience As the population of Washington state increases and as the tourist industry grows, greater demands will be placed on the National Forests. Rebuilding old trails and adding new ones will alleviate overcrowding and will help disperse visitors over a larger area

Please keep the Trails 2000 and the Backcountry Areas in mind as you work to develop a final draft of the Forest Plan. I look forward to working with you on this important concept

Sincerely,

Brock Adams

BROCK ADAMS
United States Senator

BA/jvg

J-517

☑ 2888 Jackson Federal Building
915 Second Avenue
Seattle, WA 98174
(206) 442-5545

☐ 770 U.S. Court House
W 920 Riverside Avenue
Spokane, WA 99201
(509) 456-6616

ROD CHANDLER
EIGHTH DISTRICT WASHINGTON

COMMITTEE
WAYS AND MEANS

223 CANNON BUILDING
WASHINGTON, DC 20515
(202) 225-7761

285

DISTRICT OFFICES
3326 160TH AVENUE SE
BELLEVUE, WA 98008
(206) 642-0316

1025 SOUTH 320TH STREET
FEDERAL WAY, WA 98003
(206) 583-6371
(206) 941-2878

Congress of the United States
House of Representatives
Washington, DC 20515

May 6, 1988

1920 - (71)

Ken White
Colborn
Rodman

Mr Doug MacWilliams, Supervisor
Mt Baker-Snoqualmie National Forest
1022 1st Avenue South
Seattle, Washington 98104

Dear Mr. MacWilliams:

I am writing to express some of my priorities and concerns for the Mt. Baker-Snoqualmie National Forest As you are well aware, thousands of Washington residents enjoy the trails in our National Forests as a means of outdoor recreation. Trails are essential for hiking, backpacking, fishing, hunting, horseback riding, and many other pursuits.

Washington is one of the fastest growing states in the nation, and many are drawn here by the unique quality of life that the Pacific Northwest offers. There is no better way to enjoy this outdoor setting than by trail. Unfortunately, the supply of trails so critical to outdoor recreation has been dwindling for years In the past several years, money for repairing and maintaining our trails system has been pretty tight

The result has been a significant deterioration both in the quantity and quality of trails in our parks and forests. Some trails are now beyond maintenance and thorough reconstruction is needed Of course, the result of this decay has been fewer trails for outdoor enthusiasts to enjoy. This loss of trails is detrimental not only to outdoor enthusiasts, but to the thousands of others who gain their livelihood in the recreation industry.

Recently, the Washington Trails Association has proposed the creation of Backcountry Areas, public land set aside for non-motorized trail recreation. New and rebuilt trails in Backcountry Areas would provide our citizens with the opportunity to walk and hike in a variety of settings, from low elevation streams to high ridge tops, where a variety of natural features can be enjoyed These features include majestic trees, inspiring mountain peaks, and beautiful meadows I am pleased to endorse both the concept of Backcountry Areas and I encourage you to give this plan full consideration as you prepare your final Forest plan.

I am also concerned about efforts to reverse Mt. Baker-Snoqualmie's progressive and fair policy on conflict between motorized and non-motorized users. I believe that most ORV users are law abiding, courteous and sensitive to the concerns of hikers and horsemen However, in cases where conflict exists, appropriate steps have not always been taken to adequately address the legal rights of non-motorized users. Your forest is a notable exception to this condition.

J-518

ORV enthusiasts and non-motorized trail users should be able to enjoy Washington's beautiful and serene environment without the unnecessary conflicts that currently exist in many of our national Forests One cause of this conflict is the failure of the multiple-use trails designation Hikers simply do not use trails where ORVs are allowed. Thus, multiple-use trails become single-use trails at the expense of hikers

The ORV policy of Mt. Baker-Snoqualmie National Forest reduces conflict better than any other Forest in Washington State. Its guidelines come closest to the letter and spirit of the Executive Orders and C.F.R. statute Section D of its 1986 Management Plan states that the Forest's policy should be to "insure that Off-Road-Vehicle (ORV) use, including snow type, is managed to mitigate their impacts on other resources, promote safety, and minimize conflict with other uses " As you continue work on your forest plan, I encourage you to follow the 1986 guidelines on conflict as closely as possible.

When we get together later this month, I would also like to discuss the proposed Cascade exchange involving U.S. Forest Service and Plum Creek Timber Company lands. I understand that you have some serious reservations about the legislative nature of this proposal and I am interested in hearing your views.

It would also be useful to discuss other issues in the proposed alternative forest management plans for the forest, including your thoughts on timber production from the Pratt River area, relative to its value as a recreational area.

Sincerely,

ROD CHANDLER
Member of Congress

RC/dd

2609

GRACE COLE
1ST DISTRICT
3029 NE 163RD
SEATTLE WA 98155

341 HOUSE OFFICE BUILDING
OLYMPIA, WASHINGTON 98504
RES TEL 206 362 7409
LEG TEL 786-7910
HOTLINE 1-800-562-6000

House of Representatives

STATE OF WASHINGTON
OLYMPIA

FIFTIETH LEGISLATURE
1987-88
COMMITTEES

COMMERCE & LABOR VICE CHAIR
EDUCATION
NATURAL RESOURCES
ASSISTANT MAJORITY WHIP

April 27, 1988

Mt Baker-Snoqualmie National Forest
Attention Forest Plan
1022 First Avenue
Seattle, WA 98104

J-519

To Whom it May Concern

As a member of the Washington State House of Representatives' Natural Resources Committee, I have become increasingly concerned about the retention of old-growth timber When taking the entire ecosystem into consideration, it is evident that old-growth timber should be left standing for the proliferation of birds and wildlife

I am also appauled at the decresing amount of dollars which the Federal Government is accepting for the sale of timber from the sale of Forest Service lands It seems that the amount accepted is much less than the current open market pricing I understand that, by the time the Forest Service develops logging roads, the Government actually loses money on the sale of Forest Service timber

I recently came accross some shocking statistics regarding the Forest Service's 1986 budget allocations for recreation and wildlife, and fish protection It seems that only 10% was directed for recreation and a smaller percentage for protection purposes Perhaps the Forest Service should re-evaluate some priorities

Specifically, I would like to urge action on the following issues

1 Expansion of the size of the Spotted Owl habitat areas to 45,000 acres in order to fully protect them from logging
2 Support of the concept of protected corridors of old growth timber which link areas of habitat.
3 Enforcement of a moritorium on logging in the Cedar River Watershed until full protection of the Spotted Owl can be guaranteed
4 Reduction of the annual allowable sale quantity of timber to at least 125 mullion board feet.
5 Finally, I would like to urge support for the conservationists' Alternative G I oppose the Forest Service's preferred Alternative H for overemphasizing timber production to the detriment of old-growth habitat, roadless recreation, and fisheries

Recreation and Fisheries are both extrememly important to the citizens of the State of Washington for economic and astetic reasons Forest planning can either protect or destroy our valuable natural assets I urge you to again, take great care and consider the conservationist's alternatives

Sincerely,

GRACE COLE

Grace Cole

State Representative
First Legislative District

cc
The Hon Senator Brock Adams
The Hon Senator Dan Evans
The Hon Congressman John Miller

MIKE LOWRY
SEVENTH DISTRICT
WASHINGTON

2454 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON DC 20515
(202) 225-3106

318 FIRST AVENUE SOUTH #300
SEATTLE WA 98104
(206) 442-7170

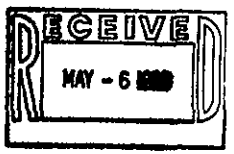
11902

COMMITTEES:
BUDGET
MERCHANT MARINE AND FISHERIES
BANKING FINANCE AND URBAN AFFAIRS

Congress of the United States

House of Representatives

Washington, DC 20515



May 2, 1988

Mr. J.D. MacWilliams
Forest Supervisor
Mt. Baker-Snoqualmie N.F.
1022 First Avenue
Seattle, WA 98104

J-520

Dear Mr. MacWilliams.

I am writing to provide an official comment regarding the Mt Baker-Snoqualmie National Forest Land and Resource Management Plan. I would like to thank you for extending the comment and review period until May 2nd, which provides a greater opportunity for citizen involvement

I would like to start by reiterating that, as a public official, my policy is to develop the public lands in such a manner as is consistent with protection and maintenance of the resource. No one questions the importance of the timber industry to Washington State, both as a source of timber products and jobs The real questions are how much of the public lands to allocate to the timber industry, what timber harvest levels are consistent with sustainable yields, and to what extent the timber industry should be subsidized by the American people

I support multiple use of the national forests, by which I would include motorized and non-motorized recreation, fisheries, wildlife, and watershed protection, as well as mining and forestry activities. Although the U S Forest Service acknowledges all these other activities, it treats everything as subsidiary to logging. Over the past decade, the Forest Service has spent an average of about $200 million on logging roads, with an additional average $100 million spent on logging roads through the Purchaser Credit Program. Funding for recreational facilities, trail construction and maintenance, and fish and wildlife enhancement have been paltry in comparison.

I believe that Mt. Baker-Snoqualmie N F , located adjacent to a fast-growing urban area, has special, non-timber, obligations The population of the Puget Sound area has more than doubled since 1950, and is projected to double again by the year 2020 At the same time, people's interest and involvement in outdoor activities have increased dramatically A 1986 State of Washington study found over 700,000 households in our state that hike or backpack on a regular basis Businesses that produce camping equipment and other outdoors equipment now account over $300 million in sales in the Puget Sound area alone, and directly employ several thousand people. I have seen estimates that 26,000 jobs are directly dependent on Mt Baker-Snoqualmie N F -- but only about 4,000 of these jobs are timber-related, while recreation, fish and wildlife related uses account for the rest. It is important that the Forest Service acknowledge these facts and adjust its policies accordingly

An excellent way for the Forest Service to recognize the importance of recreational interests would be to endorse the Trails 2000 proposal. In Mt. Baker-Snoqualmie N.F , the amount of recreational trails have declined from about 2,000 miles in the 1940's to less than 1,400 miles today. The Preferred Alternative Management Plan would involve further destruction of 200 miles of trails. According to your own estimates, during a summer weekend, over 20,000 hikers use Mt. Baker-Snoqualmie trails. Your agency has identified 48 areas in alpine meadows and wetlands that suffer from overuse and resulting environmental damage. This is a serious issue that needs to be addressed in the Management Plan. I hope that you will work to restore and maintain existing trails, increase trail mileage by new construction, and protect areas remaining roadless areas that are suitable for additional trails. The Washington Trails Association has identified five such areas: Helen Butte/Jackman Creek, Mt. Dickman, Eagle Rock, Ragged Ridge, and the Pratt River valley. I think that the Forest Service should carefully consider these proposals

I am concerned about the level of the timber harvest from the National Forest System As you are probably aware, I have asked the General Accounting Office to examine the assumptions used by your agency in determining the Allowable Sale Quantity (ASQ) off the public lands I am concerned about the fact your calculations are based on use of a single computer model developed for Douglas Fir forest between 3,000' and 4,000' elevations ("Douglas Fir Simulated Intensive Management" model), which is then extrapolated to other forest types and elevations I am also concerned about the fact your models are based on assumptions about regrowth, including 10-15% enhancements based upon genetics and 10% enhancements based upon increased use of fertilizers and pesticides It is disturbing that there is little actual field data to support such assumed enhancements Under the circumstances, I believe it would be prudent to reduce the harvest level to 128 million board feet (Alternative G)

I believe that the Forest Service needs to conduct additional research into the impact of logging on wildlife and fisheries There are significant gaps in our understanding of how logging affects wildlife, including the change to the single canopy-level of second growth forests, the loss of cavity nesters, the loss of herbaceous ground cover and shrubs, the changes in lichen and fungi, the effect of slash and debris on regrowth, the relationship of landslides to stream siltation, and how the loss of canopy shade trees changes stream water temperature and affects stream fauna Only after serious efforts are made to understand all components of the forest system, can I be fully confident that the Forest Service is acting in the national interest.

Spotted owls are only one example of how little the Forest Service values non-timber concerns. Recently the Fish and Wildlife Service decided not to list the spotted owl as an endangered species. There is, however, certain evidence that this was a political decision, not a scientific one. The bulk of scientific evidence strongly suggests the spotted owl is in great trouble. The State of Washington considers the spotted owl to be an endangered species, and recommends allocating 4,500 acres to protect each nesting site I am deeply concerned about how your agency proposes to protect the spotted owl.

First, you only allocate 1,000 acres per SOHA. Second, you have clearly chosen to place SOHAs in higher elevation sites which do not interfere with logging operations. The result is that only 24% of the 84 SOHAs actually contain spotted owls! Finally, there are no protected corridors between areas of suitable owl habitat You plan would clearly doom the owl to extinction

I think it is extremely important to protect the few remaining lowland (below 2,500') tracts of old-growth forest. Recent studies by forest ecologists at the University of Washington indicate that over 90% of the Pacific Northwest's original old-growth forest has been logged, and that several of the important lowland communities are virtually extinct. One forest ecologist at U.W has contacted me with the following information· looking for stands of Douglas Fir that are greater than 450 years and greater in size than 100 acres, he found exactly 12 such stands in the State of Washington 4 in Mt. Baker-Snoqualmie N.F., 2 in Olympic N.F., 1 in Gifford Pinchot N.F., and the rest in National Parks. These areas should clearly be protected I call upon the Forest Service to put their resources into an immediate search for the few remaining tracts of ancient trees, and protecting these, rather than quibbling about the definition of "old-growth forest" so that these areas can be cut. I believe you should use the more restrictive definition of old-growth that was formulated by your own Pacific Northwest Research Station.

J-521

I also call upon you to recognize the value of protecting roadless areas in the Helen Butte-Jackman Creek area, the Mt. Dickman area, the Eagle Rock area, the Ragged Ridge area, and the Pratt River Valley area There are Special Interest Areas that deserve protection, including the Twin Sisters Botanical Area, the Naches Pass Historical Area, and the Baker Lake and Monte Cristo Scenic Areas. In addition, the Scenic Corridor of the North Cascades Highway deserves enhanced protection.

The public is extremely interested in protecting Washington's riparian areas and wetlands. Several of the best candidates for Wild & Scenic River status are found within Mt. Baker-Snoqualmie N.F. You should give increased attention to this list, which includes· the Nooksack River (North, South, and Middle Forks); the tributaries of the Skagit and Sauk Rivers (Noisy, Diobsud, Illabot Creeks and Baker, White Chuck and Suittle Rivers); the Stillaquamish River (North and South Forks, Canyon Creek, and Boulder River), the Skykomish River (North Fork, Rapid, Tye, Miller, Foss, and Beckler Rivers), the Snoqualmie (Middle Fork, Pratt, and Taylor Rivers), Carbon River; White River; Clearwater River, and Greenwater River.

Thank you for your consideration.

Sincerely,

Mike Lowry
Member of Congress

1078

JOLENE UNSOELD
TWENTY SECOND DISTRICT

RESIDENCE
6110 BUCKTHORN N W
OLYMPIA, WA 98502
206-866-8616

OLYMPIA OFFICE
HOUSE OFFICE BLDG.
OLYMPIA 98504
206-786-7840

House of Representatives
STATE OF WASHINGTON
OLYMPIA

April 8, 1988

Mt. Baker-Snoqualmie National Forest
Attention Public Affairs
1022 First Avenue
Seattle, WA 98104

Dear Mt. Baker-Snoqualmie National Forest Staff:

My family has been hiking in the Mt. Baker-Snoqualmie National Forest since the 1960's. Last summer we took a family hiking trip through the area to Glacier Peak. This forest deserves protection from destructive logging practices and excessive road building. It is too important both as priceless wildlife habitat and for recreation to be opened up to more logging and roads.

I support the Alternative G of the draft forest plan because it addresses the growing need for more recreational opportunities in the Forest and also balances the needs of wildlife with timber production. The Forest Service's Preferred Alternative H, on the other hand, does not adequately balance timber production with recreation and wildlife. In this alternative there will be over 180 miles of new road construction and logging in areas that are now roadless and protected for wildlife and recreation.

It is important that special areas within the Forest be protected. These areas include Monte Cristo and Baker Lake Scenic Areas, Naches Pass Historic Area and Twin Sisters Botanical Area In addition, the old growth areas of the Forest should be protected for spotted owl and other wildlife habitat. Spotted owl habitat areas should be expanded to 4500 acres with protected corridors linking them. Roadless areas should also be preserved, especially for recreation

Because of the importance of recreation, both to the economy of the area and to the many hikers within the state, trail construction and reconstruction should be increased. Hiking trails should be off limits to all motorized, off-road vehicles and should not be re-routed to facilitate increased logging.

I fully support the Forest Service's plan to request wild and scenic river status for five rivers in the Forest. There should be, though, other river and river segments also included in the recommendation, including the middle fork of the Snoqualmie, all of the forks of the Nooksack, the Stillaguamish the Skykomish, the Skagit and the Sauk, as well as rivers originating on Mt Rainier, the Carbon and the White and their tributaries.

In order to give the much needed increased emphasis on wildlife and recreation, the Forest Service should decrease its logging in the Forest to 128 million board feet The public is ready and eager for this change in priorities within the Mt. Baker-Snoqualmie National Forest.

Sincerely,

Jolene Unsoeld
State Representative
22nd Legislative District

JU·sc

J-522

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Office Of The Mayor
City of Seattle

Charles Royer Mayor

May 2, 1988

Doug MacWilliams
Forest Supervisor
Mt. Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, Washington 98104

Dear Mr MacWilliams

We thank you for the opportunity to comment on the Draft Environmental Impact Statement regarding the Proposed Land and Resource Management Plan for the Mt. Baker-Snoqualmie National Forest The management of the Forest will affect the citizens of Seattle in many ways. Our concerns with the proposed plan fall into two areas elements of the forest plan that might affect the plans and operations of the City's water and electric utilities, and aspects of the plan that are of considerable interest to the citizens of Seattle, who use the National Forest for recreation, education, and many other purposes.

VALUES OF THE NATIONAL FOREST

The Mount Baker-Snoqualmie National Forest contains some of the closest undisturbed environments to Seattle, and is very important to our citizens as a natural area with substantial scenic beauty and ecological value. Many of Seattle's citizens enjoy the solitude, lush forests, and diverse animal life of the Mt. Baker-Snoqualmie National Forest. Many fish in its numerous streams and lakes, hike in its forests and meadows, or raft on its marvelous rivers. The Forest has many special wildlife habitats that are worthy of protection. The Mt Baker-Snoqualmie's wonderful old-growth forests are of special interest to many citizens because of their unique contribution to the biological diversity of the Puget Sound region.

The Forest provides many opportunities for conducting environmental education and research programs, and contributes to our understanding of nature We are particularly concerned that our schoolchildren have the opportunity to learn about and appreciate our natural areas, and the Mt. Baker-Snoqualmie National Forest is very important among these.

J-523

Recreational opportunities in the National Forest not only enhance the quality of life in the Puget Sound region significantly, but also provide substantial economic benefits through tourism and the support of outdoor recreation. Many jobs are provided in these industries, and it is important that we maintain the kind of natural environment that will continue to encourage and support these activities Because of its great natural values, the National Forest also provides an attraction for businesses to locate in our area, stimulating economic development. To preserve the quality of life and the economic well being of our region's inhabitants, it is essential that the natural and scenic values of the Mt Baker-Snoqualmie National Forest be preserved.

The management of the Mt. Baker-Snoqualmie National Forest is also important to Seattle citizens because the City owns considerable land adjacent to National Forest land, and because our utilities operate important facilities within the Forest's boundaries. Our water and electric utilities have expressed concerns with some elements of the proposed plan

ISSUES OF CONCERN TO CITY UTILITIES

Parts of both of the City's municipal watersheds fall within the Mt Baker-Snoqualmie National Forest, as do several of our hydroelectric power generating and transmission facilities. Our watersheds on the Cedar River and the South Fork of the Tolt River are the primary sources of municipal and industrial water for the approximately 1 1 million customers of the Seattle Water Department. In addition, Seattle City Light's facilities on the Skagit River provide electric power to customers in Seattle.

Cedar River Watershed

We are pleased to note that the Seattle Water Department has had a long-standing working relationship with the Mt. Baker-Snoqualmie National Forest, a relationship that has provided benefits for both the City and the Forest Service. Our association has resulted in cooperation on several issues important to the City of Seattle. A prime example of this cooperation is the 1962 Cedar River Watershed Cooperative Agreement, which is based upon the objectives of both protecting water quality and managing timber resources in the Watershed We expect this type of cooperation to continue in the future, particularly with regard to the management of National Forest lands in the Cedar River Watershed.

The City of Seattle is completing a reevaluation of its management goals for the Watershed and developing a long-term management plan. Because the Forest Service is the second largest land owner in the Watershed, it is essential that the planning processes of City and the Forest Service be coordinated. One major element of the emerging Watershed management plan will likely be an increased emphasis on the protection of valuable wildlife habitats, particularly old-growth forest. The effectiveness of the City's watershed management program would benefit substantially from the cooperation of all land owners in the management of their lands in the Watershed. This cooperation can serve the long-term goals of both the City and the Forest Service. We share important goals and concerns for the Watershed, and can build upon the 1962 agreement to better pursue those goals.

The three management intensities for the Cedar River Watershed (20A, B, and C) include different provisions for dealing with the following issues of importance to the City: (1) policies for exchange of remaining National Forest lands in the Watershed for City lands elsewhere; (2) protection of old-growth forest and unroaded areas in the Watershed; and (3) public recreation on National Forest land in the Watershed.

Land Exchange. It has long been a goal of the City to obtain ownership of all lands in the Cedar River Watershed, and we now own more than 80 percent of these lands. Ownership of Watershed lands provides the City with the greatest level of control over activities in the Watershed that can affect water quality, a major management concern for the Water Department. Expediting the ongoing land exchange with the Forest Service is of major interest to the City.

Intensity 20A, included in the preferred alternative, has provisions to continue the current program of land exchange, but provides no protection for any of the remaining old-growth forest on National Forest lands. Although intensity 20A would allow the City to gain eventual ownership of all federal lands in the Watershed, it is not compatible with the City's objective of reserving a portion of the remaining old-growth habitat in the Watershed.

Intensity 20C, on the other hand, provides for the protection of some old-growth habitat in the Watershed, but also includes a provision for the Forest Service to retain ownership of all National Forest lands in the Watershed. This provision would be incompatible with the City's goal of obtaining eventual ownership of all lands in the Watershed.

Of the three management intensities for the Cedar River Watershed, a plan similar to that described in intensity 20B would best accomplish the ownership and habitat protection goals of the City. The stipulation in intensity 20B that the City would agree to protect the old growth to be exchanged is in keeping with the City's goal of protecting this valuable and diminishing habitat, and intensity 20B provides for eventual City ownership of federal lands in the Watershed in a shorter time period than would be the case under 20A.

As noted below, however, we do not feel that the resolution of issues of concern to both parties should be limited to adoption of one of the three proposed management intensities. We feel that it is possible to develop a new management intensity that may better serve the interests of both parties. A critical element of this new management intensity should be the coordination of our respective programs for the protection of old-growth habitats.

Protection of Old-Growth Forest. It is fairly certain that a major element of the City's long-range plans for the Cedar River Watershed will be the exclusion from timber harvesting of substantial areas of City-owned lands in the Watershed, including not only most of the City's remaining old growth but also large areas of second-growth forest that could eventually develop into old growth. Much of the City's existing old growth is adjacent to old growth on National Forest land containing old growth. The second-growth forests reserved by the City could also add a large, contiguous area of forested habitat that would provide a continuous, complimentary network of forested habitats throughout the Watershed. Clearly, by working together on the important goal of protecting certain old-growth forests in the Watershed, the City and the Forest Service can accomplish much more than would be possible otherwise.

Protection of old-growth habitats in the Cedar River Watershed could provide a valuable linkage between old-growth habitats to the north and south. The need for this linkage has been pointed out by many individuals who are concerned that the habitat of spotted owls in Washington may become too fragmented for the species to survive. The value of protecting old-growth habitat in the Watershed would be substantially enhanced by the City's long range plans for protection of its forest habitats in the Watershed, as well as through current negotiations by which the City will obtain several thousand additional acres of old growth from the remaining private land owners in the Watershed. Almost all of this land is adjacent to National Forest land. The City

is prepared to reserve these lands to enhance a Forest Service program to protect species using old-growth habitats in the Watershed.

Protection of old-growth habitats in the Watershed may make a substantial contribution to the protection of species that depend on old growth, such as the spotted owl. Research conducted by the Water Department, although not yet completed, has indicated that as many as five spotted owls may be using old-growth habitats in the Watershed, including at least one mated pair In keeping with the City's goals for protecting this valuable habitat and the species that depend upon it, we strongly urge the Forest Service to consider designating areas of old growth in the Watershed for the protection of spotted owls and other old-growth dependent species.

We urge you to consider protecting old-growth forests in three areas of the Watershed west of Meadow Mountain (Gronski timber sale area), Abiel Peak, and Findley Lake Our research indicates that a pair of spotted owls has a home range in the area west of Meadow Mountain This is excellent habitat for spotted owls and should be designated as a SOHA Protection of the old-growth in the Abiel Peak area of the Cedar River Watershed would enhance the value of protecting old-growth in the Annette Lake area to the north, as proposed in the preferred alternative. The old-growth near the Findley Lake area may also support spotted owls, and would be of value for protecting other old-growth dependent species

To enhance a habitat protection program on National Forest lands in the Watershed, the City is prepared to commit to the protection of large areas of old-growth habitat near Meadow Mountain, Abiel Peak, and Findley Lake that we are now in the process of acquiring from private owners The City is ready to consider other creative alternatives to contribute to structuring a total package for old-growth reservation, including acquisition and exchange. In addition, considerable old-growth in the Findley Lake basin has already been designated for protection by the City.

Protection of Unroaded Areas. Several roadless areas of the Cedar River Watershed are connected to other roadless areas outside of the Watershed. We believe that these areas should be added to the inventory of roadless areas on National Forest land and that they should be considered for protection in the proposed forest plan. The areas include sections near Abiel Peak and Meadow Mountain

J-525

Control of Public Access. In all three of the management intensities for the Cedar River Watershed, dispersed recreation would be allowed on National Forest lands. It has long been the City's policy not to allow unsupervised dispersed recreation in the Cedar River Watershed We have adopted this policy to assure adequate protection for our unfiltered water supply. A Watershed management program providing for strict control over human activities in the Cedar River Watershed is a requirement of public health agencies In addition, as a result of recently adopted amendments to the Safe Drinking Water Act, the regulations regarding allowable activities in watersheds supplying unfiltered water are being more strictly interpreted

If we do not achieve the objectives of the new drinking water regulations, we face the prospect of constructing and operating very expensive filtration facilities In its long-term program of land acquisition and control, the City has made a substantial investment in providing a high quality water supply without additional, expensive treatment We are very concerned that this investment be protected The provisions in intensity 20C, which would result in an increase in dispersed recreation in the Watershed, would present significant problems for the City in complying with the new regulations and other expected changes to these regulations The City, therefore, opposes intensity 20C

We believe that an agreement on closure of National Forest lands in the Watershed to dispersed recreation can be achieved, and that provisions for such an agreement should be reflected in the forest plan. Day use of the Cascade Crest and the McClellan Butte trails, which is currently allowed, would continue to be allowed under any such agreement.

Recommendation The City is highly interested in exploring a variety of options for protecting portions of the remaining old-growth habitats in the Watershed, for expediting the land exchange, and for controlling public access to federal lands in the Watershed. However, rather than recommending that one of the three management intensities be adopted in its present form, we recommend that an appropriate alternative be developed cooperatively by the City and the Forest Service

Skagit River Hydroelectric Facilities

The City is concerned with the potential impacts of logging activities on anadromous fish and bald eagles in the Skagit River system These impacts could jeopardize Seattle City Light's considerable efforts and expenditures to protect and enhance habitats for fish and eagles in the Skagit drainage.

Logging and road construction near streams can result in increased sedimentation and turbidity, with consequent degradation of habitats for fish. It can also reduce the availability of roosting and perching sites for bald eagles or cause disturbances that may lower the quality of such sites. We strongly urge the Forest Service to protect remaining roadless areas and old-growth forests adjacent to streams in the Skagit River drainage to protect wildlife habitat, water quality, and fisheries. Of particular importance are the areas adjacent to Diobsud, Illabot, Rocky, Patent, and Olson creeks, and the Cascade River

Seattle City Light has experienced no significant problems with the operation of its facilities on the Skagit and Sauk rivers related to their inclusion in the federal Wild and Scenic River system Although City Light transmission lines parallel or cross several candidate rivers, we anticipate no problems with the designation of these rivers as Scenic or Recreational.

ISSUES OF CONCERN TO CITIZENS OF SEATTLE

The proposed forest plan indicates that the availability of opportunities for primitive and semi-primitive recreation will decrease in the future, while the demand for such activities will increase. We are concerned that the proposed recreational trail system may not be adequate for the growing population served by the National Forest Several recent proposals contain valuable suggestions for addressing this problem The Trails 2000 proposal, developed by the Sierra Club, advocates the rebuilding of 250 miles of abandoned trails and the construction of 350 miles of new trails by the year 2000.

Implementing the Trails 2000 program would result in a vastly improved trail system that would provide public access to many excellent roadless areas. Low-elevation, forested trails that are open nearly year-round, such as the Greenwater Lakes and Pratt River trails, are particularly important These areas are much more accessible than forests and meadows at high elevations, which are in more rugged terrain and available to hikers only part of the year

We are also concerned about the loss of many existing trails through timber harvesting and road construction in areas that are now roadless Harvesting in many areas will fragment the trail system and seriously reduce the quality of recreational experiences While protection of roadless lands within the Skykomish Ranger district is adequate under the preferred alternative, it is not sufficient within the remainder of the

National Forest. Important areas such as Jordan, Damfino, and Chenuis creeks should be added to the preferred alternative as Semi-primitive, Nonmotorized Management Areas

The Backcountry Areas proposal of the Washington Trails Association is one that we support. If implemented, this proposal would protect several roadless areas near Seattle that have substantial potential for backcountry recreation, including Jackman Creek, Mt. Dickerman, Eagle Rock, and Ragged Ridge As noted in the proposed plan, the Forest's Wilderness Areas are already reaching their maximum capacity for recreation, yet the demand is expected to grow in the future. Reserving many roadless areas for primitive and semi-primitive dispersed recreation would take some of the pressure off of the designated Wilderness Areas. Protecting free-flowing rivers in the National Forest is essential to the protection of the fish that inhabit them and the quality of recreational experiences in the riverine environment. Many rivers in the Forest offer excellent scenery, rafting, kayaking, fishing, wildlife habitat, and opportunities for enjoying nature. We were disappointed that only five rivers were recommended in the proposed forest plan for inclusion in the federal Wild and Scenic River system. There are other rivers that we feel have outstanding values, such as substantial anadromous fish runs, fine old-growth forests, and excellent recreational opportunities These include the Stillaguamish, White Chuck, Pratt, and White rivers, and Diobsud and Illabot creeks. We urge you to add these rivers to your recommendations

Wildlife and fish in the National Forest provide many benefits to our citizens, and it is very important that native wildlife and fish species, and their habitats, be well protected. We commend you for including programs to enhance fish and wildlife habitats in the proposed plan. Our fisheries specialists are concerned, however, about the heavy reliance on artificial spawning and rearing structures. The success of these techniques is not assured We feel that a greater emphasis on preventing loss by protecting streams and watersheds is a more prudent approach

We encourage efforts to study the endangered grizzly bear and gray wolf, which once were widely distributed in our region. The Forest Service should avoid any actions that might preclude their reintroduction

Our old-growth forests are especially important habitats Not only does this unique and diminishing environment possess great aesthetic value, but it also contributes substantially to regional biological diversity and to the preservation of

the many kinds of plants and animals that are partly or totally restricted to it. Most of the region's low-elevation old growth has already been logged, making the remaining forests particularly valuable not only to hikers and nature enthusiasts but also to the wildlife species that once inhabited vast areas of the Puget Sound lowlands. Important areas that should be given greater protection include the excellent old-growth forests along Irene, Higgins, and Canyon creeks, and along the Cascade and White Chuck rivers.

The welfare of the spotted owl is of special concern to many residents of Seattle. This species, which is dependent on old-growth habitats, was recently listed as endangered in the state by the Washington Department of Wildlife The survival of the spotted owl depends on the protection of the very large stands of old-growth habitat in which it lives. Biologists inform us that the 1,000 acres of old growth included in Spotted Owl Habitat Areas (SOHAs) under the proposed plan is not enough. The City has conducted research on this species that supports this conclusion The results of our research and the research of others indicate that a pair of owls require at least 2,200 acres of old growth, and may need as much as 4,000 acres. We would be pleased to share the results of the City's research with the Forest Service.

We are also concerned that some of the old-growth habitat that is proposed for protection in the National Forest may not be adequate in quality for the spotted owl or other old-growth dependent species, and that many of the designated SOHAs are not presently inhabited by spotted owls. We urge the Forest Service to evaluate more closely the needs of these species and to initiate an inventory of wildlife habitats that is ecologically oriented. Until these issues are resolved, the conservative approach would be to avoid harvesting in areas that may later prove to be critical to the survival of old-growth dependent species.

We also recognize the importance of the timber resources of the National Forest to the citizens of Washington It is important that the Forest Service assist the communities that have traditionally relied on National Forest timber These communities are vulnerable to the dramatic market fluctuations that occur in the timber industry Avoiding serious dislocations for this important industry in Washington will require a balanced program for managing our forests Addressing the larger and more complex issues of the long-term stability and economic well being of these communities will require creative solutions and a broader perspective than has been taken in the past.

There are many ways that the Forest Service can assist these communities in meeting their economic needs without sacrificing a large part of the remaining old-growth forest in our region. In the 1985 Forest Service assessment under the Renewable Resources Planning Act, it is stated that small, nonindustrial woodlots have the greatest potential for increasing the nation's wood supply. Many individuals have observed that the timber resources on nonfederal lands in Washington are not being used nearly as efficiently as they could be. Forest Service programs to stimulate and support increased wood production on these lands, such as the State and Private Forestry Program, can increase jobs in the timber industry to offset the reduction in harvest of old growth on federal lands. We strongly urge the Forest Service to increase the emphasis on such programs. Substituting lumber exports for log exports would also increase timber-related jobs in the state

In the long run, however, diversification of local economies now mostly dependent on volatile timber markets may provide the stability these communities need. We encourage the Forest Service to work with these communities to find innovative solutions to the problems that they may face during the transition from an economy based on resource extraction to a more diversified one.

CONCLUSIONS

The proposed forest plan (Alternative H) is an improvement over past management plans. However, Alternative G contains many provisions that would contribute more to the protection of the values of the National Forest described in this letter We urge you to carefully consider incorporating many of these provisions into the forest plan

Again, we thank you for the opportunity to comment on this important planning document Your staff has been most helpful in providing information to us, and we commend your sincere efforts to solicit and consider comments from all those who are interested in the management of the Mt. Baker-Snoqualmie National Forest.

Sincerely,

Charles Royer

CITY OF BELLINGHAM
OFFICE OF THE MAYOR
TIM DOUGLAS

May 2, 1988

Douglas McWilliams, Forest Supervisor
Mt. Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, WA 98104

Dear Mr McWilliams

I am most concerned about a provision in the proposed plan for the Mount Baker Snoqualmie National Forest. Apparently, Coleman Glacier is designated as a special area within the wilderness classification. Proposed standards limit the average number of parties encountered to 16, the number in the party to 12, and campsite *visibility to 15 seen from other campsites.* Each of these standards emphasizes the sense of wilderness but would deny to significant numbers of people access to a glacier experience.

For years, Coleman Glacier has provided one of the outstanding educational opertunities for American citizens. Thousands of visitors each year take advantage of the quick accessibility of the glacier, and many of these same people use this route for ascent of Mount Baker. Should the *proposed plan be* adopted as is, thousands of visits each year would be prohibited

Since the historic use has not threatened the ecology of this special resource, I urge you not to impose the restrictions reflected in your plan We need to assure that future generations understand and appreciate the geologic forces at work in the Pacific Northwest Our regional economy depends on the use--thoughtful of course--of our outstanding outdoor attractions. Please feel free to contact me should you wish further comments on this matter

Sincerely,

Tim Douglas, Mayor
City of Bellingham

sgs

J-528

427

DEPARTMENT OF THE AIR FORCE
REGIONAL CIVIL ENGINEER, WESTERN REGION (AFESC)
630 SANSOME STREET - ROOM 1316
SAN FRANCISCO, CALIFORNIA 94111-2278

MAR 25 1988

REPLY TO ATTN OF: ROVP (Farrel/556-0882)

SUBJECT: Draft Environmental Impact Statement (DEIS) - Proposed Land and Resource Management Plan, Mt. Baker-Snoqualmie National Forest, Washington

TO: Mt. Baker-Snoqualmie National Forest
ATTN Forest Plan
1022 First Ave.
Seattle, WA 98104

1 We appreciate the opportunity to review the subject DEIS and offer the following comments

a As shown on the attached map, the Mt Baker-Snoqualmie National Forest is subject to military overflights in the form of low-level training missions. Inasmuch as low-level overflights do have the potential to disrupt the solitude and naturalness of areas directly under their flight paths, we recommend you include consideration of low-level training missions in your discussion and decisionmaking process wherever solitude and naturalness are desirable attributes within the forest system. Within that context, we further recommend you consider location, altitude, and frequency of flights.

b Geographic areas which are appropriate for military overflights and low altitude training routes are becoming increasingly rare. In selecting overflight training routes, the military must consider mission requirements and fuel costs as well as environmental constraints Ideally, training routes are located within areas which are relatively isolated, have diverse topography and minimal commercial activity, maintain sparse human populations, and contain lands under federal jurisdiction. It is apparent these characteristics are also very compatible with National Forest Systems. Therefore, the Air Force generally supports Management Plans which do not restrict use of the airspace for military overflights

2 If we can be of further assistance in any manner, please contact Mr. David Farrel, at (415) 556-0882.

Phillip E Lammi

PHILLIP E. LAMMI, Chief
Environmental Planning Division

1 Atch Training Routes Map

J-529

1466

Department of Energy
Bonneville Power Administration
P.O Box 3621
Portland, Oregon 97208-3621
April 14, 1988

In reply refer to AJ

Mt Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, Washington 98104

Attn Forest Plan

Dear Sir

We have reviewed the Proposed Land and Resource Management Plan and Draft Environmental Impact Statement (DEIS) for the Mt. Baker-Snoqualmie National Forest. We would like to commend the Mt. Baker-Snoqualmie National Forest for establishing a management area and standards and guidelines for utility sites and corridors

Our specific comments on the management plan and EIS are listed below. We have included a map which illustrates Bonneville Power Administrations (BPA's) existing and proposed corridors recommended for designation The proposed corridors were taken from the Pacific Northwest East-West Corridor Study completed in 1977 by BPA and the Forest Service Due to the importance of corridor planning on the Mt Baker-Snoqualmie National Forest and the possible need for additional transmission within the next 10 years, BPA will contact the Forest to discuss corridor availability and suitability in the next several months. If there are any questions on our comments before that time, please contact John Hooson, Facilities Planning Branch, Office of Engineering, (503) 230-3299, or FTS 429-3299

J-530

Specific Comments on Proposed Plan

1. The Proposed Land and Resource Management Plan should identify specifically the corridors that have been designated, and if none have been designated, explain why. Reference could be made to Figure III-31, Utility Corridors, found in the DEIS.

2 Page 4-1, Forest Management Goals - We recommend that the Forest Management Goals address energy, including corridors and renewable energy resources. The Standards/Guidelines on page IV-103 should reference the Project Plan and Right-of-Way Maintenance Plan as important documents which guide the construction and maintenance of BPA transmission rights-of-way within Management Area 25 These are documents required by the BPA/Forest Service Memorandum of Understanding.

3 Page 4-120 to 4-218, Management Area Standards and Guidelines - It would be helpful if management area descriptions describe whether they are considered an avoidance or exclusion area for transmission facilities. This will help ensure consistency with other Forest Service (FS) and Bureau of Land Management (BLM) plans and the requirements of BLM and FS directives

4. Page 4-214 to 215, Management Area 25 - The Standards/Guidelines do not make clear how large an area is encompassed by Management Area 25. For example, does it include only the land permitted (right-of-way), or is area allowed for expansion?

Specific Comments on Draft EIS

1. The DEIS has also done a good job of addressing corridors We particularly like the use of a corridor map and the descriptions of the built environment For decisionmaking purposes, we suggest that the Final EIS identify, in table form, the affect of the alternatives on the acreage available for corridors (Exclusion Area & Avoidance Area) This should also be done for renewable energy resources such as small hydro, and geothermal.

2 The statement of the duration of the energy surplus attributed to BPA on Page III-17 of the Draft EIS is incorrect BPA currently projects the regional energy surplus to last until 1994, assuming medium load growth.

3 Page III-167 to 168, The built Environment - Utility Corridors - On page III-168 the load growth information should be revised to show an annual growth rate of - 3 to 2 7 (BPA Forecast of Electric Consumption in the Pacific Northwest, October 1986) It should be noted that BPA's/NW Energy Planning Council's draft 1988 forecast will show an increase in annual load growth from the 1986 forecast On page III-168, last paragraph, it should be noted that BPA is currently evaluating transmission requirements (loads and reliability) for serving the Puget Sound Area Expansion of transmission capacity on the Stevens Pass Corridor is being considered and could be needed prior to the year 2000 rather than after the year 2000 as mentioned

4. Chapter IV, "Environmental Consequences," should analyze the effect of the alternate plans on both existing and planned corridors as mentioned above

5 The Forest Plan and Draft EIS should also reference the 1986 Western Regional Corridor Study for information on corridors. The corridor study was prepared by the Western Utility Group, an ad hoc group of western utilities It was intended to describe consolidated utility corridors for the Western United States and was originally published in 1980 The 1986 edition was recently transmitted to all Forests

6. We recommend that the alternative plan maps illustrate in color, Management Area 25 It is mentioned on the map legend, but cannot be found on the maps.

We appreciate this opportunity to review and comment upon your plan and EIS

Anthony R Morrell
Assistant to the Administrator
for Environment

Enclosure
Map

cc
J Cheek, PP&L, Portland OR
R. Sipe, USFS Region 6, Portland OR
Walt Bennett, USFS Region 6, Portland, OR

J-531

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U S ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE WASHINGTON 98101

MAY 2 1988

RECEIVED
MAY - 3

REPLY TO ATTN OF WD-136

Environmental Protection Agency
1200 6th Ave., WD-136
Seattle, WA 98101

Doug MacWilliams
Forest Supervisor
Mt. Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, Washington 98104

Dear Mr. MacWilliams

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the Environmental Protection Agency (EPA) has reviewed the Proposed Land and Resource Management Plan and accompanying Draft Environmental Impact Statement (DEIS) for the Mt. Baker-Snoqualmie National Forest (BSNF) We would like to thank the BSNF staff for their efforts in assisting us in our review of the DEIS and Plan by providing an overview meeting (January 8, 1988), invitations for further discussion, and opportunities for field visits. These have helped highlight and clarify issues we believe are important to a successful and environmentally sound management plan.

The preferred alternative includes reduced timber harvest from current levels and with a significant emphasis on anadromous fish habitat improvement projects. The DEIS emphasized identifying the potential and significant adverse impacts to the environment from activities associated with timber harvesting, mineral extraction, and other activities.

We determine the environmental effects of the proposed alternatives by reviewing the process by which the forest management activities are carried out. This may include the procedures, decisions and time-frames necessary to comply with environmental standards, prevent adverse effects, and improve existing conditions. Some components we believe are important in the forest management process are

A data base of existing conditions from which technical experts and the public can judge the expected effects and level of prediction uncertainty,

Best Management Practices (BMPs) and prescription development,

Identification and selection of BMPs for a particular activity and how uncertainty of BMPs are factored into selection,

Through on-site inspection and administration during an activity, verifying that a particular activity is occurring as prescribed in contracts, leases or permits,

Environmental monitoring before, during, and after completion of an activity to determine whether impacts were accurately predicted,

J-532

Feedback mechanism that is built into the process such that forest activities causing a problem will be corrected before they are allowed to continue,

Upgrading BMPs or prescriptions to correct inaccurate predictions,

The use of NEPA for project preparation and implementation.

Based on our review of this process, EPA has rated the documents EC-2 (Environmental Concerns - Insufficient Information), a summary of EPA's rating system is also enclosed. The documents did not include as much detail on existing environmental conditions, especially water quality, which we believe can reasonably be included in a document of this type This information is important because it provides the baseline for understanding the environmental consequences and priorities for plan implementation. The feedback mechanism was not clearly described such that actions needed to correct problems discovered through administrative and field monitoring will be corrected. Our main concern is that the level of detail and commitment for water quality and fishery habitat monitoring is not commensurate with the sensitivity of the resource. Further elaboration of EPA's concerns, as well as specific comments on the DEIS and Plan are enclosed.

Though our concerns cover a broad range of issues we believe that they can successfully be addressed in the Final EIS and Plan, and that they will contribute to the successful administration of the BSNF. Toward this end, the EPA is willing to provide all possible and appropriate assistance. If we can be of help, or answer any questions you may have, please call Wayne Elson (206-442-1463, FTS 339-1463) of my staff or Paul Kaldjian (202-475-8797, FTS 475-8797) of EPA's Office of Federal Activities We have appreciated the opportunity to participate in this review and look forward to continuing participation in the NEPA process as the EIS and Plan are finalized.

Sincerely,

Robert S. Burd
Director, Water Division

Enclosures

cc WDNR
WDE
WDF
USFWS
NMFS
USFS, Region 6
USFS, Region 4
USFS, Region 1

10,664

U S ENVIRONMENTAL PROTECTION AGENCY COMMENTS

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND PLAN

MT BAKER-SNOQUALMIE NATIONAL FOREST

DEIS

Affected Environment

Additional detail on the current status of water quality is needed There is no organized summary is presented which covers the whole Forest A watershed inventory would be a logical place to present information documenting water quality conditions It is difficult to evaluate effects on water quality which would result from implementing the various options without documentation on the current status

III-13 The DEIS states that all waters on the BSNF are classified by the state as Class AA Excellent Further, that Forest-wide mitigation measures, water quality standards for the state are met through application of Best Management Practices (BMPs), water for domestic use and fish are key resources protected by BMPs The process for how this will be carried out should be explained further

Most headwater streams on the forest are naturally almost sediment free It would be useful to identify the ones that are not, identify the causes for this, and what is being done to prevent sedimentation, and differentiate between natural and man-induced causes

"Among the water quality attributes that affect water use by fish, temperature can be a concern Removal of streamside vegetation usually increases summer water temperatures in direct proportion to the amount of increased sunlight on the water surface Changes in water temperature begin to have a detrimental effect on fish/fish habitat when a threshold amount or percent of streamside vegetation that provides shade is removed within a watershed or basin Mitigation in the form of limiting removal of vegetation along streams, etc , has generally been successful in the past " While the DEIS elaborates on the process, it should be concentrating on current conditions within the Forest Again, where are conditions unacceptable, what are their causes, and what things are being done to rectify the problem

III-15 For the comprehensive list of municipal watersheds listed in Table III-2, have there been instances of waterborne disease? Any significant source related water quality problems should be summarized

III-19 For purposes of Forest planning, width of riparian areas on BSNF is at least 100 ft back from water's edge on both sides of all perennial streams Does this include intermittent streams that do not directly supply domestic water, are not used by fish, or contain enough water to be a major contributor to streams that contain these characteristics? How and when is the boundary determined for protecting all other riparian areas, including wetlands?

J-533

III-27 The text uses the definition of old growth "mature, large sawtimber, at least 21 in diameter at DBL " Does this cause any confusion with roadless areas that may have virgin growth not meeting this definition? Also, the glossary definition (page V-46) seems to be different

III-72 Discussions on riparian zones and wetlands need to be expanded to include current conditions and issues unique to the BSNF The discussion in the DEIS is too vague to clearly understand existing conditions

III-74 "Major effects to fisheries resource and habitat come from stream sedimentation resulting from road building, timber harvest activities, and recreation over-use on erodible soils, and from vegetation disturbances along streams, primarily that which removes shading vegetation or leaves excess debris in the streams " This is more a discussion of environmental consequences than affected environment The DEIS needs to describe what these have done to the BSNF environment and what is being done to curtail or reverse impacts

III-74 Are all stream miles fishable? What is the current condition and ability of the forest to produce fish--are all stream segments hosting what they should?

III-147 The term "hydrocarbons" should be changed to "volatile organic compounds" to reflect current terminology

The text explains that activities on BSNF land that can contribute to suspended particulates are burning vegetation, logging activities, road construction, campfires, and vehicular traffic on gravel roads But what are the conditions on the Forest?

Washington State Department of Ecology has set a required 35 percent reduction in emissions of total suspended particulates from prescribed burning by 1990 What is the base from which this percentage reduction reduction is derived? The 1976-1979 levels?

III-148 Is the 35% reduction by 1990 (p III-147) based on better wood utilization? How much is currently being contributed based on the tons of particulates for each acre yarded, each acre cleared for roads, each acre broadcast burned, and each acre of mountain goat habitat created?

III-155 Current mining of olivine is 30,000 tons/year from one mine The DEIS says that "since the resource is virtually inexhaustible, these deposits will meet any foreseeable demand " Are there no environmental impacts or concerns resulting from the operation of this mine, now or in the future? What NEPA procedures are followed for this and the 4,000 mining claims properly recorded on the Forest

III-156 The EIS should explain the environmental process that is followed if coal, oil, gas, geothermal or leachable minerals will be mined or pumped This also goes for the extraction of sand, gravel, and stone

III-162 Road construction probably results in the greatest amount of ground disturbance of any forest activity Still, this section of the DEIS only identifies the number/miles of roads and what types, but no mention of the condition Are the roads on the BSNF contributing to the adverse impacts to the environment, especially water quality? Current conditions and efforts to prevent adverse effects need to be discussed.

III-164 It is not clear what methods for vegetation management are currently being carried out on the Forest, since 1984, as the injunction on pesticide use continues This should be discussed.

Environmental Consequences

IV-2 An important part of implementing the final Forest Plan will be monitoring the accuracy of these predictions to provide more and better information for future planning

IV-2 Reference is made to the vegetation management DEIS, "for planning purposes, it is assumed that herbicides will be available The use of chemicals for site preparation and release has been a small program in the past In this chapter, the environmental effect of herbicides will not be discussed, their effects are examined in detail, in October 1987 EIS [sic] " If the intent here is to incorporate information by reference, this must be made more clear Further, this is not a sufficient tiering -- the vegetation management EIS is for all the forests in Region 6, and describes the pesticide to be used, the health effects, and typical environmental risks and effects, however, it does not lay out the specific nor the unique characteristics of the BSNF

IV-2 Under "Cutting Vegetation" as a general effect of management activities on the environment, we suggest adding that cutting vegetation also changes the timing and flow peaks See page IV-14 bottom

IV-3 Under "Burning Vegetation and Other Debris," the fact that burning is less costly is not an effect, rather, a justification, of the method The tendency to confuse impacts with justifications should be avoided

IV-3 It is not clear how planting vegetation increases noise from motors, logging whistles, and people Further, the significance of these environmental impacts and how they can be avoided should be discussed

IV-4 In the discussion under Trail Construction, to "make remote areas accessible to hikers" is not an environmental impact of the activity (though it may lead to environmental impacts) but a justification or goal of the activity Mixing impacts with justifications confuses the issues

IV-6 For Table IV-1, does this mean that the preferred alternatives will contribute 67,000 new tons of erosion/year? Is this in addition to the existing 72,000 tons per year above natural rates? Are all these caused by human activity?

IV-9 The discussion of the cumulative effects of each alternative is only in generalities There needs to be a comprehensive discussion of all cumulative impacts somewhere, showing the cross-media and temporal relationships The current presentation of the cumulative impacts is compartmentalized, which discourages evaluation of areawide relationships among and between forest management and natural activities

IV-10 Having a section on the impacts of soil on water may be misleading because soil itself does not have the impact on water, but rather the soil disturbances that cause erosion, sedimentation, and mass wasting The crucial elements are how the soil gets to the water, how much, and whether this affects beneficial uses

IV-11 The DEIS states that "Changes in soil which increase surface erosion and/or mass wasting can have a major effect on fish spawning and rearing, when the material reaches stream channels and is deposited as sediment The extent to which fisheries will be affected depends upon the type and size of the disturbance and the susceptibility of a particular soil to be involved in a mass wasting event " The various causes of sedimentation affecting fisheries and how they can be avoided should be discussed

IV-14 The Built Environment Section, on page IV-146, includes a discussion on the two types of mitigation for road construction An evaluation of the effectiveness of various mitigation techniques for road construction, when each should be used, and the trade-offs between the two should be provided

IV-15 It would be helpful if the time-units for Figure IV-1 were provided

IV-16 While all alternatives will have a relatively low risk of creating disturbance in wetlands, the alternatives that prescribe the most ground-disturbing activities (NC,A,D) create the most risk Any areas that are disturbed will be rehabilitated How this is to be ensured, what the process for doing so will be, and who the responsible parties are need to be explained

IV-16 For Table IV-4, the text says "percents will have a very rough estimate of the effects of harvest activities on water " There should be a narrative describing the relationship between the two A table of anticipated impacts to water for each watershed should be included This could be part of a comprehensive cumulative impacts analysis

IV-17 Chemicals used for vegetative control can create water toxicity Chemical entry into streams is mainly through direct application to stream surfaces and drift or run-off from nearby treatment units Standards and guidelines (Appendix D and Plan) provide specific direction for any application of chemicals near water At present, the Forest is still enjoined from any use of herbicide The full implications of this should be discussed The plan must also describe those elements of pesticide use that are site-specific to the BSNF, but only generally described in the programmatic vegetation management EIS

IV-19 It is not sufficient to "insure" that impacts to water resources from mining will not be significant because of the regulatory controls available for water resources The mechanisms and processes for carrying out the regulations need to be presented

IV-20 If the accumulations of sediment in streambeds become significant when the roaded portion of a sub-basin area exceeds 2-3 percent, and the average road density on the BSNF is between 3 percent and "somewhat less than 3%," it appears that the accumulations are or are about to become significant Therefore, the assumption that road construction will not contribute a critical level of sediment is tentative This needs to be evaluated much more thoroughly In addition, how the percentages are calculated, and how the percentages will change over the next decades should also be discussed

IV-21 It is stated that mitigation measures, proper construction, and timely maintenance can help negate these effects from runoff and major sedimentation from road systems The extent to which the adverse environmental impacts will be prevented, the mechanisms for doing so, and the commitments toward protection need to be described

IV-21 It is the nature of cumulative impact analysis to analyze the combined effects of many minor effects Therefore, it is not sufficient to address only the major causes

The EIS needs to discuss further the situation when insufficient data is available to predict cumulative water quality effects A statement of intent to collect data over the life of the plan, how important the missing data is to the Plan and EIS, how decisions will be made despite the absence of important information, and what assumptions were made in making those decisions are needed

IV-23 Discussion of the class of watersheds and existing conditions seems more appropriate under Chapter III, the "Affected Environment "

IV-25 Forest Service thoroughly identifies the relationships in cumulative impact assessment, however, with the approach that was taken certain environmental effects can be masked

IV-26 It is not clear why the Deer Creek study is referenced, the information gained from the study and how it can be applied should be discussed

IV-27 The discussion on mitigation measures for water is too general For example, the procedures to be followed, the source of options for mitigation, the decision-making processes in choosing mitigation measures, etc , are an important part of this section This is necessary for determining the ability to minimize the impacts to water quality

IV-61 There is no real discussion of the effects of changes in soils on fish The only discussion is that the streams in western Washington and Oregon are highly vulnerable and that there may be major effects on fish There needs to be discussion of specific areas for this to be useful

IV-61 In the discussion of the effects of recreation on fish, there is no discussion of the measures that will be used to mitigate the impacts to fish populations, nor the criteria for when they need to be applied They should be included

IV-63 The discussion here is too generic, centering around the types of impacts that may occur Nothing specific to the BSNF, nor precautions that will be taken are discussed This leads to confusion between what could possibly happen, and what could be expected if mitigation or proactive decisions were not made

In trying to identify the environmental consequences of the alternative on the various resources of the BSNF, there is no real indication of what to expect and what will be done Other than adding the maps, and some constraints contained in the Standards and Guidelines and the Mitigation Measures, there seems to be few BSNF specific planning requirements While some of these are in other FS documents, the purpose of the plan and EIS is to translate these into specifics for the BSNF

IV-64 To assume that mineral related effects on fisheries resources on the forest will not be major, based on compliance with state and federal laws and following an environmental assessment with reclamation goals and mitigation measures, is not appropriate We suggest specific reference to the requirements of NEPA Secondly, because there are different ways of complying with the law, and different interpretations of the law, how the FS will proceed must be explained What, for example, is the process that will be followed to establish a mining operation on the BSNF?

IV-64 The effects of land uses on fish is a generic statement of the impacts of hydroelectric power plant development on fish and fish habitat It is important that the criteria for what is acceptable and what is not should be discussed (The FERC Cluster Impact DEIS on the Snohomish River may be useful here) Also, the process FS will follow if an applicant wishes to put in a dam needs to be included in the EIS The FS role in ensuring no unnecessary adverse environmental impacts needs to be explained

IV-64 The presentation of the impacts of roads to fish is again a presentation of broad categories of what can occur, and of general events that are known to occur, rather than specific discussions of what is taking place on the BSNF

IV-65 The statement that road construction, timber harvesting and small hydro construction/operation is beneficial to fish/fish habitat needs to be elaborated upon Under what circumstances is this the case and how is this determined?

IV-65 What are the threshold levels for fish and fish habitat and what will be one if management activities cause a drop below this level? It is not sufficient to say the impacts are adverse and unacceptable, rather, the ways and processes for avoiding, protecting, and mitigating need to be discussed

IV-65 It is stated that "Timber management activities generally have less cumulative effect on spawning habitat quality than do forest roads " The meaning of this comparative statement is unclear Is it based on habitat monitoring on the BSNF? Both have the potential to cause adverse environmental impacts and need to be addressed as such

IV-65 A cumulative impact assessment is more than saying that something can cause cumulative effects It is identifying the various elements needed to prevent future problems This needs to be reflected in the FEIS

IV-65 The criteria for determining how much large woody debris from timber harvesting activity is too much should be explained How successful have projects that are intended to restore large woody debris been on the BSNF?

IV-66 What is being done to accommodate for data gaps needs to be explained, the NEPA implementing regulations address the issue of missing or incomplete information can be used to address the lack of studies on cumulative effects to salmon from small hydroelectric power development

IV-67 We were not able to find the minimum shading requirements for timber harvesting and fish under "Direct Effects "

The DEIS does not disclose the potential impacts on air quality both inside and outside of the BSNF by prescribed burning activities on Forest lands The DEIS does a good job of quantifying the emissions from prescribed burning for each alternative and correctly indicates that such burning would be done in accordance with the State of Washington smoke management plan (SMP) However, the DEIS needs to provide some discussion regarding the location and frequency of burning activities and the downwind air quality impacts such burning would have, even when conducted in accordance with the SMP This would include

(1) expected concentrations at communities downwind of burning activities (using the SMP to identify impact areas and dispersion modeling to estimate concentrations),

(2) expected concentrations at residences, recreational areas, etc , immediately downwind of individual burns (based on recent data collected in Oregon), and

(3) impacts on visibility, both in nearby Class I areas, within the new wildernesses which are not Class I areas, and both inside and outside the BSNF

The technical tools for performing these analyses are now available and the quality of the results are adequate for comparing the potential air quality impacts of the alternatives

IV-127 Volatile organic compounds are also emitted by prescribed burning activities and should be included here

The conclusion regarding carbon monoxide is incorrect even though the data for I-5 at Northgate and the state and federal standards are correct The measured 8-hour average of 11 ppm at Northgate exceeds the state and federal standards of 9 ppm Although traffic volumes in the I-90 corridor are less than that of I-5 at Northgate, this data, in and of itself, does not justify a conclusion that the carbon monoxide standards are not exceeded through the I-90 corridor

IV-128 The use of the terms "total suspended particulates" and "suspended particulates" on these pages needs to be revised to be consistent with the current terminology per EPA's July 1, 1987, revisions to the national ambient air quality standards (NAAQS) for particulate matter (52 FR 24634-24669 and 24572-24715) In these rulemakings, EPA revoked the NAAQS for total suspended particulates (TSP), promulgated new NAAQS for particulate matter with aerodynamic diameters less than or equal to a nominal 10 micrometers (PM_{10}), and retained the prevention of significant deterioration (PSD) increments for TSP In order to implement these revisions, EPA defined the terms "particulate matter" (40 CFR 51 100(oo)), "particulate matter emissions" (40 CFR 51 100(pp)), "PM_{10}" (40 CFR 51 100(qq)), "PM_{10} emissions" (40 CFR 51 100(rr)) and "total suspended particulate" (40 CFR 51 100(ss))

When discussing the emissions from prescribed burning activities (page IV-128, paragraphs 3, 4, 5, 6, 7, page IV-129, Table IV-38, paragraphs 4, 5) the term "particulate matter emissions" should be used When discussing historical ambient concentrations of particulates (page IV-128, paragraph 6) in relation to state and local standards, the term "total suspended particulate" should be used

IV-128 Paragraphs 6 and 7 need to be expanded to include the discussion of downwind impacts as indicated above

IV-129 Although it is technically correct to indicate that changes in visibility are affected by "particulate matter emissions", it would be better to discuss the fine particle (i e less than 2 micrometers in aerodynamic diameter) emissions which have a much greater effect on visibility It is still true that prescribed burning is the primary contributor to such fine particle emissions in Western Washington

IV-146 In the discussion of mitigation and adverse impacts, it is important to identify the resource being affected

IV-147 It is stated that "Other mitigation measures are discussed in the last section of this chapter " We suggest that there be one place where all mitigation related to roads should be included or summarized The same suggestion is also to be applied to all other categories This would be of great assistance to document to reviewers, as well as to those that will be applying the EIS and Plan

IV-151 It is not clear whether a resource area is the same as a management area. The nature of this unit should be explained with a definition

IV-152 Explain the meaning of "the identification of an 'adverse effect' is somewhat subjective " It is very important that the criteria for making this determination be discussed

IV-152 The adverse environmental effects that cannot be avoided should be further discussed If a certain level of impacts are acceptable, the FS must identify to what extent these impacts are acceptable, again providing criteria for making this determination

IV-157 Under "The Fish Resource" there is no discussion of mitigation measures but, rather, a general presentation of potential problems and the application of BMPs These relate not to the practical options to be used or developed, but to generally known experiences

IV-159 The standard referred to under Regeneration Assurance needs to be discussed, including what it is, who applies it, and where it can be found

IV-159 Under Suitable Lands, the standards are more specific, but there should be an evaluation of the environmental results of past activities for use in future decision making The protocol for using the information should also be made available

IV-159 How the lands are evaluated for classification needs to be discussed This would include discussions of the accuracy of methods and identification of the responsible officials

IV-161 The standards that have been developed need to be identified more specifically By stating that special attention will be given to activities in riparian areas, there are no assurances that the riparian areas will be adequately protected and that potential impacts will be properly mitigated For example, what will and will not be allowed in riparian areas should be discussed

IV-161 The context of the statement on BMPs and the EPA is not clear The purposes for which the reports are prepared and are carried out needs to be discussed, as well as how they affect Forest Service management activities

IV-161 How protection of water quality standards is ensured through BMP implementation, needs to be explained further

IV-162 For the Mineral Resource the "appropriate environmental analysis" to be conducted needs to be explored If this refers to NEPA, such should be clearly stated The procedures, criteria, and relationships of future site-specific activities to the overall plan need discussion/explanation Without these, it is difficult to assess future and cumulative impacts.

Further, the monitoring protocol for periodic inspections to ensure compliance with approved operation plans should be included

IV-162 The introduction to the specific Management Areas is confusing A clear distinction between mitigation measures and standards and guidelines must be made Without this, it is difficult to differentiate between what is required by law or policy and what is specifically designed to minimize or eliminate the environmental impacts of a given decision or activity

IV-162 Though it is "expected" that the mitigation measures will be effective, assurances must be made, and feedback mechanisms must be implemented, to ensure this

IV-166 We suggest that the DEIS include a comprehensive discussion of the status of pesticide use on Federal lands in the Pacific Northwest This could tie in the references to pesticides made on pages IV-171,-172,-175,-169, and elsewhere throughout the document

IV-167 How will it be determined where and whether water temperature is an issue? *And doesn't it usually become an issue until after the shading requirement* goes below 80%, and it is too late?

IV-167 The process for issuing FERC licenses and permits needs to be more thoroughly discussed, including the minimum standards that are required

IV-168 Under 13B, silvicultural treatments will be permitted only when riparian objectives can be met How are the riparian objectives determined, and who makes the decision whether or not the treatments are consistent with the objectives A reference to another section of the DEIS may be in order

FOREST PLAN

Management Situation

2-19 In this Information Needs Section, it is not clear how important the current absence of this information is to the plan and DEIS where the information will actually be gathered, what the FS will do in its absence, and how the information will eventually be used While identifying the needs for additional information is very important, the role of the future information and the commitments to obtaining it need to be discussed For example, whether the projects are ongoing or planned, and who the responsible parties are need to be identified, including reasonably expected time frames for gathering the information Some sort of prioritization would also be helpful

Responsiveness to Issues, Concerns, and Opportunities

3-7 In stating that an environmental analysis will be done, we suggest referencing *the NEPA regulations to clarify the nature of the environmental analyses* For clarification, "other resources" should be explained

3-7 For the estimated soil sediment output estimates to be meaningful, the current sediment outputs need to be stated, including a breakdown of what fraction is activity generated and what is natural background

Forest Management Direction

4-1 For the management goals to be meaningful, the EIS needs to include something to help determine when goals are met or when they are slipping behind some schedule This is essential for accountability, documentation, and evaluating results

4-4 Under "Protection" for forest management goals, it is not clear what is being *protected and what this needs protection from*

4-7 It is stated that "Resident fish habitat will remain essentially as it existed prior to the Plan implementation" and that "Anadromous fish habitat will have improved significantly " It is not clear that this is a result of improved water quality on the BSNF We suggest making the correlation between fish habitat improvement and what specifically is being improved that results in an improvement to the habitat

4-12 To avoid confusion and to provide a clear indication of the actual extent of wildlife habitat improvement, we suggest providing actual acreages as well as acre equivalents Further, the Glossary needs to provide a more useful and concise definition of acreage equivalent

4-13 In our review edition of the Forest Plan, the page numbers go from 4-12 to *4-16* It does not appear that any pages are missing

4-16 There is a big jump in the production of energy materials over five decades--from 0 to 477 billion BTUs per year What kinds of environmental impacts and environmental analyses are to be expected from this?

4-17 We support the concept whereby the level of involvement will vary commensurate with project complexity However, this needs additional discussion The criteria for determining what levels of involvement are appropriate, the monitoring to confirm predictions, the contingency plans, the responsible parties, the level of environmental analysis, etc , all need to be tied into this procedure for it to be meaningful

4-17 It is stated that "Emphasis will be placed on the protection of riparian areas so that *their integrity is maintained* " Riparian integrity needs to be clearly defined Under such an approach what level of impact still preserves the integrity of the area?

4-18 What does it mean monitoring will be done at "several levels of intensity, the most common will be end-product reviews, which are highly cost and time effective" and that "more intensive monitoring will be done as needs arise"? In many cases, intensive monitoring is needed to gather baseline information against which to compare impacts Is this need provided for in the above statements? Is long-term monitoring encouraged under this approach? Finally these statements also need to be tied into the threefold procedure of implementation, effectiveness, and validation monitoring

4-41 Acknowledging and identifying the activities that have the greatest impact on fish and fish habitat is good as the first step However, protection, mitigation and restoration of fish habitat should not only be a primary emphasis of the fishery program, but of all activities that may have adverse impacts on fish/fish habitat There is no apparent coordination of the fisheries program with other resource management programs

4-42 We support the high investment level in habitat improvement Fish habitat capability should also be monitored

4-42 How is catchable fish related to total fish, and how are the figures 100 catchable fish/lake acre and 55 catchable fish/stream mile determined, developed, and monitored?

4-57 The Minerals section begins by stating that "This section contains a (1) 'brief' description of the minerals management program and (2) summary of how the mineral resources and activities will be managed " A full discussion of the program and management under the Plan needs to be included It is not found on page 4-99 under Forest-wide Standards and Guidelines We suggest completing the minerals discussion under this section

4-57 The process the FS will follow when mineral activities will be incompatible with the management objectives should be identified in the plan As presented, it is unclear who carries what responsibilities and whether or not there is a threshold above which the project scope needs to be reassessed It is also important to explain the requirements placed on the proponents of the mineral activities

4-57 What standards specifically will be used to help determine whether mineral development is the highest and best use and whether a withdrawn area should be revoked? What is meant by "withdrawal" in this instance?

4-57 The statement that "Through monitoring, the processing of mineral management activities can be made more efficient, reclamation techniques can be made more successful, and objectives can be made more achievable" is misleading Monitoring is a process of identifying needs and trends, accurately identifying and appropriately using the information gathered by monitoring helps lead to project success Monitoring alone does not ensure success

4-57 There must be a discussion of future site-specific NEPA analyses For example, what kind of environmental impact evaluation process will be followed for anticipated mining activities?

4-57 The confidence in industry's ability to conduct activities in sensitive areas needs to be demonstrated by a willingness for environmentally protective activities If "restrictive" management objects will be changed based on industry's ability, such will have to be documented and ensured

4-58 What are the "minimal to moderate" restriction on the mineral resource activities that the Plan allows? Again, there should be discussion of NEPA

4-58 With respect to mineral interests on the BSNF, it is stated that the actual amount of activity may vary significantly from that which has been predicted The Plan needs to discuss the impacts of this to the Plan, the planning process, and cumulative effects analysis, etc As the ensuing impacts may be significant, they need to be discussed, despite the uncertainty

4-62 This is the kind of commitment we believe is appropriate with protection of the environment from FS activities "As funding levels vary primary priority will be given to resource management and protection, with secondary priority given to user convenience " However, the Plan should continue further to be clear that protection of water quality and beneficial uses will be given priority

4-63 The numbers for road construction appear inconsistent First of all does "ultimately" mean after five decades? Secondly, at what point in time is the plan considered implemented? In other words, how do the average road construction rates of 185 miles for locals (18 5 miles?) and 5 2 miles for arterials and collectors through the first decade contribute to the 823 miles (714 + 109) expected to result from Plan implementation?

4-63 Which roads will be permanently closed, beyond those listed? If they are not yet known, what will be the criteria for closing roads?

4-63 Appendix B should be discussed For example, how and why these particular road projects were chosen and what the order of project activity will be need to be discussed

4-69 Forest Service documents (DEIS Preparations Guide and Outline Appendix D, 1985) state that standards and guidelines "provide the description of how things will be done on the ground " This is inconsistent with the stated purpose of standards and guidelines found in the Plan Their purpose is to identify anticipated direction for activities on the BSNF, and to use in the formulation of the Forest's planning model and development of alternatives These two purposes obscure the basic intent to provide specifics We suggest that FS make the standards and guidelines more applicable to all who follow plan implementation

4-89 It is important that the Plan explain and discuss cooperative efforts for fish habitat restoration projects and fish stocking programs, for example with states, tribes, or any others

4-91 Under Management Practices for Timber Management, it is stated that "Management intensities will vary with site productivity, timber species, other resource management objectives, and timing of implementation " In the same way, the Forest Service should ensure that monitoring intensities correspond directly with management intensities and site sensitivities

4-93 The reference for guidance on created openings should be presented For example, how was it decided that a clearing is considered closed when the tree is 4 5 feet high? Is this from other Forest Service documents? Further, what does "when other resources management considerations prevail" mean? And where in the Plan are the "particular management objectives" to be found?

4-95 To meet the Forest-wide standards and guidelines for soil, air, water, and riparian areas what are the FS's responsibilities over and against those of the state and private contractors? What kinds of arrangements are made with the contracted harvester, mineral lessees, special use permit holders, etc ? What does the contract include?

4-96 The statement that says that the FS will "Plan and accomplish rehabilitation projects as necessary to meet soil and water objectives and standards" needs to contain specific information to be meaningful Again, criteria, commitments, etc , need to be included

4-97 With reference to BMPs and water quality standards, the Plan and EIS must be consistent and accurate on the relationship between the two throughout the document

4-97 This section lacks the specific commitments to water quality and riparian areas needed to ensure adequate protection

4-97 It is stated that "Geographical boundaries of riparian areas are determined by on-site characteristics " What are these characteristics? How much of the area around the riparian area is included within the area to protected? Further, large bodies of water in addition to those listed, will be included, how large is large?

J-538

10664

4-98 It is apparent that the vegetation cover referred to in the top paragraph are what are commonly referred of as buffer strips This should be made clear In addition, it is important to identify specifics for how they will be implemented

4-98 We support the decision to inventory and map riparian areas for the Forest-wide data base but discussion of this needs to be much broader Discussion should include the data that the Forest will be collecting This is very useful for cumulative effects Specific guidance is needed so that data collection will be consistent across the forest How will the information gathered here be used to address the information needs identified on page 2-19? How will decisions affecting riparian area be handled without this inventory?

4-98 The reference to cumulative impacts needs to be supported by further discussion

4-99 We support efforts to "be directed toward minimizing adverse environmental impacts on the surface resources and toward reclaiming the site " But what will be done to specifically carry that out? This needs to be discussed

4-99 The contract conditions for mineral/energy exploration and development need to be discussed

4-108 There needs to be reference to the vegetation management EIS in the final stages of development in the Pacific Northwest How will the USFS proceed in the event the injunction is lifted? The programmatic EIS is not sufficiently specific to cover the BSNF And the EIS does not sufficiently document the potential use of various pest management techniques once the injunction is lifted Will further environmental analysis be conducted after the injunction is lifted?

4-117 Under the Fire Prevention Plan there is reference to specific direction relative to those elements and issues crucial to the successful and environmentally sound completion of a project/activity Every management activity on the Forest needs such specific direction However, there is still the need for additional discussion to make the document useful There should also be specific time frames and identification of responsibilities

4-120 The accompanying maps do not show the management areas for riparian and fish habitat emphasis Page 4-98, #10, implies that these areas are not known If the resolution of the maps is such that the riparian and fish habitat areas cannot be shown on the maps, they still need to be identified somehow

4-120 For the most part, the prescriptions for each management area do not contain the level of specificity necessary to be of real guidance to the federal land manager They are general and set in very general terms, leaving room for a wide span of interpretation Without question, the land manager must be given enough room to allow for special circumstances However, a minimum level of specific guidance must be provided

4-143 Under WINTER SPORTS RESORTS, the standards and guidelines for Water, soil, and air state, simply "Meet Forest-wide S&G Give extra attention to erosion prevention and control on areas cleared for ski runs " This does not indicate what air and water quality standards must be met Nothing identifies what visual quality and riparian zone guidelines must be followed Further, what kinds of contractual arrangements are made with the ski areas? What kinds of monitoring and cumulative effects analysis is carried out?

J-539

4-169 Under RIPARIAN AND FISH HABITAT EMPHASIS, to maintain consistency and thorough environmental protection, there needs to be specific guidance on how riparian zones are to be delineated There is also reference made to "this strategy"--what strategy? There is no strategy discussed or presented

4-170 Under "Planning" for "Fish & Wildlife", how is it known when the standards are met?

4-170 Intensity 13C is fully represented, but where are 13A B & D?

4-170 Under (C)(1)(b), which trees are not planned to be harvested--how will it be determined which trees are needed for slope stability or future wood debris?

4-170 Under (C)(1)(c), for monitoring streamside vegetation, it is not clear whether 80% shade is 80% of the existing total watershed

4-170 Under (C)(1)(d), current levels of habitat capability and riparian vegetation diversity need to be identified Discussion needs to be given to what criteria will be used for determining which places are selected for improvement

4-170 Under (C)(1)(e), for managing wetlands, is it meant that wetlands will only be protected if T&E species are involved or if they are at least several acres in size It appears that this may unnecessarily neglect some important wetlands How is the "several acres in size" to be interpreted

4-171 Under Habitat Improvement (C)(2), fish & wildlife habitat to be emphasized How is this emphasis to be realized, i e , what does emphasize mean and what specific activities will be encouraged and actually carried out?

4-171 Under timber (E) What does "A range of silvicultural treatments will be permitted only when riparian objectives can be accomplished" mean? This needs to be elaborated upon There should also be inclusion of BMPs for mitigation, as well as contract conditions

4-171 Under (E)(2)(a), the purpose of the reference to Fl is unclear

Under (E)(2)(b), what happens if more than 10% of the area is damaged, and what defines the area? How is this enforced and monitored?

Under (F)(1)(a), what does it mean to permit watershed improvements and maintenance? Should they not be required? We suggest that a more active, rather than passive, approach be taken

Under (F)(2)(a), how is no more than 10% soil exposure ensured?

Under (F)(2)(b), how are disturbance, widely distributed, and project area to be interpreted?

4-172 For mineral extraction, a statement of protection of riparian values is not sufficient How will this be determined or ensured?

4-172 Why is NEPA mentioned under (J)(1) and not (J)(3) or (J)(4)?

4-172 What is (J)(4), Land Ownership Planning, and how is this area special And what does it mean that "federal and non-federal lands shall contain equal amounts of riparian habitat"? If this refers to land exchanges then such must be made clear

4-172 Under (L)(1), it is stated that "Locating roads in riparian areas can only be done if riparian values are protected " How it is determined and ensured needs to be explained

Under (L)(2)(a), *it is not* clear what is meant by the "stated riparian area objective? Should the word "to" instead be "by"?

4-172 Under (L)(2)(e), there should be a high priority for protection above and beyond correction Further, how does "high priority" translate into management reality?

4-190 How are the Timber elements under (E) ensured and who implements it?

4-191 Under (E)(10)(c), what criteria will determine or be used to determine the prevention of degradation? What are the selected methods available for site-specific analysis?

4-191 Under (E)(16), what is the connection to the vegetation management EIS?

4-192 There must be, included under (E)(21), a reference to NEPA Is this a part of the NEPA scoping process, and does this contribute to the decision-making for determining adding a sale project?

4-193 Under (E)(25), the Timber Harvest Administration should include development, implementation and verification of BMPs that are doing what they are intended to do. This means monitoring Under (29) or (30), FS should ensure that the environmental components of the sale have been satisfactorily done

4-194 Under (F), FS should consider requiring BMPs, site monitoring, and tracking cumulative effects before, during, and after project activity

Implementation of the Forest Plan

A main concern on the proposed Plan is that the level of detail and the commitment to monitoring and feedback mechanisms was not commensurate with protection needed by the environment The feedback mechanisms need to be made clear so that standards and guidelines, best management practices, standard operating procedures, intensity of monitoring, and timber sale administration are adjusted when monitoring indicates a need Inclusion of these components will significantly strengthen the accuracy and effectiveness of the FEIS and Plan Further, the regulatory requirements in NEPA and the National Forest Management Act (NFMA) support the development of a detailed monitoring plan and feedback mechanism

NEPA requires that EISs include mitigation Without a detailed monitoring plan, it will be difficult for the Forest to comply with the Council on Environmental Quality's NEPA regulations which require that an EIS shall contain "means to mitigate adverse environmental impacts (40 CFR 1502 16(h)) " *When adverse effects on water quality and* fisheries are potentially significant, they must be mitigated A detailed monitoring plan needs to accompany any proposed mitigation activity in order to measure its effectiveness and ensure that necessary corrections are implemented

NFMA also provides the basis for a monitoring plan The National Forest System Land and Resource Management Planning Regulations (36 CFR 219 11(d)) state that a Forest Plan shall contain a "Monitoring and Evaluation Requirement that will provide a basis for *a periodic determination* and evaluation of the effects of management practices " Since the effects of management practices for timber outputs can significantly affect water quality and fisheries, a detailed monitoring plan is warranted

The development of a detailed water quality monitoring plan should be based on a list of current beneficial uses, present condition, and desired future condition for each stream or a watershed unit which is small enough to adequately protect the beneficial uses (similar to the concept in goals for roads in Table 4-18). The present condition and desired future condition can be expressed in terms which best describe the beneficial use (e g percent fish habitat capability) The monitoring plan should include types of surveys, location of sampling, parameters to be monitored, indicator species, budget, procedures for using data or results in plan implementation, and availability of results to interested and affected groups Enclosed is a copy of our monitoring guidance Appendices A and O of the Final Nez Perce National Forest Plan, October 1987 includes the level of detail and approach to water quality and fishery monitoring which we believe can accomplish the stated objectives

5-1 The cumulative impacts of *the projects listed in Appendices A-H should* be discussed How these projects will affect the plan and in turn the environmental impacts of the plan also need discussion

5-2 If "outputs and activities in individual years may be significantly different from those in Chapter 4 and 5, depending on fiscal budget," how accurate is the plan? Is this why there are so few specifics? Does this imply that though individual years may vary, the net result after 10 years will be as projected? *How will FS proceed in the face of uncertain budgets?* If this is a real concern, it will affect the plan and DEIS, as well as the activities and environmental impacts, and must be discussed

5-2 The complete NEPA process needs to be described here, not just the case for a categorical exclusion Include scoping, EISs and discussion of cumulative effects See NEPA regulations 1508 4, 1508 7, and 1500 4(p)

5-2 It is stated that "The monitoring Plan ensures that activities reasonably conform to the Management Area direction, and that outputs *satisfy the Plan* objectives " At what point is "reasonably" no longer satisfactory? In other words, what is the threshold for unreasonable? Criteria are needed

5-2 In the case of monitoring for environmental protection, we believe that compiling results in an annual report for evaluation by an interdisciplinary team could be ineffective if monitoring shows that action is needed immediately Long-term monitoring is not sufficient by itself The *monitoring plan contains no timely feedback mechanism* for results from ongoing monitoring, especially of specific activities, like when a timber contract may be violated or an operation needs to be altered to protect water quality

5-3 While annual evaluations may be a good way of tracking cumulative effects, they preclude the ability for immediate action We recommend a plan for monitoring to provide immediate feedback on a site- and action-specific basis

5-3 What does it mean that "Procedures prescribed by NEPA will be followed as the Forest Supervisor determines the appropriate action " It is not clear what NEPA procedures have to do with monitoring results that indicate a reduction in water quality on Forest Service lands NEPA is not the mechanism whereby environmental impacts are mitigated, rather, it is a process by which to identify mitigation measures

5-3 Of the several variables across the top of Table 5-1 that merit special discussion, "Precision" and "Reliability" are mentioned They need further elaboration to be useful How they were determined, who measured them, with what, and to what end they can be used would be very helpful information

5-4 Under the heading "Method of Monitoring" in Table 5-1, the table confuses the way something is to be monitored (the method) with the indicator that is to be monitored, which, in some instances in the Table, is implied under "Unit of Measure " If is important that the Table be very clear about keeping the variable to be monitored (e g , turbidity) distinct from the method (e g Secchi disk or cobble embeddedness) These in turn, must be kept distinct from the attribute represented by the variable, i e , the attribute to be protected (e g , water quality)

For example, under Time-Impacts to Growing Stock Levels on page 5-5 "aerial surveys" and "stand exams" are a method of monitoring, but under Fish/Water- Evaluate Fish Habitat Capability Trends, on page 5-7, Quality and Quantity of Spawning Areas " "stream stability," etc , are not monitoring methods, they are attributes the land managers are concerned about protecting The table needs to be tightened up (It should be noted that "stand exams" and "aerial surveys" still lack specific criteria)

The Monitoring Plan as tabulated does not monitor the impacts of activities to resources, there needs to be an approach that links monitoring water quality to specific activities taking place on the Forest An inventory of watersheds and there current condition would be the first step

5-4 The Monitoring Plan needs to include an additional column to discuss what happens (or reference where in the plan it can be found) if the "threshold of variability" is exceeded There needs to be discussion of a specific course of action if the threshold is exceeded

5-6 It doesn't follow, under Fish/Water -- Effectiveness of Fish Habitat Restoration and Enhancement Projects, where the objective is to determine whether the habitat treatment results in an increase in habitat quality, that the unit of measure is the number of structures This is only quantitative and is not a true measure of improved habitat quality

5-6 The Table needs to include a column that provides a baseline to identify the level of a variable before an activity is initiated How else will the threshold of variable be determined?

In some cases units are needed for the threshold of variability above and beyond a straight percentage increase or decrease

The "Method of Monitoring" column for Fish/Water needs to be revisited and clarified. As presented, it is very confusing

Riparian are monitoring needs to occur before projects as well as after Long reporting periods such as 2 and 5 years may not be frequent enough to prevent damage from occurring in other areas

5-7 The Watershed Condition Class Assessment under Fish/Water needs a whole table and section for itself Table 5-1 should contain "Watershed Condition" as an "action/effort to be monitored "

5-4 Table 5-1 should be broken into two tables, on for monitoring actions and efforts, the other to monitor natural resources It is too confusing to combine output monitoring with (environment) effects monitoring They should be separated

B-1 What is the prioritization method for project implementation?

B-2 The projects left out of the listing, considered not major, appear significant How will they be identified and implemented?

C-2 For the wildlife habitat improvement schedule of Table C-1 the activity for wetland forage and habitat improvement is not specific but should be, to be consistent with the rest of the table

C-3 The structure available for each type of habitat improvement should be discussed, including what the opportunities, options, and requirements are

F-1 The funding levels on the right side of the page need to be explained Are they proposed, minimum, or allocated levels? If the money is not available, such should be explained

SUMMARY OF THE EPA RATING SYSTEM
FOR DRAFT ENVIRONMENTAL IMPACT STATEMENTS
DEFINITIONS AND FOLLOW-UP ACTION *

Environmental Impact of the Action

LO--Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal

EC--Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact EPA intends to work with the lead agency to reduce these impacts

EO--Environmental Objections

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative) EPA intends to work with the lead agency to reduce these impacts

EU--Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality EPA intends to work with the lead agency to reduce these impacts If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ

Adequacy of the Impact Statement

Category 1--Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action No further analysis of data collection is necessary but the reviewer may suggest the addition of clarifying language or information

Category 2--Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action The identified additional information, data, analyses, or discussion should be included in the final EIS

Category 3--Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts EPA believes that the identified additional information, data analyses, or discussions are of such a magnitude that they should have full public review at a draft stage EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS On the basis of the potential significant impacts involved this proposal could be a candidate for referral to the CEQ

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment

February, 1987

J-542

NATIONAL FOREST
WATER QUALITY MONITORING
RECOMMENDATIONS

GENERAL MONITORING GUIDELINES

Priorities. Greatest priority should be given to assessing fishery impacts in the following order: 1) endangered anadromous runs; 2) other anadromous runs; 3) resident salmonids; 4) and others, including warm water species.

Site Selections. Site selection for monitoring impacts on the above fish population should reflect the need for a representative range of environmental conditions, e.g., soil type, channel morphology, *and erosion potential*. *Special attention should be given to* watersheds with the greatest sediment production potential. Consideration must also be given to monitoring in heavily developed watersheds and in watersheds developed or disturbed in increments over time to evaluate cumulative effects upon fishery resources.

Paired Watersheds. Paired watersheds should be selected wherever possible, consisting of a representative stream reach in the watersheds to be developed and a comparable reach in an undeveloped *watershed. Control (or reference) reaches should be selected based* upon similarity in stream slope, elevation, streamside vegetation, bank stability, fishery, soil type, stream classification, etc.

Timing. Timing of monitoring should emphasize detecting impacts from first entry into a watershed. This may require prior monitoring to establish adequate baseline data in both the developed and undeveloped watersheds.

Frequency. Frequency and location of monitoring should be periodically adjusted to reflect needs or problems identified in the ongoing monitoring. Typically, monitoring at a specific site will be initially intensive, with a later shift to periodic trend verification.

Long-Term Monitoring. Certain aspects of the monitoring should be designed to evaluate impacts not detectable on a short-term basis. Examples are long-term stabilizaton of logging roads, recovery rates of degraded streams, persence of large woody debris, etc.

IMPLEMENTATION MONITORING

This on-site monitoring should evaluate the correctness of Best Management Practices (BMP) implementation. This information will be critical in determining whether adverse instream habitat impacts were caused by inadequate BMPs or improper implementation of BMPs. In general, however, we feel that the specific method used to evaluate the correctness of BMP implementation are best identified by the U.S. Forest Service (USFS).

EFFECTIVENESS MONITORING

Stream Monitoring Parameters. Both fish density (by species and age class) and fish habitat quality should be evaluated. Habitat quality should not be confined solely to substrate composition (e.g., cobble embeddedness and percent fine sediment by depth), but should also include such factors as pool/riffle ratio, amount and size of large organic debris, vegetative cover, channel morphology, etc. Data should be gathered by the most cost effective method while insuring data quality, and utilization of standard methods of measurement and analysis.

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CALIBRATION MONITORING

The total monitoring effort should be carefully designed so that one outcome is to improve our ability to predict via models: 1) the actual sediment loading to a stream; 2) the actual impact of those sediments on fish habitat; and 3) the actual impacts of those sediments or other fish habitat changes on fish population.

INTERAGENCY SUPPORT/COORDINATION

Technical Fisheries Advisory Committee. To improve interagency coordination (and to provide technical assistance and support), we suggest that the USFS establish a technical fishery advisory committee in each state. This group could consist of representatives of government agencies who manage the resource or whose activities impact the fisheries resource. By meeting quarterly, or as significant issues arise, this group could identify, and hopefully resolve problems as they develop. They could also play a key role in assisting the USFS in preparing and presenting the annual monitoring report discussed below.

Annual Monitoring Report. We suggest that an annual public meeting be held to brief all parties on the monitoring results. To minimize travel costs, the USFS could review results from individual forests within a state at a single meeting. This would also facilitate comparison of results from different forests. The technical fisheries advisory committee could help the USFS develop, and present a consensus on impacts and needed actions.

Written material should focus on an analysis of planned vs actual actions and impacts. For example, where water quality problems occurred, the USFS should clearly define the nature and cause of the problems, the corrective actions taken, and the procedures to be used to prevent future occurrences. This material, together with supporting data, should be made available to all parties prior to the public meeting. A more formal written report summarizing long-term trends and impacts should be prepared periodically, possibly at 5-year intervals.

10,935

STATE OF WASHINGTON
OFFICE OF THE GOVERNOR

OLYMPIA
98504-0413

BOOTH GARDNER
GOVERNOR

May 2, 1988

Mr. Doug MacWilliams
Forest Supervisor
Mt. Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, Washington 98104

Dear Mr. MacWilliams

I appreciate having this opportunity to comment on behalf of the state of Washington on the proposed management plan for the Mt Baker-Snoqualmie National Forest. The state of Washington wants a forest management plan which is both environmentally sound and provides an acceptable and stable supply of amenities and commodities, and I trust you will find the state's comments constructive.

The Forest Service is developing management plans for the seven national forests in Washington State These will have significant socio-economic and natural resource impacts on the state and those local communities and industries which rely upon forest resources In view of this, I have asked the appropriate state agencies to review each forest plan to determine whether it is consistent with state goals and policies I have also asked them to suggest positive steps which could be taken by the Forest Service to accommodate state concerns This review has included coordination with the Commissioner of Public Lands as the attached letter documents

The state's response is divided into several components Attachment A lists the key state policies, analyzes the preferred alternative with regard to them and indicates certain steps that the state believes should be taken Detailed state wildlife and fisheries concerns and prescriptions are in Attachment B Timber supply data and concerns are in Attachment C Attachment D provides data on state recreation needs And, Attachment E is a compilation of page-specific technical comments from state agencies

The Mt Baker-Snoqualmie National Forest is an irreplaceable resource for residents of Washington State Many in the forest products industry are dependent on the Forest for timber supply, the Forest's rivers and streams

J-544

provide crucial habitat for fish, the Forest is the home for much of the state's wildlife and it provides a wide variety of recreational opportunities for many Washington's residents, over one half of whom live within one-half day drive of the Forest.

Obviously, the Forest's capacity to meet the extensive demands on it is not infinite and therein lies the source of the problem. finding a way to balance the many competing objectives. This is a difficult task and I want to commend you for your excellent effort to date to formulate a long-term management plan to meet these differing objectives

As the enclosed state response indicates, Washington wants a stable and reliable supply of timber for its forest products industry, stability for timber-dependent communities, opportunities for its residents to enjoy the various recreational pursuits the Forest has to offer, and protections for habitat aimed at meeting state wildlife and fisheries goals While the state comments indicate its policies for these areas I recognize in the end there will have to be a balance among these diverse, and sometimes competing, state policies.

In this regard some basic questions have been raised about the Forest's current calculation of its timber supply base and amounts of old growth As the discussion in Attachment A indicates, the forest products industry has raised what we regard to be some legitimate questions regarding timber supply If through further examination it is determined that the Forest has significantly underestimated the Forest's timber supply base and that an upward adjustment can be made, the task of balancing differing objectives will be far easier. Concern has also been expressed by environmental representatives regarding the amount of old growth remaining in the forest We would like to discuss with the Forest Service its definition of old growth and the effects this definition has on estimates of old growth inventory

We have also noticed what appears to be a case of double counting in the Mt Baker-Snoqualmie National Forest Plan, with the Forest claiming a portion of the supply from other regions as part of its total supply picture for its own region The state's concern is that this is a misleading supply figure and, in fact, the industry in this region may have less timber available than projected This has significant ramifications for both industry and timber-dependent communities and highlights the need for an accurate assessment of timber supply from each forest and for an aggregate look at the supply from each of the seven forests in Washington along with the supply from non-Federal owners.

We would like to work closely with you, industry and environmental representatives to resolve these issues. Until such time that the state is comfortable with the Forest's analysis of the timber base and old growth supply the state is not in a position to make allocational choices for the other valuable amenities and resources. Decisions made on an uncertain data

base may lead to false choices regarding utilization of very important resources. We have, therefore, opted to provide the Forest only with state goals for these resources so that you are informed about the broad resource requirements that the state sees for the Forest. Information in Attachment A is not intended to be interpreted as the final state position.

In closing, I have asked the appropriate state agencies to conduct an aggregate impact analysis of all seven Washington Forest Service plans. We will not select or propose a preferred alternative plan for any national forest until this evaluation is done. Consequently, I urge the Forest not adopt individual forest plans until the state has had the opportunity to comment on the statewide aggregate impact. This will allow additional time for the state to work with you to develop and refine an acceptable final statewide position on all forest plans in Washington State

If you have questions or wish to follow up on any of the suggestions contained in this letter, please contact Bob Nichols of my office at (206) 586-0820

Sincerely,

Booth Gardner
Governor

cc: The Honorable Neil Goldschmidt
The Honorable Dan Evans
The Honorable Brock Adams
The Honorable Al Swift
The Honorable John Miller
The Honorable Norm Dicks
The Honorable Mike Lowry
The Honorable Don Bonker
The Honorable Rod Chandler
The Honorable Tom Foley
The Honorable Sid Morrison
The Honorable Jack Metcalf
The Honorable Brad Owen
The Honorable Dean Sutherland
The Honorable Simeon Wilson

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J-545

Brian Boyle
Commissioner of Public Lands

May 2, 1988

The Honorable Booth Gardner
Governor of Washington State
Legislative Building
Olympia, Washington 98504

Dear Governor Gardner

I have been pleased to participate in the coordinated state agency review of the Mt Baker-Snoqualmie National Forest Plan I strongly support inclusion and balancing of all state agency policy goals for national forest management within one state response I believe the policy review process for the Mt Baker-Snoqualmie plan has been a useful one and that the resulting policy comments broadly incorporate the policy goals of the Department of Natural Resources

I look forward to continuing to work with you and your staff so that our overall statewide recommendations on national forest plans will reflect a reasonable balance among diverse state natural resource and economic development objectives

Sincerely,

Brian Boyle
Commissioner of Public Lands

BB cpj

Department of Natural Resources
Olympia Washington 98504
206 753 5317

ATTACHMENT A

POLICY COMMENTS

POLICY 1 -- THE NATIONAL FORESTS SHOULD PROVIDE A RELIABLE FLOW OF RAW MATERIAL TO HELP SUPPORT THE VIABILITY OF THE STATEWIDE FOREST PRODUCTS INDUSTRY

The state of Washington expects the national forests to continue as a major supplier of wood for the state's vital forest products industry. Timber sales should provide a level of stumpage, species mix, and availability to meet industry needs without dramatic variations which distort stumpage prices and make long range industry planning difficult Providing a fairly stable flow of timber from national forest lands which avoids dramatic fluctuations is a preferred approach for the Mt Baker-Snoqualmie National Forest

Our review of the planning documents has raised a number of questions relating to a stable flow of timber that need to be clarified in the final EIS so that the state and the public can fully assess the consequences of the planned action.

The preferred alternative for the Mt Baker-Snoqualmie plan has an annual allowable sale quantity (ASQ) of 170 million board feet. This compares with a harvest of 210 million board feet per year for the 1976-1985 period This is nearly a one-fifth decline, and a substantial reduction from the mid-1960s level where, for example, the 1965 harvest was 484 million board feet Such declines have resulted from competing interests and amenity values (e g., land reserved for wilderness and projected needs for wildlife and recreation) and have had, and will continue to have, economic implications for the many mills which rely on the Forest for their timber supply

Understandably, the forest products industry has expressed concern regarding this decline in the Forest's timber supply In their attempt to address this issue, the industry has reevaluated the Forest's technical calculations to establish the available timber supply base Their specific concerns are listed in Attachment C The state has met with the industry representatives and has been advised of their numerous questions regarding the accuracy and validity of the Forest's timber supply figures We believe there is merit to at least some of the issues raised by industry and are troubled that, in discussions between the Forest Service and industry on this issue, there has not been any resolution. The substantial discrepancy between the industry and the Forest Service over the timber supply base is a major concern since, in the state's attempt to meet and balance state policy goals, we need to have a data base on which key participants can agree in order to provide a solid foundation from which we might evaluate various state options. Further, to the extent industry concerns are correct, they may represent a significant opportunity to adjust upward the supply of harvestable timber. Relative agreement on the timber supply base is a most critical element in evaluating these management plans and we urge continued discussions to resolve these very important issues We do not believe a final EIS should be released until the discrepancies have been resolved.

POLICY 2 -- PROMOTE LONG-TERM COMMUNITY STABILITY

It is the state's policy to encourage the balanced growth of the economy consistent with the preservation of Washington's quality of life and environment. Inherent in this policy is the provision of adequate opportunities and revenues for stabilizing and broadening the state's economic base while maintaining high natural resource and environmental values. In addition, it is the state's policy to provide communities with access to opportunities for productive and coordinated development to encourage community stability and economic vitality.

In Policy number 1, the state discussed the need to resolve issues relating to the Forest's timber base This is not only important from the perspective of the timber industry's need for stable supplies of raw material, but also from the point of view of stability within timber dependent communities With the exception of the pulp and paper mills, the vast majority of the industry's workforce in the five county Mt Baker-Snoqualmie region is employed in small establishments. These tend to be significant basic employers for those smaller communities in the eastern portions of these five counties. The amount of timber harvesting that occurs on the Forest has obvious impacts on forest receipts and revenue for local governments (as well as for the state) in those counties that are more dependent upon timber harvests from the Forest Counties such as Skagit will particularly experience more difficulty in funding important local government services.

If discussions with the industry task force do not result in an upward revision in the timber supply base, we see some significant destabilizing forces at work for these timber dependent communities We say this for several reasons

Already local communities have been affected adversely by recent efficiencies in the forest products industry For example, in Skagit County, 320 (22 6 percent) lumber and wood products jobs were lost in the period 1977-1986 Despite a vigorous wood products industry, these efficiencies have resulted in a statewide decline in jobs The statewide industry has undergone fundamental change, down 15,900 jobs from 1978 highs, and this massive job loss has created high unemployment and stagnant local economies in counties dependent upon forest employment.

More importantly, the state's review and analysis of the Forest's planning documents determined that approximately 40 percent of this region's timber supply comes from areas outside of the the five county area In particular, this supply comes from the Olympic peninsula and southwestern Washington The state foresees short and long-term major declines in the two areas' timber availability. This suggests that a good portion of the present timber supply for the five county Mt. Baker-Snoqualmie forest products industry may be unavailable in the future. The Olympic National Forest's DEIS projects a decline in total (federal and nonfederal) supply during next three decades A similar situation exists in southwestern Washington where industry timberlands are projected to undergo significant declines in future timber availability.

As a result of recent changes in Forest Service management regulations, land previously included in the timber base will be set aside for purposes other than timber harvest, i e., spotted owls and various minimum management requirements (although specific amounts are in question) We also recognize that some of the recent timber volume presently available to the forest products industry in the Mt. Baker-Snoqualmie region is from resale timber which will be unavailable in the future.

The state, given these reasons, sees the need for greater initiative in two areas to help the state maintain its objective of promoting community stability. With the considerations noted above and, since the Mt. Baker-Snoqualmie National Forest contributes significant economic and amenity values for the five-county area and the state as a whole, both areas involve closer coordination between the Forest and the state.

First, if the Forest chooses an alternative which creates negative socio-economic impacts, it should work with the state in exploring possible mitigation measures in order to avoid conflicts with federal and state job and community assistance programs. It makes little sense for federal and state agencies to undergo considerable effort and expense to alleviate economic hardships on local communities without close coordination with the Mt. Baker-Snoqualmie National Forest which is a major economic force in the area.

It may be noted there is a wide range of community problem areas that can be the focus of public and private partnerships which should be considered by the Forest Service. As a dominant landowner, producer of timber, and source of direct or indirect employment in the area, the Forest Service is invited to involve itself more closely in the area's economic development (e.g., joint economic planning, rural development, new and small business development, community and public school development) planning activities.

The Job Training Partnership Act (JTPA) of 1982 might serve as a model that could be utilized in such a partnership effort. JTPA encourages more integration with state and local programs, strong public and private partnerships, an emphasis on training rather than income support or public employment, and flexibility to plan and manage programs tailored to local circumstances. JTPA training funds might be used to support training directly responsive to the needs of specific industries and businesses. JTPA funds available for employment-generating activities could assist a wide variety of economic development activities when they increase job opportunities for JTPA-eligible persons.

Long-term economic diversification of forest-dependent communities should be a joint long-term cooperative commitment of federal, state and local governments. As a first step it should be noted that the state has some concern over the emphasis in the Forest Service model on the estimation of timber value, the Forest's major revenue producer. Equal emphasis on all potential economic resources, including recreation, tourism, wildlife, etc., would help local communities identify diversification goals.

Second, the Mt. Baker-Snoqualmie National Forest is a significant contributor of timber for the five-county area (approximately 18 percent of total supply from all owners over the 1975-84 period). While the state recognizes that

providing an even or adequate flow of wood supply from all owners in the Forest's region is not within the Forest's responsibility, the state does believe that timber dependent local communities would benefit from a greater cooperative relationship among all timber landowners in the area regarding harvest levels since fully 82 percent of the present timber supply comes from non-National Forest Service lands. With the majority of the timber harvests occuring on non-federal lands in the Mt. Baker-Snoqualmie impact area, a coordinated strategy among all classes of landowners to address current and future economic -- and possibly, environmental and natural resource -- problems would be very beneficial We would be willing to work with the Forest and other landowners in further exploration of this idea.

POLICY 3 -- WILDLIFE/FISHERY MANAGEMENT AND HABITAT PROTECTION SHOULD EMPHASIZE STATE SPECIES GOALS

The state and the Forest Service have joint responsibilities for wildlife and fish within Forest Service jurisdictions While the Forest Service is responsible for habitat, the state is responsible for wildlife and fish populations. Obviously these are two complementary responsibilities and there needs to be close coordination between the state and the Forest on wildlife and fish management activities. After review of the proposed management plan and EIS for the Mt. Baker-Snoqualmie National Forest, the state is concerned that none of the alternatives presented provide the wildlife and fish habitat protection at levels necessary to achieve state management goals

Specific state goals for the Mt. Baker-Snoqualmie National Forest are to

- o Recover populations of threatened and endangered species.
- o Increase black-tailed deer population 10 percent and protect winter range.
- o Maintain or increase elk populations and associated winter range.
- o Maintain or increase watchable wildlife populations.
- o Increase wild steelhead populations to maximum sustainable harvest levels.
- o Increase wild anadromous cutthroat and wild resident trout populations in some waters up to potential carrying capacity levels (to provide "trophy" fisheries).
- o Increase (and maintain) these same wild trout species populations to (at) desired harvest levels in other waters.
- o Maintain or increase regionwide wildlife species diversity.
- o Maintain regionwide genetic diversity within and among populations of the same species.
- o Fully mitigate for wildlife and fisheries losses due to logging practices.

Related to our concern over the Forest's habitat management activities, the state is also concerned about Forest Service mitigation policy for wildlife habitat areas. The U.S. Forest Service established policy on fish habitat

indicates the following priorities regarding fisheries management where feasible, protect existing habitat from degradation, rehabilitate areas in which existing habitat has been degraded as a result of management activities, rehabilitate, where feasible, areas in which natural forces have caused habitat degradation, and, enhance habitat through development practices. The state fully supports this published Forest Service policy and believes a similar policy should be established for wildlife.

Our specific concern is that the Forest Service proposed management plan and DEIS indicate losses for wildlife populations (except for the bald eagle) across all alternatives rather than maintaining them at current levels. In order to protect existing populations, the Forest Service needs to establish a clear policy to protect existing habitat from degradation and to provide mitigation for areas degraded as a result of management activities by replacement in kind on site, or replacement in kind off site, or other replacement negotiated with state agencies of jurisdiction.

The state recognizes that its fish and wildlife goals constitute goals and that their full attainment might not be possible given other values which also must be considered in developing the final management plan for the Forest. The state has listed specific recommendations in Attachment B to meet state wildlife and fish objectives, which may have impacts on timber supply, and we urge that the Forest give them every serious consideration. But, to reiterate what was discussed in Policy number 1, we need as a first step to resolve issues relating to timber supply on the Mt. Baker-Snoqualmie National Forest If, indeed, an upward adjustment in the timber supply base is possible as suggested by industry representatives, the opportunity may be there to better meet state fish and wildlife goals without compromising timber supply

In order to meet these state wildlife and fish goals there are five key policy concerns which the state would like the Forest to address

A. Riparian Management

Riparian zones are a key part of any forest ecosystem. While constituting only a fraction (2-3 percent) of the total forest land base, these zones are essential for all fish and for 70 percent of all wildlife species which utilize riparian habitats to meet all or a portion of their life requirements These zones are concentrated in a very small area yet provide a rich and diverse habitat for a wide variety of wildlife occupying different niches within the zones. Moreover, riparian zones provide a natural sediment filter protecting water quality and fish habitats, and are a source of large woody debris which creates additional fish habitat The stream is also protected by trees within the riparian zone moderating temperature fluctuations crucial for fish survival.

The proposed management plan's prescription for riparian zones on perennial streams allows up to 67 percent of the standing volume in the first 75 feet of the zone to be harvested over time. The outer 25 feet of the zone may be managed according the adjacent land prescription, which means it may be cut if the adjacent land is clear cut. In the smaller, lightly incised or intermittent streams, the plan allows for a ten foot buffer which is totally inadequate for fish and wildlife protection.

Studies have shown that wildlife and fish species diversity is reduced significantly as streamside zones are decreased. Since riparian habitats are so critical for wildlife and fish, they merit special protections and the state recommends a riparian zone as wide as the potential height of the tallest trees in the zone. This prescription should apply to all waters bearing fish as well as smaller Class III streams featuring key wildlife habitats. Specific and detailed prescriptions for riparian zone management may be found in Attachment B.

B Road and Travel Management

Road construction, use, and maintenance present the greatest potential impact on the environment of all forest practices. At least four acres of wildlife habitat are directly removed for each mile of new road constructed. Increased access leads to more poaching, harassment, and vehicle/animal accidents Many species of wildlife avoid roads which reduce habitat carrying capacity and wildlife numbers. In addition, roads are a major source of increased sedimentation in forest streams and excessive road densities decrease high quality viewing and hunting opportunities.

The Forest's preferred alternative proposes a road density in excess of three miles per square mile open to public use without restriction. Further, the state is concerned over the Forest's proposed approach to opening roadless areas for wildlife habitat improvement and hunter access. The state believes road and travel management should emphasize avoidance of special habitats, unstable slopes and sediment-vulnerable areas and open road densities should be compatible with prevailing wildlife use. In order to protect habitat carrying capacity, the state believes open road densities and elk, deer and goat winter ranges should be less than two miles per square mile. Detailed state recommendations on the Forest's road and travel management plans relating to the Mt. Baker-Snoqualmie plan may be found in Attachment B.

C Dead and Down Woody Debris

In the forest ecosystem, dying, dead and down trees provide a wide variety of habitat niches for many wildlife species and they are essential components of any forest ecosystem.

Region 6 Forest Service policy is to maintain dead and down woody material at a level sufficient to support 40 percent of the potential woodpecker populations. The state can accept this specific policy on extensively managed land allocations. However, the Forest Service sets the Minimum Management Requirement level for other cavity nesters at 20 percent The state believes this level is not sufficient to support viable populations for cavity nesters forest wide as researchers support 40-60 percent level to ensure viable populations. See Attachment B for additional state recommendations in this area

J-548

D. Old Growth Ecosystems

Only recently have we begun to appreciate the value of old growth. We now know that old growth is more than just big and old trees, rather, old growth constitutes a rich ecosystem supporting a wide variety of wildlife and plant species. Specialized niches and other species requirements rarely found in stands managed on economic rotations include large amounts and sizes of standing dead and down wood, large organic debris, lichen (a major winter food source for elk), and a four-layered canopy. Further, many wildlife species have evolved in close association with stable old growth ecosystems and are not readily adaptable to unstable ecosystems (i.e., managed stands). Some species adapted to the old growth system are totally or primarily dependent on it for their life support and population viability These ecosystems are unique, supporting wildlife and plant species that are found only in old growth.

Given these benefits, and the fact that we are only now beginning to understand the value and complexity of these ecosystems, the state recommends a conservative approach in this planning cycle to the way the Forest Service manages for this irreplaceable resource. The old saying, "the first rule of intelligent tinkering is to save all the pieces" is applicable Our knowledge of life cycles, population dynamics and species dependence on old growth is far from complete How large does an old growth area have to be to retain its most limited species? What would the loss of that species mean to society?

Time is needed to thoroughly evaluate these issues. In order to accommodate this end, unroaded areas with large blocks of old growth acreages need to be maintained in an unroaded status to provide the necessary habitat, solitude and gene pool to maintain viable populations Further, since many species depend on old growth for protection during migration and dispersal and become vulnerable to predators when they must travel great distances between old growth stands, corridors between such stands must be maintained. To this end, we suggest that any one drainage has a total of at least 5 percent old growth and, where larger blocks occur, they should be favored for protection over the fragmented and isolated stands which are not known to be occupied by MISs (management indicator species) This recommendation is designed to provide both sufficient habitat and travel corridors to help ensure population viability In addition, the state believes some legitimate questions have been raised by environmental representatives regarding how much "bona fide" old growth forest -- and we recognize there are definitional problems -- remains in the Mt. Baker-Snoqualmie National Forest If, in fact, such old growth is far less than Forest Service estimates, the concerns expressed by the state regarding the need for, and continued viability of, what remains of the old growth forest in Washington become accentuated A reexamination of the amount of old growth remaining in the Forest would be beneficial.

As a final note, the state is concerned that the Forest's proposed management areas for spotted owls are to some degree misaligned The proposed plan has designated some areas for SOHAs (spotted owl habitat areas) where we believe there are no known spotted owls. other areas where we believe spotted owls exist are left unprotected by the proposed plan. The state has conducted extensive surveys about where spotted owls exist and do not exist in the Mt. Baker-Snoqualmie area and we describe this information at the end of Attachment B.

J-549

E. Fishery Resources

The fish resources of the Mt. Baker-Snoqualmie Forest have significant economic and recreational value and the state places high priority on maintenance and enhancement of these fish populations and protection of their habitats Numerous user groups are also very concerned about the future of these fisheries, especially since the demand for sport fishing is projected to significantly increase in the near future and is expected to exceed the supply in a very few years.

A major state concern is that the Forest planning documents fail to recognize the potential for the alpine lake recreational fishery In fact, the Forest's documents virtually make no mention of this resource. The Mt. Baker-Snoqualmie National Forest has a major resource here worth millions of dollars The state believes that the planning document significantly underestimates the value of this resource and Attachment B provides in considerable detail the actual and potential value of this recreational fishery Attachment B also addresses what the state sees as deficiencies in the way Forest planning documents calculate the value of all fisheries in the Forest and argues that the Forest's value of $2.1 million for the combined salmon and game fish (in streams and high lakes) is highly inaccurate. The true value of these resources approaches $20 million per year, even using the Forest's overly low assigned values.

With this in mind, it is important that the final Forest Management plan take steps the state sees necessary to protect this resource. In this regard, we have already discussed suggested changes in riparian zone management practices In addition, the state believes the Forest's proposed reliance on Best Management Practices (BMPs) is inadequate since the state's experience is that these BMPs have not been sufficient to avoid adverse impacts to fish habitat in the past In the place of BMPs the state strongly recommends the need for minimum management requirements to be developed for fish in order to provide strengthened forest-wide requirements for protection of fish habitat. And, finally, the state believes that the Forest should place more emphasis on non-degradation of habitat protection activities instead of your unspecified habitat enhancement projects, the feasibility and funding for which is uncertain

POLICY 4 -- THE NATIONAL FOREST PLAN SHOULD MEET STATE OBJECTIVES FOR RECREATION, SCENIC RIVERS AND ROADLESS AREAS

The Mt Baker-Snoqualmie National Forest lies in portions of two SCORP (Statewide Comprehensive Outdoor Recreation Plan) planning districts - District 3 (Skagit & Whatcom Counties) and District 4 (King, Pierce, Snohomish Counties). Planning District 4 exhibits the most intense user pressures on recreational opportunities and facilities of any area in the state. This is both a result of high density population in the four county District and the high attraction of the Puget Sound to recreational users from Canada and the rest of the state. Part of this attraction lies in the forest environment and the associated recreational potential it offers to a diversity of activities and much of what occurs on the Forest in terms of recreational endeavors can occur nowhere else. We would like the Forest Service to consider some specific needs identified in the 1985 Washington SCORP and the 1987 Washington Off-Road Vehicle Plan in establishing Forest objectives for recreation.

1. General Recreation Needs.

The 1985 SCORP identified day-hiking, backpacking, boating, and snowmobiling as activities in District 3 which require additional opportunities to meet user needs. By 1990, specific facility needs for Planning District 3 are 276 more day-hiking trail miles, 109 more backpacking trail miles, 106 more moorage slips/launch lanes for boating, additional trail miles for snowmobiling are also needed in this district

By 1990, specific facility needs in District 4 will be 15,951 more picnic facilities, 9,448 more camping facilities, 2,860 more bridle trail miles, 992 more day-hiking trail miles, 986 more backpacking trail miles, 891 more moorage slips/launch lanes In winter recreation, downhill skiing shows the heaviest use pressure in this district Snowmobiling and cross country skiing also require additional opportunities to meet the projected demand We are also concerned that the proposed plan is inadequate with regard to meeting both motorized and primitive/semi-primitive recreation objectives

It should be noted that within the IAC's (State Interagency Committee for Outdoor Recreation) NonHighway Road Funding Program (NHR), three broad priorities have been established (1) direct provision of day use areas, campgrounds, trails and trailheads, equestrian facilities, (2) site specific planning development, renovation, land acquisition, and (3) assisting projects which help resolve user conflicts This program has a limited capability to assist federal project proposals directed at a non-ORV clientele hikers, equestrians, fishermen, etc

2 ORV Needs

The 1987 Washington State Off-Road Vehicle Plan indicates there are facility needs for motorized recreation activities in both Planning Districts 3 and 4. Currently (1987), to meet recreation demand, District 3 needs 95 more motorcycle trail miles, 54 more four-wheel drive trail miles, and 16 more ATV (all-terrain vehicles) trail miles. District 4 has higher needs for all activities 313 more trail miles are needed for motorcycling, 213 more trail miles are needed for four wheel driving, and 80 more trail miles are needed for ATVs

Statewide, the greatest off-road vehicle (ORV) needs are for opportunities for trail riding Users rank scenic backcountry trails as their highest ORV experience category. For all forests, the ORV Plan gives the following rank order for project development (a) New four-wheel drive opportunities. (b) Maintenance of existing motorcycle opportunities. (c) Development of new motorcycle opportunities.

The IAC's ORV funding program has a limited capability to assist federal agency project proposals directed toward the users of trail motorcycles, four-wheel drive vehicles, and ATVs.

3 Scenic Rivers

The Washington State Scenic Rivers Program supports the five rivers the Forest Service recommends for suitability study They are as follows (a) North Fork Nooksack River, (b) North Fork Skykomish River, (c) South Fork Skykomish River, (d) Tye River, (e) Middle Fork Snoqualmie River The Scenic Rivers Program recommends that the Beckler River be considered for study as it is a tributary to the South Fork Skykomish River, which is on the list to be studies. The Stillaguamish River is also currently under review for study by the Scenic Rivers Program.

4 Recreational Demand and Roadless Areas

We are pleased the Forest recognizes the significance the Mt Baker - Snoqualmie National Forest has for this state's urban population In fact, given its proximity to this state's population center, this Forest is one of the ten most heavily visited national forests in the country. This demand will continue in the years ahead as this state's population and the interest in outdoor recreational opportunities increases Clearly, because of the recreational opportunities it contains, this Forest occupies a very central place in Washington and, in large measure, offers much of the "quality of life" that is so highly valued by the state's residents

The state is troubled, however, over the current and projected, imbalance between the demand for recreation opportunities and the projected supply. In particular, we are concerned over the shortages of primitive and semi-primitive opportunities since, with increased use, the quality of these opportunities will be compromised Simply put, this state wants to minimize situations in which those who enjoy primitive and sem-primitive activities will be faced with either overcrowding or restrictive permit systems

The Forest Service, we recognize, understands that "it cannot meet current or future demand for unroaded, non-wilderness dispersed recreation without seriously altering the expected recreation on these lands." Given other competing demands, it is a very difficult task to preserve the remaining opportunities

In an effort to help the Forest Service in this regard, Attachment D contains a non-prioritized listing by the IAC of nine roadless areas which the state sees as valuable for recreational pursuits. Apart from recreational interests, the roadless areas benefit other values on the Forest such as critical habitat, water quality and fisheries These values and those of recreation may in fact overlap and enhance the decision-making process. Each of the areas finally chosen will have to address as many of the highest values for each of these elements as possible Roadless areas chosen, in an ecological sense, must serve both the human and biological environment. We also enclose in Attachment D a current IAC summary of recreational demand for the Mt Baker-Snoqualmie region which may be helpful as supplementary information to that used by the Forest. As the introduction indicates, a fuller-scale study is in process and results should be available by late this year or early next year.

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OTHER KEY POLICY CONCERNS

A. The State's Water Resources Must Be Properly Utilized and Protected

The Forest Service has broadly addressed the issue of management activities/impacts on water quantity but provided little to no detail on the cumulative impacts of forest activities on watersheds and water resources. The state of Washington is responsible for the granting of water rights. The Forest Service needs to address the matter of federal reserved water rights as part of their planning process so that the state can more efficiently allocate, protect, and adjudicate its water resources. The state is also responsible for the protection, beneficial allocation and utilization of permits for environmentally sound water resource projects The Forest Service needs to stay in close touch with state and regional water resource planning groups (i.e., the State Hydro Power Task Force, and the Northwest Power Planning Council) to ensure close state/federal coordination. The Forest Service should also take a broader view concerning hydropower and the protection of instream values. i.e., rivers need to be protected from hydro-development that would produce unnecessary power.

One of the major goals of the state is to protect and preserve instream values through the establishment of instream flows When water withdrawal is proposed on Forest lands either the Forest Service or the applicant should consult with the Departments of Ecology, Fisheries, Wildlife and affected Indian Tribes regarding cumulative impacts on fisheries, wildlife and water resources and mitigation strategies.

B. Protect Water Quality

The state of Washington and the U.S Forest Service share the common goal of protecting state water quality. Land use practices on Forest Service lands have the potential of modifying both the quantity and quality of our state waters. Sedimentation from road building, logging and grazing activities can degrade existing water resources.

The plan states that state and federal water quality standards will be met or exceeded. We are, however, uncertain how the Forest Service intends to do this Fundamentally, we believe in the plan and interdisciplinary Team process but need extra assurance that the lack of plan specificity will facilitate goal accomplishment. Detailed information is needed rather than non-specific wording. We recommend adoption of the riparian prescription found in Attachment C We insist, as a minimum, the Forest Service address the Timber/Fish/Wildlife process and the Best Management Practices (BMP's) set forth in the rules and regulations affecting water quality. This process would provide assurance the state needs to approve the forest plans for water quality compliance.

One of the state's major concerns is how sedimentation will be controlled Most sediment control guidelines, standards and BMP's are not specific. The state believes definitive standards must be set to ensure water quality criteria can be met. This could initially be accomplished by creating a set of minimum standards controlling practices responsible for sedimentation, i e., roads should avoid riparian zones, wetlands, and

meadows and road densities should be limited. The use of minimum standards assume that the forest will strive for better and more creative controls but assures at least a set of minimum requirements. Evaluation of alternatives is based on predicated sediment loading by alternative, however, there is very little discussion of the sediment model or its documentation Since we cannot determine how effective the model is, we have no accurate way to evaluate the alternative We need to be able to validate the model and determine its effectiveness Consequently, we can only treat the data in the alternatives as indicated rather than actual yields.

C. The U.S Forest Service should participate with the state and other forest landowners in watershed management plans where needed to coordinate harvesting and protection measures.

It is state policy to encourage forest landowners in specific watersheds and others to voluntarily coordinate land use and development plans to provide the most effective pattern of development to meet the needs of landowners while protecting watershed values such as fisheries habitat, water quality, and stable water flows In this way, extra protections planned in one part of a watershed can be taken into account elsewhere in the watershed, even across ownership boundaries Likewise, plans for more intensive development activities in one part of a watershed need to be taken into account by landowners elsewhere in the watershed, considering the specific resource needs and past activities in that area. This will be especially important if the USFS plans more intensive localized harvesting in shared watersheds as part of a strategy designed to maintain forest-wide harvest levels while also providing greater wildlife habitat protection

D Protect Air Quality

The cooperative Smoke Management plan, which sets standards for smoke management in the state, was developed with the state's air quality goals in mind The Forest Service is a cooperator and complies with the comprehensive guidelines of the plan All Forest Service plans adopt these standards by reference and therefore comply with state standards.

E Protect Historical and Archaeological Sites.

It is the policy of the state of Washington to designate, preserve, protect, enhance, and perpetuate those structures and sites which reflect outstanding elements of the state's historic, archaeological, architectural, or cultural heritage.

In line with this policy the Mt Baker-Snoqualmie National Forest has developed a professional program to identify, evaluate, and protect significant archaeological sites important to Washington's heritage. The program adequately addresses preservation issues and does not conflict with state policy

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ATTACHMENT B

This attachment provides in detail state concerns about the ability of the plan to meet state fish and wildlife management goals and contains specific recommendations. See Policy 3, Attachment A for further clarification.

A. PLAN ASSUMPTIONS

1. Modelling for fish and wildlife is inadequate or unexplained.

FORPLAN model level identifiers are based strictly on parameters needed to determine timber outputs The geographic specificity to allocation zones consisting of watersheds and roadless areas were not used to model wildlife and fish outputs. An elevational breakdown could be inserted in the empty level 2. Even without it, big game outputs could be modelled based on forage and cover regulationships and roading, assuming proportions of the area in winter and summer ranges. Response of fish to activities needs to become a model yield; the Forest should work with others to develop and test such a model.

Model restrictions did not allow maximum benchmarks to be run except for timber and recreation Though some modelling was accomplished out of FORPLAN, projected outputs do not show realistic trends or amounts of change which would be expected due to habitat alteration. Nowhere in the documents was wildlife coefficient development explained, except for snag habitat.

To count on investments to maintain viable fish populations is inappropriate Restoration or enhancement of rearing areas is ignored in favor of spawning, though rearing habitat is likely limiting for all but chum and pink salmon.

2. Economics

Economic analysis is an integral part of the forest planning process Cost, benefit, and present net value (PNV) are highlighted in the comparison of alternatives and are an integral part of determining net public benefits, as required by 36 CRF 219 12(f) Because the state administers resources whose economic values are quantified as part of their evaluation, we are concerned about what may be inequitable treatment given various resources

This inequality arises on more than one analysis level Use of the allowable cut effect and the four percent discount rate affects the economic benefit of intensive timber management practices including old growth harvest We believe the plan underestimates the value of non-commodity resources for PNV quantification *Animals are public* resources which, in the economic sense, are vital inputs for a variety of consumptive and non-consumptive goods Enhancements represent real benefits and impacts produce real losses, both of which affect PNV

There are several ways that PNV figures are biased away from fish and wildlife values and towards timber. First, an arbitrary reduction of 37 5 percent was made from the numbers derived by Loomis and Sorg for the 1985 RPA documents. We believe the justification for that reduction is not economically valid. With Travel Cost Method (TCM), an implicit demand curve is mathematically derived, and consumer surplus determined Net, not total, willingness to pay is measured by consumer surplus We agree that TCM studies are highly site-specific. However, the conjecture that study locations are typically high quality sites should be substantiated by quantitatively comparing "average" sites with the Loomis and Sorg sites before any value reductions take place.

In fact, there is reason to believe that the Loomis and Sorg results underestimate applicable wildlife values. TCM measures only the recreation use component. Other recognized sources of value include existence of the resource, option to make future use of it, and ability to pass on the resource to future generations. For certain ecosystems and some species of fish and wildlife, especially those that are well-publicized or whose existence is threatened, we would expect these components to add significant value. They are ignored in your evaluation process.

Another general area of concern is the Forest's apparent lack of information regarding resident fish populations and its effect on PNV. There is virtually no mention made of the alpine lakes fishery as a major recreational resource within the Forest. A recent (1987) survey of the state's recreational fishing population reveals that there are about 793,800 user days of fishing recreation expended in alpine lakes fishing by licensed anglers only To estimate total user-days, one must multiply this number by 1.2 (approximately 20 percent of high lakes anglers are juveniles who are not required to purchase licenses). The "real" use estimate is about 952,000 angler days. Although we do not have information specific to those lakes within the Forests, we believe a close estimate of angler use can be derived using the number of lakes within the Forest, their proximity to major population centers, and several other factors. We believe that angler use of alpine lakes on Forest land is about 305,700 angler days (about 114,642 WFUD's)

We believe this estimate realistically approximates what is happening on the Forest Your own study in the Alpine lakes Wilderness Area showed use comparable to our estimates, about (400-550 user-days per lake). Your estimate in the DEIS (page III-76) shows an estimated use of only 54,950 lake user-days per year which is far to low. Even if Forest lakes receive only the statewide average use of 397 angler-days, the use would still equal 86,198 WFUDS

We believe *your* estimated use of stream fishing on streams which emanate from the Forest is also underestimated. Although we do not have specific data on user-days of resident trout fishing on streams and beaver ponds only within Forest boundaries, we can produce a fairly accurate estimate of this fishery within the entire WDW administrative region (Region Four)

These fishermen generate approximately 967,600 user days of recreation, or 343,686 WFUDs (in Forest Service jargon -- using the .342 and .375 conversion rates) within the seven-county Region (licensed anglers only) After expanding these numbers to include all anglers, these numbers rise to 1,206,000 angler days and 430,600 WFUDs.

We have no simple method to extract out the proportion of stream/beaver pond fishing that takes place only on Forest lands. One method would be to apply your ratio of 40 percent to 60 percent, given in Table III-29 (depending on what this is based upon). This would result in 171,963 WFUDs expended on resident fisheries on Forest land (114,642 WFUDs for lakes x 1 5 = 171,963)

Using the Forest's figures of $56 55 for anadromous RVDs. $14 70 for resident trout, and the conversion factors given (.375 WFUD/angler-day, and .342 WFUD/angler-day), we calculate a combined value for sport fishing only, for game fish only, of more than $17,400,000 in the waters affected by the Forest's Management activities

This value does not include the value of the commercial steelhead fishery, nor does it include the value of salmon commercial and sport fisheries. If, as you suggest, 50 percent of the anadromous fishing is produced from Forest land (water), then over 9 6 million dollars of the above is produced from the Forest.

Based on the above, we would argue that the Forest's value of only $2.1 million for the combined salmon and game fish (in streams and high lakes) is highly inaccuate. The true value of these resources approaches $20 million per year, even when one accepts the Forest's very low assigned values. However, we cannot accept these values It appears unreasonable to us to state that angler-days are only worth $4.13 for resident fishing and $21.21 for anadromous fishing, as the Forest has done (we will be glad to supply detailed calculations).

Recreational use in fish resources is underestimated and the value per user day is undervalued. The benefits bias of timber versus recreation was further compounded by assuming maximum operating and maintenance costs Forest-wide over time for recreation. Although we have no good way of converting our statewide hunter use information into a close estimate of use on Forest land only, we suspect the same under-estimation of use took place for hunters as well We believe that the Forest is underestimating and, therefore, undervaluing hunting, trapping, and appreciative wildlife use in the same manner that fishing recreation has been undervalued Much of the Forest's recreation use data is now almost ten years old.

Another biasing factor is the failure to incorporate fish and wildlife losses as costs in PNV calculations. We believe such losses are large, both cumulatively and for certain site-specific management actions. Failures to count these impacts as costs in your analysis provides an implicit subsidy to the management activities which cause

the adverse effects. From a technical standpoint, it should be pointed out that the proper measure of value for this purpose is willingness to accept payment (WTA), not willingness to pay (WTP), which is determined by TCM WTA magnitudes are typically higher than those of WTP. In addition, losses should be measured relative to existing condition of the resource, not to its future condition under the current direction alternative This underscores the need to develop a quantified linkage between activities, changes in habitat and changes in fish populations.

Finally, the plan introduces a distinct bias by attributing a one percent real growth rate to timber prices, while holding other resource values constant over time. Taking into account your statement that demand for fish and wildlife oriented recreation is expected to increase each year, we believe that timber values are unjustly favored by this assumption At a minimum, studies on trends for fish and wildlife values must be found to substantiate a flat growth rate before such treatment can be considered valid. The forest should run a sensitivity test on 0, 1, 2 and 3 percent real price trends for non-cash as well as all cash resources, not just timber.

3. Monitoring

We would gain much more assurance of management success from a Plan which set out the What, Where, When, How and By Whom. We see a need for a plan which (1) sets goals. (2) describes areas; (3) assigns tasks. (4) defines methods. (5) lays out a schedule. (6) details who is responsible, and sets out clear performance standards (i.e., acres of habitat, numbers of animals/fish, etc.), and (7) details how monitored information will be fed back into the operations.

The maps supplied, some of the appendices, and the Monitoring Plan are helpful in this respect, but (with a few exceptions) the whole Plan lacks the necessary cohesiveness that would allow it to drive its own implementation Its credibility is damaged by placing too much reliance on other Forest Service manuals which have been implicitly included by reference.

One other area we find disturbing is the large amount of information that must be collected just to "rough tune" the Plan. We agree emphatically that this information is necessary, in fact, essential to the planning process. It appears that the Monitoring Plan (Chapter 5) contains a schedule to gather most of this needed information, however, not all needs are covered, the schedule is protracted over a rather long time period, and the data gathering needs are so great, we doubt the Forest can assemble the required information within a meaningful time frame unless Forest field staff is increased significantly In a few cases, some information needs are not addressed at all

One positive note regarding the Forest's Plan is the stated intent to initiate an effort to collect the information listed in Chapter 2. We believe this effort is long overdue and extremely important. The

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negative of this is that the Plan and DEIS do not make a strong commitment to actually accomplish the data collection plan We note several references in these documents which link information collection capabilities directly to funding capabilities. The importance of specific information needs might necessitate a reprioritization of available funding, at least on an interim basis

4. MMRS

We appreciate inclusion of the maps delineating habitat areas with the documents sent us. These greatly help envisioning areas that will be managed by special prescriptions for specific species of wildlife. What we find disturbing about these maps is specific designations of principal management direction only. For example, in the Nooksack River area there exists a large block of land designated only as a SOHA. It is implied that this area is also to be managed as elk winter range, pileated woodpecker habitat, and marten habitat. However, it is only designated as Spotted Owl Habitat.

What would happen, for instance, if data showed a SOHA to be more appropriate elsewhere due to monitoring, and the area was abandoned as a SOHA. Would it still be protected for elk wintering grounds? We would much appreciate a system which layers each of these habitat areas which have been designated for "multiple" needs. In other words, the area identified above should also be designated (secondarily) as elk winter range, and (tertiarily) as marten/woodpecker habitat.

Along this same line, the amount of overlapping uses of specially managed areas gives us some concern This practice forces prey and predators together on small "inclusions" and increases stress on populations. It is possible such stress could elicit artificial selection processes which may alter the long-term viability of some species. We recommend that the Forest have a geneticist look into this aspect of habitat alteration. Another concern about maximum overlapping of land allocations is the fact that areas can be destroyed by catastrophic events, leaving no substitute areas available to maintain existing numbers or to act as dispersal sites.

We recommend that more habitat areas be established for old growth dependent species. These habitat areas would be in addition to those identified as the MMR level and separate from other land allocations. Estimates indicate that at least 30 percent more habitat areas would be necessary to replace stands which would eventually be lost to fire, blowdown, or other catastrophe and less than 100 percent occupancy rate. Without replacement stands, the loss of even one habitat necessary to the distribution grid has the potential to bring one or more species below MMR (legal) levels

We also believe the Plan places too much reliance on high elevations old-growth to achieve its "quota" of old growth habitat The Plan also relies on a vast amount of unknown information and the collection of which is based on an uninsured funding base In most cases, wilderness areas within the Forest complex are at too high an

elevation to be regarded as optimal fish and/or wildlife habitat. While these areas provide some summer range for deer and elk, they do not provide optimal year-round habitat for spotted owls, pileated woodpeckers, marten, and other wildlife We suggest that the Forest reappraise some of these areas from an ecological standpoint, and affirm those areas that are truly suitable habitat. Combining the stand ages and small and large saw timber influences MMR habitat suitable. A proportionate decrease in wildlife numbers needs to be made to reflect this.

The Forest's intent is to build roads into the "heart" of certain roadless areas. Once these areas are roaded, there is no option open to regain the ecosystem characteristics that they provide. We recommend instead that the Forest's logging plans for these areas in the near term include a conservative timber harvest approach that works only around the perimeters of these important areas. Then if it is found that unroaded old-growth is required to meet specific wildlife or recreation demands in the future, these areas can be readdressed with more restrictive management prescriptions.

We are pleased that the Forest's analysis determined that dedicating, rather than managing, old-growth for MMR habitats was the appropriate strategy.

B. FISH AND WILDLIFE PRESCRIPTIONS AND DATA NEEDS NECESSARY TO MEET STATE FISH AND WILDLIFE GOALS

1. State species goals

Public lands represent the major source of fish and wildlife for user groups in the state of Washington. However, all alternatives reduce big game species and all MMR species None of the alternatives presented in the DEIS "optimizes" habitat for any wildlife species of concern. Your MMR levels and management direction do not reflect the state's goals in regard to wildlife populations. We intend to maintain elk populations at, or above, present levels, increase deer populations by 10 percent, fully recover bald eagle, spotted owl, and peregrene falcon populations, and maintain pileated woodpeckers, marten, fisher, and other old growth indicators at viability levels above "minimum reproductive levels." There is some indication that grizzly bears and wolves may also be present on Forest lands. If this is the case, there may also be plans to recover populations of these species.

The Plan proposes to reduce already critical winter range by clear-cut logging and road building It also proposes to "push" roads into presently roadless areas without waiting to see if the monitoring plan calls for some of these areas to be left roadless. We are also disturbed to see entire watersheds (Sultan and Cedar Rivers) almost entirely left out of your Plan. We also take exception with the Forest's definition of winter range. Coniferous tree stands "40 feet tall with 70 percent canopy closure are not "optimal winter range" for deer and elk. True multi-aged, multi-species stands, with the oldest trees at least 125 years old,

better define the true winter-range needs of deer and elk. Table C-1 indicates the intent to "create openings" (harvest timber) in critical winter range We would like the Forest to consider doing a limited amount of selective timber harvest in these areas. This would preserve snow interception and thermal protection capabilities and still provide forage capabilities of these areas. Lichens and moss provide important winter forage for elk and goats.

The Forest should specify management goals coordinated with state management goals for each stream, lake, and beaver pond complex. The state management strategy calls for increasing sport fishing opportunities for resident fish and increasing the diversity of these opportunities It is important to know that a particular water be managed for sport trophy fishing, commercial and sport wild anadromous capability, unique species (such as golden trout, grayling, lake trout, etc) high intensity fishing, etc.

Another area of concern to us is the Forest's stated objective of maintaining only "existing resident fish habitat capability values" and to "increase" anadromous fish habitat only through "habitat improvement" projects (artificial means). In the case of anadromous fish, our short term goal is to increase runs of wild winter-run steelhead in all Region Four rivers, up to MSH To accomplish this, the habitat capability must be increased. In some instances, where the goal is to provide catch-and-release fisheries, the objective is to attain a habitat capability of 100 percent of the potential This is also true of resident fisheries in the "trophy" category (such as Middle Fork Snoqualmie). We are gradually achieving our goals of bringing wild winter-run steelhead populations back from the depressed state of the 1970's The following table shows the degree of progress made thus far, and what our ultimate goals are for the four-river systems on which we have good data.

Total wild steelhead escapement is listed below each river name by year. This includes both harvested fish and spawning escapement.

Year	Snohomish	Skagit	Green	Lake Washington
1980-81	2,954	4,308	1,083	--
1981-82	4,160	.9,609	2,121	--
1982-83	5,158	7,732	1,526	--
1983-84	6,432	8,963	2,188	1,250
1984-85	6,508	8,511	2,286	474
1985-86	7,790	11,098	2,778	1,816
Future Run-size target**	8,000	12,000	2,000	1,800
			1,800*	1,200*

* Upper river -- upstream of city water diversions and Howard Hanson dam.
**Based on weighted usuable rearing habitat of these river systems. are approximations based on continuing research.

As our data collection proceeds, we will have more specific goals for the other five river systems in Region Four. All these rivers are slated for similar management and will follow similar management direction (increased wild production).

2. Riparian Prescription

Riparian ecosystems make up only a small portion of the forest land base on the Mount Baker-Snoqualmie National Forest, but support a greater density and diversity of wildlife than any other habitat type. Several wildlife species, including certain threatened and endangered species and all species of fish, are dependent on riparian habitats to meet all or a portion of their life requirements. Management within riparian zones should emphasize the needs of wildlife and fish. To remedy particular shortcomings noted in the plans' prescription for riparian zones, we have a number of recommendations

In defining zone boundaries for planning purposes, we suggest adoption of the zone proposed by Meehan et al and Swanson et al, which includes the body of water and all vegetation directly influencing aquatic processes. At a minimum, this would extend from the ordinary high water mark a distance equal to the potential height of the tallest trees. Soils, vegetation and topography should then be used to modify zone width, where appropriate. For example, flood plains and associated wetlands should be incorporated. This riparian zone prescription should apply to all waters bearing fish as well as most small Class III streams featuring key wildlife habitats.

Management within the riparian zones should emphasize maintaining cover and vegetative diversity, stabilizing soils, and recruiting large organic debris and snags. We recommend at 100' no harvest zone along anadromous stream reaches. Low management intensity would be appropriate for the rest of the riparian zones LOD should be retained at 750 pieces per mile where possible Large snags should be retained at the level needed to provide for 100 percent of the potential population for cavity excavator species Down wood for wildlife should be available at a minimum of 4 logs per acre, 20" at large end and 20' long, or the largest size available Where cuts occur, selective harvest of intermediate-size trees 5" dbh to 18"dph would be best for wildlife where 70 percent canopy cover can be retained. Clearcuts should be avoided, unless a site-specific justification of fish and wildlife benefit can be made Clearcut units should be limited to 5 acres. Under any cutting method the rotation in big game winter range should be long to produce optimal thermal cover, with maximum harvest per decade covering no more than 5 percent of the zone in any on watershed Roads should be 250 feet or more from streams or wetlands Salvage sales are inappropriate for riparian zones

The added protection provided by our recommended changes above will also limit those areas in need of repair or improvement by limiting riparan damage from road construction or timber management. This will reduce the need for high levels of funding for mitigation and assure the most important and cost-effective areas are improved. We suggest that natural protection and non-structural improvements receive a higher priority throughout the forest.

There should also be some recognition of the Memorandum of Understanding (MOU) with the state of Washington regarding activities in fish-bearing waters In that MOU, the Forest Service has agreed to comply with the State Hydraulic Code.

We are concerned that the minimum management requirements (MMRs) for riparian areas provide standards that can be measured and monitored Best management practices are qualitative at best and it is documented that the degradation of stream habitats and water quality has occurred despite the use of BMPs. We recommend that the riparian prescription provided above be adopted for general use in all zones.

3. Dead and Down Woody Debris

Forest Service Region 6 policy has been to maintain dead and down wood at a level sufficient to support 40 percent of the potential woodpecker populations. The MMR level for cavity nesters was set at 20 percent by way of a "best guess." We do not agree that the MMR level for cavity nesters will maintain viable populations of all dependent species. Thomas et al (1979) defines the 20-40 percent level as, "snag habitats produced by these levels are marginal and will probably not support viable populations" and the 40-60 percent population level as, "snag habitats produced will probably maintain viable populations "

An inventory constraint should be employed to produce the appropriate snag levels, particularly areas with shorter rotations where the large diameter snag would not normally be produced before harvest occurs. Providing such a constraint will not only ensure the snags will be allowed to accumulate, but will provide a measure of the amount of falldown in timber ASO. Without calculation of this falldown, which should be coordinated with other forests, we expect your timber inventory, ASO, and receipts to be inflated above actual levels. We also have a concern for the larger sizes of down wood, *20" at large end by 20' long or more, and we suggest similar* treatment as noted above for snag habitat

Finally, the number of snags retained during harvest, in our experience, rarely reflects the number of remaining a few years out into the future Additional snags and green trees must be left to account for losses due to fuelwood cutters, fire, safety considerations, and natural decay. We suggest a vigorous and effective enforcement effort, following the issuance of Forest-wide direction that standing dead or live trees may not be taken as *fuelwood except in excess of wildlife needs Similarly, salvage* sales should be limited to those necessary to prevent the spread of pests or disease, except in excess of wildlife needs

Monitoring/research should be conducted to, (1) determine population trends at varying snag management levels, and (2) refine or substantiate the definitions used in Thomas, et al (1979).

4. Road and Travel Management

A forest-wide road system of more than three miles per square mile open to public vehicular traffic is inadequate in terms of its impacts on *wildlife, particularly when it is considered* that the density figures likely include roadless areas, other no-cut areas, and exclude non-system roads Actual road densities in suitable forested acres are likely to be considerably higher than expressed. The Plan should identify miles of open and closed roads (including non-system roads) on a watershed basis and describe the methods for implementing closures, timing of closures, and locations.

We disagree with the belief that roadless areas need to be roaded and managed in order to provide high quality big game habitat. That *position ignores the critical nature of security areas.* Wildlife use in unroaded (undisturbed) habitat is always higher than in similar roaded habitat Some species are virtually eliminated by actively used roads. Building roads and harvesting timber in roadless areas will not provide both roaded recreation and big game habitat. Roaded recreational opportunity can be increased by developing roadless areas, but the supply for roaded recreational opportunity already exceeds the demand Further, increased and easier access to back-country areas results in more restrictive hunting regulations, less hunting freedom and opportunity, and fewer mature bulls and bucks.

To mitigate adverse effects from forest roads, we urge the following measures be adopted as standards throughout the Forest

- New road construction should avoid areas described by Brown et al and Thomas et al as special habitats These include riparian zones, wetlands, meadows, and places with critical uses, such as deer and elk travel corridors and calving areas, and your old growth habitat MMR areas Special habitats and natural and created openings should be screened by buffers of natural vegetation.

- It is also critical to limit the density of roads open to public traffic to accommodate the prevailing wildlife use Our recommended forest-wide standards are included above and in page-specific comments

5. Fisheries Resources Need Greater Protection and Enhancement. MMR's Need to be Developed For Fish

One source of concern stems from the decision of Region 6 not to develop MMR's for fish Planning requirements should be the same for all wildlife species. We do not agree that BMP's are sufficient to avoid adverse impacts to fish habitat as stated in the MMR documents. The Forest's BMP's have not done an adequate job of protecting water quality in all streams. Deer Creek (N.F. Stillaguamish tributary), the North Fork Stillaguamish, Finney Creek, and others in the Region, now experience temperatures and turbidity

levels above state water quality standards Yet the plan assumes that following BMPs will adequately protect water quality. We question the assumption that unspecified habitat improvement projects with uncertain funding will be sufficient to increase fish losses.

We see that most of these important data and information gathering needs are outlined in Chapter Two of the Plan, however no timetable is given. We believe the following needs should be given a very high priority, and should be completed prior to implementing a "fixed" plan.

- o Inventory all stream and beaver pond habitat within the Forest.
- o Either validate the Fish Habitat Capability Index, not only for anadromous fish, but for resident fish as well, or develop multiple parameteers, multiple summer and winter habitat capacility indices
- o Determine at least wild salmon and steelhead spawning habitat requirements that meet state species escapement goals.
- o Inventory all lakes on the Forest Develop a data base on each lake's physical and biological characteristics and fishery management history (method of planting, fish species, numbers of fish, frequency of plants, natural vs. planted, etc.) WDW biologists would welcome the opportunity to share in this effort.
- o Select and intensively survey a group of index lakes and streams to obtain a more precise estimate of angler use.

6 Mitigation for Fisheries

The state of Washington's fishery policy stresses habitat protection and mitigation for fishery resource losses, and we have concern over the Mt Baker Snoqualmie Forest's basic treatment of adverse fishery resource impacts. Resource losses should be regarded as a definite, mandatory mitigation responsibility, not as an optional planning element or discretionary budget item Our prior responses to other draft National Forest plans have also highlighted this important policy. We request that the Forest treat fish production losses (attributable to their operations) as a mitigation need requiring the firm, dependable funding that is fitting for a definable resource commitment

The logic for this request is based on perpetuation of fishery resources. If a hydropower developer, for example, blocked 30 percent of the fish production potential of a watershed, there would be no question as to the mitigation responsibility involved and its level (a full 30 percent) The cumulative effects of environmental alterations such as logging and associated road building which would lower production of fish by the same 30 percent should be treated in a comparable manner. Timber harvesting and associated activities such as road building have become major exceptions to this rule of compensation.

The key to defining this mitigation responsibility is quantified linkage between levels of environmental modification and changes in fish production The current draft plan makes no attempt to do this nor does it recognize development of this quantified relationship as a long-term need. Our common requirement today is for quanitification of any project-expected impacts on trout, salmon, and spiny ray species. Mitigation requirements are then designated to address these impacts.

7. The Sikes Act provides that Forests must jointly develop with the state a Statewide Comprehensive Plan, and provide funding for fish and wildlife improvements This plan is years overdue We would like to work with you in the development of such a plan.

8 The state has attached detailed maps identifying a total of 84 known spotted owl sites (a site is an area with clusters of individual spotted owl response locations which represent a separate spotted owl individual/pair) on the Mt. Baker-Snoqualmie National Forest There is a number of areas throughout the forest which have not been surveyed (either within the last three years, or at all) And, there is a large area of checkerboard ownership in the middle portion of the forest that is a Special Area of Concern for spotted owls because it has very few known owls with the remaining habitat extremely fragmented and widely scattered. There are separate recommendations for each of these situations

1 In order to meet the state goal of maintaining viable populations, the Mt. Baker-Snoqualmie National Forest should maintain all currently known sites and historic sites (until they can be surveyed and status of owls determined) State data indicates each area should have a 3,800 acre SOHA established within 1 8 - 2 1 miles of the next center of activity (see attached guidelines, existing site status, and map).

2. All historic sites, which have owl records prior to the last three years, but have not been recently surveyed, should be surveyed to determine status and. if owls are present, should have SOHAs established

3. Some sites may need to be established between known areas to ensure corridors between and adequate distribution of sites for dispersal purposes

4 Within Special Areas of Concern, further harvesting of spotted owl habitat (old growth and mature forest stands) will aggravate current fragmentation of spotted owl habitat, making dispersal particularly difficult. These areas which have been identified on the forest are

a <u>The checkerboard ownership area from Township 19N to 22N.</u> This area is a vital link both north-south and east-west for the Cascade spotted owl population. There is only one known pair in this entire area and only 7 documented sites

(3 of which are historic). There are the three known sites in the Cedar River Watershed (one of which is historic) although there are no SOHAs designated in the Draft Forest Plan. SOHAs should be established for all known sites in the watershed.

b The NW Block of the Darrington District and the SW Block of Baker River District. There should be no further harvesting or planning of sales until the status of spotted owls in this block has been determined. There is only one nest site identified in this area (Gee Creek) and four of the nine known sites are historic Eight of the nine sites are heavily fragmented. This entire area needs to be intensively surveyed.

c The area on the Skykomish Ranger District bounded by the South Fork Skykomish/North Fork Skykomish/Cascade Crest. This area forms a large distribution gap on the forest Six of the eight known sites are historic. The entire area needs to be surveyed before proceeding with harvesting.

d. The Pratt River block on the North Bend District. This block is the last contiguous block of habitat before the large area of checkerboard ownership. It is crucial to maintain owls in this area

5. Specific management recommendations and guidelines follow

For spotted owl sites that are

	Status	Recommended Guidelines
1.	Within SOHAS	Section 2,3,4
2.	Adjacent to SOHAs (they do not include the primary use areas or known locations)	Move to appropriate area, then use Sections 2,3,4
3	Outside SOHAs	Establish a SOHA, then use Sections 2,3,4
4	Historic Sites	Survey, then establish a SOHA then use Sections 2,3,4
5.	SOHAs without Sites	
	a. Surveyed Repeatedly	Drop from network unless needed for distribution or replacement areas.
	b. Never Surveyed	Survey to determine locations of owls

6. Management Check Points

a. Specific threshold points must be defined for occupancy, reproduction and survival that can be used in research and monitoring to determine if population viability is being maintained.

b If viability is not being maintained in all, or portions of, the forest, specific procedures must be set in motion to provide higher levels of management protection (e.g., increasing sizes of areas, increasing densities of sites, not harvesting any additional spotted owl habitat).

RECOMMENDED GUIDELINES

1. Distribution and Selection of Sites

A. Special Areas of Concern

Special Areas of Concern are geographic areas within the Forest where there are distribution gaps, fragmented and limited remaining spotted owl habitat, and very low, scattered occurrences of owls These areas require retaining the best management options for owls in order to avoid isolating individual sites and subpopulations over time across the Forest.

1. Within special areas of concern there should be no further harvesting of spotted owl habitat that will aggravate distribution problems, rather distribution should be improved by managing for an increase in spotted owl habitat over time.

2. Conduct comprehensive surveys within all special areas of concern to determine current distribution of owls.

3. Over time, develop links between isolated pairs and/or subpopulations by allowing the stands to develop naturally or, by using silvicultural treatments

4. Key areas which would help bridge distribution gaps or would help complete SOHAs that occur on private or state land within the forest should be identified Encourage the participation of these other landowners to help maintain spotted owls in these areas.

B. Areas Outside Special Areas of Concern

1. In order to meet state species goals for spotted owls, all currently known sites should be maintained.

2. Sites that are not currently occupied, or that have not been surveyed may need to be selected to ensure adequate distribution within all provinces.

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3. Priority for selection of sites should be

   a Areas that have been consistently occupied by breeding pairs.

   b. Areas that have been consistently occupied by pairs (or areas with the highest level of occupancy over time)

   c. Areas with a known breeding pair in at least one of the last three years

   d. Areas with a known pair within at least one of the last three years.

   e. Areas with single birds observed repeatedly in the last three years.

   f. Areas with single birds observed in at least one of the last three years

   g. Areas with historic (prior to the last 3 years) locations of birds.

   h. Areas of spotted owl habitat with no known occupancy.

   i Areas that are not currently spotted owl habitat but are capable of producing spotted owl habitat in the future in the shortest amount of time.

4. The objective for sites selected is occupancy by pairs and long-term viability. Departures from the priority of selection may be made in some cases if it is to the benefit of the long-term viability of owls at that site.

5. Historic sites and unsurveyed areas should be inventoried to determine distribution and status of owls.

2. Size and Configuration of SOHAs

A. Establish a SOHA for each site selected.

B. State data indicate that SOHAs should be designed to contain 3,800 acres of the best available spotted owl habitat. If research and monitoring show viability to be in jeopardy, it may be necessary to increase these by one to two standard deviations above the mean.

C. SOHA configuration should be determined by the spotted owl location information for the area. If the nest or center of activity is known, it must be included in the SOHA. If the site is based on one or a few response locations, they should be included in the SOHA. If telemetry data is available it should be used to design the SOHA. Total SOHA size should still be as large as stated in 2.B.

D. Habitat for the SOHA should be within a 1.8 mile radius of the nest or activity center. If spotted owl habitat is not available within the recommended distance, expand the radius 0.3 miles and select the closest available habitat. If sufficient spotted owl habitat cannot be found at these maximum radii, select the next oldest forest stands to develop the SOHA.

E Design the SOHAs to ensure that they are contiguous and compact as possible to minimize fragmentation.

F. Any land management activities (including unsold timber sales within the 1.5-1.8 mile radius which would fragment the SOHA should be dropped.

3. Replacement Areas for SOHAs

A. Ideally, one replacement area should be available for every two designated SOHAs.

B. Use sections 1, 2, and 4 to select and manage replacement areas in the event of the catastrophic loss of any SOHA

4 Management of SOHAs and Replacement Areas

A. Timber harvest, salvage logging, or firewood cutting should not occur within the designated SOHA/Replacement areas.

B. Consolidate fragmented SOHA/Replacement areas over time by managing existing young stands to become spotted owl habitat.

C. If habitat that is not currently spotted owl habitat is being used for all or a portion of SOHA/Replacement areas, use silvicultural prescriptions to create spotted owl habitat in those areas over time.

D. The nest site and main activity centers of the owls should be identified before any timber harvest or timber sales take place within the 1.8-2.1 mile radius area.

E. Size of the management areas (SOHA/Replacement) should be maintained through time. If the suitability or size of a management area is affected by a catastrophic event (fire, blowdown, volcanic eruption, etc.), then additional acres should be added.

F. Road construction through centers of activity in SOHA/Replacement areas should be avoided. Outside centers of activity, roads may be allowed after consultation with the local biologist Unneeded roads and spurs should be closed and allowed to revegetate.

G Review new mineral, oil, and gas operating and development plans. Develop recommendations to minimize impacts to spotted owls and their habitat.

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H. If timber sale units are to be harvested adjacent to SOHA/Replacement area boundaries, they should be designed and managed to minimize the chance of windthrow and fire damage to the sites.

I. Use seasonal restrictions for activities within 1/4 mile of owl nest sites or centers of activity. Suggested times are February 1 - August 31. If, after monitoring a site (at least through May 1), it is determined that the owls are not nesting, biologists may recommend that activities could begin at an earlier date

J. Retain forested corridors within and between SOHAs. If such corridors do not exist, manage habitat to create them

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SPOTTED OWL SITES
MT BAKER - SNOQUALMIE NATIONAL FOREST

SITE NAME (SOHA NAME)	LEGAL DESCRIPTION	SITE STATUS	LAND STATUS	LAST KNOWN LOCATION	PAIR YEAR	MGT CODE	SOHA SHOULD INCLUDE SUITABLE HABITAT IN AREA OF	COMMENTS
Mt Baker Ranger District								
1) W Fork Silesia Cr	T40N R9E S14	I	Wilderness	1987(s)	N	1	T40N R9E S10, 11, 14, 23	
2) Silesia Cr	T40N R9E S1	I	Wilderness	1986(s)	N	1	T40N R9E S1, 2, 3, 12 T40N R10E S7, 18	
3) N Fork Hooksack RNA	T40N R8E S34	I	RNA	1982(p)	Y, 82	4		Area must be surveyed before SOHA delineated
4) Excelsior Mine	T39N R8E S5	I	Non-reserved	1987(p)	Y, 87	1		Mine site
5) Bar Cr	T39N R8E S21	I	Non-reserved	1982(s)	N	4		Area must be surveyed before SOHA delineated
6) N Fork Hooksack	T37N R7E S5	I	Non-reserved	1987(p)	Y, 87	1	T37N R7E S4, 5 6 T37N R6E S1 T38N R6E S35, 36 T38N R7E S30, 31, 32, 33	
7) Bell Cr	T37N R7E S14	I	Non-reserved	1987(p)	Y, 87	1	T37N R7E S13 in addition to area currently designated as SOHA	Radio telemetry information
8) Wanlick Cr	T37N R7E S36	I	Non-reserved	1987(p)	Y, 87	1	T37N R7E S25 26, 35, 36 T37N R8E S30, 31	Radio telemetry information
9) Sandy Cr	T37N R8E S23	I	Non-reserved	1987(p)	Y, 87	1	T37N R8E S9, 10, 11, 13 14, 15, 16, 22, 23	Radio telemetry information
10) Shuksan Cr	T38N R10E S19	I	Non-reserved	1987(p)	Y, 87	1	T38N R10E S18 19 30, 31 T38N R9E S22, 23, 24, 25, 26, 27	Radio telemetry information

DEFINITION OF TABLE HEADINGS

SITE NAME - A spotted owl site is defined as an area with documented spotted owl use during the breeding season and information which indicates the area is within a single pairs' defended territory. SOHA name is listed below site name if the two do not correspond

LEGAL DESCRIPTION - Township, range and section for each spotted owl site

SITE STATUS - Describes spotted owl site as either in (I), adjacent (A), or out (O) of 2200 acre SOHA

LAND STATUS - Describes management status of the spotted owl site

LAST KNOWN LOCATION - Identifies most recent spotted owl location at a site *and whether it was a pair (p) or single (s) location*

PAIR, YEAR - Identifies if the site has ever had a pair location (Y), or not (N) and if it has the most recent year

MANAGEMENT CODE - Identifies a set of prescriptions for each site based upon site status and whether or not the site is *recent or historic*

SOHA SHOULD INCLUDE SUITABLE HABITAT IN AREA OF - Identifies recommended area for establishing, adjusting or expanding a spotted owl habitat area

COMMENTS - Self-explanatory

SPOTTED OWL SITES
MT BAKER - SNOQUALMIE NATIONAL FOREST

SITE NAME (SOHA NAME)	LEGAL DESCRIPTION	SITE STATUS	LAND STATUS	LAST KNOWN LOCATION	PAIR YEAR	MGT CODE	SOHA SHOULD INCLUDE SUITABLE HABITAT IN AREA OF	COMMENTS
11) Noisy Cr	T37N R9E S12	I	Wilderness & Private Land	1985(s)	Y, 84	1		
12) Upper Thunder Cr	T36N R9E S14	A	Non-reserved	1987(p)	Y, 87	2	T36N R9E S11, 12, 13, 14, 15 T36N R10E S7, 18	
13) Sauk Mountain	T35N R9E S2	I	Non-reserved	1987(p)	Y, 87	1	T35N R10E S7, 8 T35N R9E S1, 2, 3, 10, 11, 12 T36N R9E S33, 34	Fragmented habitat
14) Diobsud Cr	T36N R10E S24	I	Non-reserved	1987(p)	Y, 87	1	T36N R10E S13, 24, 25 35, 36 T36N R11E S18, 19, 30 T35N R10E S1, 2, 3, 4, 9, 10	Radio telemetry information
15) Monogram Cr	T35N R12E S6	O	Non-reserved	1986(s)	N	3		
16) La Rush Lake - Irene Cr	T35N R12E S18	O	Non-reserved	1983(s)	N	4		
17) Otter Cr	T34N R11E S14	I	Wilderness	1982(s)	N	4		
18) Upper Illabot Cr (Illabot SOHA)	T34N R11E S26	I	Wilderness & Non-reserved	1987(s)	N	1	T34N R11E S22, 26, 27, 35, 36	
19) Lower Illabot Cr	T34N R11E S17	O	Non-reserved	1978(s)	N	4		
20) Gee Cr (Quartz Cr SOHA)	T34N R8E S15	I	Non-reserved	1987(p)	Y, 87	1	T34N R8E S8, 9, 10, 14, 15 16, 17, 21, 22	Very fragmented habitat
21) Pressentin	T34N R7E S12	I	Non-reserved	1987(s)	N	1	T34N R8E S6, 7 T34N R7E S1, 2, 11, 12, 13, 14	Site located in 1987, needs more surveys to define significant areas
22) Selqelson Cr	T33N R8E S14	A	Non-reserved	1982(s)	Y, 78	2		Very fragmented habitat Original pair location area logged May no longer contain separate site Defer sales in T33N R8E S13, 14, 15, 23

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LAND STATUS - Describes management status of the spotted owl site
LAST KNOWN LOCATION - Identifies most recent spotted owl location at a site and whether it was a pair (p) or single (s) location
PAIR, YEAR - Identifies if the site has ever had a pair location (Y), or not (N) and if it has the most recent year
MANAGEMENT CODE - Identifies a set of prescriptions for each site based upon site status and whether or not the site is recent or historic
SOHA SHOULD INCLUDE SUITABLE HABITAT IN AREA OF - Identifies recommended area for establishing, adjusting or expanding a spotted owl habitat area.
COMMENTS - Self-explanatory

SPOTTED OWL SITES
MT BAKER - SNOQUALMIE NATIONAL FOREST

SITE NAME (SOHA NAME)	LEGAL DESCRIPTION	SITE STATUS	LAND STATUS	LAST KNOWN LOCATION	PAIR YEAR	MGT CODE	SOHA SHOULD INCLUDE SUITABLE HABITAT IN AREA OF	COMMENTS
23) Deer Cr	T33N R8E S9	I	Non-reserved	1987(s)	Y, 82	1	T33N R8E S3, 4, 5, 8, 9 10, 11, 14, 15, 16, 17	Very fragmented habitat
Darrington Ranger District								
24) Stillaguamish N Branch North Fork	T34N R9E S21	I	Non-reserved	1983(s)	Y, 82	4	T34N R9E S19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34 T34N R8E S24, 25, 36	Fragmented habitat
25) Stillaguamish N Fork	T33N R9E S9	O	Non-reserved	1985(s)	N	3	T33N R9E S2, 3, 4, 5, 8, 9, 10, 11, 14, 15, 16, 17, 21, 22	Very fragmented habitat
26) Stillaguamish N Branch N Fork	T34N R9E S32	O	Non-reserved	1983(s)	N	4	T34N R9E S31, 32, 33, 34 T33N R9E S2, 3, 4, 5	Very fragmented habitat
27) Stillaguamish S Branch N Fork	T33N R9E S18	I	Non-reserved	1987(p)	Y, 87	1	T33N R9E S7, 8, 9, 16, 17, 18, 19, 20, 21 T33N R8E S12, 13	Fragmented habitat Radio telemetry information
28) Higgins Mountain	T33N R8E S26	O	Non-reserved	1982(s)	Y, 78	4	T33N R8E S24, 25, 26, 32, 33, 34, 35, 36 T33N R9E S30, 31	Fragmented habitat
29) Grade Cr	T34N R11E S31	I	Non-reserved	1987(s)	N	1	T34N R11E S19, 20, 29, 30, 31, 32 T33N R11E S5, 6, 7, 8 T34N R10E S36 T33N R10E S1	Fragmented or steep, high elevation habitat
30) Tenas Cr	T33N R11E S27	O	Non-reserved	1978(s)	N	4	Area must be surveyed before SOHA can be properly delineated	Fragmented habitat Only one location

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MANAGEMENT CODE - Identifies a set of prescriptions for each site based upon site status and whether or not the site is recent or historic
SOHA SHOULD INCLUDE SUITABLE HABITAT IN AREA OF - Identifies recommended area for establishing, adjusting or expanding a spotted owl habitat area
COMMENTS - Self-explanatory

SPOTTED OWL SITES
MT BAKER - SNOQUALMIE NATIONAL FOREST

SITE NAME (SOHA NAME)	LEGAL DESCRIPTION	SITE STATUS	LAND STATUS	LAST KNOWN LOCATION	PAIR YEAR	MGT CODE	SOHA SHOULD INCLUDE *SUITABLE HABITAT IN* AREA OF	COMMENTS
31) Prairie Mountain	T32N R10E S12	O	Non-reserved	1987(s)	N	3	Area must be surveyed before SOHA can be properly delineated	Site located in 1987, needs more surveys to define significant areas
32) Lime Cr	T32N R12E S29	O	Non-reserved	1987(s)	N	3	Area must be surveyed *before* SOHA can be properly delineated	Site located in 1987, needs more surveys to define significant areas
33) Downey Cr (Downey Cr 3 SOHA)	T33N R13E S20	I	Wilderness	1987(p)	Y, 87	1		Site in one of three adjacent SOHAs along Downey drainage Other two SOHAs are surveyed and unoccupied
34) Glacier Cr	T30N R13E S1	I	Wilderness	1987(p)	Y, 87	1		Site in one of three adjacent SOHAs along White Chuck drainage Other two SOHAs are surveyed and unoccupied
35) Crystal Cr	T31N R11E S10	I	Non-reserved	1987(s)	N	1	T31N R11E S1, 2, 3, 4, 9, 10, 11, 12 T32N R11E S33, 35	
36) Black Oak Cr	T31N R11E S8	I	Non-reserved	1987(s)	Y, 86	1	T31N R11E S4, 5, 6, 7, 8, 9 T31N R10E S1, 12 T32N R10E S36 T32N R11E S31	Little remaining suitable habitat
37) Gold Mountain	T31N R10E S4	O	Non-reserved	1983(p)	Y, 83	4	T31N R10E S1, 2, 3, 4, 9, 10, 11, 15, 16 T32N R10E S32, 33, 34	Area must be surveyed *before SOHA delineated*

DEFINITION OF TABLE HEADINGS

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MANAGEMENT CODE - Identifies a set of prescriptions for each site based upon site status and whether or not the site is recent or historic
SOHA SHOULD INCLUDE SUITABLE HABITAT IN AREA OF - Identifies recommended area for establishing, adjusting or expanding a spotted owl habitat area
COMMENTS - Self-explanatory

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SPOTTED OWL SITES
MT BAKER - SNOQUALMIE NATIONAL FOREST

SITE NAME (SOHA NAME)	LEGAL DESCRIPTION	SITE STATUS	LAND STATUS	LAST KNOWN LOCATION	PAIR YEAR	MGT CODE	SOHA SHOULD INCLUDE SUITABLE HABITAT IN AREA OF	COMMENTS
38) Backman Cr	T31N R10E S6	O	Non-reserved	1982(s)	N	4	T32N R9E S35, 36 T31N R9E S1, 12 T31N R10E S6, 7, 18	Must identify area of site before SOHA delineated
39) Clear Cr	T31N R9E S24	A	Non-reserved	1987(p)	Y, 87	2	T31N R9E S12, 13, 23, 24, 25, 26, 27 T31N R10E S18, 19	
40) Squire Cr	T31N R9E S10	I	Non-reserved	1982(s)	N	4	T31N R9E S2, 3, 4, 9, 10, 11, 16 T32N R9E S33, 34, 35	SOHA in wilderness and non-reserved
41) Tupso Pass (Gerkman Cr SOHA)	T31N R8E S10	A	Wilderness & Non-reserved	1987(s)	N	2	T31N R8E S2, 3 4, 8, 9, 10, 11	Site located in 1987, needs more surveys to define significant areas
42) Meadow Cr	T31N R8E S18	O	Non-reserved	1987(s)	N	3		Site located in 1987, needs more surveys to define significant areas
43) Bear Lake (Lake 22 SOHA - RNA)	T30N R8E S26	A	Non-reserved	1985(s)	N	2	T30N R8E S20, 21, 22, 23, 25, 26	Area must be surveyed before SOHA can be properly delineated
44) Barlow Pass	T29N R11E S6	I	Non-reserved	1987(p)	Y, 87	1	T29N R11E S6, 7, 18 T29N R10E S1, 2 T30N R10E S35, 36 T30N R11E S31	SOHA very high elevation Move lower
45) Elliott Cr	T29N R11E S3	A	Non-reserved Adjacent to Wilderness	1987(s)	N	2	T29N R11E S2, 3, 4 T30N R11E S32 33, 34, 35	

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SOHA SHOULD INCLUDE SUITABLE HABITAT IN AREA OF - Identifies recommended area for establishing, adjusting or expanding a spotted owl habitat area
COMMENTS - Self-explanatory

SPOTTED OWL SITES
MT BAKER - SNOQUALMIE NATIONAL FOREST

	SITE NAME (SOHA NAME)	LEGAL DESCRIPTION	SITE STATUS	LAND STATUS	LAST KNOWN LOCATION	PAIR YEAR	MGT CODE	SOHA SHOULD INCLUDE SUITABLE HABITAT IN AREA OF	COMMENTS
46)	Red Mountain	T30N R12E S29	O	Wilderness	1986(s)	Y, 84	3		See Site #47 comment
47)	North Fork Sauk	T30N R12E S34	I	Wilderness	1987(p)	Y, 87	1		Survey to determine if Site #46 and Site #47 are separate sites - possibly same site.
	Skykomish Ranger District								
48)	Pass Cr (N Fork Skykomish 1 SOHA)	T29N R12E S36	I	Wilderness	1987(s)	Y, 86	1		
49)	Blanca Lake Trail	T28N R12E S18	O	Non-reserved	1980(s)	N	4		Only one location
50)	Silver Cr	T28N R11E S20	I	Non-reserved	1986(s)	Y, 84	1		
51)	Trout Cr (Barclay 2 SOHA)	T27N R11E S17	I	Non-reserved	1987(s)	N	1		
52)	Barclay Cr (Barclay 1 SOHA)	T27N R11E S31	A	Non-reserved	1983(s)	N	4	T27N R11E S30, 31, 32	Only one location
53)	Grotto Mountain	T26N R11E S8	A	Non-reserved	1983(p)	Y, 83	4	T26N R11E S6, 7, 8, 9, 15, 16, 17, 18	Only one location
54)	Eagle Cr	T26N R11E S10	O	Non-reserved	1976(s)	N	4	T26N R11E S2, 4, 10, 12, 14, 16, 23	Only one location
55)	Beckler River (Barclay 3 SOHA)	T27N R12E S31	A	Non-reserved	1987(s)	N	2	T27N R12E S19, 20, 21, 29, 30, 31, 32 T26N R12E S5, 8	Only one location

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SPOTTED OWL SITES
MT BAKER - SNOQUALMIE NATIONAL FOREST

	SITE NAME (SOHA NAME)	LEGAL DESCRIPTION	SITE STATUS	LAND STATUS	LAST KNOWN LOCATION	PAIR YEAR	MGT CODE	SOHA SHOULD INCLUDE SUITABLE HABITAT IN AREA OF	COMMENTS
56)	Meadow Cr (Rapid River 3 SOHA)	T27N R12E S12	I	Wilderness Non-reserved	1983(p)	Y, 83	4	T27N R12E S11, 12, 13, 14 T27 R13E S18 In addition to area currently designated as SOHA	
57)	Rapid River 2	T27N R13E S32	I	Wilderness	1981(p)	Y, 81	4		Only one location
58)	Lake Janus (Rapid River 1 SOHA)	T27N R13E S27	I	Wilderness	1983(p)	Y, 83	4		Surveyed 1987, only barred owls respond
59)	Surprise Cr (Deception Cr 3 SOHA)	T26N R13E S32	I	Wilderness Boundary	1985(s)	N	1	T26N R13E S27, 28, 29, 30, 31, 32 SOHA should include these sections (if habitat is there) instead of just wilderness area near response	
60)	Deception Cr (Deception Cr 2 SOHA)	T25N R13E S7	I	Wilderness	1987(s)	N	1	T25N R12E S12	Survey area outside of wilderness.
61)	Upper Deception Cr (Deception Cr 1 SOHA)	T25N R13E S19	I	Wilderness	1987(s)	N	1	T25N R12E S18, 19	
62)	E Fork Miller Cr	T25N R11E S27	O	Non-reserved near Wilderness	1981(s)	N	4	T25N R11E S22, 23, 26, 27, 33, 34	
63)	W Fork Miller Cr	T25N R11E S19	I	Non-reserved adjacent to Wilderness	1987(s)	N	1		Site located in 1987, needs surveys to define significant areas
	North Bend Ranger District								
64)	Sunday Cr	T25N R10E S19	I	Wilderness	1987(p)	Y, 87	1		
65)	Lennox Cr	T25N R10E S26	I	Non-reserved near Wilderness Boundary	1986(s)	N	1	T25N R10E S20, 21, 22, 25, 26	

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SPOTTED OWL SITES
MT BAKER - SNOQUALMIE NATIONAL FOREST

	SITE NAME (SOHA NAME)	LEGAL DESCRIPTION	SITE STATUS	LAND STATUS	LAST KNOWN LOCATION	PAIR YEAR	MGT CODE	SOHA SHOULD INCLUDE SUITABLE HABITAT IN AREA OF	COMMENTS
66)	N Fork Snoqualmie	T25N R10E S3	O	Non-reserved near Wilderness Boundary	1982(s)	N	4	T25N R10E S2, 3, 4, 10, 11	
67)	Lower Dingford Cr	T24N R11E S31	A	Non-reserved near Wilderness Boundary	1983(p)	Y, 83	4	T24N R11E S31 T23N R11E S6	Survey this area and site below to determine if these are 1 or 2 sites
68)	Upper Dingford Cr	T24N R11E S33	I	Wilderness	1987(s)	Y, 84	1		See survey recommendations above
69)	Pratt River	T23N R10E S18	O	Non-reserved	1987(p)	Y, 87	3	T23N R10E S4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29 T24N R10E S31, 32, 33	Site just identified in 1987 Fragmented habitat Further surveying needed
70)	Talapus Lake	T22N R10E S10	A	Non-reserved Wilderness	1987(s)	Y, 83	2	T22N R10E S2, 3, 4, 5, 8, 9, 10, 11, 12	Very fragmented habitat
71)	Annette Lake	T22N R10E S24	I	Non-reserved	1983(p)	Y, 83	4	T22N R10E S13, 14, 15, 22, 24, 25, 26	Very fragmented habitat
72)	Fish Cr	T22N R8E S14	O	Non-reserved	1981(s)	N	4		Only one location
73)	Upper Rex Cr	T21N R9E S14	O	Non-reserved	1987(s)	Y, 81	3	T21N R9E S8, 10, 11, 12, 14, 16, 22 T21N R10E S4, 6, 8, 12, 18 T22N R9E S36 T22N R10E S32	Very fragmented habitat
74)	S Fork Cedar River	T21N R10E S14	O	Non-reserved	1987(p)	Y, 87	3	T21N R10E S2, 4, 10, 12, 14, 16, 20, 22, 24 T21N R11E S6, 8, 18	Radio Telemetry information Very fragmented habitat
75)	Sunday Cr (Borup SOHA)	T21N R11E S34	A	Non-reserved	1987(s)	Y, 87	2	T21N R11E S16, 18, 20, 22, 26, 28, 30, 32, 34, 36 T20N R11E S2, 4, 10	Very fragmented habitat

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COMMENTS - Self-explanatory

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SPOTTED OWL SITES
MT BAKER - SNOQUALMIE NATIONAL FOREST

	SITE NAME (SOHA NAME)	LEGAL DESCRIPTION	SITE STATUS	LAND STATUS	LAST KNOWN LOCATION	PAIR YEAR	MGT CODE	SOHA SHOULD INCLUDE SUITABLE HABITAT IN AREA OF	COMMENTS
76)	Twin Camps Cr	T19N R11E S10	I	Non-reserved	1984(s)	Y, 80	4	T19N R11E S2, 4, 6, 10, 12, 14, 16 T20N R11E S32, 34 T19N R12E S2, 10	Very fragmented habitat
	White River Ranger District								
77)	Cedar Lake	T18N R8E S6	I	Wilderness Adjacent to Forest Boundary	1976(s)	N	4		
78)	Clearwater Cr	T18N R8E S10	I	Wilderness	1983(p)	Y, 83	4	T18N R8E S1, 2, 3, 4, 10, 11, 14, 15	Area should be surveyed SOHA in Wilderness Site on boundary of wilderness and non-reserved land Some of this non-reserved area should be in SOHA
79)	Pinchole Cr	T18N R8E S13	I	Non-reserved	1986(p)	Y, 86	1	T18N R8E S1, 12, 13, 14, 23, 24 T18N R9E S6, 7, 18, 19	See note above
80)	Buck Cr	T18N R10E S29	I	Non-reserved	1981(s)	N	4		
81)	Ranger Cr	T18N R10E S22	I	Non-reserved	1986(p)	Y, 86	1	T18N R10E S14, 15, 16, 21, 22, 23 26, 27, 34, 35	
82)	Quinn Lake	T18N R11E S7	I	Wilderness	1986(s)	Y, 85	1	T11N R11E S5, 6, 7, 8, 17, 18 T18N R10E S1, 12 T19N R10E S36	Site near Wilderness boundary SOHA all in Wilderness See note below
83)	Maggie Cr	T18N R11E S4	I	Wilderness	1986(p)	Y, 86	1	T18N R11E S2, 3, 4, 5, 8, 9, 10, 11 T19N R11E S31, 32, 34	Needs surveying to determine if separate site from Quinn Lake (above)
84)	Upper Greenwater	T18N R11E S29	O	Wilderness	1976(s)	N	4		

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COMMENTS - Self-explanatory

SPOTTED OWL HABITAT AREAS WITHOUT A SPOTTED OWL SITE
Mt Baker-Snoqualmie National Forest

SOHA NAME	MAP NUMBER	SURVEYED?
Mt Baker Ranger District		
Silesia Cr	S1	Y
Kulshan Cr	S2	Y
Wallace Cr	S3	N
Ermine Cr	S4	Y
Thunder Lk	S5	Y
Alma Copper	S6	Y
Found Cr	S7	Y
Mill Cr	S8	Y
Darrington Ranger District		
West Ditney	S9	Y
Boulder River	S10	Y
Meadow Mtn	S11	N
Canyon Lk	S12	N
Long Cr RNA	S13	N
Big Four	S14	N
Sitkum Cr	S15	Y
Fire Cr	S16	Y
Downey Cr 1	S17	Y
Downey Cr. 2	S18	Y
Skykomish Ranger District		
N Fork Skykomish 3	S19	N
N Fork Skykomish 2 - CADY	S20	Y
Troublesome Cr	S21	Y
S Fork Salmon River	S22	N
North Bend Ranger District		
Mid Fork Snoqualmie	S23	Y
Pioneer	S24	Y

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ATTACHMENT C

SUMMARY OF FINDINGS AND CONCLUSIONS

1. About 76,000 acres of Silver Fir land in the so-called Mountain Hemlock Zone were misclassified as unsuitable. The average net green volume per acre on these lands is 6 percent higher than for the overall large sawtimber class The real productivity of these lands is more than twice as high as that estimated by the Forest Service. They are capable of producing over 100 cubic feet per acre per year, which implies a potential contribution of 38 MMBF per year (76,000 x 100 CF x 5 BF/CF), before reductions for economic, wildlife or other considerations.

2 The conversion ratio used to restate FORPLAN cubic feet timber outputs in terms of board feet is too low and underestimates actual board-foot volume for the first decade of the preferred alternative by at least 4.3 percent.

3. There are numerous, serious errors in the managed yields including their on an incorrect site index, misuse of DFSIM to predict Hemlock/True Fir yields, incorrect entry into FORPLAN, exclusion of fertilizer, and incorrect adjustment for genetic improvement As a result, managed yields for 60 percent of the forest are *underestimated by over 50 percent, and* thus for the overall forest by over 30 percent

4 An examination of the distribution of acres for each decade over the next 150 years shows that there will always be enough suitable mature forest habitat to provide for a higher percentage of the maximum potential population of cavity excavators than the 40 percent sought in the preferred alternative. The preferred alternative's 3 percent reduction in all existing and regenerated yield tables is therefore totally unnecessary

5. Arbitrary harvest timing constraints are being applied to more than 50,000 acres of unroaded lands containing mature sawtimber and currently classified as economically inaccessible These constraints force the areas to be harvested within the first 5 decades or not at all, with the result that only 4,000 acres are harvested and the remaining 46,000 acres effectively become de factor wilderness.

6. Productivity (Site Index) has been grossly underestimated on the 70 percent of the forest occupied by species other than Douglas Fir, because it was erroneously reduced by the percent normal stocking of the existing forest. Site index represents the potential of land to grow trees, and is independent of current stocking. This error was compounded by using a yield simulator, *DFSIM, that is only suitable for use with 80 percent or* purer Douglas Fir to derive 50-year site index

7. Future yields for naturally regenerated stands were adjusted down to not exceed existing stand yields that reflect the current, less than normally stocked forest, even though the plan calls for planting 25 percent of the naturally regenerated acreage to ensure adequate stocking.

8. The plan is based on an obsolete (1976) inventory whose lack of stratification forces use of broad, size-oriented grouping of timber stands, rather than 10-year age classes preferred by FORPLAN. Use of such broad classes in FORPLAN has been previously demonstrated to cause ASO to be biased on the low side.

9. The empirical yield tables used for existing timber stands were developed using a Region 6 process that has been the subject of criticism for the last ten years, and has been termed a "made-do" process by the Region 6 Technical Task Force These yields must be considered questionable.

10. The draft plan states that utilization standards will be changed during the plan to reduce nonchargeable green volume to 8 percent of net green volume during the first decade, stepping down to 2 percent by the fifth decade. This is inconsistent with the utilization standard for the empirical yields used by FORPLAN to calculate ASO, which excluded *nonchargeable green volume of about 20 percent of net green volume. The* net effect of this will be to credit more volume per acre toward meeting the ASO than assumed in the yield tables, resulting in less acres being harvested and thereby causing a hidden reduction in ASO.

11. The structure of the forest model is inaccurate because it fails to stratify the forest by species, even though the forest will be managed for about 40 percent Douglas Fir and 60 percent Hemlock/True Fir in the future, with management prescriptions as well as yields of these species differing significantly.

12 There is an opportunity to increase timber production on areas where very long rotation ages are specified, through the use of shelterwood harvests that would be compatible with the management emphasis on the areas

13. FORPLAN makes use of a concept called allocation zones to ensure that all the lands in an area defined as a zone are managed in a compatible manner. Normally, several alternative packages of management prescriptions are input for each zone, and FORPLAN allowed to select the optimal package, i.e , the one that best contributes to the objective of maximizing net present value of the overall plan. However on this forest, the planning team input only a single predetermined package of *prescriptions for each zone, thereby preventing* FORPLAN from developing an optimal plan.

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TIMBER HARVEST BY COUNTY AND OWNER CLASS
(Million board feet, Scribner log rule)

COUNTY	OWNER CLASS						
	PRIVATE	STATE	MT BAKER-SNOQUALMIE NATIONAL FOREST			OTHER PUBLIC	TOTAL
			AMOUNT	% FOREST	% TOTAL		
1985							
Island	10	4	—	—	—	1	15
King	221	21	65	29	20	12	319
Kitsap	33	7	—	—	—	5	45
Pierce	187	16	37	16	15	9	249
San Juan	2	—	—	—	—	—	2
Skagit	162	84	24	11	9	1	271
Snohomish	68	61	70	31	15	5	204
Whatcom	46	20	29	13	30	1	96
Total	729	213	225	100	19	34	1,201
% of total	60	18	19	—	—	3	100
1984							
Island	10	5	—	—	—	—	15
King	227	8	33	14	12	5	273
Kitsap	33	5	—	—	—	4	42
Pierce	183	5	37	16	14	47	272
San Juan	2	—	—	—	—	—	2
Skagit	111	57	41	18	20	—	209
Snohomish	72	33	75	32	40	6	186
Whatcom	58	9	47	20	41	2	116
Total	696	122	233	100	21	64	1,115
% of total	61	11	22	—	—	6	100

David Larsen
Analysis and Planning EM-11
Department of Natural Resources
Olympia, Wasnington 98504
Phone (206) 586-4439

SOURCE Washington Timber Harvest Reports, 1975-1985.

TIMBER HARVEST BY COUNTY AND OWNER CLASS
(Million board feet, Scribner log rule)

COUNTY	OWNER CLASS						
	PRIVATE	STATE	MT BAKER-SNOQUALMIE NATIONAL FOREST			OTHER PUBLIC	TOTAL
			AMOUNT	% FOREST	% TOTAL		
1983							
Island	11	3	—	—	—	1	15
King	220	6	52	23	19	—	278
Kitsap	39	3	—	—	—	2	44
Pierce	137	3	42	19	21	15	197
San Juan	4	—	—	—	—	<1	4
Skagit	182	39	52	23	19	1	274
Snohomish	94	36	53	23	29	2	185
Whatcom	66	11	27	12	25	2	106
Total	753	101	226	100	21	23	1,103
% of total	68	9	21	—	—	2	100
1982							
Island	8	—	—	—	—	—	8
King	241	2	25	20	9	—	268
Kitsap	32	4	—	—	—	1	37
Pierce	184	8	13	10	6	7	212
San Juan	2	—	—	—	—	<1	2
Skagit	139	20	40	32	20	<1	199
Snohomish	111	29	41	33	22	2	183
Whatcom	37	23	6	5	9	1	67
Total	754	86	125	100	13	11	976
% of total	77	9	13	—	—	1	100
1981							
Island	13	—	—	—	—	—	13
King	184	14	52	34	21	—	250
Kitsap	32	2	—	—	—	<1	34
Pierce	170	12	32	21	15	5	219
San Juan	3	—	—	—	—	—	3
Skagit	122	24	57	38	28	1	204
Snohomish	91	14	—	—	—	1	106
Whatcom	32	12	10	7	18	1	55
Total	647	78	151	100	18	8	884
% of total	73	9	17	—	—	1	100

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Attachment A, Page 3

TIMBER HARVEST BY COUNTY AND OWNER CLASS
(Million board feet, Scribner log rule)

COUNTY	OWNER CLASS						
	PRIVATE	STATE	MT. BAKER-SNOQUALMIE NATIONAL FOREST			OTHER PUBLIC	TOTAL
			AMOUNT	% FOREST	% TOTAL		
1980							
Island	10	1	—	—	—	<1	11
King	208	14	48	22	17	8	278
Kitsap	38	5	—	—	—	<1	43
Pierce	177	11	33	15	14	9	230
San Juan	6	—	—	—	—	—	6
Skagit	112	38	80	37	35	1	231
Snohomish	85	33	42	19	26	<1	160
Whatcom	41	25	14	7	17	1	81
Total	677	127	217	100	21	19	1,040
% of total	65	12	21	—	—	2	100
1979							
Island	10	<1	—	—	—	1	11
King	279	31	93	34	22	20	423
Kitsap	35	2	—	—	—	4	41
Pierce	161	24	<1	—	—	13	198
San Juan	11	—	—	—	—	—	11
Skagit	159	35	138	51	41	2	334
Snohomish	88	75	21	0	11	<1	184
Whatcom	50	42	18	7	16	<1	110
Total	793	209	270	100	21	40	1,912
% of total	60	16	21	—	—	3	100
1978							
Island	12	—	—	—	—	—	12
King	270	42	34	13	9	22	368
Kitsap	37	9	—	—	—	3	49
Pierce	147	16	40	16	18	14	217
San Juan	10	<1	—	—	—	<1	10
Skagit	112	51	64	25	28	—	227
Snohomish	80	66	99	39	40	1	245
Whatcom	44	39	20	7	19	2	105
Total	712	223	257	100	21	42	1,234
% of total	58	18	22	—	—	3	100

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Attachment A, Page 4

TIMBER HARVEST BY COUNTY AND OWNER CLASS
(Million board feet, Scribner log rule)

COUNTY	OWNER CLASS						
	PRIVATE	STATE	MT. BAKER SNOQUALMIE NATIONAL FOREST			OTHER PUBLIC	TOTAL
			AMOUNT	% FOREST	% TOTAL		
1977							
Island	12	1	—	—	—	<1	13
King	334	11	35	16	9	16	396
Kitsap	39	2	—	—	—	5	46
Pierce	218	15	38	18	14	10	281
San Juan	10	—	—	—	—	—	10
Skagit	86	49	53	24	28	1	187
Snohomish	93	45	73	34	35	<1	211
Whatcom	46	28	18	8	20	—	92
Total	838	151	217	100	17	32	1,238
% of total	68	12	17	—	—	3	100
1976							
Island	15	<1	—	—	—	—	15
King	382	18	33	14	7	17	450
Kitsap	40	4	—	—	—	5	49
Pierce	259	7	52	22	16	13	331
San Juan	12	—	—	—	—	—	12
Skagit	123	31	56	24	26	3	213
Snohomish	92	27	62	26	34	<1	181
Whatcom	43	31	31	14	30	<1	105
Total	966	118	234	100	17	38	1,356
% of total	71	9	17	—	—	3	100
1975							
Island	19	<1	—	—	—	<1	19
King	370	21	33	20	8	11	435
Kitsap	25	1	—	—	—	3	29
Pierce	209	15	24	14	8	35	283
San Juan	13	—	—	—	—	—	13
Skagit	107	19	54	32	30	—	180
Snohomish	159	25	52	31	22	2	238
Whatcom	51	30	6	3	7	2	89
Total	953	111	169	100	13	53	1,286
% of total	74	9	13	—	—	4	100

TIMBER HARVEST BY COUNTY AND OWNER CLASS
(Million board feet, Scribner log rule)

COUNTY	OWNER CLASS						
	PRIVATE	STATE	MT BAKER SNOQUALMIE NATIONAL FOREST			OTHER PUBLIC	TOTAL
			AMOUNT	% FOREST	% TOTAL		
1975-1984 (10 year summary)							
Total	7,789	1,326	2,099	—	—	330	11,544
% of total	67	12	18	—	—	3	100

SOURCE. Washington Timber Harvest Reports, 1975-1985.

David Larsen
Analysis and Planning EM-11
Department of Natural Resources
Olympia, Washington 98504
Phone (206) 586-4439
April 6, 1988

LOG CONSUMPTION FROM WASHINGTON NATIONAL FORESTS
(Thousand board feet, Scribner log scale)

	All National Forests	Mt. Baker-Snoqualmie National Forest Volume	Percent
Economic area			
Puget Sound	267,014	206,539	97
Olympic Peninsula	324,716	5,482	3
Lower Columbia	194,895	1,183	<1
Central Washington	146,569	—	—
Inland Empire	122,914	—	—
Total	1,056,108	213,204	100
Industry			
Lumber	777,960	165,519	78
Veneer & plywood	163,935	16,976	8
Pulp	83,041	5,557	3
Shake & shingle	29,852	24,844	11
Export	173	173	<1
Post, pole & piling	1,147	135	<1
Total	1,056,108	213,204	100

SOURCE 1984 Washington Mill Survey, Table 5

David Larsen
Analysis and Planning EM-11
Department of Natural Resources

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Attachment C

May 8, 1987

CONSUMPTION OF 1984 TIMBER HARVEST
FROM THE MT.BAKER-SNOQUALMIE NATIONAL FOREST, BY COUNTY
(Million board feet, Scribner log rule)

Economic area and counties	Volume	
Puget Sound	Mbf	Percent
King	10,238	4 8
Pierce	13,845	6.5
Skagit	19,393	9.1
Snohomish	137,638	64.6
Whatcom	25,425	11.9
Area total	206,539	96 9
Olympic Peninsula and Lower Columbia		
(Clallam, Clark, Cowlitz, Lewis)[1]	6,665	3 1
Total	213,204	100.0

SOURCE 1984 Washington Mill Survey

David Larsen
Analysis and Planning EM-11
Department of Natural Resources

[1] Combined to avoid disclosure

J-570

Attachment D

March 11, 1988

LOG CONSUMPTION BY COUNTY AND HARVEST ORIGIN BY COUNTY
(Thousand board feet, Scribner log rule)

Economic area and county of use	Total	Five Puget Sound Counties: Total	King	Pierce	Skagit	Snohomish	Whatcom
Puget Sound							
(60 % of the timber consumption in the Puget Sound region is from the five counties where the Mt Baker-Snoqualmie National Forest is located)							
Island/San Juan/ Kitsap	144,228	--	--	--	--	--	--
King	143,223	119,396	75,915	34,006	--	9,575	--
Pierce	619,647	273,880	89,881	153,208	--	30,791	--
Skagit	53,190	51,052	617	--	35,439	8,541	8,455
Snohomish	614,534	481,136	43,597	18,231	172,190	188,995	58,123
Whatcom	97,119	82,002	1,156	--	34,093	5,788	40,965
Total	1,671,941	1,007,466	210,010	205,445	241,722	241,690	107,543
Olympic Peninsula							
(2 5 % of the timber consumption in the Olympic Peninsula counties comes from the five counties where the Mt Baker-Snoqualmie National Forest is located)							
Clallam	352,024	2,700	2,445	--	255	--	--
Grays Harbor/ Jefferson	1,075,770	--	--	--	--	--	--
Lewis/Mason	482 753	16,550	2,550	13,532	--	468	--
Pacific	75,723	2,290	--	--	--	2,290	--
Thurston	137,450	31,120	--	18,280	5,136	3,852	3,852
Total	2 103,720	52,660	4 995	31,812	5,391	6,610	3,852
Total Western Washington							
(21 % of the Western Washington timber harvest is from the five counties where the Mt Baker-Snoqualmie National Forest is located)							
Total	5,046,545	1,060,126	216,061	237,257	247,113	248,300	111,395

SOURCE 1984 Washington Mill Survey, Table 4

David Larsen
Analysis and Planning
Department of Natural Resources

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ATTACHMENT D

RECREATION AND ROADLESS AREAS

Nine roadless areas valuable for recreation pursuits have been identified in this attachment. The areas discussed have not been prioritized, based upon IAC criteria, they are merely the best choices for recreation

The IAC tapped several knowledgeable sources to prepare this reply. First, we talked to users cognizant of the forest resource and recreational experiences "on the ground." Next, we consulted the U.S. Forest Service descriptions of these areas as provided in the Appendices - Draft Environmental Impact Statement (Appendix C) for the forest The integration of these information sources helped us target the selected areas. The scientific and emotion/empirical values overlapped to indicate those areas that were most cared about and important for continued recreational pursuits into the future. TABLE A summarizes some elements critical to recreational values in roadless allocations Treat this table as only a marker to enable easy comparisons. For more site specific detail, refer to TABLE B called Roadless Areas Most Valuable for Recreation.

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ROADLESS AREAS MOST VALUABLE FOR RECREATION -- MT BAKER SNOQUALMIE NATIONAL FOREST

ROADLESS AREA - Name or Forest Service Number	User Group Support	Type of Access	Primitive Recreation	Trails - Existing or Potential	Views or Special Features	Water	Old Growth or Diversity
(Boulder River - 6050 (BJ)) or Mt Dickeraman Backcountry area	hikers horsemen	road access arterial routes	'Good with challenges camping, at limbing fish/hunting	several - Forgotten & Dickeraman Mts 16 miles existing	next to Boulder River Wilderness potential Ferry Creek RNA views of mts	many streams drains Sauk & Stilla	900-6000 mature coniferous forest
2 (Eagle Rock - 6054 (54)) or Eagle Rock Backcountry Area	hikers horsemen	S R 2 Use-heavy 2 other roads	Excellent trail rec, fish/hunting	Few existing trails Little horse use	13 rugged peaks over 5000 Deeply cut valleys Mountain goats	3 river 13 lks 8 drain -ages	900-6245 mixed W Cascade for alpine/snow
(Glacier Peak W - W6031 (WA/WB)) Cascade River drainage	hikers	4 roads, to Park & Wild	Hiking X-Co skiing at climbing hunt/fish	moderate use La Push/Bear Lks destination	Bald eagle sites Steelhead/salmon Amer Indian relig sites/old growth	6 crks 3 lks	1200-8200 doug fir hemlock silver fir
(Glacier Peak E - 6031 (WA)) or Ragged Ridge Backcountry Area 4 Verlot/Silverton area from Boardman Lk to Silver Tip Pk	hikers horsemen	1/4 to 1/2 mile road access many pts	hiking fishing at climbing	Many popular destination trails Poodle Pass Headlee Pass Gothic Basin Weden Creek Boardman Lake	Mountain goats - Headlee Pass Steep, rocky topography in south old growth	S Fk Stilla- guamish Lk Evan Board- man Lk	1600-6100 cedar fir hemlock
(Hidden Lake - 6045 (45)) Cascade River drainage 5	hikers	2 roads	hiking hunting mineering photography	Hidden Lk Pk Trail Heavily used trail to peak/lookout	Bald eagles Hidden Lk Pk Look-out (historic site), old growth	drain- ages	1100-6900 W Cascades species- fir,hemlock
Mt Baker - Canyon Creek Block - 6041 (MA)] 6	hikers horsemen snowmobiler CRVers	6 roads	winter uses backpacking mineering ORV riding	6 trails Canyon Ridge Tr-ORV	2 E/W ridges Church Mountain Canyon Ridge steeply dissected	Canyon Creek many lakes	2200-6315 subalpine & W Cascade species
(Mt Baker - Noisy Diobsud Block - 6041 (MB)) 7 Baker River/north Baker Lk Helen Butte/Jackman Creek Backcountry Area	hikers horsemen snowmobiler ORVers hikers horsemen	8 roads	camping hunt/fish mineering ski touring hiking photography	6 trails Heavy use on the Anderson & Watson Lks, Sauk Mt, and Baker Lake Tr	5 major peaks: Sauk, Bald Mts, Welker Pk, Watson Mt, Diobsud Buttes. steep slopes Bald eagles Peregrine falcons Salmon/steelhead	drains Skagit+ Baker R many small lakes Baker Lake	500-6200 W. Cascade species Subalpine & alpine vegetation
(Norse Peak - 6034 (NA-NB)) 8	horsemen	2 hwys PCT 4 FS rds	hiking bridle scenic drive	Pacific Crest Tr Noble Knob, Lookout & Corral Pass Tr	Snoquera Crk Falls Castle Mountain Corral Pass Cappd	5 + drain- ages	2300-6000 subalpine alpine veg
Pratt River Backcountry Area 9 (No Bend Ranger Dist.)	hikers horsemen	isolated by few bridges	hiking bridle	8 miles existing 11 miles planned-- IAC 87-88	old growth forest	Pratt River	

KEY: (Forest Service named roadless area); (Parcel)

Roadless Areas Most Valuable for Recreation
Mt. Baker Snoqualmie National Forest

1. Boulder River -
Acreage (Parcel BJ) 27,369 of which 19,133 classified for recreation

ROS classes: Primitive, Semi-Primitive Non-Motorized

Recreation: potential for primitive recreation/challenging experiences are good for this area. Camping, hiking, scrambling, hunting, angling, and berry picking are popular here. Offers dispersed recreational opportunities

User comments Mt Dickerman Backcountry Area - Area offers superb views of surrounding peaks in an alpine setting---Big Four, Sloan, Vesper, and Pugh from Mt. Dickerman, Forgotten and Stillaguamish. Attraction to lakes in the area as well: Independence, Helena, Peek a Boo Area offers diverse opportunities such as rockhounding, recreational prospecting, mountain climbing, angling, and hunting

Access: About 75 miles from Seattle Arterial and collector roads encircle the parcel.

2. Eagle Rock -
Acreage (Parcel 54): 33,177 of which 26,397 classified for recreation

ROS classes: Primitive, Semi-Primitive Non-Motorized

Recreation: Use is heavy Easy access to some lakes make popular day hike trips Outstanding rock and mountain climbing popular on Baring Mountain, Gunn Peak, Merchant Peak Primitive recreational uses include hiking, camping, fishing, hunting, backpacking and climbing. 6,000 + visitors go into this area to hike and fish each year Only one trail in this area

User comments: Eagle Rock Backcountry Area - Alpine scenery is a major attraction here Views of Gunn Lake, Gunn Peak, Merchant Peak, Mt Baring are spectacular Good climbing available throughout this area. Popular lakes include Baring and Eagle Wildlife also attracts visitors--mountain goats, bear, and good fishing.

Access: About 40 miles from Everett and 50 miles to Seattle. Less than 10 miles from three Wildernesses: Henry M Jackson, Alpine Lakes and Glacier Peak

3 Glacier Peak H -
Acreage (Parcel HA-HB). 7,941 acres of which 5,004 classified for recreation

ROS classes: Primitive and Semi-Primitive Non-Motorized

Recreation: Primitive recreational opportunities include hiking, cross country travel, hunting, fishing, mountaineering Lower boundaries are near roads and existing heavy recreational use Upper reaches near Johannesburg Mountain and upper Pincer Creek offer rugged and scenic views and opportunities for solitude Spectacular views of Glacier Peak Wilderness and North Cascades National Park Important steelhead and salmon habitat in the Cascade River. Bald eagles frequent the area for forgaging and night roosting purposes.

User comments: Important forested riparian zone along each side of the Cascade River. Provides access to the National Park.

Access: Parcel adjoins the Glacier Peak Wilderness. Marblemount is about 15 miles away. Seattle and Vancouver, B.C. are each about 125 miles away.

4 Glacier Peak K (KA) -
Acreage: 43,362 of which 35,035 classified for recreation

ROS classes: Primitive and Semi-Primitive Non-Motorized

Recreation: Opportunities for challenging experiences are good. Mostly a day-use area. Destination trails such as those to Boardman Lake, Headlee Pass and Weden Creek have 1500 + users a year. South Fork of Stillaguamish receives heavy use from sports fishermen.

User comments: Ragged Ridge Backcountry Area - Excellent opportunity in the southern portion of this parcel for a ridge top trail along Ragged Ridge in an alpine setting. Access above Wallace Falls to Mt. Stickney A trail could be constructed in the deeply incised valleys of the Wallace River drainage that would tie in with Wallace Falls State Park and provide access 10 months of the year. Excellent views from Mt. Stickney.

In the northern portion of this parcel in the Monte Cristo area, excellent trail potential exists from Boardman Lake on the west to Silver Tip Peak on the east. This area is accessible via the Mountain Loop Highway between Verlot and Silverton. This lies on the edge of the Henry M Jackson Wilderness.

Access. Located about 60 miles from Everett The parcel lies south and west of the Boulder River and Henry M Jackson Wilderness Areas.

5 Hidden Lake (45) -
Acreage 6,652 of which 5,215 classified for recreation

ROS classes: Primitive and Semi-Primitive Non-Motorized

Recreation. Excellent opportunities for primitive recreation that includes hiking, hunting, mountaineering, photography Recreational trail use associated with lake and lookout are substantial. Hidden Lake Lookout provides a panoramic view of the national forest and the North Cascades National Park and may be eligible for the National Historic Register. Trail to lookout is one of most popular in the North Cascades Old growth forested slopes above the Cascade River area provide important habitat for wintering bald eagles.

User comments: Important parcel for historic reasons and its proximity to the Cascade River and River Road Access to Hidden Lakes and the North Cascades National Park. Spectacular old growth along the Cascade River. Provides panoramic views of surrounding forest and park.

Access: Located 9 miles east of Marblemount between the North Cascades National Park and the Cascade River Road Bellingham is 65 miles away; Seattle and Vancouver B.C. are each about 120 miles away.

6 Mt. Baker - Canyon Creek 6041 (MA)
Acreage: 25,046 acres of which 17,464 classified for recreation

ROS classes: Primitive and Semi-Primitive Non-Motorized

Recreation: Primitive recreation opportunities include high lakes fishing, alpine mountaineering, backpacking, nordic skiing, snowmobiling. Heaviest trail use near Damfino Lakes and Church Mountain. Church Mountain provides notable viewpoint to Mt. Baker, Mt. Shuskan, and the Picket Range. Damfino Trail accesses High Divide and the Wildernesses. Canyon Ridge Trail is open to off-road vehicles. Sites along the North Fork Nooksack River, Church Mountain, Whistler Lake are important for American Indian religious reasons. Area generally steep and dissected with numerous small lakes.

User comments: Important area for equestrian users, one of few available on the forest. Good access for users in Whatcom County. Some of this block receives heavy snowmobile use and should remain open to this use (Damfino Lakes and Church Mountain). Motorized users support *completion and improvement of the Canyon Ridge Trail for ORVs.*

Access: Parcel adjoins the Mt. Baker Wilderness to the east. Bellingham is 35 miles away; Vancouver B.C. is 90 miles to the north. Most recreational users originate in Canada.

7. Mt. Baker - Noisy Diobsud Block (MQ)
Acreage: 51,402 of which 36,702 classified for recreation

ROS classes: Primitive and Semi-Primitive Non-Motorized

Recreation: Primitive recreation opportunities include camping, hunting, fishing, mountaineering, ski touring, hiking, and photography. Portion nearest Baker Lake or North Cascades Highway (SR 20) receives heaviest use. Principal recreation areas center on Baker Lake, Anderson-Watson Lakes, and Sauk Mountain Sauk Lake and Mountain are destinations for hikers. Sauk Mountain provides excellent view of the Skagit Wild and Scenic River Trail access into the National Park and a low elevation trail along the east side of Baker Lake are important in the area. Important wildlife habitat for bald eagles, peregrine falcons, mountain goats.

User comments: Dramatic scenery, panoramic views and old growth trees are attractive elements of this area especially along north side of Baker Lake; also the Hidden Creek drainage That area of Watson-Anderson Lakes is heavily used by hikers, horsemen, and fishermen. Recreational users support further trail development along the east side of Baker Lake for access to Hidden Creek drainage and Green Lake. Motorized users support development of an intensive ORV trail system in the Baker Lake area as well. This area is a top priority for recreational forest users.

Helen Butte/Jackman Creek Backcountry Area: Area for hikers and packstock; provide access to viewpoints overlooking Lake Shannon, Clear Lake, Bald Lake, and Helen Buttes.

Access: Parcel is adjacent to North Cascades National Park and the Noisy Diosbud Wilderness. Sedro-Woolley is 40 miles away; Bellingham is 60 miles away; Seattle and Vancouver, B.C. are 110 miles away.

8. Norse Peak - 6034 (NA-ND)
Acreage: 9,312 of which 4,835 classified for recreation

ROS Classes: Roaded Natural, Roaded Modified, Semi-Primitive Motorized, Semi-Primitive Non-Motorized

Recreation: Current uses vary. Activities range from sightseeing via road to hiking the Pacific Crest Trail Trails to Castle Mountain and the Noble Knob Lookout site get heavy day use. Major attractions are Snoquera Falls, Castle Mountain, and the campground at Corral Pass. This area has good road access with no area being more than a mile from a road. During hunting season, use in the area is particularly heavy Old growth Douglas Fir at lower elevations.

User comments: Popular equestrian area since it provides access to Government Meadows and Sam Flats, via Crystal Mountain.

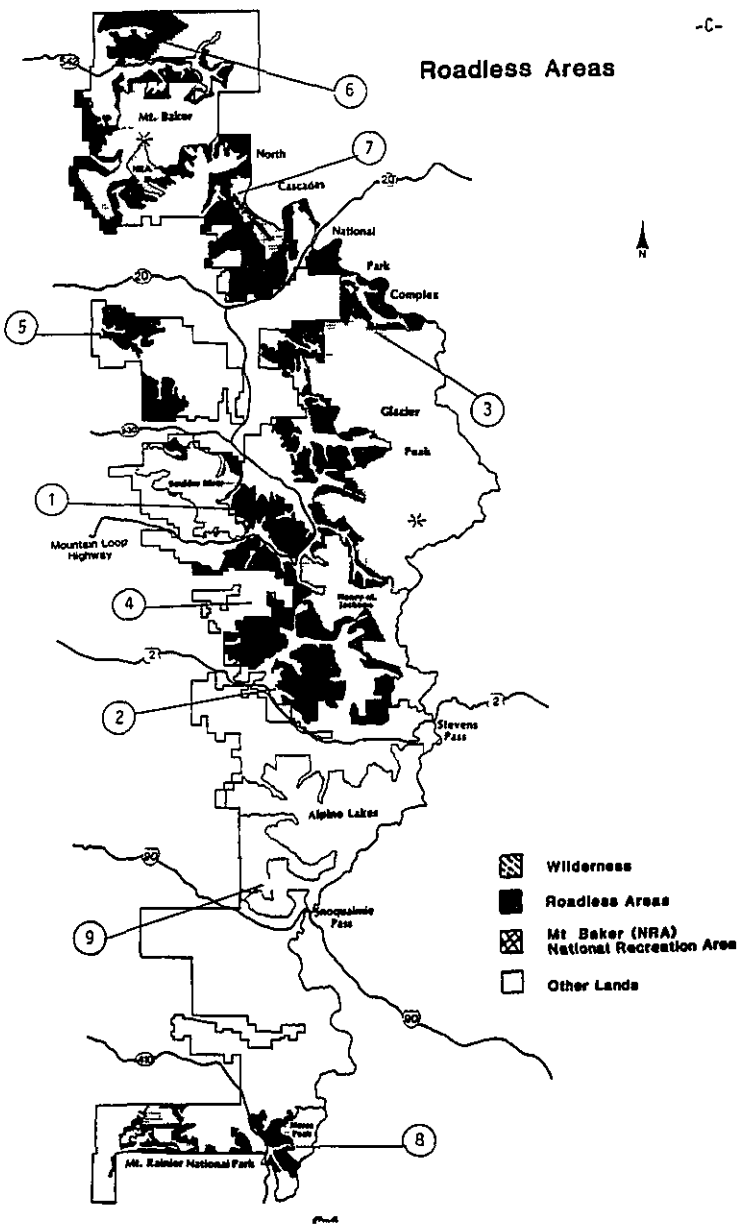
Access: These parcels provide access to the Norse Peak Wilderness, Mt. Rainier National Park is 4 miles away. Seattle and Tacoma are within 50-70 miles away.

9 Pratt River Backcountry Area - (not a listed roadless area); west of Alpine Lakes Wilderness.

Recreation: This area borders the Alpine Lakes Wilderness with groves of old growth, and low elevation routes available for hiking most of the year Currently, the IAC is funding a planning project for the development of about 11 miles of trail (Middle Fork Trail). This trail will open up about 30 miles of hiker/horse trail. The trail would be open 3 to 4 seasons, at low elevation (a type which is in high demand on the forest in non-Wilderness areas)

User comments: This area is strongly supported by hikers and equestrian users since it contributes important low elevation trails in an old growth setting The area has high priority with users for recreational activities.

Access: This backcountry area is less than an hour's drive from Seattle.



Estimated Participation and Facilities for Selected Forest Activities

The Interagency Committee for Outdoor Recreation (IAC) is the state agency charged with statewide outdoor recreation planning. The IAC periodically conducts surveys to determine recreation participation and recreation facility supply. These recreation assessments provide decision makers with information about current and future recreation needs in Washington.

Analysis is currently underway on a recent study of recreation behavior. This study is a cooperative effort among the states of Washington, Oregon and Idaho, and several federal agencies. This regional approach to recreation planning discounts political boundaries, and provides a comprehensive view of actual recreation participation. The study examined 82 activites. Analysis will project future participation in some of these activities. Results should be available in late 1988 or early 1989.

Current data on recreation participation exists from previous studies. The most recent was a study conducted in 1983. Several of the surveyed activities are relevant to Forest Service planning. Use of this information should be based on knowledge of certain assumptions and limitations.

1. The 1983 participation survey contacted Washington residents only. It underestimates demand because it does not include demand placed on resources from visitors. This is especially true for resources which are attractive destinations.

2. Supply or inventory information includes facilities managed for certain activities by public and private entities. Although participation in IAC surveys is mandatory, it may underestimate total supply.

3. Estimating facility demand is done by comparing recreation participation to recreation supply through the use of standards. Standards tend to be subjective reflections of desirable conditions. They convert annual activity occasions of use by incorporating concepts such as the percentage of use on an average peak day, the percentage of people who wish to use a facility, the number of persons a facility can accommodate at one time; and the turnover rate at the facility.

4. Demand usually exceeds supply because standards reflect ideal conditions. Many activities, such as 4X4 Driving, have participants that desire to use facilities or areas managed for their activity. However, most of their use occurs in defacto areas, hence an unsatisfied need (difference between demand and supply) is demonstrated.

5. Future recreation participation and facility demand is included on the following page were made through linear projections based on forecasted population increases in the planning districts. Population in Planning District Three is estimated to increase 29% between 1983 and 2000; Planning District Four 25% (OFM 1986 estimates). This highly simplistic method does not take into account many important considerations such as changes in social-demographic characteristics, technology, or trends in activity popularity.

PLANNING DISTRICT 3. (Island, San Juan, Skagit, Whatcom)

	ESTIMATED PARTICIPATION Annual Activity Occasions in 100's		ESTIMATED FACILITIES			
				Supply	Demand	
Activity	1983	2000	Unit	1983	1983	2000
Backpacking	1779	2301	Trail Mile	752	822	1064
Camping	28127	36386	Campsite	8516	7649	9895
Horseback Riding	2083	2694	Trail Mile	501	287	372
Day Hiking	15882	20545	Trail Mile	433	666	862
Picnicking	10146	13125	Picnic Table	2900	2426	3138
4X4 Driving	1624	2101	Trail Mile	9	67	87
Motorcycling	3224	4171	Trail Mile	23	219	284

PLANNING DISTRICT 4. (King, Kitsap, Pierce, Snohomish)

	ESTIMATED PARTICIPATION Annual Activity Occasions in 100's		ESTIMATED FACILITIES			
				Supply	Demand	
Activity	1983	2000	Unit	1983	1983	2000
Backpacking	4199	5245	Trail Mile	1040	1941	2425
Camping	69921	87341	Campsite	10871	19015	23752
Horseback Riding	21484	26836	Trail Mile	407	2965	3703
Day Hiking	41845	52270	Trail Mile	871	1756	2193
Picnicking	101930	127324	Picnic Table	10071	24370	30441
4X4 Driving	7530	9406	Trail Mile	9	311	388
Motorcycling	18443	23038	Trail Mile	21	1254	1567

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Page Specific Comments for
Mt Baker-Snoqualmie National Forest

PAGE-SPECIFIC COMMENTS

Summary Plan

The summary water is one of the most valuable resources, yet elsewhere you state it states that it has no value We believe that it does

Page 8

The northern spotted owl has been listed as endangered by the State of Washington since your document was published Eagles also winter on the Stillaguamish, White, and Nisqually Rivers

There are eight species of resident game fish in Forest waters, and at least five other fish species These are

Game Fish	Others
rainbow trout	largescale sucker
cutthroat trout	coastrange sculpin
eastern brook trout	shortland sculpin
arctic grayling	torrent sculpin
golden trout	mottled sculpin
mountain whitefish	dace sp
pygmy whitefish	

Page 13

Unroaded, Indicators of Response An additional logical indicator would be changes in wildlife populations Measures of species diversity and popula-tion density would be appropriate

Timber Harvest Levels Will future evaluation of local management success take all issues of concern into account, not just timber harvest outputs?

Indicators of Response An excellent indicator of response would include a model to indicate wildlife populations, both densities and diversity

Pages 14-15

Thirty-five percent of old growth is in wilderness Much of this old growth is at a relatively high elevation and in many cases has only marginal wildlife value

Indicators of Response Pounds of fish is a poor indicator of habitat use Pounds of fish harvested can be just as much an indicator of harvest efficiency of the fishery(ies) as it is of production (at least up to some point)

Old growth left over time is also not a good indicator of response If areas are too small, at the wrong elevation, or too far apart, they may not provide useable habitat Some model to measure "useability" of old growth by wildlife would better measure success

Jobs Would recreation-oriented jobs be evaluated in the equation?

Page 16

Recreation The Plan should provide a better evaluation of recreation We believe the economic values used are far too low We would also comment that Wilderness does not provide optimal wildlife-oriented recreation Although it can provide excellent alpine lakes fishing opportunities and some goat hunting, most deer and elk hunting and trapping depend on lower elevation old-growth

Indicators of Response Should include an evaluation of actual recreational use rather than just some suitability criteria, i e , some smaller areas could have good visual qualities, adequate roads, and other amenities, but could be too isolated to provide wildlife recreation or have an insect problem or some other nuisance that would keep people away, but that would not show up in a "qualitative analysis"

We recommend that wildlife abundance and diversity be a parameter to judge these areas

Page 17

Water Quality, Indicators of Response Better indicators of response would include temperature, suspended sediments, BOD, and fish production

Transportation There must be a parameter that measures usability of habitat remaining near roads, we recommend modelling the graph by Brown, et al (USFS 1985) Access by firewood cutters, for example, can have a detrimental effect on dead and down wood residue Access by vehicles of all kinds can keep deer, elk, and other wildlife species from making full use of available habitat

Adjacent and Intermingled Lands "In areas of intermingled lands, the objectives and subsequent land practices of all owners affect the management of adjacent land " This statement is true That's why the Forest should analyze impacts on wildlife of adjacent land management in this document

Page 18

Effects of Timber Management , Indicators of Response Why not also consider wildlife production potential?

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Page 19

Adjacent and Intermingled Lands The state does not support trading out of lower elevation productive lands These areas are critical habitats for all species, and where they are covered with old-growth forest they are particularly important

Indicators of Response Recreational opportunities and recreation-based employment should also be evaluated

Page 20

Indicators of Response There is no indicator here that measures effects of wood residue management on wildlife Alternative H does not "maximize the net public benefits " (emphasis added) It doesn't even "optimize" fish, wildlife, and recreational benefits

Why are there no wildlife ICOs stated in this entire section We recommend they be included, as stated above

Page 21 et seq

Alternative NC was included to comply with an order to include a "true no-action alternative", and Alternative A is referred to as a no-action alternative Neither of these is a no-action alternative, both are "continued-action" alternatives As such, they do not comply with the intent of Washington State's State Environmental Policy Act (SEPA) nor, we believe, do they fulfill the intent of the National Environmental Policy Act (NEPA) Both SEPA and NEPA require that a no-action alternative be considered in order to truly weigh the impacts of proposed actions

A no-action alternative should be modeled using minimal level management regimes Presenting an analysis of minimum level effects would give a much truer "baseline" against which to compare your other alternatives

steelhead are from catch-and-release fisheries (where no harvest at all takes place) These fish may be caught multiple times, increasing their value by as much as 20% to 30% We also dispute the value placed on this resource Harvest of a single steelhead can consume as much as six angler days per fish Based on the Forest's own low value of $56 55 per WFUD for steelhead angling, this gives each steelhead a value of about $127 26 per fish (sport caught), and based on current market value of commercially caught fish, a value of at least $26 50 per fish (We do not agree that ex-vessel price minus fishing costs is a reasonable value for the resource) These costs are a multiplier which drives this state's economy and need to be included in the price (value) of our resources Each commodity should be valued at its market place

By state standards all wildlife-oriented recreation carries with it a value to the state This true value needs to be recognized in the Forest's plan

Page 49

Alternatives which reduce thermal cover for deer, elk and goats beyond prescription limits on the entire winter range will not allow the state to achieve our objective of increasing the numbers of these animals

Page 51

The statement that demand for unroaded dispersed recreation will not be met raises the question how does this correlate with the Region's (USFS Region 6) recently stated intent to provide for more recreational use?

Page 51

Those roadless areas lying at lower elevations (<2,500 feet and containing old growth) should be considered "critical sensitive areas" because this habitat type is usually limiting There is relatively little of this habitat remaining in the Puget trough

Page 55

Irreversible Commitment of Resources See our comments directly above Because of the long regeneration time involved with timber production, loss of thermal cover, travel corridors, calving/fawning areas, and other limiting habitat types cannot be considered reversible

J-577

Proposed Land and Resource Management Plan

Ch 2

C Current Resource Conditions There is no mention of endangered, threatened or sensitive plants

G Information Needs We strongly agree with the need to collect baseline information on vegetation at sites which have potential for future degradation from recreational activities, especially in wilderness

A serious omission is the absence of an inventory effort for endangered, threatened and sensitive plants We urge the forest to conduct such an inventory and recognize its importance in this section of the plan

Plan

1-1

See Summary Page 5 comments

1-10

See Summary Page 13 comments

2-3

See Summary Page 8 comments

2-4

See Summary Page 8 comments

2-5

See Summary Page 44 comments

2-15, paragraph 3

Attributing 33 percent more nonconsumptive than consumptive recreation is probably realistic, but conflicts with your Appendix output tables which only show 6 percent for nonconsumptive

2-19

Recreation lines 1 and 3, RIM ROS and EVC are not in the glossary and not defined in the Public Summary Also, add line 6 Complete Vegetation Management Plans for all developed recreation sites

2-21 & 22

Under "Fish-Water-Riparian," modifications are needed. The primary thrust should be development of quantified linkages between forest management practices, environmental changes and anadromous fish production In addition, the specific methods proposed need careful review We have found that (1) summer standing crops in stream study sections are not a good indicator of eventual smolt production, and (2) that smolt production from selected tributaries does not necessarily correlate well with system-wide production levels

There also needs to be an early "check-point" in the process to evaluate the plan's heavy reliance on mitigation and habitat structure versus natural habitat protection Other modifications will be needed if changes are made in response to previous comments

2-21, last sentence

"Complete and update stream surveys for all fish bearing streams ", please add "and nonfish-bearing streams"

3-3, first sentence

This does not consider occupancy or suitability for wildlife See Appendix B for our recommendations

Last paragraph

MMR levels were intended for use as benchmarks The loss of one habitat or pair at MMR levels provides a risk of non-viability Viability is a range, we recommend the Forest meet level 8 or 9 on the Salwasser scale, as intended by regulatory language Moderate assurance of viability for 50 years on the planning area does not meet this intent

3-4

We strongly support the designation of the five RNAs listed here We urge that the Forest utilize the expertise of the area ecologist and the Pacific Northwest RNA scientist in identifying those additional areas suitable for RNA designation Elements that should be considered for inclusion in additional RNAs are listed in the 1987 State of Washington Natural Heritage Plan

3-8

The Wood Residue section needs to address the response of increased utilization on long-term timber production (into second and third rotation), as well as wildlife, fish, soil, and water

4-1

Forest Management Direction This chapter seems to address the management goals of users' groups without ever stating the role or overall goal of the Forest in managing the forest landscape as a whole (the Forest's stewardship responsibilities) Is forest policy locked into changing multiple-user needs or does the Forest have a broader view of maintaining a forest environment that may provide users with products?

4-2

Nowhere in the Wildlife and Fish section is it mentioned that the Forest will maintain viable populations of native plant species Forest Service policy includes the maintenance of viable populations of native plants, so should this Forest Plan

4-2

Wildlife and Fish, 3 What are "desired" levels? We expect the forest to meet state species escapement goals We suggest adding a statement that will protect, enhance, and provide habitat to meet state species goals for species hunted and trapped

4-2

Goals Recreation top of page add 9 Coordinate with and consider the views of public and private sector agencies and organizations to develop partnerships between these groups and the Forest Service toward better satisfying public needs

4-2

Goals, Wildlife and Fish We cannot agree with your definition of viable populations

In some cases population levels above those currently found on Forestland will be necessary to meet this definition

Range 1

Add, "where they don't conflict with other resource goals including those for wildlife, riparian management, etc "

4-4

Facilities Add item 6, which would state, "Maintain the transportation system at the lowest density required to meet administrative needs and to access facilities "

Lands. Add item 5, which would state, "Retain lands designated for MMR species habitat "

J-579

4-6

Desired Future Condition - Nowhere in this section are endangered, threatened and sensitive plants mentioned, or most other species of non-game

4-8, last paragraph

The numbers provided on page 4-11 do not reflect the statements made here

4-9

The "Desired future condition" is not beneficial to people (recreation) or to wildlife and fish, whose numbers can be maintained only by capital investment of uncertain funding Benefitting wildlife include small mammals, birds, etc , many of which are considered "pests" by silviculturists, while all MMR and MIS species and most large predators will be severely reduced

4-24, paragraph 4

It seems that the first sentence conflicts with the last

4-34

Threatened, Endangered and Sensitive Plants 4th paragraph Although many of the sensitive plants to occur in areas not directly impacted by timber harvest, there are still a number of potential threats to the plants These include road and trail construction, impacts from recreational use, particularly within "over-used" wilderness area sites, small hydro projects, grazing, campground development, etc Sensitive plant populations are often quite localized and even small projects have the potential for significant negative impacts The statement in this section tends to suggest that threats to sensitive plants are minimal because they do not occur in harvest areas Concern for sensitive plants should be expressed under the other categories (e g , roads, recreation, etc) as well

4-35

We support the establishment of the proposed RNAs and urge the Forest to continue to inventory for RNA needs, especially in those parts of the forest outside of the wilderness areas RNAs in the wilderness areas should have more restrictive management than the rest of the wilderness

4-37

Maintaining available habitat is a far surer method of providing for the needs of wildlife Constructing and maintaining artificial structures to support the wildlife base relies on funds which may or may not be available in the future, it's expensive and dependent on techniques which are not well tested in some cases

Nest boxes, nesting platforms, and other structures may produce wood ducks, loons, mergansers, ospreys, woodpeckers, owls, and other wildlife, but what will they feed on if the adjacent cover types and forest practices degrade or destroy their food base, such as fish stocks, insects, mammals, etc

Management Indicator Species In retrospect, it seems that at least two other species should have been added to this list the goshawk and the Pacific giant salamander Since some old-growth is to be "manipulated" by "creating openings", it would seem appropriate to evaluate the success/failure of this management option by monitoring the "health" of the canopy dwellers, and the "health" of stream ecosystems in these areas

4-37, paragraph 3

We understand planning regulations to state that MIS should be maintained or enhanced Also, that at least one alternative should meet state species goals Yet, the indicator species which follow will all decline in all alternative s except for T & E species

Paragraph 6

Here is the 6 percent nonconsumptive use figure, which is elsewhere stated to be 30+ percent higher than consumptive How did the Forest calculate WFUDs and value them considering these inconsistencies?

4-39, paragraph 2

Include coordination with WDW on state-listed T & E & S species

Paragraph 6

Feeding stations need to be coordinated with WDW We urge that critical winter range be covered by your big game prescriptions where ever it occurs, not just on a small percentage of acres The Forest apparently realizes that projected big game declines are due to timber harvest in these areas

Paragraph 7

Same for mountain goats

4-40, paragraph 3

These species are surrogates for a much larger group of animals which have varying levels of dependency on old growth and/or mature tree habitat

Paragraph 5

We disagree that populations of northern spotted owls will remain viable over the next 50 years in the planning area under you proposed management

J-580

Your SOHAs do not occur where many of your owls occur State data indicates that the size and dispersal of your protected owls is inadequate to maintain the numbers you project The owl is endangered in the Washington portion of its range Please see Attachment B for our recommendations

4-41

Fisheries Program This section relies heavily on "created" habitat instead of avoiding impacts Refer to our comments in Appendix B regarding our lack of confidence in meeting management goals by "mitigating" impacts through reliance on artificial structures This is not adequate mitigation Habitat is a complex of factors, elements, and conditions acting together We do not believe you can really "recreate" habitat The best we could hope for is that natural habitat could be supplemented by such efforts

Another area of concern relates to the stated intent to create anadromous fish habitat by providing "fish passage to presently unused or inaccessible areas " Much of the presently "unused" and/or inaccessible habitat for anadromous fish is used, or could be potentially used, by resident fish The decision over which species to favor needs consultation with state agencies of jurisdiction

We believe better management direction for managing anadromous fish habitat involves avoiding habitat damage In this case, the opportunity is left open to "enhance" habitat at some later time to meet future (and unforeseen) needs for increased fish production

Fishery Activities and Outputs, second sentence The values given here are far too high and given the wrong terms (regarding streams) Many alpine lakes on Forest lands are only stocked at 50 to 100 fish per surface acre once every three to five years Some, of course, are stocked at higher levels and some have dense populations of naturally producing resident fish However, the goal of 100 catchable fish per acre is unrealistic This does not diminish the value of these fisheries, the real value of a recreational fishery is measured in terms of its use (see our earlier comments in the General Comments Section) The stated goal of producing 55 catchable fish per stream mile is unrealistic. A more appropriate goal wild be to produce some realistic number of fish per square area of stream bed Small and large streams could then be equated in a meaningful manner

Fishery Outputs Pounds of anadromous fish harvested commercially is not a good indicator of success or failure of fish habitat improvements If changes in fishing efficiency should occur due to changes in technology, etc , you would assume success of "mitigation projects", rather than truly realizing that stocks are being overharvested A better measure would be smolt, or parr, production in situ

4-42, first paragraph

We disagree that current levels of resident fish can be maintained using your riparian prescription and BMPs Capital investment will be required to mitigate and/or rehabilitate areas reduced in capability due to management activities

4-71

General 1 USFS, regional office, has acknowledged that the state fish and wildlife agencies have a joint recreation responsibility on National Forest lands Please add, "and other agency" to your statement

4-73, paragrsph 8

" shall attempt to avoid . where significant wildlife winter use occurs " is not a standard or a guideline Eliminate the words, "attempt to"

4-73

Off-Road Vehicle Use paragraph 3 Add four-wheel drive vehicles and motorcycles use will not be permitted on groomed snowmobile trails

4-75 - 4-119

Standards and Guidelines should be more specifically worded to establish a stronger direction For instance, at page 4-170, Management Area Prescriptions, the prescription 13C states that primary excavators will be managed at 100% of potential, yet at 4-88 (number 1) it calls for managing these species at 20% population levels. At page 4-77, prescriptions, it calls for a goal to "maintain or increase mountain goat populations", and at 4-88 (number 9) it states that Management Prescription 15 MMR shall be invoked in planning (protect goat habitat wherever it is found) Yet the summary and DEIS show that mountain goat populations will decline over time

4-77

The goal for wilderness seems heavily weighted toward human use Consideration of other values should have equal emphasis such as wolf or grizzly bear habitat Given that perspective, it puts a new twist on the "spontaneity of use "

4-81

The Forest's concern for the introduction on non-native species of plants is laudable and we support it The Forest should use the same attitude toward the introduction of non-native fish species and grazers (sheep and cattle) in the wilderness areas

4-84

Improvements for fish and wildlife can be quite destructive locally and all should be evaluated on a case-by-case basis whether they were in existence prior to wilderness designation or not For example, salting for certain species of wildlife can cause tremendous damage to the plant communities in the area of the salt blocks

4-84, paragraph 9

Please consult with WDW during the planning and development phases, per the new coordination process endorsed by IAC

4-88, Goal

The first sentence of the goal comes out of planning regulations, yet the Forest does not display an alternative that meets this goal

Management 1

Use 40% level on lands managed intensively for timber, higher elsewhere Provide for recruitment trees to ensure future snags

Management 2

Except in marten MMR areas where other standards apply

Management 3

Nest sites are required to be maintained by law, whether in active use or not Last sentence, change "should" to "shall", add consult with WDW

Management 4

Add consult with WDW

Management 6

Provide a sufficient amount and distribution of available forage and optimal thermal cover to maintain a harvestable surplus that meets state species goals Road density should be low enough to allow use of forage and cover areas

Management 10

Last word in the sentence should be changed to "avoided"

Management 11

Add to the end of the sentence "within 1000 acres around the core "

J-581

Management 12

Add. SOHAs shall be located and sized to provide sufficient habitat to sustain existing sites and additional habitats as needed for recovery See our Attachment B for sites and criteria

4-29, Management 1

Add, "Avoid activities resulting in soil disturbance or vegetation alteration that could alter natural habitat quality "

Management 2

The state's priority for rehabilitation is full mitigation, in kind, on site

4-90, first paragraph

WDW should be consulted on all sensitive species Also use Attachment B for maintaining a viable population of spotted owls in the planning area

Management 2

A management and recovery plan for spotted owls in Washington is in preparation and will be available by the fall of 1988 In the interim, use our Attachment B as management guidance

Management 5

See our comments under #1 and 2 above

4-89

We support your decision to evaluate all projects for impacts on threatened, endangered and sensitive species We appreciate the Forest's decision to conduct inventories for these species and to develop a program to enhance their habitats

4-95

We understand that when 12 percent of an activity site is left in a severely burned, compacted, puddled, etc state, that long-term resource damage is sustained and productivity lost We consider the 20 percent allowance to be excessive, and to exceed the amount other Forests are using as a limit

4-97

Water Resources and Riparian Areas, 3 Small water sources and nonfish-bearing streams provide significant habitat for wildlife These need to be included in the riparian prescription

J-582

Management 4

Strike the word "large" from the first sentence

Management 6

Cederholm has found natural old growth ecosystems to contain 750 pieces of LOD per mile on the western Olympic Peninsula

FOREST PLAN Standards and Guidelines

Water Resources and Riparian Areas

Page 4-97

Item 1 What are USFS BMPs? What guarantees that they are adequate?

Item 2 What feedback mechanism has been designed to report water quality conditions in the Forest to the State Department of Ecology?

Item 3 How does the riparian area relate to forest management? What are the specific leave tree requirements? Is there a minimum width in all cases indicated?

Item 4 How is soil or slope stability related back to riparian width? Is any effort made to provide riparian protection on small perennial and seasonal non-fish bearing streams for prevention of downstream impacts (debris flows and avalanches)?

Item 5 What are the general maintenance requirements for riparian areas? Who makes sure these are followed? How do you prevent blow-down?

Item 6 Have the rates of LOD recruitment and minimum leave tree requirements been established to provide LOD at existing levels? How much LOD is needed to "maintain" fish habitat? Is maintaining enough or is enhancement needed or even a possibility? Is there a need to enhance water quality with additional LOD? What about LOD as a mitigation tool?

Item 7 How does this relate specifically to management practices?

Item 8a Are there any specific guidelines for assessing deeply incised Class III streams and their stability?

Item 8b What is highly vs lightly incised?

Item 9 What are "acceptable limits" for stream temperature increases What mechanism is proposed for determining limits of vegetation removal that prevent temperature increases?

Item 10 Does anyone verify and update the inventory of riparian zones to reflect what is actually left? What number or percent of riparian zones meet the design criteria?

Item 11 How will the forester recognize a potential cumulative effects problem?

4-98

This section has several references to "fish bearing" streams This implies that adequate protection will only be provided if fish are definitely present These should be changed to read "fish production potential" since fish use is often seasonal in nature In addition, fish may be temporarily absent for a year or more due to inadequate spawning populations or barriers to migration Both are correctable short-term problems

4-98, 8b

Lightly incised Class III streams are often important wildlife resources and should be protected by a riparian prescription

4-99

Goal Eliminate the words, "the surface" Add the words, "and while meeting management area objectives" to the end of the sentence

Management 4

Strike the words, "the surface"

4-102, Facilities, 3a

Add phrase reflecting need to meet management area objectives

4-103, 3c

Add, "Maintain the Forest Development System at levels not to exceed 2 miles per square mile in big game winter range and 3 miles per square mile elsewhere "

4-108

We suggest the Forest will govern its vegetation management program according to the final programmatic EIS in preparation

4-121, Management Area Prescriptions

Inadequate discussion of water quality in general over the forest, emphasis placed on single watershed only Comments are too dispersed

4-123, E1a

Add, "Maintain sufficient standing dead and down wood for 100 percent wildlife population potential "

C1a

Change, "has been known" to read, "may be expected"

4-125, C1a

Change, "has been known" to read, "may be expected"

4-126, E1a

Add, "Maintain sufficient standing dead and down wood for 100 percent wildlife population potential "

4-128, C1a

Change, "Has been known" to read, "may be expected"

E1a

Add, "Maintain standing dead and down wood to meet the 100 percent potential level for wildlife populations "

4-130, C1a

Change, "has been known" to read, "may be expected"

4-131, J1a

Inventoried goat, deer, and elk winter range should be Group II

4-134, J3a

Inventoried goat, deer, and elk winter range should be Group II

4-136, J3a

Inventoried goat, deer, and elk winter range should be Group II

4-137

Developed Sites These should be developed outside riparian management area boundaries and provided with developed trails to access water

J-583

4-144

Developed Sites These should not be located in known critical wildlife habitats or within riparian management area boundaries

4-147, E1b

Maintain standing dead and down wood to meet 100 percent potential wildlife population needs

4-149 C1

Add #6 - maintain standing dead and down wood to meet 60 percent potential wildlife population needs

4-151, C1

Add #6 - maintain standing dead and down wood to meet 60 percent potential wildlife population needs

4-164, C1

The spotted owl is a surrogate for a large number of other species wholly or partially dependent on old growth habitats Not all of these species are as tolerant of the presence of humans as are owls Further, owls are known to be quite aggressive towards humans during the time of year when their young are present, which takes energy needed to provide food Humans often bring domestic animals into developed recreation sites which creates a much greater avoidance response in some species of wildlife, and for a longer time, than does the presence of humans

A1e

Consult with WDW, refer to the recovery and management plan when complete

E1b

Meet 100 percent of the needs of cavity nesters

4-1166, Gc

See our Attachment

J1a

Place in Group II unless this habitat is determined to be unoccupied by owls and proponent's land is occupied

L1a

Add, "and acreage of habitat lost is replaced "

L2b

Use protocols developed by the spotted owl subcommittee of the Interagency Committee for Wildlife when completed.

4-167

The same comments apply to mature and old growth habitats as provided above for old growth habitat

C1b

Maintain 100 percent of the population potential for snag dependent wildlife

4-167 - 4-171

See Summary Page 49 comments

4-160

Riparian Lightly incised Classed III streams are important to many wildlife species and need to be included in your riparian prescriptions

4-170, A1a

Should read, " fish and wildlife values"

A2a

We do not consider ORVs a compatible use within riparian management zone boundaries, unless on designated trails to cross a stream

A5a

Only to access crossings or facilities

C1

See our riparian prescription provided in general comments

C1e

Changes, "small (usually several acres)" to read, "all"

4-172, J4a

Second sentence should read, " amounts of mature riparian habitat "

J-584

L1a

Add no new roads should be constructed unless necessary to cross, these should be constructed at right angles

L2a

Include calving or fawning and raptor nesting

L2c

Must be fully mitigated in kind, on site

4-173

This is a very good prescription, but it needs to be applied to identified critical winter range, rather to selected acreages within

Intensity 14A

Minimum Management Requirement We recognize that the Region has eliminated deer and elk as an MMR species We recommend their inclusion as MIS and the use of intensity B It should be retitled critical winter range

4-173 - 4-177

All deer and elk critical winter range should be managed under intensity B 14B C 1 d should also read The same range of habitat types shall be maintained on winter ranges less than 2,000 acres We also have problems with the designation of *several stages (pg 4-175) from 21-90 years' old* being termed thermal/hiding cover, and 90+ years being termed optimal cover (See 1 stages (pg 4-175) from 21-90 years' old being termed thermal/hiding cover, and 90+ years being termed optimal cover (See comments re Pg 6-15)

4-174, C1a

Standard should be 2 miles per square mile

J3a

Should be Group II

L3a

Optimum open road density for wildlife would be close to zero We suggest changing "optimum" to "an" and "for" to "that maintains"

4-177 - 4-181

Intensity 15B All mountain goat habitat should be managed at this intensity, with emphasis that only 5% of lands in this prescription can be harvested per decade (15B E 1 b) We also recommend that deer and elk MMR's should be dropped and all deer and elk winter range should be managed at Intensity B

4-176, E

Very good

J3a

Should be Group II

4-178, 4a

Change, "has been identified" to, "may be expected"

4-179, J2

Group II is appropriate

L1b

Two miles per square mile is appropriate

L3a

Change, "has been identified" to, "may be expected"

A5a

Change, "has been identified" to, "may be expected" Change, "consider" to, "implement"

A5b

Change, "located" to, "relocated"

4-181, J2a

Should be Group II

4-182

Northern bald eagle This is an excellent prescription The bald eagle recovery plan should be implemented in terms of both numbers and locations of bald eagle nesting sites Provision for alternate nest sites at each recovery site is recommended

J-585

10935

4-184, L3a

Change to read, "Roads within 1/4 mile of nests, in feeding and/or roost areas will have time-of-year restriction on maintenance and use "

Intensity 16B

Use grizzly bear recovery plan, also see draft Colville N F Plan

4-196

Research Natural Areas, Standards and Guidelines

A Recreation Camping should be prohibited in all RNAs

D Grazing We support the ban on grazing

Ch 5 There is no mention of sensitive plants in part C - Monitoring and Evaluation Program

References The third citation is in error The correct citation is

Washington Natural Heritage Program 1987 Endangered, threatened and sensitive vascular plants of Washington Washington Department *of Natural Resources Olympia, Wash 29 p*

4-198, Cid

Consult with state and federal agencies of jurisdiction

E1b

Maintain 100 percent of the potential population of snag dependent species

4-203

The 1962 agreement is nonbinding in the sense that it does not supplant NFMA and the MUSYA Activities in the watershed need to be completely revised to bring them in as part of the NEPA process Existing spotted owl habitat should be retained in National Forest ownership and the old growth prescription be applied as the management prescription

4-215, E1

Add "d Seed areas in identified winter ranges with big game preferred forage "

5-2

What action will be taken if monitoring shows that "management practices on adjacent or intermingled non-National Forest lands are affecting the Forest plan goals and objectives"?

J-586

Last paragraph "Results of the monitoring program will be reviewed by an interdisciplinary team " Wouldn't it be appropriate to make these results available to Ecology, etc , the public?

5-4

See Summary Page 8 and 13 comments

5-4, Table 5-1

What are the targets under this plan? For instance, under soil (this page), it states "5 high risk projects every 5 years " Certainly this must be within each District on the Forest Five such projects Forest-wide would be only a token effort

5-5

See Summary Page 13 comments

5-5, Table 5-1

Wildlife Eagles, Old Growth and Snag Dependant Species, deer/elk/goats, what is the methodology that will be used to "survey" and "monitor" these habitats?

5-5, Table 5-1

Wildlife monitoring of bald eagles does not reflect the needs identified on page 2-21

Monitoring for old growth and snag dependent species needs to include population and occupancy determinations for MMR species This is also identified on page 2-21 Also, the link between selected MMR species and their surrogates needs to be quantified, as well as the assumptions underlying the parameters used to establish habitat types, sizes, and distribution

The effects of recreational access projects on wildlife and habitat needs to be quantified

5-6, Table 5-1

Riparian Area Should include turbidity, sediment, and bedload during the fall through spring spawning periods - October through June

Page 5-6 Riparian Area (A) What constitutes a "Sensitive" stream in a condition Class III How many projects fall in this category?

Fish/Water Water Quality How many sites? Are you only addressing needs of fisheries or also human consumption? What is the frequency of sampling during the July/September period? Will turbidity be evaluated

in high flow periods? Will cumulative effects in basins be assessed? What mechanisms are available to correct the causes of exceedances in the standards?

5-6 & 7
C-3 & 4

The sections entitled "Fish/Water" in Table 5-1 and "Fish Habit Improvement Schedule" (Table C-2) need to be modified and expanded We are especially concerned over the inherent feasibility of increasing salmon production by over 250 percent in the first decade The plan places total reliance on habitat improvement projects for this level of increase The technology is, at best, questionable There is almost a complete void in substantiated long-term sustained successes from these types of projects Documented, short-term favorable results are relatively limited and are sometimes only reflections of localized aggregations of exiting populations (as with an artificial reef), We would be extremely pleased if everything worked as planned and a 250 percent increase in salmon production was achieved This level of enhancement is unlikely, however, the odds for attaining this desired end-point can be increased by the following evaluation criteria

1 Projects must address the critical limiting factors for each species For example, spawning gravel is seldom a limiting factor for coho salmon Provision of additional spawning habitat for this species will seldom increase production More rearing habitat is generally the need

2 Projects must be compatible with the prevailing fishery management situation Basically, it must be technically and economically feasible to "deliver" the additional spawning adults and/or juvenile recruits to make the projects work

3 Intra- and inter-species competition and/or preferences must be addressed for each project For example, juvenile coho prefer pool habitats but steelhead prefer riffles Enhancement for one can be to the detriment of the other Similar concerns apply between resident and anadromous fish whenever access to new habitat is considered

A new, expanded appendix addressing these issues is appropriate

Pg 5-7, Table 5-1

Fish/Water What constitutes a Class III "sensitive" stream? Again, is this per District?

6-15

Optimal Cover We do not agree that the defined cover will provide "snow intercept, thermal cover, and maintenance forage" necessary to sustain wild-life We recommend a definition, instead, as given in Brown 1985, pg 229, as follows

" a forest stand with 1) four layers (overstory canopy, sub-canopy, shrub layer, and herbaceous layer), and 2) an overstory canopy which can intercept and hold substantial amount of snow yet has dispersed (<1/8 acre) openings These criteria are generally achieved when the dominant trees average 21 inches dbh or greater, have 70 percent or greater crown closure, and are in the large saw timber or old-growth stand condition

Appendix C Plan

Table C-1

How were the goals and priorities selected?

Plan App C-2

We suggest the proposed projects be reprioritized to enhance T, E, or S species first, then those whose populations are declining, followed by those that are of economic significance

If the experimental black bear forage project is intended to provide silvicultural protection for trees, we suggest it be funded by that department, in consultation with wildlife

Table C-2 (Also see comments under LMP 5-6)

Are the fish enhancement projects meant to meet the impacts of the ASQ or are some of these designed to correct past problems? If not, why not? How were these projects selected and prioritized?

Appendix DP

See Plan Page 4-203 comments

Plan App E-3

IAC will be transmitting a new coordination process to be used in trail and development The process was developed by WDW using USFS personnel, and was funded by IAC We suggest a reference to its use in your documents

DEIS

Title page second paragraph

The statement "while long-term estimates of Forest resources and environmental conditions are considered, the alternatives and the final decision apply only for the life of this Forest Plan -- not more than 15 years" is misleading In certain, major respects, this Plan commits the Forest to an irreversible commitment of resources in the first 15 years For example, old growth that is harvested during this period cannot be replaced for from 240 years (best case) to as long as 400 years, or maybe never

J-587

10925

S-36

See Summary Page 55 comments

I-5

See Summary Page 44 comments

I-10

See Summary Pages 13 & 52 comments

I-11

See Summary Pages 13 & 18 comments

Draft Environmental Impact Statement

I-12

Paragraph 5 Diversity is a complex concept In order to maintain the regional or global species diversity, it is necessary to maintain large areas of some relatively homogeneous habitats, such as old-growth forests This may mean that the local diversity is low But without maintaining these large homogeneous areas, species which are dependent on these habitats or species which are widely spaced throughout the environment may not survive, reducing the regional and global species diversity

Increasing the "edge effect" or creating a relatively small scale patchwork of different habitats may increase the number of species which can occupy an area, but these species tend to be cosmopolitan and often weedy species (species which can take advantage of disturbed habitats) Species which are specific to native ecosystems or are intolerant to disturbance decrease or are eliminated from many managed, patchwork areas

I-13

See Summary Pages 14 & 15 comments

I-13

Paragraph 1, Indicators of Response Maintenance of native plant communities (forest and non-forest) needs more consideration Large, viable examples of the different zones and communities need to be set aside--not just old growth

I-15

See Summary Page 16 comments

S-1

See Summary Page 5 comments

S-3

See Summary Page 8 comments

S-7

See Summary Pages 13 & 18 comments

S-9

See Summary Pages 16 & 17 comments

S10 & 11

See Summary Page 17 comments

S-11

See Summary Page 19 comments

S-12

See Summary Page 20 comments

S-14 - S-37

See Summary Page 21 et seq comments

S-26

See Summary Page 42 comments

Table S-3 If one works through this table and calculates the return on dollars invested, Alternative C comes out a hands-down winner at $3 92 returned per dollar spent Alternative H only returns $2 95 and Alternatives A and E-dep tie last for $2 60 Should the Forest be considering deriving the most revenue for our money, or is its mission simply to standardize jobs

S-28

See Summary Page 44 comments

S-32

See Summary Page 49 comments

J-588

I-16

See Summary Page 17 comments

I-16

Paragraph 2 Introduction of non-native (exotic) species of plants is another negative effect of developing road and trail systems which needs to be addressed

I-17

See Summary Page 19 comments

I-17

Effects of Timber Management and Related Activities Additional issues need to be raised in this section Are forests and forest ecosystems sustainable under current forest practices What are the effects of current practices on soil flora and fauna? What is necessary in order to maintain viable populations of native plant species and communities? What are the documented effects of biocides and fertilizers on native ecosystems (forest, non-forest, wetland and aquatic), not just target species and resources?

I-18

See Summary Page 20 comments

I-18

Wood Residue This section doesn't provide enough information on the effects on the environment of removing the organic matter (natural fertilizer, organic content of soils, erosion, soil water holding capacity, habitat for soil flora and fauna, etc) contained in the woody residue

II-6

The concept of overlapping uses in all cases is troublesome to us We believe it will cause wildlife species to be artificially "herded" together, causing higher than normal stress levels and perhaps result in some artificially induced genetic selection This concept also does not provide adequate dispersal areas and it "places all our eggs in one basket" in regard to natural disasters

II-15

The discussion beginning under "Opportunity Cost Analysis" should be deleted From the Appendices, it is clear that the planning process did not establish any quantified linkage between environmental change and fish production Thus, riparian area protection is only a "cost" with respect to fish There are no calculated economic benefits balanced against this cost

II-19, II-20, II-31

See Summary Page 21 comments

II-22

See Summary Page 52 comments

II-24

The RPA program is moving ahead of the Forest planning process The process should start with determining how much can be produced, what are all the uses of this production, i e , protection of water, wildlife production

II-35

We do not consider either Alternative A or NC to be true "no action" alternatives We need to see minimum level applied across the Forest as a true baseline in order to compare the relative merits of alternatives

II-43

There seems to be a discrepancy in RNAs for Alternative G - page II-43 indicates two additional RNAs will be established under this Alternative (as opposed to Alternatives C,D,E,F and H which each propose five additional RNAs), but the table on page II-49 indicates 6,161 acres of existing and potential RNAs, the highest figure for any Alternative

II-47

Figure II-2 does not provide a picture of relative value to wildlife and fish, but accessibility to timber management We suggest this chart be redone to reflect management compatibility with value to wildlife and fish

II-55

See summary Page 38 comments

II-57, paragraph 2

" one existing and two potential nest sites " This statement conflicts with other document statements indicating 4 sites identified for bald eagle recovery We again ask that the recovery plan specifics be identified in the plan and implemented in the preferred alternative

II-59

Habitat for old growth dependent species needed to meet MMRs should be retained in USFS ownership (management) Our Attachment B contains the location and state guidelines for SOHAs necessary to maintain viable

10935

populations in the planning area Further, we believe the 1962 agreement to be nonbinding in the sense that it does not supersede NFMA and the MUSYA, yet activities occurring and proposed in this watershed appear to be in violation of these acts

II-68

The second paragraph appears to conflict with previous descriptions of the sediment index The two components should be (1) natural and (2) activity-produced The latter should include both "old" and "new" sources The quantified analysis will be of little value unless this distinction is made The third paragraph accurately describes the situation with respect to water yields

II-103, paragraph e

"These population estimates are based on the maximum available habitat in each alternative for the decade shown " The Forest seems to recognize that this way of estimating severely inflates the number of animals that will occur, yet does not describe this impact or make an attempt to come up with a coefficient of reduction that would account for losses due to elevation, topography, fragmentation, size of patches, or spacing We suggest that these kinds of coefficients are developed for determining dispersion, timber yield table reductions, etc , and that the same effort and ground-truthing be put into development of realistic wildlife and fish population/habitat estimates

J-590

II-104

See Summary Pages 37 & 38 comments

II-119, paragraph 5

We do not accept this evaluation as valid It ignores several important concepts and parameters, and thus your valuation or roaded vs unroaded recreation is skewed Consider demand along with diminishing resources

II-124

See Summary Pages 13 & 17 comments

II-125

See Summary Pages 13, 14, 15, & 16 comments

III-6 & 7

The narrative under "North Half of the Forest" should also state that this area is one of the most unstable in the entire Pacific Northwest region There seems to be plenty of evidence to justify special protection measures in this area, particularly with respect to degree of riparian area protection While some of this extra protection will come

through routine but site-specific application of management requirements, alternatives such as a 100-foot anadromous fish riparian zone merit serious consideration

III-9

The narrative under "Special Conditions" describes protection for soils with "a 75 percent probability of a doubling of mass soils movement " The problem is that "risk" is really a gradually diminishing series of values over a range from highly unstable to very stable soils The draft plan does not adequately address soil types with a moderately high degree of risk (for example, those with a 50 to 75 percent probability of a doubling of mass soil movement) A table of special measures by risk category would be useful In addition, the draft plan's discussion of the Deer Creek situation is very superficial This is the "best known" example of forest environmental damage in the entire Pacific Northwest region The case merits detailed discussion at several points in the plan, including cumulative effects The planning process needs to present in detail how it will prevent a new "Deer Creek" in the future

III-12

The basic stream classification system described is common to National Forests in general However, "deeply incised" and "lightly incised" is a special adaption unique to Mt Baker-Snoqualmie

III-13, paragraph 7

Discuss the potential for vegetation removal to affect low temperatures in winter in terms of direct lethal effects, influences on disease and growth rates

Page III-13 Water - Turbidity and Sediment Only addressed the turbidity caused by increased glacial runoff in the spring What about man-caused turbidity and sediment?

General

What are BMPs for protecting stream water quality?

How often are standards expected to be exceeded?

What mitigating procedures are planned or available?

Temperature

What is the "threshold amount" of vegetation removal which causes problems for fish?

What types of riparian management prescriptions are being utilized to protect streams from high temperature fluctuations?

III-18

Riparian Zones In paragraphs 1 and 2, riparian zones are defined to include all wetlands However, discussion of management and environmental effects to riparian zones elsewhere in this section and throughout most of this document only include those areas adjacent to streams, and then are only concerned with fish-bearing reaches of streams

Management of other wetland areas -- around lakes, ponds, springs and non-fish bearing streams, wet meadows, bogs, marshes and swamps -- need to be discussed

Maintaining wildlife habitat and conditions for fish is not sufficient to maintain native riparian wetland and aquatic systems Native plant communities, nutrient levels, non-fish aquatic species of animals and plants, and food webs all need to be considered Native wetland (including streamside) vegetation cannot withstand logging, vehicle use, roads or livestock use All of these uses adversely effect wetland soils and plant communities and act as transport mechanisms for non-native plant species Many non-native species, once established in wetlands, spread by taking advantage of human and natural disturbance, by out-competing native plants and by using water (lakes or streams) as a dispersal mechanism

There needs to be management plans for protection of wetland (including streamside) plant communities and native ecosystems, including buffer zones to protect them Equipment, motorized vehicles, livestock, and in many cases people, need to be kept out of wetlands

III-19, paragraph 4

"Wildlife can impact or destroy riparian vegetation " Please add though this occurs rarely, wildlife can be the agents which produce new wetlands and riparian areas

Paragraph 6

"Human-caused disturbances in riparian zones include but are not limited to road and trail building, harvesting trees, recreation use, dam construction, " We suggest you compare the use of the word "disturbance", as applied to the above human-induced changes, to the language in paragraph 4 ascribing "impact or destroy" to wildlife effects on vegetation You should consider modifying your adjectives to better fit reality

III-19

The Forest's habitat is critical to Puget Sound natural salmon production and there are large amounts of private land within the National Forest boundary These two factors justify a greatly expanded planning treatment for cumulative effects, particularly with respect to riparian areas

Currently, the draft plan only has a few vague statements such as "protection of the watershed values may require reduced timber harvesting on public lands " Specific criteria for future decision-making are needed

III-19

Paragraph 1, last sentence, Riparian Zones and Planning Possible typographic error -- should, "or contain enough water to be a major contributor to streams " read, "or do not contain enough water to be a major "?

Paragraph 3, sentence 4 Floods also maintain riparian vegetation

Paragraph 4 Soils in riparian areas (all wetlands) are not discussed in much detail, contrary to what is stated in this paragraph Effects of road building and timber harvest on these soils especially need to be discussed

Paragraph 5 Livestock use also has a serious effect on riparian zones (all wetlands)

III-53

The Wood Residue section begins with a good discussion on the role of woody debris in nutrient cycles, etc Unfortunately, the conclusion to the section discounts this and emphasizes utilization rather than management of the forest landscape

III-57

Threatened, Endangered and Sensitive Plants 4th paragraph This discussion needs to include the possibility of non-ground disturbing activities that could increase the rarity of plants, thus the probable listing of species Non-ground disturbing activities include prolonged moderate grazing, trampling, hiking and cropping

III-58

Forage Vegetation - Livestock Management Livestock management and effects to the environment are not adequately addressed in this section or elsewhere in the document

Livestock can have a significant effect on soils, vegetation and water quality Trampling by livestock can damage or destroy soil structure Grazing and trampling can reduce and in some cases remove vegetative cover Livestock can bring about a shift in plant species composition, increasing cover values of species which are resistant to or tolerant of grazing and trampling, while decreasing or eliminating species which are sensitive to grazing or trampling Livestock are known to disperse exotic (non-native) species of plants and animals which in turn can cause major changes to the native ecosystem Wetland, riparian and stream

J-591

10935

systems can be highly affected -- animals tend to concentrate in these areas They destroy the hydric soil's structure, damage vegetation (denuding some areas), break down stream banks, increase turbidity, damage water quality an alter nutrient levels which can in turn alter species composition and food webs

Given the potential damage to the forest ecosystem, the lack of use of the two sheep grazing allotments, and the results of trial use of transitory range, no livestock grazing should be allowed on the forest other than recreational livestock The effects of recreational livestock use should be monitored, and if there are documented negative effects, appropriate action taken

III-59

Chapter III Wildlife provide, in general, very good discussions

III-60, paragraph 1

Last sentence figure of 33 percent disagrees with table figures which attribute only 6 percent of wildlife recreation to nonconsumptive use

Paragraph 4

Include elevation

III-60

Why were no management indicator species chosen for two of the four "Special or Unique Habitats" (Caves, Cliffs, Talus and Riparian Zones)?

III-61, paragraph 3

Conflicts with statement in other documents in this set

Paragraph 4

The northern spotted owl is a State-listed endangered species

Paragraph 5-6

There is no provision for protection of spotted owl habitat off federal lands Your documents state that you recognize that practically all old growth on nonfederal lands will be harvested within 10 years See our Attachment B for our recommendations for maintaining viable populations of spotted owls in the planning area

III-62, paragraph 6

Recent studies in western Oregon indicate that 540 aces is the average amount of old growth used by pileated woodpeckers for breeding purposes

J-592

III-63

We cannot find a description of your wildlife model development or any coefficient development, even though it is stated to be in the Appendix volume Please so describe and indicate whether the loss of use of habitats due to be presence of open roads was used to reduce the population numbers reported for deer and elk in your tables, or whether they are reported without such reductions

III-65

The two tables are quite helpful If percent figures were also included, they would be even more so

III-66

Your mountain goat prescription needs to be revised to reflect the need of 45 acres per goat Your last two sentences show your awareness that Forest habitat can supply more animals than currently exist and that public demand is expected to increase, yet not one alternative increases deer and elk on the Forest, nor does your assessment appear to consider the cumulative effects of timber management on intermingled lands and their depressing effect on population numbers due to lack of cover

III-74

See Summary Page 8 comments

III-74

Paragraph 2, Sentence 2 This sentence is incorrect ("The spawning and rearing habitat requirements of these species represent the biological and physical needs of the forests' aquatic animal species ") Managing for the listed species of fish may not necessarily manage for microbe, insect, amphibian, reptile or herptile species which use the forest's aquatic systems There is literature which indicates that some aquatic beetles may be much more sensitive to perturbations to riparian and aquatic systems than are fish

By only managing for fish species there may be no management for stream reaches which do not have the listed fish species Not all of the species of fish listed are native to the forest Managing for species of fish where they did not naturally exist disrupts the native physical and biological system Managing for the listed fish species does not necessarily manage for native aquatic and wetland plants which are the foundation of the aquatic ecosystems

III-74

The discussion under "Fish" should note that pink salmon runs occur only during odd-numbered years It is not clear if this factor has been accounted for in the planning process (it was not in the draft plan for Olympic National Forest)

III-75

The section under "Demand for Sport Fish" should be revised to reflect existence of major sport fisheries in all larger rivers (even though most of the effort occurs downstream from Forest lands) A table showing recent average catches would be useful to the reader

III-77

Paragraphs 6 and 7 (Production Levels II and III) What is involved in restoring spawning habitat? What activities and materials are used to restore habitat? What effects are there to those areas and down stream (turbidity, habitat for other plant and animal species, alteration of food webs, stream flow and channel location)?

III-78 & 79

Tables III-30a and III-30b need to be redone The standard practice for this type of planning exercise is to use recent yearly averages, not a single year's value This would have prevented the apparent error for pink salmon (1983 was a pink year) and given much more realistic future expectations for the other species

III-80

The five-year program outlined to implement Level III further illustrates the problem with showing full production on-line throughout the first decade

III-80

See Summary Page 42 comments

III-82 & 83

Tables III-32 and III-33 also need to be redone Again, averages for recent years should be used These tables are especially inappropriate since single year's values for different years are sometimes used (for example, 1979 WDF data and 1980 non-pink year N W Indian Fisheries Commission data in the same table) All of the assumptions in these tables also need to be reviewed based on current knowledge

III-123

Recreation Use Conflicts Effects of recreation on the native ecosystem need to be addressed much more than they are in this section and throughout the document Recreation can have a disproportionate impact on some areas/habitats (around lakes, and in alpine and subalpine meadows for instance), and indications are that recreational use will increase

III-135

Current Wilderness Use What effects are there to over-use of wilderness areas? What are the effects of over-use of wetland and lake areas in wilderness? What plans are there to alleviate over-use and to rehabilitate damaged areas?

III-135

Wilderness Use Conflicts This section needs to recognize special conflicts that may arise in RNAs within wildernesses One established RNA and three proposed RNAs occur in wildernesses

III-142

Research Natural Areas Either this section of the Plan or the section on RNAs (4-196) needs to state or clarify the overall goal or objective of RNA designation How many RNAs are needed? Or what range of variation of natural ecosystems is required for adequate development of an RNA system? Page III-143 lists the " need for examples of ecosystems " from the RNA "yellow book" (Dyrness & Franklin 1975) These 1975 cell needs were established based on the state-of-knowledge at that time Since, the U S Forest Service, through the work of their own ecologists, has further defined the range of forest ecosystems on the Forest's land The needs sections should, therefore, be up-dated to reflect this increased knowledge by including major forest associations defined by Henderson, et al 1981-1984 in the State of Washington Natural Heritage Plan If the purpose of the RNA system is to be fully recognized, the Forest should attempt to establish baseline areas in the low elevation hemlock or recedar community types where an opportunity to plan for designation exists now, rather than later being forced through public pressure to set aside an area that may conflict with future management concerns

III-159

Land Status (Also III-160-Access Requirements) We do not argue with the statement that reasonable access needs to be provided to on-Forest develop-ments so long as proper mitigation occurs However, unless biological considerations exist, such access roads should remain multiple-use roads We understand that access can be, and has been, denied the public to protect developments from vandalism (in this case, a hydro-electric project)

III-163, paragraph 1

" the existence of a road may have little impact on species such as deer, elk, and mountain goats, the traffic and associated human activities " This statement ignores the fact that acres of habitat are directly removed by the construction of a road At present amounts of road miles (system only), the estimated loss of habitat to all wildlife, not just deer and elk is in the neighborhood of 15,000

J-593

1035

IV-2

Water temperature concerns here and elsewhere should include winter problems (lower temperatures during egg incubation, for example)

IV-2

Other general effects of cutting vegetation are

1 Alters the plant species composition of the cut area by altering the climate of that area

2 Decreases water absorption and retention on the cut area hence increasing run-off

3 Introduces non-native and weed species through disturbance of the area and spreading of seeds by equipment and humans

IV-3

Other general effects of road and landing construction are

1 Provide access to humans.

2 Increases run-off

3 Accentuates flood peaks

4 Increases stream sedimentation and turbidity

IV-3

Other general effects of construction of fish habitat structures are

1 Replace other habitats

2 May introduce fish into stream reaches which did not originally have fish and thereby alter the native aquatic ecosystem

IV-3

Other general effects of burning vegetation or organic debris are

1 May alter or destroy the soil flora and fauna, reducing the long-term productivity of the site

2 Can increase leaching of nutrients from the soil

3 Convert long-term nutrient sources (woody debris) into short-term nutrients

J-594

4 May destroy the soil organic layer

5 Decreases soils strength and resistance to erosion by destroying roots and ground cover

Bullet #2 in this section on page IV-3 is not an effect of this action, but rather is a justification

IV-3

Another general effect of planting vegetation is it may introduce non-native plant species into the forest

Bullets #6 and #7 as printed in this section don't seem to fit here Bullet #6 seems to belong under Road and Landing Construction, and bullet #7 seems to belong under both Cutting Vegetation, and Road and Landing Construction

IV-5

Soils, second para We have only rarely witnessed debris torrents in old growth areas However, they are relatively common in cut-over areas, especially where small (even seasonal) streams have had their banks denuded by timber practices

In large standing timber, debris slides (flows) usually "hang up" after only a short distance and become debris "jams"

IV-5 & 6

Effects of Timber Harvest on Soils The effects of burning on soils is misrepresented in this section There are studies which indicate significant negative effects of burning to long-term soil fertility, soil flora and fauna, and soil organic matter Paragraph 5 on page IV-6 is particularly misleading -- providing select information from the literature to support burning while not citing or providing information from the literature which may show negative impacts

Paragraph 6 on page IV-6, sentences 3 and 4 contradict sentence 2 It cannot be reasonably said that "no measurable physical changes will occur" from burning down to, but not including, the bottom of the duff layer, especially when the following sentences claim that no data exist to support (and presumably refute) effects to soils by this burning and that it is "assumed that the impact to soils will be in proportion to the total acres burned ..."

IV-8

The discussion under "Note" makes it clear that the data have only relative value as an index This connotation is often missing elsewhere in the draft plan (for example, Table IV-1 on page IV-6) It would be better to assign simple 1 to 10 index values once the original calculations are made

IV-10

The discussion in the last full paragraph indicates that changes in water yields (at least for smaller areas) can be expected even though they are not quantified in the planning process

IV-11

Vegetation Disturbing soils provides habitat for non-native and weed plant species Their establishment can change the species composition and succession of plant communities They can alter food webs by displacing native species This is particularly true of wetland and riparian systems, but also applies to uplands.

Soil erosion can lead to sedimentation of wetlands and riparian areas altering the native vegetation (killing vegetation, altering the hydrology, soils and aeration of the areas)

IV-13

Mitigation Measures for Soils There are other possible mitigation measures

1 Leaving buffer strips around riparian and wetland areas would help

   a) reduce siltation of aquatic and wetland areas,
   b) help maintain water storage and desynchronization functions of wetland and riparian systems,
   c) help reduce habitat loss and damage, and
   d) reduce establishment and spread of non-native species

2 Wetland and riparian areas should not be logged, have vehicles used in them, or have roads built through them Trails should be routed around wetlands and riparian areas as much as possible

3 Broadcase burning should be avoided except where/when clearly necessary

IV-14 & 15

Most of the conclusions beginning at the bottom of page IV-14 should be deleted *For example, one conclusion states, "Water yields will not be noticeably different from one alternative to another or from the present situation "* Also note the following admission for all" "Data to support quantitative differences among the alternatives on most of the impacts discussed above are not available " (Also note the examples of misleading statements such as "actual amount of sediment" and "natural background sediment" on this sample page)

IV-16

Wetlands Wetlands are fast becoming rare and unique habitats because of their overall loss Further losses should be avoided entirely

First para How are the wetland areas rehabilitated?

IV-16 & 17

Table IV-4 would be much more useful if modified to consider cumulative effects In this case, the proportion of each watershed outside of Forest Service control (if any) could be shown

IV-17

Paragraph 1 Effects of biocides and fertilizers on aquatic systems need to be addressed in more detail

Paragraph 2 Increasing nutrients to sphagnum bogs can completely change those systems from low to high nutrient systems, with a nearly complete change in flora and fauna

IV-17

Chemicals Forest chemicals can enter surface water if applied without proper care This is a special concern of ours

They also destroy forbs and woody vegetation (such as young alder, blackberry, huckleberry, and other forage for deer and elk This limits large areas of regenerated forestland from contributing to the appropriate forage/cover quota

In areas of wildlife habitat, chemicals should be strictly limited, or areas adjacent to hiding cover should be seeded with alternative food sources

IV-19

The discussion relative to FERC projects should note that full mitigation is legally required for any adverse impacts on fish and wildlife resources (although the practical result may be something less) The FERC process also allows for enhancement

IV-19

Energy Development Alternative C allows only three hydropower projects. From the standpoint of fish/wildlife benefits (lack of impacts) this is preferred We strongly support a low level of development

J-595

10955

IV-20

The discussion after Table IV-6 needs to be modified since there are two important differences from the Clearwater River situation The first is the draft plan's extensive discussion of the higher degree of instability on the northern portion of the Forest *The second difference is presence* of substantial numbers of pink salmon - a species much more prone to be limited by sediments during its critical life history stages (spawning/ incubation) It is also probable that the average stream gradient in the Clearwater study area is significantly greater than the Mt Baker-Snoqualmie norm (gradient affects flushing rate)

IV-20

Sediments Again, Alternative C has the least impacts We support this aspect of the alternative, but not some of its other aspects (See earlier discussion)

IV-20

The discussion under "Fish" contains one of many qualitative references to water temperature problems The plan needs a much more detailed treatment of this factor, including specific temperature objectives and criteria It will also be important to address sub-lethal effects that adversely affect a fish's capabilities Fish are seldom "killed" outright by lethal temperatures They disappear, for example, when their swimming speed is reduced and predation rates increase

Water-Cumulative Effects

Page IV-21 Paragraph 4 - "Due to resource limitations and data constraints, this cumulative effects assessment will only address major causes of effects " What will be the focus and where will the dollars be spent? What types of answers do they expect?

IV-21 - 25

The information provided in this section provides an excellent start toward quantifying environmental effects of on- and off- Forest management activities and their relationship to each other, i e , cumulative effects The same general conceptual approach should be developed for quantifying effects on fish production Again, however, no specific criteria are offered to address management of problem areas *For example, how much* would harvest rates probably have to be reduced in Class II watersheds to produce a beneficial result?

IV-25

Vegetation *Changing water levels can* have a major effect on wetlands, causing them to dry-up and change to other vegetation or habitats, or flooding and killing wetland vegetation

J-596

IV-26

Fish Habitat The documented changes in stream temperatures coupled with the impacts of sediment can be extremely impacting to fish populations Timber management can produce both these effects simultaneously We doubt that the Forest's BMPs can alleviate the effects of the riparian prescription as described in your chosen alternative

It may be a poor assumption that forested areas with no timber management will provide 100% of the potential population of cavity excavators Much of the areas set aside are high elevation where trees are smaller and, therefore, less suitable to all cavity excavators and dwellers

Page IV-28, Paragraph 1

"There are some restoration techniques that will occasionally be used " What does this mean? How many, where, and how many dollars? If a bad spot is found in a Class II area, will it be addressed, or only problems in *Class III*? *Who decides* this?

Paragraph 2

"Proper maintenance has been identified as an essential part of minimizing erosion or sedimentation from road surfaces " What specifically are you *planning for road maintenance*? Describe the program in general, where are your priorities? What types of maintenance - water bars, erosion control structures, culvert clean-out? Who makes these decisions and how frequent are the inspections - yearly, quarterly? What about road closure and abandonment? Is any effort made to check orphaned roads for safety and stability? What types of monitoring will be used to evaluate road maintenance as it impacts water quality?

Paragraph 4

Chemicals - What are "proper controls"? Is there a procedural requirement which must be met? Are buffer zones required around spray applications? Are drift agents required? What procedures are used to minimize the entry of fertilizers into streams? Is there a process to notify downstream users of chemical application? Is there a monitoring procedure to evaluate impacts of chemical application?

Page IV-40 Vegetation, Timber - Indirect Effects on Other Resources

Paragraph III

I am pleased to note that MMRs with regard to riparian treatments are maintained throughout the process Stream enhancement expenditures are preferred at a high level, though this has not been defined It is disturbing to note that no riparian regulations are stated with regard to leave trees, viable condition, *stand density and/or composition*

Page IV-61, Paragraph 3

When prioritizing restoration/enhancement projects, will the basin classification be referenced against the potential fish productivity of the basin?

Paragraph 6

In general, what are these guidelines for harvest near streams? Have they been successful? Is any monitoring required to verify that significant disruption has not occurred? What specific riparian requirements are designated?

IV-65

The use of threshold or tolerance values such as those described in the draft plan has only limited value The main problem is that they are "after-the-fact" and reactive in nature Any subsequent correction will entail the loss of at least several generations of salmon production In addition, the overall fish production will include many "increments" from specific habitat improvements Any monitoring process must separate these out from the "existing" level of fish production The real need is for a systematic approach that will prevent, not correct, natural fish production losses and document benefits from habitat structures In addition, the discussion on large woody debris (LOD) needs to be modified The benefits realized are primarily for juvenile rearing habitat, not spawning habitat Further, the varied effects by species are due to the critical limiting factors for their production, not necessarily the amount of time spent in freshwater Thus, impacts of sediments on pink salmon production can be just as important as LOD for coho rearing

IV-87

The last paragraph states that the minimum 80 percent shading requirement will be met "where temperature is an issue " However, the criteria for qualification as an "issue" is not provided

IV-157

First paragraph What is meant by "recreation use exceeding carrying capacity and limits of acceptable change?" How are these defined? In fact, recreation, in general, can impact wildlife use in all sensitive areas We see no reference in Table 5-1 stating what will be monitored We also see nothing under Standards and Guidelines in reference to seeking out and resolving such conflicts

J-597

Appendices

Appendix A

See Plan 4-63

Appendix B

See Summary Pages 42 & 44 comments

B-2, paragraph 3

Should include rearing habitat as well as spawning

B-18

This is most detailed evaluation of suitability that we have seen, which adds credibility, though data seems based on 1976 plot data

B-19

Was a sensitivity test made to determine the variance in inventory data? Is the NC alternative comparable to others? Was the RIM data compared to SCORP as a reality check?

B-20

What was the Forest's attempt to identify the known sites of indicator species Are there inventories for these species?

B-24

Are wildlife and sport fisheries increases included as noncash benefits?

B-27, paragraph 1

This is because of the Forest's selection of level identifiers Had the Forest opted to use other, nontimber-oriented identifiers, wildlife and other resources could also have been modeled With the appropriate link between activities, sediment and fish production, fish populations could have been modeled.

B-37

It seems more reasonable to use historical costs with empirical yield tables and the new method with DF SIM, otherwise values would be inflated.

B-39, paragraph 4

Were costs for closures, permanent or temporary, included in order to keep road densities low enough for other resource protection?

'1985

B-40, paragraph 2

Explain coefficient development, especially road-related

Paragraph 6

Good

B-41, paragraph 1

Trends in recreation are changing Historical data projected on future population projections may not provide a realistic picture of future demand by recreation type

Paragraph 2

This only works if coefficient parameters are accurate We cannot determine this from explanations on B-40

Paragraph 4

See our general comments on economics We strongly object to this arbitrary reduction

Appendices

B-41

Use of the 1985 RPA program assessment values has been consistently criticized by resource management agencies in the Pacific Northwest - both in the original report and during their subsequent use in *all draft* National Forest plans for Region 6. These arbitrary valuations are really only the opinion of one group of economists (and on a National perspective) This section *highlights the basic problem*

"Some felt the original values derived were too high for marginal valuation, rather, the values were believed to be closer to average values for all recreation A subsequent reduction was made to *accommo*-date this prevailing belief " (emphasis added)

B-42, paragraph 1

Good

Paragraph 5

We recommend 100' no harvest prescription along anadromous fish streams, and the prescription applied to other streams as provided in our general comments

Paragraph 6

This prescription on lightly incised streams only considers fish and water quality, not wildlife *Class III streams outnumber* I and II significantly and, therefore, represent a substantial portion of the available riparian habitat for wildlife A ten foot zone will not maintain the characteristics of riparian habitat and will therefore not be useful to the majority of riparian oriented wildlife

B-42

The third paragraph under "Riparian Minimum Management Requirements" has a critical assumption Basically, "within an acceptable level of disturb*ance*" *means* "while still protecting streambanks, maintaining stream shading, provide a buffer against sediment moving to the stream," and this should be so stated

B-43, paragraph 2

The Forest needs to complete a full stream survey before the next planning period

Paragraph 3

This assumes all riparian areas will be geographically adjacent to *an MMR* area, which is obviously a false assumption since many are placed in unsuitable timberlands

Paragraph 5

A full range of silvicultural activities is not appropriate in riparian areas, i e thinning, fertilization, brush control

B-44

The discussion under "Anadromous Fisheries" seemingly explains the intent of "acceptable level," namely The approach was taken to incur investment costs that, at a minimum, would maintain existing levels of anadromous fish runs, which are considered minimal for population viability " It also makes it clear that the draft plan will have no quantified linkage between fish production and levels of environmental manipulation ("were difficult to quantify")

In the second paragraph, the first of two higher levels for investment should be used by the Forest as a planning "benchmark" for potential salmon production in the absence of environmental changes It is defined as "1) maintain existing populations, plus restore original spawning grounds to production" (original rearing areas should be added since this *is the definition's probable* intent)

J-598

B-45, paragraph 1

The 1, 2, and 3 percent real price trends need to be modeled for other resources also, and a process used to determine the trend which is similar to that used for timber

B-46, paragraph 3

The losses of fish and wildlife need to be modeled accurately, and those due to activities need to be charged as costs, and evaluated in calculation of PNV

Paragraph 5

This doesn't allow for fragmentation, size or spacing of patches This results in an inflated inventory There should be a coefficient of reduction calculated and ground-truthed as has been done to allow calculation of the dispersion factor

B-53, paragraph 2

This data will allow calculation of numbers and sizes of snags and green recruitment trees needed

B-58

Were allocation zones used to predict changes in wildlife and fish or just analysis areas? We would like to see population estimates for alternatives by drainage

B-70

Table B-9 We note the Category IV only applies to harvestable species

This table implies that # 11, 12, 16, and 24 were not available to be chosen as prescriptions for Category IV

B-72, paragraph 1

There is no such agency as the Washington State Fish and Game Department

Paragraph 2

Good

Paragraph 3

See our riparian habitat comments in the general section

Paragraph 4

Though your analysis turned out different than some other Forests, we are pleased at your decision to dedicate MMR habitats, since we are unconvinced there is any proof that old growth habitat can be silviculturally generated

B-72

In the third full paragraph, the first sentence is as follows "Though these prescriptions were designed to meet minimum constraints, they were still developed considering economic efficiency " The subsequent discussion indicates that this was really done only for wildlife, not fish Since no benchmarks or quantitative linkages to environmental change were developed for fish, it is impossible to have any meaningful analysis for "economic efficiency "

B-74

The assumption that adequate spawning escapements will be made available to use each specific habitat improvement project is not realistic In some areas, a salmon species is managed to fully harvest the hatchery-produced component at a high fishing rate Provision of an adequate natural spawning escapement will be impossible In the case of runs managed for natural production, it will often be technically impossible to manage for increased escapement only to the specific location of a habitat improvement project The staggered construction timing of these projects makes provision of increased escapements even more difficult from a technical fisheries management perspective At best, production from each successful project will increase gradually over several life cycles of the target species

B-75, paragraph 6

Good process

B-77

Table B-10 Won't Prescriptions 5A, 5B, and 6 preclude designation as "wild" or "scenic"?

B-78

Table B-10 Group II classification is appropriate for Prescriptions 11, 12, 13 A-D, 14A, 15A, 16A, and 16B

B-84

What species are used to regenerate the hardwood stands that are harvested?

J-599

10935

B-85, paragraph 2

Was the average adjusted based on the percent of timber type on suitable land?

B-90, paragraph 2

Was such a constraint ever applied in the development of any alternative?

If not, why not?

B-92, paragraph 5

This states wildlife as being one of the yield coefficient developments discussed in the section Nowhere in the documents can we find any explanation of models used to predict wildlife responses to activities

B-93, paragraph 4

Was DR SIM adjusted for the slower growth rate of silver fir and others?

Paragraph 5

Grouping small and large saw timber in the mixed conifer type plus other groupings described are convenient for timber, but influence suitability of MMR habitats for wildlife Was a percent reduction made in calculating habitat capability?

B-95, paragraph 1

We do not fully understand the process by which the Forest arrived at the yield table reduction Cull and mortality do show up on inventory plot data, stand exams and yield tables so that actual snag recruitment over time can be accounted for A constraint can be applied in FORPLAN, then, to provide for the numbers and sizes of snags and green recruitment trees recommended by Brown, et al (1985) which would assure any fall down in yields was more accurately accounted for

B-96, paragraph 3

What does this represent in acres per mile?

Last paragraph

Second sentence, replace the word "snags" with "trees" *We do not accept* that the 20 percent population level will ensure viable populations of all dependent species We suggest the Forest review the definitions of viability in Thomas, et al and manage for levels which provide for more than a possibility of viability

T-600

B-97, paragraph 1

How was this calculated? What does this represent in numbers and sizes? A normal rotation will not produce the larger size snags required by particular species How many green recruitment trees are available in this method?

B-103, first sentence

Explain criteria. The process tends to emphasize roads There is not a linear relationship, there is a point of diminishing return where too many encounters will reduce recreation Is this accounted for?

Paragraph c

Winter Dispersed Recreation If estimates are not expected to change by alternative, does that mean the number of trails are not expected to vary by alternative?

B-106

Were sediment levels based on sampling, extrapolations of data from other studies, or ???

B-107, first sentence

The stand age is probably appropriate for natural stands, but should not be used for managed stands, which will likely take closer to 250 years to develop old growth characteristics, if indeed they will

Paragraph 1

How many acres does natural regeneration affect? Is the wholesale conversion of stands taken into account in evaluating diversity? The fact that intensity XF was not selected by FORPLAN because it didn't contribute to max timber or PNV is discredited by the Forest's statement that the intent of the intensity was for indicator species management

Firewood, Nonchargeable Live Material These need to be constrained by the need to produce sufficient numbers and sizes of snags and down wood for wildlife needs

B-108

Salvable Dead - needs to be constrained to meet wildlife needs for snags and down wood

B-109

Anadromous Fish A model needs to be developed that sites activity type and levels to losses in fish outputs before investment level increases are calculated We believe the values associated with commercial and

recreational uses of the fishery to be significantly underrated The Forest assumes that funding will be available for investments at the levels proposed in the plan, and that it is possible to predict population increases by project based on current knowledge We question these assumptions

B-115

In the last paragraph (Non-Priced Activities) it is stated that it is not possible to quantify the effects of sediment on fish production It should be noted, however, that the Olympic National Forest has used a direct quantified linkage between sediments and fish production in their planning process In addition, other National Forests in this state have used an "index" for environmental impacts on fish (Gifford Pinchot) and a direct relationship between fish production and riparian area disturbance (Umatilla) These same planning options were available for the Mt Baker-Snoqualmie, but were rejected for largely unspecified reasons

B-125

The discussion concerning "Level III" adds additional narrative to support "Level II" as a "benchmark," particularly "beyond that which historically existed under natural conditions " In addition, it appears that something other than adult escapement is envisioned for habitat structures ("stocking of juvenile fish if necessary to meet production goals") This could bring adult production on-line sooner (if proper stocks are available) but would entail additional project costs

In common with other Forests in Region 6, a great deal of reliance is being placed on specific habitat improvement structures and modifications However, this is largely an unproven technology As such, we feel that the odds for success in terms of healthy salmon populations are much less than with the alternative of simple habitat protection The draft plan does not provide this alternative We recommend that a 100-foot riparian protection zone for anadromous fish areas be evaluated as a planning alternative (as presented in the preferred alternative for Gifford Pinchot National Forest)

B-134

The discussion on "anadromous fish benefits" (and other sections of the draft plan) indicates that only production to U S fisheries was included in economic valuations Since the signing of a formal treaty with Canada concerning salmon interceptions, the consensus among economists is that values for Canadian catches should also be included The logic is that the treaty is essentially a "trade-off" or exchange of Canadian salmon for U S salmon Thus, Forest-produced salmon have definite value in the Canadian fishery since they are being "exchanged" for Canadian-origin salmon of comparable value being taken in U S fisheries The treaty also provides that "new" salmon production will be allocated primarily to the country of origin Thus, any values associated with stream improvement projects should be based on total production expectations, not the expected catch by only U S fisheries

J-901

B-139

We are pleased that the Forest recognizes the changing trends in terms of demand for recreation, clean water, and fish and wildlife This is not apparently part of the decision criteria, however, since these resources are sacrificed and demand is exceeded in the first or second decade, as opposed to timber We find this surprising since statements in the documents indicate that recreation is providing more revenue than timber

B-143

Table B-22 Are the figures in this table correct? Comparing the relationship of jobs to employment to income in one alternative to other alternatives intuitively causes us to question your coefficients

B-146, paragraph 7

Elsewhere in the documents, the figure 4000' is used, which is probably more accurate for suitable owl habitat generally

B-147

Mountain goats Please revise your prescription to provide for a minimum of 45 acres per goat on winter range in several stages V and VI, these may be managed stands, but on a minimum of a 200 year rotation, removed at no more than 5 percent per decade

Appendix B-148

See Summary Page 49 comments

B-149, paragraph 1

Add that the Forest will meet the levels specified in the recovery plan and the recommended locations The Forest should also provide for alternative nests sites within 1/4 mile of selected recovery sites Roosts should also be discussed

Fish We object to the assumption that compliance with the Clean Water Act will ensure existing (MMR) levels of fish Models need to be developed that will determine the link between activities and fish populations

B-149

Under "Riparian Areas," it is stated that actual field samples for Streamside Management Units (SMU's) "averaged 225 feet on each side for Class I and II streams and 125 feet on each site for Class III and IV streams It is then stated" "Since these widths represented what was currently being implemented, it was assumed that they exceeded the MMR necessary to protect riparian values " We cannot see any possible reason why the assumption should be "exceeded" instead of "equaled " This

becomes a very critical point because of the following "They were arbitrarily reduced to 200 feet for Class I and II streams, and 100 feet for Class III and IV Based on professional judgment and experience, it was determined that all Class III streams did not require the same degree of protection as the 100-foot width might indicate The lightly incised Class III stream width was reduced to 10 feet on each side of the stream "

B-150

The ramifications of the series of assumptions on the previous page ends with the following "the SMU prescription does not apply to Class IV streams " Thus, the following appears to have occurred

Stream Class	Current Actual Protection	Planned Protection
I & II	225 feet	200 feet
III, deeply incised	125 feet (average)	100 feet
III, lightly incised	125 feet (average)	10 feet
IV	125 feet (average)	None

We realize that this only applies to the planning process and that each case will be examined on its own individual merit However, changes of this magnitude must significantly impact implementation or the planning process is deliberately flawed We cannot see how even existing levels of fish production (which are already admittedly far below potential natural levels) can be maintained with this type of reduced habitat protection

Paragraph 8

This assumption ignores the value of the riparian habitat adjacent to lightly incised streams to wildlife Class III streams provide many, many more miles of riparian habitat than do Class I and II streams

B-150

See our recommended riparian prescription in general comments section

Paragraph 3

The system used to calculate the dispersion factor takes into account only the technical aspects of placing units on the ground spatially The purpose of this MMR appears to have been left out of the equation, as it was on most Forests We understand the harvest dispersion MMR to be required as a way of providing for soil maintenance, water quality, and wildlife diversity It was put into place to prevent local accelerated harvest which could engender unacceptable resource damage We suggest that a soils, hydrology, and wildlife specialist be involved in the determination of the acceptable factor

Primary Cavity Excavators Your assumption should be evaluated by analyzing your inventory plot data, this may be true generally across the Forest, but not locally where snags may need to be enhanced to provide levels required in the plan

B-151, paragraph 1

See comments page B-149, Fish

Paragraph 4

See comments B-105, paragraph 3

B-152, paragraph 3

Please explain exactly how this was done, provide an example, and show the results

B-157

Table B-24 Fish and Wildlife - show outputs (explain model) Soil and Water - show outputs We strongly believe a minimum level alternative needs to be run and used as a baseline rather than A or NC

B-160

Table B-25 The estimates for fish and wildlife do not make intuitive sense The trends seem wrong We have no idea how these numbers were generated so cannot assist in improving your model

B-162-194

See statement for Table B-25 It applies to all of these tables

B-218

Good evaluation

B-219

Tradeoffs. An honest evaluation and explanation It is obvious that these factors work together to undermine solutions Discounting drives acres into solution early, which is intensified by the ACE, in turn pushed by the constraint for timber supply, as it does for recreation?

B-223-224

Alternative A was developed to provide max timber outputs while maintaining or exceeding current recreation, wildlife, fisheries, and visual resource outputs The outputs on page 224 show that no wildlife indicator species will be either maintained or increased Thus, the alternative does not exist In fact, this goal was not achieved in any alternative

209-J-602

B-230

The various elements of "Alternative G" provide, in aggregate, a tremendous amount of protection for anadromous fish habitat They include emphasis on old growth, 65 miles of road closures, retention for 80 percent of the roadless areas, 765 miles of potential wild and scenic rivers and 142 SOHA's It is inconceivable that this results in salmon production only equal to that predicted for Alternative "B", "D", "H" and "H-Departure " (The same illogical situation can be seen in the acreage statistics provided in Table B-64 on pages B-234 and 235)

B-234

Table B-64 We need to be able to compare with average last decade and minimum level management

B-241

Table B-65 See comments for Table B-64

B-242

Table B-65 (and subsequent data in the draft plan) all show increased fish production fully "on-line" during the first decade In addition to problems discussed previously, this treatment produces "new" fish before the structures are even built A realistic projection would show the new salmon production coming on-line during the middle of the second decade

B-242

Table B-65 Why does demand satisfied for recreation differ so little among alternatives when the amount of unroaded lands varies significantly?

B-244

Table B-66a Compare to minimum management alternative and average last decade Show sediment produced over background (due to activity) Your water outputs indicate something wrong with your modelling

B-245

In this and subsequent tables, it would be much more useful to show sediments as they increase over natural levels, not the total for natural plus activity-produced sediment In addition, the water yield numbers should be omitted since their display indicates that this factor will show no change In reality, the question is not resolved and the numbers simply reflect a lack of quantified data The constant numbers imply that there will also be no changes in peak or minimum flow values (both of which could be detrimental to fish production)

B-247

Wildlife and Fish Trends across alternatives would indicate that harvesting more timber and building roads creates more capacity for wildlife use We do not agree Cover is, or will become limiting to big game and increased access leads to reduced recreational opportunity due the need for ever-increasing restrictions

B-248, B-66b

Roads hardly vary by alternative, even those which cut little timber generate lots of roads

B-250-251

Your process for estimating numbers of old growth and mature tree species does not allow for fragmentation, distribution, elevation, topography, size or spacing of patches, and therefore your wildlife numbers are inflated significantly Suggest using an index which fluctuates by percent

Compare to average last decade and minimum level management alternative

Cavity Excavators MMR was never intended to be a management level, 20 percent is inappropriate for alternatives

Your current level estimates for deer and elk are approximately 1/2 of what WDW would estimate Do your figures include the effects on habitat usability due to roads? Is your model forage-based? Your figures actually bear little relationship to harvest timber levels, is this due to investments in habitat improvement?

B-255

Compare to current level and minimum level management

B-257

The narrative discussion under "Water and Riparian Resources" consistently points to a direct relationship between expensive mitigation measures and levels of management activities (timber harvest, roading) For example, Alternative "D" (to which "H (Pref)" is compared) visualizes "intensive mitigation measures" while Alternative "C" has "Least mitigation required " However, none of this is quantified A realistic expectation would be a significant "cost," particularly for management activities in the riparian area It is also probable that funds planned for fishery "enhancement" will actually be diverted to mitigation in most of the Alternatives involving moderate to high levels of forest management activities

J-603

10935

B-258

We disagree that richness increases following timber harvest and reforestation Intensive timber management is oriented towards producing a monoculture (plant genetically improved stock, brush reduction, PCT, CT, etc) The point is to reduce diversity In fact, there is a short-term increase in plant diversity for 5-10 years, followed by a much lower level of diversity than occurred during the pre-harvest condition, which lasts for the next 60-80 years when harvest occurs again The net result is less diversity, not more

B-264

Roaded recreation evaluation doesn't appear to take into account that "value" changes with scarcity, and that there is a point of diminishing returns The value of unroaded recreation should increase as demand is not met and the value of roaded recreation should decrease as demand is exceeded

B-273-274

Table B-74 This is a repeat of Table B-65 We have the same comments

J-604

B-275

Compare to average last decade outputs and a minimum level alternative

Appendix C

See Summary Page 52 comments, see Plan Pages 4-40 & 4-41 comments

Appendix D-1, paragraph 5

Please reword to clarify

Appendix D, Pg D-3

Table D-1 How were these projects chosen and prioritized? How will these projects benefit fishermen and hunters?

Appendix D-17

Should Intensity 130 be Potential, rather than Existing?

F-6

Genetics We question the assumption that the selected genetically superior seedlings have a broader gene pool than seedlings produced in natural stands Large openings are generally planted with stock and not dependent on distant nonrelatives for reproducing the next generation

Stand density PCT and CT are options in uneven-aged management, just not as cost-effective However, it a management area objective would be significantly enhanced through utilization of uneven-aged regimes, it should be the preferred option, such as in riparian areas, and modelled as such

F-7

"Uneven-aged methods may require artificial regeneration to maintain the appropriate species composition " Please explain appropriate species composition Doesn't that depend on the management area objective?

F-8, paragraph 2

Same comment as above regarding "appropriate species composition" "Uneven-aged management may favor growth of hardwoods and prevent regeneration of tall growing conifers " In riparian areas, hardwoods are commonly succeeded by conifers, the mix is good for fish and wildlife " so that shading is reduced on larger streams " We are not concerned that the mix of hardwood and conifer that would accompany uneven-aged management would in any way contribute to increases in temperature significantly impacting to fish streams, especially as compared to complete removal as in clearcutting regimes

F-9, 1d

Ok for feeding, but not for nesting or roosting

G-5

We are pleased to see this section It is the first plan that has displayed this information We would like you to update your figures prior to the final

H-2

See our recommendations in Appendix

H-2

General Conditions add to paragraph 5 except that four-wheel drives and motorcycles will not be permitted on groomed snowmobile trails

H-3

Table H-3 We could not find this table

H-4, paragraph 4

Wouldn't this just spread the annual ASQ reduction, not affect the total reduction?

H-5, paragraph 2, last sentence

We strongly disagree that more than doubling the size of SOHAs would have "little effect on the isolation, purity, or privacy of the area " Remember that these are providing habitat for all old growth users, some of whom are particularly sensitive to human intrusion, as opposed to the owl itself This is also true for humans who wish to get away from the sights, sounds, etc of other humans

I-1

MMR modifications See our general comments section

I-2

Effects See our general comments section

Mountain goats See our previous discussion for our recommended prescription

J-1 - J-5

See our general comments section

J-10

See previous comments regarding the use of Brown, et al (1985), the need for green recruitment trees, the need for an analysis of current levels, and the selection of 20 percent as the MMR level We do not understand the process in detail for calculating yield table reductions, including average size for green tree recruitment, distribution, and that number of snags produced in managed stands will be only "slightly" less than in your inventory plots It does appear that you do have a process, however, and have made a good attempt at estimating needs and tradeoffs which we have seen too rarely in other Forest Plans

J-11

Coordination We believe the least risk to actual accomplishment of snag management, as well as accurate harvest inventory, would be attained by incorporating a constraint in your model that would retard harvest when needed to produce the correct number and size of snags, and/or would incur costs to create snags when needed

J-13

Dispersion The purpose of creating a harvest dispersion factor has not been taken into consideration in its development

J-18, last footnote

-We repeat, this argument is not considered valid

J-19, paragraph 4

See previous comments on your riparian prescription

J-29

Table J-5 Since the effects of increasing MMR protection to cavity excavators and to riparian areas is considered to be insignificant in terms of jobs, PNV, etc , wouldn't it contribute to maximizing net public benefits to accommodate the need for more protection

J-32, paragraph 4

We agree with your analysis and believe it provides a strong argument in favor of your request for management at levels above 40 percent, forest-wide

J-33, paragraph 7

We suggest you contact other Forests who are attempting to quantify and agree on the best process to use, rather than avoiding the issue Meanwhile, your monitoring effort should include collection of data for the parameters of a habitat model which would cover the loosest assumptions in the current model

11,934

United States Department of the Interior

OFFICE OF ENVIRONMENTAL PROJECT REVIEW
500 N E MULTNOMAH STREET SUITE 1692
PORTLAND OREGON 97232

May 9, 1988

ER 88/27

J.D. MacWilliams, Forest Supervisor
Mt. Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, WA 98104

Dear Mr. MacWilliams:

The Department of the Interior has reviewed the Draft Environmental Impact Statement (DEIS) and Proposed Land and Resource Management Plan (PLRMP) for the Mt. Baker-Snoqualmie National Forest, Washington The following comments are provided for your use and consideration when preparing the final documents Specific comments are enclosed as attachment 1

I-606

Fish and Wildlife Resources

The U S Fish and Wildlife Service is unable at this time to support the Forest Service's Preferred Alternative (Alternative H) because of the lack of emphasis on the conservation of fish and wildlife resources.

Alternative C appears to have the greatest potential for producing the best Forest-wide mix of sensitive animal/plant species However, even Alternative C is not adequate because it includes provisions for cutting substantial amounts of the remaining old-growth timber on the Forest Furthermore, Alternative C does not present specific plans that would maximize biotic diversity of the areas to be logged

A systematic and conclusive assessment of the Forest Plan alternatives was made difficult for a number of reasons, including the following

1 The subject planning documents lack a coherent presentation of goals, concepts, impact analyses, standards and guidelines for management options, and stated directions for action The lack of coherence is caused in part by a high degree of fragmentation of topics and by a lack of explanatory information

2. Although there is a great deal of useful information in the planning documents there is often a lack of detailed biological information.

3 A clear distinction is not maintained between the concepts of habitat mitigation and habitat enhancement for wildlife. For example, there is a proposal in the DEIS to accomplish some "wildlife habitat improvement projects" such as osprey and loon nesting platforms and wood duck nesting boxes However, it is not clear whether these projects are being proposed as

"enhancement" of wildlife habitat in general or as "mitigation" for habitat losses If it is the latter, then the Forest Service should be aware that the Fish and Wildlife Service may not concur with the involved resource tradeoffs (e.g., osprey for spotted owls)

4. The fish program appears to be built upon the general assumption that "there will be no decrease in fish production from the current level in any alternative." This general assumption is supported by the Forest Service's apparent belief that the use of "mitigation" technology will offset any fish habitat losses from the forest activities. This belief is contrary to the commonly-held opinion among fishery resource agencies

   Another problem is that relationships between sediment outputs and fish production was not established The fish production models contained high rates of increase in fish biomass during the beginning stages of the first decade. These yearly high rates of increase in fish biomass appear to be heavily based on the application of unproven mitigation and enhancement technology.

5. A comprehensive range of alternatives was not provided For example, an alternative that maximizes fish and wildlife resources was not included A thorough discussion of such an alternative would be very useful for comparison purposes and to present the full range of benefits for a forest that is managed under the concept of multiple use

6 Alternatives A and NC do not represent true "no-action alternatives," as they would result in significant logging and road building on the Forest. A true no-action alternative is absolutely necessary as it would provide an informative fish and wildlife resource baseline for the existing Forest.

The Plan has been built around a very large timber harvest. This was done without the benefit of needed basic information on the aquatic/terrestrial ecosystem of the Forest and the effects of forest activities on that ecosystem For instance, it is admitted in the DEIS that not enough is known about soils to predict the longterm effects of intensive timber harvest on the soil resource in general and soil productivity in particular (p III-53) The lack of basic information is further demonstrated by the long list of needed studies presented on pages 2-21 and 2-22 of the PLRMP.

Significant portions of the Forest that have an emphasis on timber management (Management Area 17), also encompass slopes with unstable soils Specific areas with an emphasis on timber management which contain zones of highly unstable soils include the following Finney Block, Canyon Creek, Mt. Baker District, Canyon Creek, Darrington District, Jackman Creek, Mt Baker District, and South Fork of the Nooksack River We strongly recommend that logging operations be restricted to timbered areas with good slope stability We also strongly recommend against any relocation of timber sales from the aforementioned areas to other geographical areas with unstable soils that are covered by a Management Area 17 designation. Similarly, we recommend against relocation of timber sales from the previously listed geographical areas to Management Areas where no timber harvest is scheduled.

As previously touched upon, the PLRMP has a heavy emphasis on the use of "mitigation/enhancement" technology, e g, artificial nesting structures for water oriented birds, and instream structures for fish habitat Although there are occasions when it is appropriate to use such technology, it is not the preferred way to manage fish

and wildlife resources. Adoption of technologically based mitigation/enhancement programs allows the land manager to place secondary importance on the conservation of valuable fish and wildlife habitat. The preferred method of mitigating adverse impacts to fish and wildlife habitat is to avoid those projects or project parts that would cause significant environmental impacts.

The Forest Service should consider the implications of the Migratory Bird Treaty Act for projects on the Forest. Standards and Guidelines for the Plan give limited indication that the Forest will be managed to specifically conserve migratory birds and their habitat A thorough discussion should be included in the final documents on how the Forest Service plans to prevent the destruction, and enhance the habitat, of birds, nests, and eggs protected under the Migratory Bird Treaty Act. The Act requires the Forest Service to consider carefully the environmental consequences of all forest activities that are guided by the Forest Plan.

The final planning documents should also include a discussion on protecting on-Forest and off-Forest waterfowl habitat that could be adversely impacted by forest activities

The documents contain considerable discussion about the spotted owl The Service considers the northern spotted owl to be a "sensitive species" (i e , one whose status is vulnerable as a species and needs action to prevent further declines) This is not a legal category, but is an administrative step toward meeting the Service's policy of preventing additional species from becoming threatened or endangered, as defined in the Endangered Species Act of 1973, as amended. The northern spotted owl, like most bird species in the United States, is also protected under the Migratory Bird Treaty Act (16 U.S.C 703-711) and is subject to regulations under subchapter B of Title 50 CFR.

The northern spotted owl is considered vulnerable for the following reasons· (1) remaining suitable habitat in old-growth forests is being lost to logging, and that which remains is patchy, creating fragmented habitat (2) the barred owl is expanding its range into forests with fragmented habitat, bringing it into serious competition with the northern spotted owl for food, nest sites, and roost sites, (3) increased patchiness of forest habitat makes the northern spotted owl very vulnerable to predation from the great horned owl which is adapting to the new forest conditions, (4) continued decline of northern spotted owl habitat will produce low spotted owl populations with greater risks from demographic, catastrophic, and genetic causes.

The Fish and Wildlife Service is concerned about the Forest's Preferred Alternative with respect to the spotted owl for the following reasons.

1. The Forest Service's Supplemental Environmental Impact Statement for the spotted owl has not been finalized. The purpose of this document is to develop standards and guidelines to be used in the forest plans for the conservation of the spotted owl Without that guidance it would be premature to select a management option at this time.

2. An interagency agreement signed on December 1, 1987, by the Director of the Fish and Wildlife Service and the Chief of the Forest Service, commits the Forest Service to ensure the continued existence of a well-distributed owl population throughout its National Forest range Under the agreement, both agencies have agreed to coordinate efforts, including research and monitoring. An annual progress report will be supplied to the Fish and

Wildlife Service and the agreement provides for emergency action if a viable population is not maintained. The final documents should reflect this interagency agreement.

3. It is questionable whether or not the preferred alternative would provide for long-term viability of the owl. Maintaining viability of all species inhabiting the Forest is a goal of the forest planning process. As such, it appears that the Preferred Alternative could be in conflict with provisions of the National Forest Management Act of 1976. More specific comments follow with respect to the spotted owl

Under Alternative H, 1000 acres of suitable spotted owl habitat per pair would be protected from logging activities Recent preliminary research findings indicate that this suitable habitat figure is unrealistically low for spotted owls in Washington State. These findings indicate that requirements for suitable habitat may be 4200 acres (average figure) of old-growth per pair in Washington State Spotted owl population projections for planning decades 1, 2, and 5 (see DEIS Table IV-13) are not biologically reliable and, if implemented, could result in the loss of viable spotted owl populations on the Forest. Consequently, the Forest Service should develop a final Plan that will provide a high probability for survival of the spotted owl on the Forest.

Mitigation of existing and potential future adverse impacts from forest activities on fish and wildlife resources and their habitat needs to be fully considered It is the policy of the Fish and Wildlife Service to actively seek to mitigate losses of fish and wildlife habitat as a result of development projects If the Fish and Wildlife Service is requested to review specific projects/activities that result from the Forest Plan, recommendations will be made regarding (1) conservation, protection, and enhancement of fish and wildlife habitat, and (2) a balanced development of our nation's natural resources

It appears the Forest plans to monitor the use of the chosen alternative. The Forest should consider using two methodologies developed by the Fish and Wildlife Service (i.e , Habitat Evaluation Procedures (HEP) and Instream Flow Incremental Methodology (IFIM)) HEP is a method which can be used to document the quality and quantity of available habitat for selected fish and wildlife species IFIM can be used to assess aquatic habitat as a function of flow and other environmental parameters. It is a collection of field techniques, computer models and analytical procedures designed to predict changes in fish habitat due to increments of flow change. Use of HEP and IFIM would assist the Forest Service in taking timely corrective actions to activities that would impede meeting fish and wildlife goals on the Forest

The DEIS discusses the Forest Service's Land Ownership Adjustment Program (p-III-160, 161) pertaining to acquisition or disposal of certain types of lands This discussion should include Forest Service policy on securing all mineral rights to any land that is acquired by purchase in fee title or trade. Federal ownership of mineral rights will ensure that the Forest Service has a full range of options for making management decisions that will protect fish and wildlife habitat on any acquired lands.

Cultural Resources

The Forest has shown a great deal of sensitivity to the needs of the 15 Indian tribes and initiative under the American Indian Religious Freedom Act

With respect to cultural resources, however, the Preferred Alternative lacks detail in planning which suggests that cultural resources are being relegated to individual

J-607

management discretion.

The DEIS discusses only project or land transfer-related cultural resource survey (p III-94, IV-89, and IV-155) in contrast with the PLRMP which states in several places that nearly the same amount of land will be subjected to non-project purposeful survey. These two documents should be reconciled.

The PLRMP should address why only 20 prehistoric and 100 historic sites have been adequately recorded out of an inventory of 800 sites and 170,000 acres of survey to date.

The Forest's cultural resource inventory plan is apparently still under preparation (p 2-20). Because the Forest is considering how it will treat its resources over the next ten years, it is important that a summary of the chief features of this inventory plan be incorporated in the Forest Plan. The plan should, to the extent possible, outline both project-related and research- based investigations, protection, excavation, and interpretation.

With reference to the anticipated historic resource management plans, the Forest Plan (p 4-44) states only that top priorities for management plans include the Stevens Pass Historic District, the Depression-era Forest Service administrative buildings and fire lookouts. The Forest Plan should contain such information as priorities and a schedule of management plans

On page 4-44, the Plan states that 35,000 acres will be inventoried each year, almost half of which would be nonproject-related and designed to improve the Forest's understanding of the nature and distribution of its cultural resources. We endorse such a research-based inventory.

J-608

Wild and Scenic Rivers

The National Park Service has concerns with both the process used by the Forest for evaluating Wild and Scenic River potential and the results of the evaluation process.

The evaluation process is flawed because first, outdated eligibility criteria are used The *1970 guidelines cited in the analysis were superseded in 1982. Second, there is a lack of* documentation for the classification of rivers. The final and most serious problem is the lack of a suitability analysis. Without an explicit discussion of the suitability criteria defined in section 8.23 of the Land and Resource Management Planning Handbook, it is unclear if the required evaluation was accomplished

The National Park Service is concerned with the Wild and Scenic River analysis as it pertains to the results of the eligibility evaluation. The outstanding features of rivers of the northern Cascade range have been recognized by a variety of agencies and/or groups. Three separate groups have identified 14, 16 and 19 rivers in the Forest as having at least one outstandingly remarkable value. The Forest identifies only five rivers with such values. While the determination of eligibility is ultimately a matter of *judgment and interpretation,* the Forest appears to have been exceedingly conservative in defining outstandingly remarkable values.

It is recommended that the forest complete the Wild and Scenic Rivers analysis by

1. Reviewing the eligibility evaluation using current criteria and revising as necessary Specifically, review and documentation of the Middle and South Forks of the Nooksack, the North and South Forks of the Stillaguamish, and

the Miller, Beckler, and Foss Rivers are recommended.

2. Revising the classification and suitability analyses using improved documentation and Planning Handbook criteria.

The results of the review of eligibility and suitability may result in a change in findings and recommendations. If revisions are made it is important that the public and other agencies be given an opportunity to review the revised analysis before it is finalized To achieve this, one of the following options should be considered by the Forest. 1) Revise the assessment, republish it as an amendment to the draft plan and DEIS, and proceed with the final plan following public review, or 2) *Defer the entire Wild and Scenic River* analysis until after the final plan is released. In the interim, manage the 47 rivers in accordance with section 8 12 of the Planning Handbook.

Mineral Resources

The Cascade Mountains province is probably the most important physiographic division in the state of Washington in terms of the known significant metal deposits and the possibilities for discovery of additional deposits Thus, it is imperative for the Forest to have a strong mineral program to encourage and facilitate the orderly exploration, development, and production of mineral resources

Determination of mineral potential is not limited to present or past mineral activity. Mineral potential must also include areas of favorable geologic environments It is suggested that someone knowledgeable in the field of minerals prepare a mineral potential map based upon both mineral activity and geologic environments The enclosed Geologic Map (GM-30) entitled, "Availability of Federal Land for Mineral Exploration and Development in the State of Washington," may be of some help (attachment 2). Plate 3 *shows significant metallic mineral* deposits and related geologic terranes compared with Federal land availability status, several of which are located on the Mt Baker-Snoqualmie National Forest. It may be beneficial to incorporate these Bureau of Mines data into the Forest Service Foreplan Model Minerals can thus be better emphasized as a resource rather than as an impact, lands with locatable mineral potential can be shown with their access restrictions, and areas that are likely to be developed can be outlined.

The Forest is encouraged to contact the Bureau of Mines if questions arise concerning this or other mining related activities.

The Bureau of Mines has reviewed a large number of documents from other Forests and has compiled a list of elements which would be useful in preparing documents. Many of those elements are already being used by other Forests, the Mt Baker-Snoqualmie National Forest should consider the following elements in the planning process.

1. Mineral Potential Map This should be at the same scale as the alternative maps, and in color The best examples are in the Kootenai National Forest (MT) and the Okanogan National Forest (WA).

2. A comparison of *mineral potential classification with availability (access)* classification An excellent system is in the Beaverhead National Forest (MT) DEIS, pages II-71 and II-72, and is shown on Table II-11 (attachment 3) The Beaverhead mineral potential classification consists of four parts, with a range from very high potential to low potential. Another well defined classification was used in the Wallowa-Whitman (OR) DEIS see attachment 4). *The availability (access) classification for the Beaverhead National*

Forest (attachment 5) consists of four categories, including withdrawn, specific legal protection measures, special management conditions, and standard operating conditions. By comparing the acreages of various potential with availability, an excellent statistical representation of minerals availability would be presented.

3 A discussion of how minerals are affected by each of the alternatives and a section in the summary that compares how minerals fare by all of the alternatives.

4. A point-counterpoint discussion of how minerals affect other resources and how decisions affecting other resources will, in turn, affect minerals An excellent example is the DEIS from the Wenatchee National Forest (WA)

5. A narrative section on minerals, containing a history of development and mineral production, value of past production, projected mineral demand, and current operations in locatable, leasable, and salable minerals. The Wallowa Whitman National Forest DEIS is one of the best examples.

6. A list of current mineral withdrawals, acres involved, and mineral potential for locatable and leasable minerals. The best example is the Los Padres National Forest (CA) DEIS

7. A narrative section on definitions of mining exploration and development terms, what the operations involve, and the effects these activities have on the Forest. The Beaverhead National Forest DEIS is the best example

The Forest should contact the National Marine Fisheries Service to determine if notification is desired of any mineral development that would affect anadromous fish

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National Park Service Resources

The National Park Service is concerned primarily with the areas where a National Park and the Forest share a common boundary. These are administrative, not ecosystem boundaries and land use practices on Forest land adjacent to the Park have potential to cause significant impact to Park resources The Forest shares boundaries with both Mount Rainier National Park and North Cascades National Park Service Complex Many of the Forest and National Park Service management objectives, as well as operations, overlap and the areas involved should not be administered as islands The Forest Plan should recognize and facilitate a cooperative effort to manage the general region to meet mutual objectives, including specific references to cooperation in resource management and visitor services with the two Parks. The Forest should be managed cooperatively with all agencies, organizations, publics, and interests involved For example, within the PLRMP, Social and Economic Overview Section, the relationship between the Forest and the Parks should be recognized In the Current Resource Conditions Section, soils, water, riparian vegetation, wildlife, fish, cultural resources, scenery, and recreation should be recognized in an "ecosystem" context, rather than solely within the Forest boundary.

The Preferred Alternative indicates no elk habitat improvements will be undertaken within the Forest. The National Park Service endorses this management proposal.

The Forest is encouraged to designate Spotted Owl management areas (SOMA) near the Park boundaries where Spotted Owls have been located. Such areas include Mount

Rainier National Park near Mowich Lake Road, near Carbon River entrance and near the west fork of the White River

In the Standards and Guidelines Section some consideration should be given to the maintenance of naturally fish free aquatic systems. The preservation of such systems is inherent to wilderness preservation In this same Section the plan should call for establishment of regional/ecosystem cooperation in inventory and monitoring programs for indicator species. Cooperative management efforts for specific species should be sought, such as is occuring with the Grizzly Bear in North Cascades.

The alternative selected in the final plan by the Mt Baker-Snoqualmie National Forest to guide land use should be sensitive to the potential for visual impacts from forest practices along Park access roads and from Park lands along Forest/Park common boundaries. The National Park Service is particularly concerned with the designation of the south side of the Cascade River Management Area 17 for Timber Management This corridor lies between the North Cascades National Park Service Complex and the Glacier Peak Wilderness and is a major route for recreationists and hikers using Cascade Pass (approximately 6000 per year). As one of the only vehicular access routes to the high country this use is expected to grow in the future This area should be designated as 1D and/or 2AB for protection of the visually sensitive landscapes. The Cascade River Road should be included in the scenic viewshed plans, with the scenic quality maintained and gradually improved Senate Report No 700, 90th Congress, dated October 31, 1967, indicates Congressional concern for scenic viewshed management on the Middle Fork of the Cascade River (p 32). The National Park Service is also concerned with timber management and other non-wilderness use in all areas that are situated immediately adjacent to the Park boundary

Alternative H appears to give the best treatment to the scenic corridor of the Mather Memorial Parkway, but does not provide adequate protection of the Mowich Lake Road (Mount Rainier National Park) For example, the Carbon River Road and Mowich River Road corriders should be given some type of scenic value protection. It is recommended that timber harvest plans along Park boundaries be subject to site review to mitigate the visual impact of cuts as viewed from the park Specifically, it is recommended that an agreement be instituted between the Forest and the Park to assess effects of timber harvest and other development upon the viewshed of the park. A further purpose of such an agreement would be to accomplish aesthetic mitigation for impacts.

It is the understanding of the National Park Service that the last remnant of inland rain forest in the contiguous forty-eight states exists in the Mt. Baker Snoqualmie National Forest due west of the Carbon River entrance to Mount Rainier National Park. We believe that this remnant should be preserved and the Preferred Alternative does not afford adequate protection of this very significant resource.

The Forest should consider maintaining roadless areas in the following areas near Mount Rainier National Park: 1) the area just south of the Carbon River Road approximately a mile and three quarters in length, 2) the area which is contiguous to the park boundary from the Carbon River to the edge of the wilderness area along its south boundary, 3) the area in Section 31 and a small part of Section 36 due east of the wilderness boundary, 4) the area due north of the Northern Lakes, 5) the area which is contiguous with the park boundary along Huckleberry Creek, Lost Creek, and up to Fawn Creek and 6) the area along the east boundary in Sections 3 and 11.

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Summary

It is important that ecosystem and regional management with the National Park Service at North Cascades be specifically and clearly addressed in the text of the final plan.

The Preferred Alternative is deficient and needs an improved and expanded emphasis on the conserv ion of fish and wildlife resources using the Forest. The Forest Service should dev op an alternative that maximizes fish and wildlife resources (in terms of biotic diversity and numbers of individuals). Fish and Wildlife Service representatives are prepared to meet with the Forest Service to discuss such an alternative as discussed above. Please contact the Field Supervisor, Division of Ecological Services, U.S. Fish and Wildlife Service, 2625 Parkmont Lane, Building B, Olympia, Washington, 98502 phone (206) 753-9440, FTS 434-9440

Thank you for the opportunity to review and comment on these documents.

Sincerely,

Charles S. Polityka
Regional Environmental Officer

Attachments

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SPECIFIC COMMENTS
Attachment 1

Proposed Land and Resource Management Plan

Page 2-7. Both National Parks are Class I areas according to the Clean Air Act of 1977, as amended. Some mention should be made of fires being allowed to burn in Wilderness or allowed to cross into the Parks. On page 4-96 the air resource goal should include protection of adjacent Class I areas

Page 2-9 Minimum Management Requirements. Some discussion of working with other land management agencies to meet MMR's should be provided.

Page 2-9,10. This apparently important "Special Note" section is in need of clarification as it could be interpreted in several ways. One interpretation is that the Plan document does not include all of the "late changes" with respect to what the Forest Service actually plans to do on the Forest. This should be corrected in the final plan.

Page 2-19 Recreation. The Plan should include an analysis of recreational needs in a regional context including all land management agencies. On page 3-4 some discussion should be given to interpretation and information services.

Page 3-7· Adjacent and Intermingled Lands. Cooperative efforts with Mount Rainier National Park, and North Cascades National Park Service Complex to resolve adjacent and intermingled lands issues should be discussed in the plan

Regarding the Land Adjustment Map (p G-3), lands adjacent to National Park Service areas should not be available for exchange to private interests unless specific safeguards of National Park Service resources are included in the exchange.

Page 4-1 through 4-5. Forest Management Goals These goals should reflect the need to manage cooperatively with other agencies for the benefit and long term preservation of the ecosystem. This includes cooperative efforts for interpretation, information services, recreation opportunity, scenic vistas (specifically Cascades River Road, North Cascades National Park Service Complex), research, monitoring, air quality protection, and wildlife management.

Page 4-40. It is stated that dead and down logs will be left in forest project areas However, there is no indication as to how this dead and down woody material will be protected from the adverse effects of prescribed burning. It has been our observation in the field that fire-charred logs do not appear to be as ecologically valuable as uncharred dead and down logs

The topic of "the effect of prescribed burning on the ecological value of dead and down woody material" should be thoroughly addressed in the planning documents. In addition, the mitigation of potential adverse impacts to the woody material should be thoroughly discussed.

Page 4-40, (also pages 4-97 and 4-98, page 4-169 through 4-172) These sections deal with the protection and management of riparian areas. This highly important aspect of wildlife and fish habitat management should be presented in a more understandable way. Efforts should be made to be as descriptive and precise as practicable. For example, a narrative and diagrammatic comparison could be made between riparian zones in a

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natural (unlogged) and managed (logged) state for each of the four stream orders as developed by Strahler (Brown, p. 201).

Greater attention should be given to clarifying riparian zone management concepts such as providing for recruitment of large woody debris to a stream. With respect to this one example, information is needed on the recruitment potential (to the stream) of large woody debris under an unlogged condition as compared with the logged condition. Further, management concepts (e.g., stream classes, timber management intensities, structural erosion control, forest-wide standards/guidelines and riparian prescription for fish and wildlife) should be presented in such a way as to form an integrated whole. This might be more easily accomplished by presenting a separate unified section covering important facets of riparian zone management

Standards and guidelines for riparian zones may be inadequate to protect important fish and wildlife resources such as anadromous fish, amphibians, cavity nesting waterfowl, other waterfowl, and mammals It appears that lightly incised Class III streams and all Class IV streams can be heavily logged. Consequently, the management guidance presented here should be reevaluated and changed to meet fish and wildlife requirements. It should be noted that what happens in these small headwater streams has a disproportionate effect on downstream biological activity. First, because small steep gradient streams are major sources of sediment, any activity that accelerates erosion from these streams increases turbidity and sedimentation downstream. Secondly, logging practices which reduce the long-term recruitment of large woody debris to small headwater streams will diminish the ability of those streams to trap leaf materials, twigs, branches, etc. Under such conditions, aquatic insects (that function as shredders of plant materials), fungi and bacteria would not have time to process the plant materials and break them down into particulate organic matter and soluble nutrients Thus aquatic food chains in the downstream areas (where greater numbers of fish exist) would be deprived of a usable energy source.

In addition, it appears that Class I, Class II and heavily incised Class III aquatic/riparian areas may not be given the quality of protection that is required for conservation of fish and wildlife resources. There is simply too much flexibility in the Plan which could result in intensive logging and road building within these riparian areas

The preferred way to mitigate impacts to the riparian zone is to give full protection to that zone for all stream Classes This would require that logging and road building occur well outside of the riparian zone.

Page 4-41. It is proposed that spawning and rearing habitat for "salmon and sea-run trout" be improved. However, no criteria are given on how the "areas to be improved" will be selected Neither is an explanation given on how habitat improvement is to be accomplished These deficiencies should be thoroughly addressed in the final documents.

An explanation should be given as to which fish species are targeted to benefit the most from the specified habitat improvement measures. A detailed discussion should also be included on fish species that may experience adverse impacts from the specified measures. It should be noted that many aquatic habitat improvement measures are largely unproven with respect to improving the fishery. Accordingly, we suggest that the Forest Service be cautious and conservative when attempting to attribute qualitative and quantitative benefits to a particular habitat improvement measure

We commend the Forest Service's intent to monitor aquatic habitat improvement measures for effectiveness in producing fish (Plan, page 5-6). However, it is imperative

that the monitoring program be carefully planned and employ appropriate methods. It is suggested that the Forest Service develop their monitoring program for aquatic habitat improvement measures by full coordination with State and Federal fishery agencies, Indian Tribes and universities.

Page 4-43 The Forest should prioritize, or schedule the inventory, recordation, protection, and interpretation of the numerous referenced historic features (in addition to the Stevens Creek Pass district) such as the "14 distinct mining areas, 6 transportation, and 8 logging areas" Specific examples include the "Snoqualmie Pass Wagon Road; Northern Pacific Railroad corridor; the Mount Baker, Silverton, and Index mining districts, and Stillaguamish and Sauk River drainage logging areas"

Page 4-71 to 4-81, Forest-wide Standards and Guidelines There should be mention of cooperative efforts in terms of recreation, visual resource management, wilderness, wilderness administration and vegetation.

Page 5-4. The monitoring methodology for soils should be presented in detail. This will enable fish and wildlife resource agencies, and Indian Tribes to make an informed assessment of how well the Forest Service will be able to detect any flaws in the preferred Plan, and correct its course once it is applied on the ground.

Page D-2. The term "evaluation" should be defined More than two such evaluations per year should be taking place, including physical testing and controlled surface collection.

Draft Environmental Impact Statement

Page II-127 (also pages III-27, Old-Growth, and III-61, Old Growth and Mature Forest) It would be helpful in analyzing the various alternatives if old-growth was broadly categorized into dominant, co-dominant, and subdominant tree species, age of dominant and co-dominant tree species, and elevation If the Forest data base is sufficient it would also be helpful to give the number of sub-canopies and snag characteristics for these old-growth stands. All of this information should be displayed in table form This information should then be keyed to a large-scale map (s) and displayed by acreage as well as location. Further, the old growth information should be allocated, as appropriate across the various Plan alternatives and presented in appropriate places in the DEIS. An initial attempt to provide such information in Table II-12 does not provide the botanical detail that is necessary for an adequate analysis of Plan impacts on old-growth animal communities.

Page III-34 This section mentions the Forest Service's programmatic document on the management of competing vegetation The Fish and Wildlife Service recently reviewed a Forest Service document entitled Draft Environmental Impact Statement on Managing Competing and Unwanted Vegetation. Our comments were transmitted in a February 18, 1988 Department of the Interior letter indicating that we believe the draft is deficient with respect to assessing potential risks to vulnerable fish and wildlife resources. We recommend that the Forest Service revise this draft document to address these concerns before it becomes adopted into the Plan.

Pages III-78 and III-79, Tables III-30a and III-30b. Tables III-30a and III-30b are based on only a single year of fishery data These tables should be revised by use of fishery data from at least the last five years

Page III-147. The statement that there are no impacts on air quality related values should be supported by references.

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Page III-149. Data from the EPA Western Lakes Survey was published in January 1987 and should be included

Page III-154. Three features, including the volcanic feature of Mt. Rainier National Park, have been designated as "significant thermal features" Geothermal leasing is dependent on determination of whether proposals are likely to result in significant adverse impacts on such features. Provisions of Public Law 99-591 should be included in the DEIS

Page III-158 Gold should be omitted from paragraphs 4 and 5 as gold has not been at a depressed price for the last few years Also, the text should mention that some of the decline in mineral activity in the Cascades of northern Washington preceded the decline in metal prices and was a result of restrictive land management practices (see page 8 of GM-30)

Page IV-5, Soils The Forest soils are a nonrenewable resource that can be adversely affected by logging, road building, residue management, and mining It is recorded that mass wasting of soils (e g debris slide/flow/avalanche, earth slump and earth flow, soil creep) is very common and widely distributed on the Forest Both surface erosion and mass wasting of soils can be extremely destructive of aquatic ecosystems. The final document could be improved if examples of mass wasting were presented in photograph and narrative form One example that might be considered is the Goldbasin Slide area east of Verlot. This eroded area provides an impressive scene of just how destructive a series of mass wasting events can be to the local environment Eroded materials from the slide continue to enter the South Fork of the Stillaguamish River.

The following is a list of information gaps in the DEIS and other planning documents with respect to management of the soil resource on the Forest.

1 It would be helpful for our analysis of the planning efforts if a discussion on the methodology used for determining erosion and sedimentation rates was included in the final EIS Moreover, drawbacks and limitations of the methodology should also be discussed.

2. Tables IV-1 and IV-6 present soil erosion and sedimentation in tons of material over time. Such a statement should be made with supporting rationale and documentation as appropriate

3. There is no discussion on the appropriateness of using the Foreplan model to manipulate raw data from the erosion and sedimentation study. Such a discussion should be included in detail in the final EIS

4 There are some apparent inconsistencies within Table IV-1 which need to be explained or corrected. For example, the background tons of soil per year are higher for Alternative G than they are for Alternative C, and yet this is reversed under new tons of soil per year. In addition the ratio of background tons of soil per year to new tons of soil per year appears to be higher for Alternative G than for the other alternatives. Further, it could be expected that the background tons of soil per year should be roughly the same for all of the alternatives, but the table shows wide variations in soil loss between the alternatives

Page IV-17 It is stated that "Chemicals used in forestry are relatively immobile in the soil." This statement needs clarification and should be expanded upon. For example, the herbicide "tordon" was identified as being used in forestry practices in a recent Forest Service document entitled "Draft Environmental Impact Statement for Managing Competing and Unwanted Vegetation." The Environmental Protection Agency claims this chemical is mobile in soil and could therefore move to the groundwater and surface waters

Page IV-23. There is need for a table showing the amount of land that has unstable soil conditions, in the land base covered by Management Area 17 in relation to the various alternatives. Presentation of such a table would improve our ability to assess the effects of a large allowable timber harvest of important fish and wildlife resources.

Page IV-26 It is stated that "None of the alternatives are anticipated to result in reductions in fish populations . " Yet on page IV-25, it is stated "The alternatives that harvest the most timber and construct the most roads will have the greatest impact on the watersheds: Alternatives NC, A, D, H- Departure, B, and H. This is particularly true on the Class III watersheds." This type of apparently contradictory information should be clarified or eliminated in the final documents.

Page IV-30 It is indicated that, during the first planning decade, "all timber harvest activities in all alternatives would occur almost exclusively in old growth stands" Consequently, animal communities of the old growth ecosystem will, early on, be subject to some of the heaviest environmental impacts of the entire 50 year planning horizon. In regard to this and the potential for mitigation, we have noted the statement on page IV-58 that "Old growth habitat lost to timber harvesting cannot be mitigated."

A low priority should be placed on the harvest of well developed old-growth stands Consideration should be given to substituting the harvest of relatively young trees (40-50 years old) for as large a portion as possible of such old-growth stands which are slated for harvest.

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Page IV-60 through IV-68 This section can be strengthened by rectifying the following potential problem areas This should be done with the assistance of state and federal fishery agencies and affected Indian tribes (the Service has Federal Trust responsibilities for fish and wildlife resources used by the tribes).

1. The document contains no quantified statements that show relationships between environmental impacts (from forest activities) and fish production.

2. The cumulative impact assessment for fish is inadequate For example, adverse impacts from forest activities on private and Federal lands are not presented in a cumulative fashion However, there was a good presentation of cumulative impacts on water. Some of the concepts and discussion in the water section could be used in a discussion on cumulative impacts for fish

3. An assertion is made (page IV-60) "There will be no decrease in fish production from the current level in any alternative " This needs to be scrutinized by the Forest.

   There are a number of problems connected with the assertion First, it stems from the belief that "mitigation" technology can be used to fully fset the adverse impacts of logging and associated activities on fish habitat so that current levels of fish production remain stable This belief is not shared by State fishery agencies nor the Fish and Wildlife Service The odds for success of producing good anadromous and resident salmonid populations, by use of the technology, is far less than with the simple alternative of fully protecting aquatic/riparian habitat. Second, the planning documents indicate that "The pounds of anadromous fish available for commercial harvest is a direct function of the investment level for fish" (see page 38 of Public Summary). In other words it is claimed that the higher the the spending level for "mitigation" the higher the level of salmon production. This claim is questionable, because it is tied to the unproven "mitigation" technology. Furthermore, beyond a certain point the amount of money spent on mitigation measures may not have any affect on fish production. Third, if resident fish are included the validity of the assertion becomes increasingly suspect This is because one of the proposed mitigation methods is to open up resident trout waters to invasion by anadromous fish thereby subjecting both groups to intensified inter-species competition and predation.

   There may be an additional problem connected with the assertion. In Table IV-18, the lump sum figures of "pounds of anadromous fish" for Alternatives B, D, Alternative H, H-Departure, C, and G are identical to each other. If the table is in error it should be corrected

4. The fishery values of Table IV-18 are based in part on a mitigation program of generalized tree/snag leave guidelines for the riparian zone. These guidelines may not be adequate to provide for optimally functioning aquatic ecosystems. For instance the minimum management requirements for Class I, II, and deeply incised Class III streams are very generalized and subject to a wide range of interpretation. This may result in these classes of streams not receiving enough large woody debris on a timely basis It is not clear how lightly incised Class III streams/riparian areas will be managed for the recruitment of large woody debris Additionally, there is no provision for the recruitment of large woody debris to Class IV streams. Recent studies indicate that these smaller type streams, in an unlogged condition, contain more large woody debris than do larger streams.

On page IV-63, under Effects of Mining, Energy Development on Fish, not all effects of suction dredging are harmful to fisheries. Suction dredging can increase the number of spawning beds within the stream by the redistribution of sediments.

Page IV-128 It appears that the document does not address how a reduction of 35 percent in emissions of TSP will be achieved by 1990. This mandate should be specifically addressed in the DEIS.

Table II-11

Mineral Evaluation Report

Alternative A

Access Category	Energy Low	Energy Mod	Energy High	Energy Very High	Access Category	Non-Energy Low	Non-Energy Mod	Non-Energy High	Non-Energy Very High
A	101,081	230 311	0	0	A	0	193,812	66,868	70,612
B	12,765	172,068	16,648	2 395	B	0	42,167	6,927	154,782
C	972	104 542	1,858	722	C	0	50,639	10,238	47,217
D	58,218	875,119	357,782	213,140	D	0	856,082	340,999	307,178

Alternative B

Access Category	Energy Low	Energy Mod	Energy High	Energy Very High	Access Category	Non-Energy Low	Non-Energy Mod	Non-Energy High	Non-Energy Very High
A	101,081	76,532	0	0	A	0	177,613	0	0
B	2,471	116,094	19,317	3,369	B	0	35,877	10,914	94,460
C	29,666	467,929	220,241	115,770	C	0	474,729	191,967	166,910
D	39,818	721,428	136,762	97,043	D	0	455,906	221,941	317,204

Alternative C

Access Category	Energy Low	Energy Mod	Energy High	Energy Very High	Access Category	Non-Energy Low	Non-Energy Mod	Non-Energy High	Non-Energy Very High
A	128,066	481,154	329,998	165,242	A	0	704,850	267,623	131,987
B	3,835	105,873	223	110 690	B	0	27,091	7,832	75,767
C	10,889	169,777	8,569	11,263	C	0	95,162	29,873	75,463
D	30,246	625,104	37,530	38 993	D	0	315,597	119,704	296,572

Alternative D

Access Category	Energy Low	Energy Mod	Energy High	Energy Very High	Access Category	Non-Energy Low	Non-Energy Mod	Non-Energy High	Non-Energy Very High
A	127,970	402,124	201,920	125,976	A	0	564,337	193,234	100,399
B	4,072	207,232	44,843	14 872	B	0	83,286	49,076	138,657
C	22,309	302,479	50 680	24,115	C	0	190,031	68,515	141,037
D	18 685	470 073	78,877	51 294	D	0	305,026	114 207	199,696

Table II - 11 cont.

Alternative F

Access Category	Energy Low	Energy Mod	Energy High	Energy Very High	Access Category	Non-Energy Low	Non-Energy Mod	Non-Energy High	Non-Energy Very High
A	112,520	326 993	40,857	125,976	A	0	433,889	98,997	73,460
B	5,277	112,218	29,458	12,822	B	0	46,025	23,517	90,733
C	38,575	560 449	151 230	36,396	C	0	370,867	180,352	235,431
D	16,664	405,538	123,090	49,458	D	0	291,919	122,166	180,665

Alternative G

Access Category	Energy Low	Energy Mod	Energy High	Energy Very High	Access Category	Non-Energy Low	Non-Energy Mod	Non-Energy High	Non-Energy Very High
A	101 081	85,511	40,857	0	A	0	225,309	2,140	0
B	3,004	139,404	0	0	B	0	18,517	12,730	111,161
C	33,572	459 851	185,380	97,431	C	0	446,052	178,442	154,740
D	35,379	697,507	147,083	118,461	D	0	454,037	231,720	312,673

Alternative H

Access Category	Energy Low	Energy Mod	Energy High	Energy Very High	Access Category	Non-Energy Low	Non-Energy Mod	Non-Energy High	Non-Energy Very High
A	101,081	152,261	12 907	0	A	0	126,769	68,868	70,612
B	95	185,669	13,068	0	B	0	42,368	63,272	93,192
C	27,092	466,101	226,368	132,792	C	0	503,529	197,358	151,666
D	44,768	566,754	135,220	83,345	D	0	397,530	154,971	277,586

Alternative I

Access Category	Energy Low	Energy Mod	Energy High	Energy Very High	Access Category	Non-Energy Low	Non-Energy Mod	Non-Energy High	Non-Energy Very High
A	128,405	809,421	330,757	168,615	A	0	848,419	329,759	259,020
B	1,750	66,933	636	943	B	0	6,136	1,462	62,664
C	9,885	116,556	3,679	9,090	C	0	80,952	11,709	46,549
D	32,996	383,998	41,248	37,609	D	0	207,193	82,102	211,556

Alternative K

Access Category	Energy Low	Energy Mod	Energy High	Energy Very High	Access Category	Non-Energy Low	Non-Energy Mod	Non-Energy High	Non-Energy Very High
A	118,629	355,544	32,039	0	A	0	304,971	106,567	94,674
B	1,561	91 450	1,966	3,225	B	0	21,094	8,748	65,360
C	38,655	506,842	170,956	119,536	C	0	437,432	176,320	222,237
D	14 191	428,072	171 359	93,496	D	0	319 203	133,397	194,518

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Table J-3 *
EVALUATION CRITERIA FOR NONENERGY MINERALS

CATEGORY	I	II	III	IV	V
1. Potential for Substantial Development/ Production Within Ten Years	High	Moderately high	Moderate	Low	Very low based on current knowledge.
2 Current Activity Level	Production or development in progress or pending investment decision	Comprehensive exploration, development likely. May include some small scale production.	Exploration programs which may include sampling, geochemical and geophysical surveys, geologic mapping, reconnaissance drilling. May include some hobby-size producers.	Sporadic exploration with occasional isolated interest progress by companies or prospectors.	Occasional interest by prospectors
3 Land Position	Long-term maintenance of claims by established mineral companies/ individuals.	Long-term.	Intermittent by established mineral companies/individuals, long-term by prospectors.	Short-term by established companies/ individuals. Intermittent by prospectors.	Sporadic
4 Geology	Known and favorable for development of significant ore deposits.	Known and considered favorable from comparison with other producing districts.	Not well known, but appears to have favorable characteristics.	Not well known, some favorable characteristics.	Either unknown or unfavorable
5 Reserve/Resource	Ore reserves established Will sustain significant production.	Presence of, or strong potential for, substantial resources. May include small reserves.	Potential for large resource is unknown. Small resources, possibly some very small pockets of reserves.	Some mineral occurrences, but not enough information to establish resources.	Unknown

* Includes all areas not in other categories.

Attachment 4

J-10

Category A

Withdrawn or proposed for withdrawal from mineral entry.

1. Wilderness areas.
2. Wild and scenic rivers
3. Sites for facilities
4. Historic and cultural sites
5. Developed recreation sites.

Category B

Statutes or executive orders require specific protection or mitigation measures.

1. Proposed wilderness areas.
2. Congressionally mandated wilderness study areas.
3. RARE II Further Planning areas.
4. T & E Species.
5. Roadless (Type I) dispersed recreation areas.
6. Culturally significant areas.

Category C

Special conditions exist on lands which require special lease stipulations or plan of operation conditions.

1. Big game winter range.
2. Elk calving area.
3. Riparian area.

Category D

Standard lease stipulations and plan of operation conditions apply.

1. Timber production areas.
2. Existing mineral processing areas.

Attachment 5

9

U.S. Department of Transportation
Federal Highway Administration

Region 10
Alaska Idaho
Oregon Washington

222 S W Morrison Street
Portland Oregon 97204

January 12, 1988

In Reply Refer to:
HPP-010.2

Mr Lyle E. Jack, Planning Staff Officer
Mt Baker-Snoqualmie National Forests
1022 First Avenue
Seattle, Washington 98104

Dear Mr. Jack.

Federal Highway Administration, Region 10, has reviewed the draft environmental impact statement for the Mt Baker-Snoqualmie National Forests Land and Resource Management Plan and offers the following comments for your consideration

U S Highway Routes 20, 530, 2, 410, and I-90, which are on the Federal-aid highway system, are within Mt. Baker-Snoqualmie National Forests Quite often such highways in National Forest areas do not have defined right-of-way To make highway improvements with FHWA funds on the above route, or any Forest Highway System routes which may use any lands designated as recreation, requires a determination by FHWA that there is no other feasible and prudent alternative than the selected proposal Without an adequately defined right-of-way, this has, in similar situations, caused considerable delay in project implementation and increased taxpayer expense

We suggest the final EIS acknowledge that when right-of-way for Federal-aid highway routes or forest highway routes are not defined, a management effort will be made to work out such details with the government officials having operating responsibilities for that route

Ideally, in any area designated recreation by you, the designated right-of-way should be of sufficient width to allow bridge replacements, roadway widening, or elimination of safety hazards such as bad curves Roadway improvements within a defined corridor designated for highway use do not require a 4(f) determination NEPA action will apply to all highway improvements

Sincerely,

E J. Valach, Director
Office of Planning and
Program Development

J-616

1410

Washington State Department of Transportation
Transportation Building KF 01
Olympia, Washington 98504 5201
(206) 753 6005

Duane Berentson
Secretary of Transportation

February 10, 1988

Mt Baker-Snoqualmie National Forest
Attention Forest Plan
1022 First Avenue
Seattle, WA 98104

J-617

Draft Envir Impact Statement
Proposed Land and Resource
Management Plan
Mt Baker-Snoq Nat Forest

We have reviewed the Draft Environmental Impact Statement prepared by the Forest Service entitled Proposed Land and Resource Management Plan Mt Baker-Snoqualmie National Forest, and support the selection of Alternative H and H-Departure as the preferred alternative

Alternative H and H-Departure will do the most to protect the scenic corridors of all state highways located within the Mt Baker-Snoqualmie National Forest They and Alternative C are the only alternatives that protect both the foreground and middleground of the highway viewsheds All others protect foreground only, or limit protection to the Mather Memorial Parkway (SR 410) We believe the visual quality of all state highways is important and should be given the upmost protection A high degree of visual quality not only provides pleasure for the highway user, but enhances safety of the facility

Thank you for the opportunity to review this document

Very truly yours,

Robert L Berger L A
Chief Landscape Architect
Operations & Maintenance

RLB
LHR mac

258

PUGET SOUND AIR POLLUTION CONTROL AGENCY

200 West Mercer Street, Room 205
Seattle Washington 98119-3958
Telephone (206) 344 7330
Facsimile (206) 340 4769

March 21, 1988

Forest Planning Team
Mt Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, Washington 98104

Dear Forest Planning Team

Mt Baker-Snoqualmie National Forest
Proposed Forest Management Plan DEIS

Thank you for the opportunity to review the Draft Environmental Impact Statement for the Mt Baker-Snoqualmie National Forest Proposed Land and Resources Management Plan

Our concern is with the quality of the air in King Pierce, Kitsap and Snohomish counties Prescribed burning is a significant source of air contaminants in this region Therefore, all long range plans to reduce smoke from prescribed burns are supported by this Agency

We support your aggressive program to promote the utilization of wood residue We are pleased to see fibre usage and fuel for power production as high priorities for utilization We would like to see the provision of firewood for home heating placed on low priority or discontinued as residential wood burning has been responsible for degradation of the air quality in many urban areas

We are pleased to see plans for a continued decrease in burning as this will provide for better air quality and increased visibility in the Class I areas Are there also plans to reduce the smoke from the smoldering phase of fires since more smoke is produced during this combustion stage than is produced during the flaming stage?

We noticed some typographical errors on pages III-147 and IV-127, and a few misleading statements which are marked on the enclosed copies from your report

Thank you again for the opportunity to review your proposed plan

Very truly yours,

K Boyd Knechtel
Acting Air Pollution Control Officer

Naydene Maykut

By Naydene N Maykut
Air Toxics Coordinator

cpm
Enclosure

f-618

SERVING:
KING COUNTY
200 West Mercer St
Room 205
Seattle, 98119-3958
(206) 344-7330
KITSAP COUNTY
Dial Operator for TDD
Free Number Zenith 8365
Bainbridge Island Residents
Dial 344-7330
PIERCE COUNTY
901 Tacoma Avenue South
213 Hess Building
Tacoma, 98402 2101
(206) 593-2225
SNOHOMISH COUNTY
1-800-562-3565

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Gene Lobe Mayor Bremerton
Linda Tanz, Member at Large
William B. Moore Mayor Everett
A.R. Dammkoehler Air Pollution Control Officer

258 Attachment

Air and Noise - The Direct Effects of Each Alternative

General - Air. The air quality over the National Forest is affected by the combination of the pollutants generated off the Forest and the gaseous emissions and particulates generated by management practices and activities on the Forest. The extent that air quality will be affected varies with the rate of urban and industrial development ~~downwind~~ of the Forest and the mixes of practices planned in the various alternatives proposed for the Forest.

upwind (if referring to effects of outside sources on the forest)

Procedures outlined in the Federal Clean Air Act insure Federal land manager involvement in developing control strategies for polluting industries located off the Forest that may affect the air quality related values of the Forest.

While nearly all management activities have some impact on air quality, most are not measurable or even noticeable under the extent and duration of the activity.

Of the principle regulated pollutants identified in the Federal Clean Air Act, only carbon monoxide and suspended particulates are generated by the proposed management activities in measurable quantities. These are discussed as follows.

Implementation of any alternative will produce carbon monoxide from those activities that involve the use of engines. Normally the scattered locations of where most of these activities take place and the normal air movement in the mountainous terrain of the Forest prevent concentration buildups. There will be instances where activities, concentrated in small areas, do produce measurable levels of carbon monoxide. Probably this results from activities not directly related to the management activities of the Forest such as the use of the major highway corridors through the Forest.

State and local control strategies, such as auto emission checks, for this pollutant are expected to keep the concentrations well within the State and federal standards. This is based on an evaluation of traffic conditions of Interstate Highway 90 which has the highest traffic concentration on the Forest, and therefore the highest levels of carbon monoxide.

Carbon monoxide levels at the I-90 corridor are not known. However, it is assumed that traffic volumes through the I-90 corridor are less than at Northgate Shopping Center (located approximately 7 miles north of downtown Seattle) along Interstate Highway 5, where carbon monoxide sampling is taken. Data at that location for 1986 (Puget Sound Air Pollution Control Agency) shows the highest 8 hour average as 11 ppm and the highest 1 hour average as 15 ppm. This is within the State and federal standards of 9 and 35 For comparison, the location at Northgate has greater traffic volumes than I-90 and also includes the urban pollution which the I-90 corridor does not have.

General - Noise. Noise on the Forest occurs at various intensities and is transient in nature. It is generated to some extent by all management activities, vehicles, aircraft, people, and some by natural causes.

There is little objective data relative to noise levels at various locations on the Forest Since there are no new activities or management practices being proposed in any of the alternatives, there will not be any new sources of noise

within the Forest. Shifts in density and location of noise emitting activities will occur within the range of alternatives.

Noise generated by cars, aircraft, and people will likely be similar in all alternatives except Alternatives C and G, where noise levels on the Forest are expected to decline. Noise generated by heavy equipment associated with timber harvest, log transport, and road construction will likely be the greatest in those alternatives that harvest the most timber and build the most roads.

Effects of timber Harvest on Air. Broadcast burning of logging residue will generate approximately 0 4 tons of TSP per acre burned. This will decrease over time, as the amount of not utilized material decreases. By the year 1995, this rate of emission may be down to 0.3 tons per acre burned. Currently, approximately 35 percent of the harvested acres are broadcast burned, the amount is expected to decline to about 20 percent of the harvested areas by 1995.

Another source of TSP from prescribed burning activities is from disposal of piled cull material from timber harvest activities. This practice currently produces approximately 1.5 tons of TSP per acre, when the cull material is yarded to the landing. Utilization for pulp, firewood, etc. reduces this to approximately 0.7 tons of TSP per acre yarded. Current improvements in utilization are expected to continue into the future. Emission rates are expected to be cut in half over the next 10 years, then level off for the next few decades, since a certain amount of the cull material will always remain. Disposal of such low volumes may not be necessary, thus eliminating this source of TSP emissions by 1995.

J-619

As a means of dealing with the regional haze issue in Western Washington, the State Implementation Plan requires that the State achieve a reduction of 35 percent in emissions of Total Suspended Particulates from prescribed burning by 1990. The base line for this reduction was the historical generation of TSP for the period 1976-1979. For the Puget Sound area, this amounted to 155,900 tons of suspended particulates per year. (Final EIS of Pacific Northwest Regional Guide - Table 4-8.) Of that total, 57,000 tons were attributable to the prescribed burning activities on the Mt. Baker-Snoqualmie.

Suspended particulates from prescribed burning have been generated for years under past management practices. Data from current monitoring by the Puget Sound Air Pollution Agency at the Tolt River Dam, on the western edge of the Forest, indicates that the existing levels of suspended particulates are well below the State and Local standards for this pollutant. Data from 1984 indicates an annual geometric mean of 9, compared to a standard of 60 micrograms per cubic meter of air. The same data indicates 24 hour average readings as high as 40 micrograms per meter compared to the 24 hour standard of 150 micrograms per cubic meter

Implementation of any alternative will produce some suspended particulates from prescribed burning. Any of the alternatives as proposed will fall well below the State and local standards.* Table IV-38 displays the amount of suspended particulate expected to be generated from prescribed burning activities for each alternative.

* May be somewhat misleading Prescribed burning will probably not cause exceedances of the standards at established monitoring sites However, forestly burning probably will cause concentrations in excess of the standards near actual fires

AIR

Along with soil and water, air is an essential component of the Forest ecosystem (Houston 1979). Air is also an aesthetic resource, the visual experience has value to the forest visitor and to the people who reside in the area (Washington State Department of Ecology 1985) Both nature and humans can cause changes in air quality and visibility. Natural conditions that can degrade visibility include windblown dust, fog, and smoke from natural wildfires. Pollutants may or may not affect visibility; oxides of nitrogen, hydrocarbons, sulfur dioxide, and particulate matter can all impair visibility. What begins as an air pollutant often ends up in the soil or water (Houston 1979).

The air quality in the Forest area is generally good Pollution levels measured just west of the Forest boundary are - with the exception of ozone - well within State and Federal ambient air quality standards. There is no monitoring currently done inside the Forest boundary.

Traffic on Interstate 90 is the heaviest of any road on the Forest. Though not measured within the Forest boundary, it is felt the current level of carbon monoxide is considerably below the State and Federal Standards for this pollutant.

Oxidants, particularly ozone, are found in the Puget Sound region at levels exceeding the National and State standards. The highest concentrations of ozone normally occur during the summer months; temperature inversions and light winds force the pollutants up valley from the Seattle-Tacoma area. As a result, the highest levels of ozone normally occur five to fifteen miles east of the urban area and extend to within ten miles of the forest boundary. To date, there is no evidence that air quality values on the Forest are being effected by ozone; no impacts on vegetation growth, soils, or fish and wildlife have been observed.

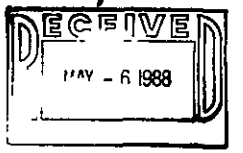
micrograms

Suspended particulate levels are monitored at a site near the Tolt Reservoir on the western boundary of the Forest. The 1984 particulate level at the Tolt station showed an annual geometric mean of 9 ~~microns~~ micrograms per cubic meter of air (Puget Sound Air Pollution Agency), well below the State standard of 60 micrograms ~~microns~~/cubic meter. Levels recorded closer to Seattle are in the 20 to 40 range. Activities on National Forest land that can contribute to suspended particulates are burning vegetation, logging activities, road construction, campfires, especially concentrated in campgrounds, and vehicular traffic on gravel surfaced roads. Most significant in generating suspended particulates are use of gravel roads and burning of vegetation, especially prescribed burning All of these various activities usually generate very low levels of particulates or are of short duration. *

To help deal with regional haze in Western Washington, the State Department of Ecology (in their 1985 Revision to the Implementation Plan for Visibility Protection) has set a required 35 percent reduction in emissions of total suspended particulates from prescribed burning by 1990. The base line for this reduction was calculated from the historical average for the period 1976-1979. The entire Puget Sound area averaged 155,900 tons of suspended particulates per year, 57,000 tons (or 37 percent) were attributable to the prescribed burning activities on the Mt. Baker-Snoqualmie National Forest.

* Prescribed burning can cause very high levels of particulates

11900



King County Council
Lois North District Four

May 4, 1988

Doug MacWilliams, Forest Supervisor
Mt Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, Washington 98104

Dear Mr MacWilliams

The Mt Baker-Snoqualmie National Forest is a great asset to King County and the region The draft forest plan will determine its management for years to come, affecting very directly nearly all of our residents who use the forest for recreation, education, inspiration and employment

We are particularly concerned at the rapid rate that the old-growth forests are being logged This complex ecosystem is critical habitat for numerous species of wildlife, some of which have been listed as endangered by the Washington Department of Wildlife These forests are important for scientific study and education and are also a major attraction for our tourism and recreation industry Unlike timber which is a renewable resource, old-growth forests were millenia in the making and are irreplaceable Since most of the lower elevation forests have been cut, the remainder is even more valuable

The roadless areas in the forest are an integral part of the open space and recreation plans we have made for the county They also are locations for most of the large old-growth forests Only in the Skykomish Ranger District is the proposed plan adequate in retaining these lands in an undeveloped condition The preferred alternative should be modified to protect more of these roadless areas, especially in the lower elevations

Fish are yet another resource that play such a large part in both the recreational and economic lives of our citizens Past logging and roadbuilding were major factors in the decline of salmon and steelhead Even with careful design and new techniques, some sedimentation occurs We are concerned that constructing hundreds of miles of new road in the next decade as proposed in the draft plan will exacerbate the situation The best way to preserve the water quality and the fish is to protect the watershed, rather than attempt to mitigate the damage caused by development

Protection of the rivers in a natural, free-flowing state is one critical component of a good fisheries management plan It has the added benefit of protecting recreation opportunities as well Your recommended list for inclusion in the

J-620

402 King County Courthouse Seattle Washington 98104 (206) 296-1004

recycled paper

national Wild and Scenic Rivers System should be expanded to include rivers such as the Stillaguamish and White Chuck The historic, ecological, recreational and scenic values of the Pratt River in eastern King County make it an outstanding candidate As one of the lowest "wild" rivers in the forest and due to its proximity to our urban centers, it has tremendous potential for year-round hiking and other types of back-country recreation

These recreational opportunities are so important to this county With a burgeoning population, a secluded forest trail or campsite is increasingly hard to find We have been distressed by the loss of trails and campgrounds in the forest over the past few years The Trails 2000 proposal which would increase the trail mileage by 40% is a fine idea If carefully laid out, such new trails could connect with the county trails we are building for a truly marvelous system

There was little recognition in the Draft Environmental Impact Statement of the historic importance of the Naches Pass wagon trail in the southeast corner of the county As the first route over the Cascades for the Longmire Party in 1853, it (and the intersecting Pacific Crest National Scenic Trail) should be spared any more degradation from crisscrossing logging roads and clearcuts

The scenic and recreational aspects of our "backyard" forest are also a major attraction to new businesses locating in our county

While the timber industry has gone through major structural changes over the past few years, it is still an important part of our economy and our rural communities However, we feel that a very large portion of the remaining old-growth forests can be preserved while maintaining healthy communities Their concerns need to be addressed We are actively pursuing economic diversity strategies and attempting to stem the conversion of prime timberlands in private ownership Increasing our exports of finished products rather than raw logs will also help the employment situation These initiatives should allow us to do a better job of preserving our great heritage of ancient forests that are synonymous with the Pacific Northwest

While the preferred alternative (Alternative H) is an improvement over existing, outdated plans, we feel additional attention should be paid to the issues raised in this letter We urge you to be conservative with these great resources, erring when in doubt on the side of preservation There are many aspects of Alternative G that better meet these goals while balancing competing uses We urge you to carefully consider it and adopt many of its provisions in the final plan

Thank you for this opportunity to comment on your plan

Sincerely,

Lois North
King County Council
District 4

Cynthia Sullivan
King County Council
District 2

Audrey Gräger
King County Council
District 1

LN/CS/AG rn

10,668

Phone 676-6717
384-1403
SCAN 644-6717

Whatcom County
Courthouse Bellingham, Washington 98225

COUNTY EXECUTIVE
SHIRLEY VAN ZANTEN

April 28, 1988

Mt. Baker-Snoqualmie National Forest
Attention: Forest Plan
1022 First Avenue
Seattle, WA 98104

RE: **Proposed Management Plan - Mt. Baker-Snoqualmie National Forest**

Dear Sir or Madam:

There are three areas of general concern to Whatcom County: **forest resource production and timber harvest; recreation; and environmental quality.** Although these areas are discussed individually, they overlap each other and are interconnected. Policy decisions affecting one area will affect the others. Further, Whatcom County feels that forest management policies should generally emphasize long-term economic benefits balanced with preservation of environmental productivity and stability as opposed to shorter term "windfall" economies which only postpone the inevitable real costs to future generations of citizens.

FOREST RESOURCES: Previous documents and discussions with Forest Service personnel have indicated that the Forest Service manages timber resources on a sustained yield basis, yet we found no direct reference to the sustained yield concept in any of the Alternative Plans or the DEIS. We feel that sustained yield management is critical to the objective of long term economic stability in the forest products industry. Because the economics of the wood products industry is complex, it is difficult to get an accurate picture of the impacts of the various alternatives on this industry in Whatcom County. It would appear that the 11% average increase in timber cutting in the Mt. Baker district over the next decade actually increases jobs in the area. However, there is a concern related to the proposed locations for logging over the next 10 years. Appendix A of the Preferred Plan indicates a considerable amount of logging will take place in and around the North Fork of the Nooksack and the Mount Baker Highway. The North Fork Nooksack Valley still has large stands of beautiful lowland old growth forest which can be viewed from the Mt. Baker Highway. Clearcut logging under the Forest Service's plan will eventually leave only a narrow strip of big trees along the highway to provide "scenic quality." This could have negative impacts on both environmental integrity and the quality of recreational experience provided to county visitors. There is a need to balance recreation jobs with wood products jobs.

J-621

RECREATION: The Forest Service has acknowledged a continuing increase in demand for back country hiking and horseback recreation. The Preferred Plan offers only 68 miles of new trail and 120 miles of reconstructed trails in the next decade. This is inadequate to replace the trails that have been lost to timber harvest activities and lack of maintenance and will result in a net decrease in trail mileage. For Wilderness areas, the Plan proposes building 21 miles of new trails in the first decade. The contrast between increasing demand for such activities and a shrinking trail base leads Whatcom County to the conclusion that a more aggressive trails program should be made part of the forest plan.

ENVIRONMENTAL QUALITY: The preferred plan recommends logging roads (and ultimately, logging) in both the North Fork Valley and the Bellingham Municipal Watershed in the upper Middle Nooksack Valley. This alternative also has designated much of the Middle Fork Watershed as being "Tentatively Suitable for Timber Production". These are areas of particular importance to Whatcom County in terms of maintaining water quality for domestic supplies and preserving important wildlife habitats. If logging is to take place in these watersheds, extreme care should be exercised. Also, both the Middle Fork and the South Fork of the Nooksack should be considered for Wild and Scenic River status. The inclusion of these two rivers will help protect the scenic beauty of the Nooksack valleys and ensure water quality essential to the healthy native fish runs which are both recreationally and commercially important to the region.

Commenting on the document itself: although it was thoroughly researched and detailed, we found it to be somewhat cumbersome and difficult to read. Also, descriptions of the alternatives by the Ranger District would have been much more informative for the purpose of addressing the county's concerns. We do want to emphasize that the Forest Service staff, both at the Mt. Baker District office and the Mt. Baker Snoqualmie National Forest office in Seattle, have been extremely cooperative and helpful in providing information and explaining the intricacies of the Plan.

In summary, we are supportive of Alternative H providing that modifications are made to address our concerns regarding timber harvest, recreation and environmental quality.

Thank you for this opportunity to comment.

Sincerely,

Shirley Van Zanten
County Executive

SZ/palj

11,260

Phone 592 5161 — 733 2900

Whatcom County

3373 Mount Baker Highway Bellingham Washington 98226

BAKER RANGER DISTRICT

4 '88

CR
TEA
ENG
SILV
RES
SAW
AD

PARK AND RECREATION BOARD

April 29, 1988

TO. Mount Baker-Snoqualmie National Forest Offices

FROM: Roger A. DeSpain, Director

SUBJECT: Comments on Proposed Forest Plan

General Comments

The formulation of the Forest Plan is a welcome effort. The actions of the U.S. Forest Service have a very direct impact on residents of Whatcom County. Our comments are from the perspective of a local agency which has observed recreation use of the Forest over the years. Our input also is based on the fact that we, as a Park and Recreation Department, use the Forest for programs. In the winter months we teach cross country skiing on Forest Service lands. In the spring, summer and fall, we utilize trails for day hiking and backpacking. In addition we have an overnight camping facility (Silver Lake Park) within close proximity of Forest boundaries and therefore potential hiking and especially horse trail linkages are of interest to us. And finally, we have wrestled over the years with the issue of ORV recreation and have worked with U.S.F.S. staff at the District and Regional levels to attempt to deal with this controversial usage of public lands.

I feel that it is not appropriate for us to comment on the merits of one proposed alternative compared to another other than to say that Alternative H appears to be an excellent effort to maintain the U.S.F.S. basic policy of multiple use of Forest Lands. In light of the growing resource demands, compromises must be made by all concerned.

We are perhaps more interested in the effects adoption of a Forest Plan will have in our day to day relationships with Forest Service staff with regard to our access and usage of trails and areas for recreation programming. For instance, I could see possible future changes in permit policies and fees. I would ask that you consider the possibility of organized user input as implementation

J-622

PARK AND RECREATION BOARD
Robert M Tull Chairman Leslie B Clark Vice Chairman William J Dittrich Robert H Klein Brian P Lynch David M Martin Jon G Soine

ADMINISTRATIVE STAFF
Roger A. DeSpain Director Gary W Chadwick Deputy Director

policies and guidelines are developed once a Plan is selected and adopted. We would be very willing to assist you in organizing local workshops to provide Whatcom County input for new recreation guidelines.

Please keep in mind that the following more specific comments are based on our own particular bias and observations. These have developed over the years due to certain factors:

1. Our Headquarters is on the Mount Baker Highway and we act as recreation information center. WE give people as much information as possible regarding public recreation use of U.S.F.S. lands.

2. We run an Outdoor Recreation Program which offers a variety of programs such as cross country skiing, hiking, canoeing, climbing, and general mountaineering and interpretive activities such as alpine plant hikes, goat and eagle watching, gold mine history, etc.

3. Silver Lake Park operates as an overnight base camp for many who utilize the Forest for sightseeing, hiking, and horseback riding.

4. We have been very involved over the years in local efforts to promote recreation based tourism.

Specific Comments

1. Wilderness vs. Developed Recreation

   The recreation users we deal with either through programs or visitor information are primarily interested in developed, easily accessible facilities. We do not see the wilderness recreator. That could very well be because of the nature of our department, we deal mainly with the people who are sightseeing or partaking in entry level forms of outdoor recreation such as day hiking, self contained motorized camping, etc. My guess is that the backcountry recreators are more experienced and thus have no need for information or programs we provide.

   There is no doubt in my mind that we will be facing a critical problem in future demand for recreation amenities, which are geared to more urban use. Campgrounds with electrical hookups, easy access interpretive trails (with interpretive programming) and ORV trails are all examples of recreation use which will have to be provided for in years to come.

   Unless State agencies, such as the Department of Natural Resources, State Parks, and to a lesser extent the State Wildlife Department, can expand recreation opportunities on appropriate lands adjacent or near U.S.F.S. boundaries, the Forest will be under a great deal of pressure to respond.

   I see a dichotomy in Alternative H that could be difficult to

deal with. There is a significant commitment to the concept of a scenic corridor along the Mount Baker Highway. This will, in conjunction with local tourism efforts, act as a magnet for the type of recreator who needs more developed recreation services. Alternative H does not adequately provide for this type of service.

2. Hiking Trails
From our perspective, there does seem to be an adequate supply for current and short term future use. It would appear that U.S.F.S. problems in this area are similar to our own and those of State Parks and D.N.R.--Lack of recreation dollars and staff for adequate maintenance, signing, road access, etc.

A prime example of this problem is the road to the Twin Lakes Area. Currently, 4-wheel drive rigs can negotiate the last part of the road to the lakes. Casual, less physically fit hikers are really not able to hike from the Tomyhoi trailhead up to the lakes and then hike up to, for instance Winchester Lookout. Using this example, it would also seem that there is a need for staffing to better control behavior at the lakes.

Horse Trails
We are interested in the possibility of linkage between our horse facilities at Silver Lake Park and your trail system. We have always envisioned the possibility of overnight horseback riding into the Forest and we would like to work with you in securing easements from private landowners as well as the development of an integrated trail system with camping areas designated.

ORV Trails
We have apparently exhausted our own resources in trying to establish an ORV area in the foothill mountains adjacent to Forest lands. We feel strongly that there is a need to provide adequate, well built ORV trails to assure a good recreation experience for ORVers. Our experiences with the ORVers over the last 16 years has been very positive. They recognize the need for environmental safeguards. In spite of the controversy ORV discussion creates, we hope that you can take on the ORV issue in the spirit of multiple use of the Forest. I realize that there are limits to Forest ORV use due to topography, soils, and distances as well as potential user conflict, but nonetheless am hopeful that you can be a provider.

Winter Sports
Our busiest season for our Outdoor Recreation Program is the cross country skiing months. We utilize many Forest areas including the leased area, Salmon Ridge. I realize that there are some significant topographical barriers to the development of higher elevation cross country areas, but we see a significant increasing demand for cross country facilities. I feel that an ambitious planning and implementation effort is needed to meet both current and future cross country skiing needs.

J-623

Summary
I realize that our comments are probably on a more detailed level than you are looking for at this time. I hope that by responding in this manner, it suggests possible problems and opportunities that could effect issues related to recreation in the Forest Plan. I would like to emphasize the potential value of a coordinated effort on the part of all involved in recreation development. I would be glad to provide coordination so that recreation issues in Whatcom County are dealt with as effectively as possible. Our working relationship with Forest Service staff has always been excellent. The formulation of the Forest Plan provides a good opportunity for a coordinating effort to assure appropriate and adequate recreational use of all public lands within Whatcom County

R. A. D.

RAD:lm

4842

LUMMI INDIAN BUSINESS
COUNCIL
2616 Kwina Road
Bellingham, WA 98225

April 28, 1988

Mt. Baker-Snoqualmie National Forest
ATTN Forest Planning
Seattle WA

Dear Sir,

Please find enclosed the response of the Lummi Indian tribe to the (draft) Forest Plan It is our hope that your agency will consider both the content of our response, and will take into consideration both our short term and long term recommendations We look forward to working through these recommendations with agency personnel in order to improve the plan with respect to cultural resources.

Sincerely yours,

Jewell Praying Wolf James
Coordinator
Cultural Resource Protection Comm

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After a careful review of the draft Forest Plan, the Lummi Indian tribe would like to make the following comments on the management future of Indian religious and cultural use sites, areas, and resources We would first like to commend the Mt Baker-Snoqualmie National Forest for establishing Indian Religious Use as a management issue, and for their effort in examining the nature and extent of cultural use on National Forest lands. The sensitivity of the Mt. Baker-Snoqualmie National Forest is a stark contrast, for example, to the draft Olympic National Forest EIS, where Indian Religious use is not even considered a "Planning Question."

However, despite the apparent sensitivity of the Mt Baker-Snoqualmie National Forest, we find in the Plan serious inconsistencies and oversights that lead us to question the depth of concern and understanding in the agency for Indian cultural needs and values Our concerns include

(1) a misunderstanding of the information communicated to the agency by the Lummi tribe in the Inventory of Native American Cultural Use Sites, Areas, and Resources,
(2) inconsistency between the stated goals of the agency with respect to these resources, and the actual management future of these resources in the preferred alternative,
(3) incomplete and inaccurate evaluation of the nature and extent of impacts of the preferred alternative on cultural use sites, areas, and resources,
(4) a minimalized interpretation of the American Indian Religious Freedom Act,
(5) a misunderstanding of the impacts of the preferred alternative on the tribal community,
(6) an incomplete assessment of future needs with respect to Indian Religious Use of National Forest lands, and,
(7) the competency of the agency to properly respond to the cultural and religious use values of National Forest lands.

We will discuss each of these concerns in the paragraphs that follow

(1) MISUNDERSTANDING OF THE INFORMATION

The Forest Plan states that, in order to minimalize disturbance of Indian Religious Use areas, timber harvesting will be scheduled from April to September. The Plan also mentions that the construction of roads into use areas will, in certain cases, increase access to these sites and areas These two statements reveal a misconception on the part of the agency with respect to Indian Religious Use of Forest Service lands. As mentioned repeatedly in the Inventory, these sites are used yearround Many of the sites are considered the "home" of the spirit songs at the end of the season. Disturbing the sites during this time of latency is no less an impact than disturbing them during their "season of use " This fact is also mentioned in the work of Dr Wayne Suttles with regard to the Lummi Indians. On the subject of access, harvesting activity and roads will, in any case, diminish access to the values that gives these sites their meaning In addition, the Plan states that cemetaries will receive 100% protection, although ceremonial use sites and areas will be subject to disturbance. The informants from the tribe were emphatic, with respect to each of these types of cultural resources, that disturbance was both irreversible and unacceptable The Plan makes the assumption that it is not a question of whether or not Indian Religious Use sites and areas will be disturbed, rather, it is a matter of the timing of harvesting activity and whether these activities can be "modified" at the margin.

(2) INCONSISTENCY IN THE PLAN

In the section dealing w sth Management Area Descriptions, the Plan states that the goal is to "provide access to and protection of environmental conditions and values of sites and areas important to American Indians for religious and cultural uses." Yet, in reviewing the structure of the preferred alternative, it is abundantly clear that cultural use sites, areas, and resources will be heavily impacted. In the section dealing with the consultation process, the Plan states that where mitigation is not possible, the "value (of the site) as a religious or cultural use area will be reduced or lost." The Plan acknowledges that timber harvesting will have a serious impact on cultural use, and that other uses will also have a detrimental impact. There is no indication that, in setting forth areas to be harvested, the sites and areas identified by the Lummi tribe (i.e., 1-1, 1-3, 1-9, or 1-10) will be protected during the planning period. The Plan recognizes the singular importance of cedar as a central and indispensable cultural resource, yet states that, "All alternatives result in a substantial loss of cedar within the inventoried areas over five decades." Under the section Mining, Energy Development, and Small Hydropower Development, the Plan states that the cultural use sites and areas will be protected "...if at all possible...". Under Standard and Guideline #6, the Plan states that protective measures will be taken "...wherever practical...". In sum,

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while the Plan establishes a worthy goal with respect to Indian Religious Use, it is hollowed out by the actual activities under the preferred alternative (R).

The Plan emphasizes the importance of the consultation process and Memorandums of Understanding. Yet, the consultation process has failed to respond to Lummi tribal concerns. When tribal leaders and elders state that an area must be preserved, they are told that, at best, the forest activity can be adjusted "at the margin", or, the activity can be "delayed". Neither of these choices are real choices for areas with a sacred meaning In addition, the fact that the Forest Service does not meet in good faith to protect these sites, and, now, that the Forest Plan outlines the destruction of identified sites, is not likely to increase confidence in the consultation process People are not likely to either meet or to speak when their voices are not heard The consultation process has not, and can not, provide a mechanism for resolving these issues so long as the agency is strapped by restricing guidelines and policies, and so long as agency personnel are neither allowed nor encouraged to respond to the needs of tribal members.

(3) MINIMALIZED INTERPRETATION OF THE AMERICAN INDIAN RELIGIOUS FREEDOM ACT

In mentioning AIRFA, the Forest Service adopts a restrictive interpretation of the agency's responsibility. As stated in the directives of Section 2 of Public Law 95-341, the Executive Branch reported to Congress that in order to preserve Indian religious free-exercise rights "The accommodation of Native religious uses within federal land management programs must take into account their desire for these lands to remain in their natural state." This directive is not followed in the Forest Plan, althought the agency is, more than any other National Forest, aware of the nature and extent of cultural use of federal lands The Forest Plan adopts a restrictive and negative interpretation of "access". Roads do not increase access; they diminish it. The principles of purity, privacy, isolation, and permanency apply to all types of cultural uses (including harvesting of foods and ceremonial materials). To diminish these values is to deny "access" in the context of AIRFA and the First Amendment and, most importantly, in the context of the information in the Inventory. And, it should be noted, AIRFA states that protection and preservation should be construed to mean "including but not limited to access to sites, use and possession of sacred objects, and the freedom to worshop through ceremonials and traditional rites." The Forest Service, in the Plan, has narrowed the original intent of the Act, and misinterpreted the meaning of "access" in the process.

(4) MISUNDERSTANDING OF THE IMPACTS OF THE PREFERRED ALTERNATIVE

Throughout the past five years, the agency has requested of the Lummi tribe information that would assist in establishing "thresholds of disturbance " In response, the Lummi tribe submitted a management concept for cultural resources that included the management values of purity, privacy, isolation, and permanency. It is evident, from reading the Plan, that these management values were not used, or were used incorrectly, in determining the nature and extent of the impacts in selecting the preferred alternative. Any clear-cutting destroys the cultural value of the site. Road construction on or adjacent to a cultural use site will destroy most of the value of the site. The Forest Service seldom utilizes the value of permanency in its evaluation of impacts, although it is of crucial importance in maintaining the meaning and value of a cultural use site or area In virtually every area of activity the Plan acknowledges there will be significant impacts on cultural resource values In fact, these activities will destroy the primary values in the sites which give them their meaning to tribal members.

(5) MISUNDERSTANDING OF THE IMPACTS OF THE PREFERRED ALTERNATIVE ON THE TRIBAL (HUMAN) COMMUNITY.

There is a lengthy discussion of the impacts of the Plan on the Human Community. There is, however, little discussion of the impacts of these activities on the tribal social and community structure. The agency is well aware of the role traditional life plays in the tribal community The traditional life of the Lummi community is based in the beliefs and practices described in the Inventory. Any impacts on these cultural use sites or areas will directly impact these beliefs and practices and will, therefore, have a direct and dramatic impact on continuity and coherence of central social and cultural values Logging communities can adjust to a reduced harvesting schedule through a program of re-training and re-orienting the local economy. Tribal communities, however, can not be asked to "re-train" their traditions This qualitiative difference is not discussed or evaluated in the Plan

(6) INCOMPLETE ASSESSMENT OF FUTURE NEEDS

It is well known that the number of people entering the traditional Indian societies has grown over the past decade. With this increase in participation there is a need for an increase in areas which have the qualities of purity, privacy, isolation, and permanency. The Plan, as it is now written, will reduce the number of potential use areas. There is no indication that the agency attempted to determine future needs for these sites and areas In addition, the agency is aware that tribal members require material such as cedar for a range of ceremonial activities. Once again, there is no estimation in the Plan of how much will be needed by the tribal community in the future

(7) COMPETENCY OF THE AGENCY TO RESPOND TO INDIAN RELIGIOUS USE

There is a deeper issue that must be addressed in the Plan, that is, the competency of the agency to respond to the issue of Indian Religious Use of National Forest lands It is apparent that much of the meaning of the information was either misunderstood or misplaced by the agency. It is also apparent that the agency is operating under restrictive guidelines and politices that disallow any real consideration of the nature and extent of Indian Religious Use The agency makes clear in the Plan that timber management must take precedence over all other uses, either singly or in combination. It is also clear that the agency entered the planning process with a preconceived notion of what constituted "commercially available forest." A review of the harvest schedule indicates that the agency must cut, there is no sign that the process seriously considers the cumulative value of the other management activities This bias is evident throughout the Plan and mitigages against any truthful assessment of the full value and meaning of forest resources to Indian spiritual and traditional life.

There is yet another issue that must be raised with respect to the Plan To speak of "levels of impact" on cultural use sites is to indicate an insensitivity to the world-view of the tribal community. It can be assumed that, if the agency actually believed these sites were sacred, central, and indispensible to tribal life, the Plan would reflect an altogether different orientation. If the agency actually believed, as the tribal informants do, that the information in the Inventory is a truthful statement about the "sacred", the agency would not presume to talk about "levels of disturbance." If these sites were, in a "Christian sense" sacred, it is clear they would enjoy real protection. It is ironic that the Forest Plan is being issued at the very time the Bishops of the Pacific Northwest have apologized to Indian traditional leaders for acts of persecution committed by the Christian community The de-legitimization of Indian beliefs in the Plan is no less of a persecutron than were the acts of the Churches in the past. The Plan reflects a bias and a world-view altogether different from that of the tribal informants. It is evident that neither the Plan, nor the politics that guide it, reflect anything beyond the organizational culture of the agency, and serve to deny and de-legitimize the needs, values, and concerns implicit in Indian spiritual life.

In light of the oversights, inconsistencies, and limitations in the Plan, we would like to make the following recommendations for the finalization of the Plan

(1) *SITE/RESOURCE SPECIFIC*

That all forest activity be suspended within a one-mile radius (minimum) of Lummi sites 1-1, 1-3, 1-9, and 1-10 These sites will be significantly impacted under the current preferred alternative.

That, with regard to potential or actual cultural use sites and areas, the Forest Service and the tribe establish agreed upon management principles which will guide all activities in-or-around these sites and areas. *

That western redcedar be considered a "sacred object" by the agency, and that the agency adopt a formal management policy that stricly prohibits the commercial harvesting of western redcedar *

That areas which contain environmental conditions necessary for traditionl and/or religious use be set aside for traditional religious purposes and that transverse corridors be established between these areas.*

(2) PROCEDURAL

That the agency restructure the consultation process, providing local land managers more discretion to permanently set aside identified cultural use sites and areas

That the Regional and National Forest offices, in association wsth the tribes, convene an Advisory Committee to jointly evaluate the adequacy of the Forest Plan, and the planning process, with respect to Indian Religious Use.*

That the agency, in association wsth the tribes, establish a schedule of present and future needs for these sites, areas, and resources and incorporate these figures into the planning process.

That the agency undertakes a program of cross-cultural education, in association wisth the tribes, to improve understanding of the value and meaning of cultural use sites, areas, and resources.

*Recommendations that were also made by the tribes in the Inventory of Native American Cultural Use, Areas, and Resources.

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Mt. Baker/Snoqualmie National Forest April 27, 1988
Attention: Forest Plan
1022 First Ave
Seattle, Wa 98104

Dear Forest Supervisor,

The Lummi Tribal Fisheries Department would like to provide the following comments on the proposed Mt. Baker/Snoqualmie Forest Plan (Plan) and Draft Environmental Impact Statement (DEIS).

The preferred alternative and the planning process are unresponsive to important fisheries issues Critical habitats and depleted stocks of fish were not identified or protected. Sensitive watersheds damaged by past practices are not given the opportunity to recover The proposed alternative would continue harvest and road building at similar levels to the past, so degradation of habitat and loss of production is likely to continue. The DEIS is misleading and does not disclose the true impacts of the proposed timber management plan. Detailed technical comments on the planning pro ess, the plan and alternatives, and the DEIS are attached

In some regards the future of the tribe is linked to the future of the forest. The forest provides many important resources utilized by the the tribe including fish, wildlife and cultural areas. We would like these resources to be wisely managed and abundant We would like to see the Forest Service restore degraded habitat and reduce impacts of the timber sale program on the fisheries resource in the future We do not think the proposed plan provides for adequate consideration of the fisheries resource, fair balancing between timber harvest and fish, good stewardship of the habitat, or even a well informed decision We see a clear need to gather more information about the condition of fish stocks and habitat to make a wise, informed and reasonable decision concerning the management of the forest for the next 15 years The Lummi Tribal Fisheries Department is willing to assist in this process if given the opportunity.

Sincerely,
Merle Jefferson
Merle Jefferson
Asst Director,
Lummi Tribal Fisheries Dept.

COMMENTS ON THE PLANNING PROCESS AND ANALYSIS

The documents lack organization and are difficult to understand-

We were disappointed with the quality of the proposed Plan and the DEIS Both the Plan and the DEIS were written in a highly disorganized and confusing manner which made them difficult to read, understand and review We would suggest rearranging and editing the documents to make them more understandable

The data used is often unreliable, inaccurate or missing-

We were also disappointed in the poor quality of the data used in the planning process In many instances the plan and DEIS were based upon data which was inaccurate, incorrect, outdated, or lacking altogether For example, information on fish production was based on outdated catch data which appears to be off one to two orders of magnitute Data from *different years was mixed up together and compared*, the price differential of various species of fish was ignored and production figures from the Mt Baker/Snoqualmie National Forest (the Forest) appear to be guesses In other cases data which was presented in impressive tables was not used in the analysis, such as the watershed existing condition class index In some cases numbers used in the analysis and presented as data where simply guesstimates without any basis in *fact, such as the increased in fish production associated* with stream enhancement In yet other instances, extremely important pieces of information are totally missing An example is the lack of information on the condition of fish habitat Overall, while the Plan appears on the surface to be based on factual data, the numbers used in the areas we are familiar were often inaccurate and unsubstantiated, rendering the analysis unreliable and flawed.

The analysis in the Plan is based on incorrect assumptions-

Given the lack of reliable data in the area of fisheries and sedimentation, the plan is based on a number of assumptions which are stated at various times in the documents but are never supported by factual evidence We believe that many of the assumptions are invalid, consequently the analysis which is based on them is flawed Some of the invalid assumptions upon which the plan and its analysis are based include.

1) Sedimentation from continued timber harvest and road construction under all alternatives will have no impact on the fisheries resource This assumption fails to recognize that serious damage has already occurred to the fisheries resource from timber harvest and roadbuilding in the past and damage is continuing despite improvements in techniques and erosion control measures The Plan admits that these activities will result in sediment production, and no evidence is presented to document that damage to fish habitat and populations will not occur or that preventive and mitigation measures have been effective or successful. Evidence from watersheds such as Canyon Creek indicates

that landslides occur even on units logged by helicopter, which is generally considered to be the most sensitive logging method The statement that riparian buffer strips would prevent sediment from reaching the stream is incorrect In Canyon Creek, for instance, when mass wasting activity has occurred on steep slopes most of the sediment from landslides has been documented to end up in the stream channels Therefore we believe this assumption is invalid.

2). Another assumption in the plan states that best management practices (BMP's) associated with the Clean Water Act will be adequate to protect fish habitat No evidence is presented to support this contention The BMP's were intended to prevent degradation of water quality, not to protect fish habitat Effectiveness of the BMP s to protect water quality is undocumented and questionable, and we believe that there is evidence that the BMP's are not adequately protecting water quality. Preventing degradation of fish habitat is different from protecting water quality, since important aspects of fish habitat such as cover and large woody debris, pool depth, substrate composition and food supply are not covered by the existing state water quality standards or BMP's A large mass wasting event such as a debris flow may cause only short term increase in water quality parameters such as turbidity, yet it may cause long term damage to the fisheries resource which may last for many years. There is also no evidence of any input from fisheries agencies or tribes in the adoption or review of the BMP's

3) It is also assumed that funding the fish habitat improvement program at mimimal levels wi) result in significant increases in fisheries production in additio to compensating for any habitat degradation which may occur No evidence is presented to support the large increases in anadromous fish production which are predicted from small investments in habitat improvement Therefore we consider these techniques unproven and believe that their production and mitigative values should be discounted until evidence their effectiveness is obtained Experience in our vicinity has shown that habitats affected by sedimentation are extremely slow to recover and that the speeding up the recovery process is difficult We think it is invalid assupmtion that unproven enhancement and mitigation measures at a low level of funding will prevent or correct all the damage that is likely to occur from the timber and road building programs, particularly at the high timber harvest rates in the preferred alternative

4) Another assumption is that fisheries production is stable and adequate. This assumption fails to recognize that fisheries production is continuing to decline due to habitat degradation from past management practices, especially due tp sedimentation from mass wasting and debris flows as in the cases of Canyon Creek and Finney Creek The difficulty of repairing damaged habitat is also seriously underestimated In many cases restoration of habitat may not be technically or financially feasible. Natural recovery times are slow and the effects of past practices may last for many decades Past damage to the fisheries resource is not acknowledged, and it is assumed that maintaining the present degraded conditions existing in many of the streams is satisfactory performance for the Plan We consider the present degraded condition of the habitat in many streams on the forest to be unacceptable and the habitat improvement program to be unproven and underfunded. Reduced fisheries production caused by past timber harvest is adversely affecting tribal income from fishing and is endangering the viability of valuable fish stocks such as the Nooksack spring chinook Funding for the watershed improvement program to reduce sediment production and speed stream recovery is inadequate for the need Therefore we consider the assumption that current production is stable and adequate to be invalid We think the Forest Service has ducked management responsibility for the condition of the fish habitat. The Plan should recognize the habitat degradation that has occurred and incorporate a plan for restoration of habitat to acceptable levels

The Plan and the planning process do not give adequate consideration to the fisheries resource

The forest plan document reflects a serious lack of interest and emphasis on the fisheries resource by the US Forest Service The condition of the fisheries resource was not even identified as an ICO despite the importance of the fisheries resource to the state an the large amount of potential habitat and production based in the Mt Baker/Snoqualmie National Forest. The lack of data available on the condition of fish habitat and the fisheries resource reinforces this perception It is unbelievable to us that the Mt. Baker/Snoqualmie National Forest plan can ignore the issue of declining fish runs and loss of habitat due to past management activity as a major issue and ICO in the plan, in spite of the concern expressed by the tribes, fisheries agencies and the public We are given the impression that the planning team is out of touch with problems related to the fisheries resource Since the fisheries resource is specifically identified in the National Forest Management Act (NFMA), we do not believe that the plan satisfies the requirements of NFMA to provide a reasonably balanced management of the resources or to protect and enhance the fisheries resource We recommend a complete revision of the fisheries analysis in the plan to address the issue of the status of declining fish runs, degraded habitat, and effects of the proposed timber harvest levels on the fishing community and tribal treaty rights

The fish production indicator used in the analysis of alternatives is inaccurate and misleading.

The fish production indicator used in the analysis of the alternatives appears to underestimate the amount and value of anadromous fish currently produced from the Forest. Given the extremely poor quality of the numbers developed for current fisheries production from the forest and used as the indicator of fisheries production under each of the alternatives it is next to impossible to determine the effect of any alternative on the fisherie. resource. The projected number of pounds of fish produced used as an indicator for each alternative is related solely to the amount of enhancement dollars. This is not logical because most fish produced in the Forest are produced from natural habitat Total fisheries production from the forest is more directly related to the productivity of the large amount of natural habitat within the forest rather than to the small amount of habitat altered each year by the small habitat improvement program In fact, the indicators project lower levels of anadromous fish production for some

alternatives with lower harvest levels and higher fish production at higher harvest levels, which is highly unlikely. In reality, the levels of funding for habitat enhancement levels are so low, and the techniques are so experiemental and unproven that it is doubtful whether the enhancement program proposed in any of the alternatives will have a significant impact on fisheries production in the national forest. The estimates for poundage of fish produced under each of the alternatives should be based upon the current natural production of fish under existing habitat conditions and the effects of each alternative on the amount and productivity of the habitat Apparently there is existing data on the amount and condition of anadromous fish habitat in the Forest however for some reason it was not presented or used in the planning process. Consequently we recommend changing the fish production indicator to reflect the effect of sedimentation and hydrologic impacts from timber harvest and roads on the productivity of fish habitat.

Inconsistent methodologies are used for various fisheries analysis in the plan-

A different methodolgy is used to determine amount of production, value of production, and the effects of the various alternatives on fisheries production. In many cases these methodologies are inconsistent and arrive at unreliable and questionable figures. We recommend standardizing these calculations to improve the figures and make the fish production figures used in the analysis compatable and realistic.

Fish production figures are inaccurate and appear to significantly underestimate value of fisheries resources produced-

Estimates of production on from forest land appear to be gross estimations based upon unsupported assumptions concerning percentages of commercial catch in Puget Sound and coastal waters. The RPA value for fish appears to be underestimated as it uses only one price for all anadromous fish species which is well below current market price for many of the species commonly produced on forest land including chinook, coho and steelhead. Catch levels for treaty harvest appears to be inaccurate and underestimated. Differences in the percentage of forest fish caught by the Treaty Indian fleet as compared to the non-treaty fleet are not explained. Smolt production figures also seem questionable, for instance in some years, the numbers of adult pinks spawning on the forest just in the Nooksack river system probably equal or exceed the prediction for the entire forest We think this analysis needs to be redone in light of the questions about the data and the assumptions upon which it is based. Our concern is that the importance of the forest for fisheries production is being seriously underestimated.

Enhancement measures underfunded and unproven, ability to increase fisheries production speculative-

As mentioned above, a great deal of value is placed on the ability of habitat improvement and restoration measures to increase fisheries production in some of the alternatives as well as replacing any production lost to habitat degradation due to the timber sale program. Since no evidnece is presented to document the effectiveness of the program and techniques, we feel it is invalid to cite the program as a mitigation measure for all future habitat degradation, particularly given the low level of funding. Neither is it honest to use the program as an indicator of fisheries production under the various alternatives.

The sedimentation analysis is not tied to effects on fisheries resources and recovery of disturbed fish habitat-

One of the major shortcomings of the Plan is the lack of any attempt to tie the effects of increased sediment from timber harvest and road construction to degradation of fish habitat and reduced fisheries production. The plan loses its credibility to us due to this failure. There is abundant evidence documenting the the damage to fish habitat from landslides which occur when unstable areas such as Canyon Creek are logged. Consequently, the failure of the plan to admit that there will be adverse effects to the fisheries resource from timber harvest and forest roads in unstable areas appears to be a whitewash and cover up. We suggest using the sediment yield calculations, with the improvements suggested below, together with the information on the existing habitat conditions and the timber sale plans, to calculate sediment yield and predict effects to fish habitat and stocks on a subwatershed basis, ie the size of Canyon Creek or the South Fork Nooksack. If the plan presented a reliable figure on subwatershed sediment yield by alternative, together with projected impacts of sediment on existing fish habitat and fish stocks, it would be much more credible. The assumption that there will be no effects to fisheries resources from sediment is unbelievable and indefensible to us, and represents a coverup of the true impacts of the timber sale program.

Refinements are needed in the sediment yield calculations

The sediment yield tables represent a good start towards identifying the potential impacts of the various alternatives. The validity of the sediment yield calculations should be tested by field checking to determine if the aerial photo analysis is identifying all the features present in the field. Aerial photo analysis often fails to identify small failures such as sidecast failures and there is some indication that such small features can represent up to 50% of the sediment production. There is also evidence that erosion from the surface of landslides over time can be equal to the initial failure volume. It needs to be determined whether this volume is being measured in the erosion plot calculations. Given these shortcominga, it is possible that sediment production is several times higher than the figures in the sediment yield calculations. We are also concerned that landslide failure rates in some parts of the forest may exceed the values determined from the sample areas. Expanding the number of sample locations or comparing with other studies or data would be a method for checking on this. Finally, sediment yield needs to be displayed by watershed rather than forest-wide to be of use in analyzing potential impacts on fisheries resources. There is also a need to separated out background sediment production from new sediment production, and to

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separate natural sediment production from sediment associated with past management activities within the background category

Mitigation measures are unproven, preventative and rehabilitive capabilities experimental and unproven-

The documents maintain that measures such as riparian zones and current road building practices would prevent sediment from reaching the stream and consequently no damage to fisheries resources would occur. Stream habitat enhancement measures are also cited as a means of mitigating for the damage that supposedly will not occur Unfortunately, the there is overwhelming evidence from the field that timber harvest and roadbuilding are causing an unacceptable level of damage to the fisheries resource. In watersheds such as Canyon Creek, Finney Creek and Deer Creek in the Mt Baker Ranger District, sediment from mass wasting and debris torrents associated with management practices has severely degraded fish habitat and is endangering stocks of fish. The damage that occurred is of such a severe magnitude that the productivity of these streams is likely to be seriously impaired for many years. While measures such as riparian management zones, better road construction techniques and stream habitat rehabilitation are undoubtably reducing the level of impact from what they were in the past, there is much evidence that degradation of the fisheries resource is still occuring as a result of timber harvest and logging roads.

Cumulative effects analysis inadequate and invalid-

The plan does not adequately address cumulative effects A watershed sensitivity ranking is provided in the DEIS however it appears to be strictly informational. There is no implementation mechanism in the plan whereby watersheds identified as sensitive are treated differently than any other area which is dedicated to timber harvest. The plan does not identify watersheds where overcutting has occurred, nor does it make any provisions for identification of watersheds where reduced cutting may be necessary to allow the recovery of stream stability and fisheries resources due to damage from past practices. We would recommend moving the sensitive watershed classification from the DEIS into the plan and incorporating the watershed sensitivity information into the rate of harvest for the lands designated for timber harvest in the sensitive watersheds. Also the percentage of basin cut per decade in the sensitve watershed condition rating sustem appears to high to prevent further degradation.

The issue of the effects of timber harvest levels on stream hydrology and channel geomorphology is not addressed in the analysis-

The analysis in the planning process did not address the effects of clearcut logging on stream hydrology and channel stability. Increases in peak flows can result from accelerated snow melt during rain-on-snow events. This can result in increased mass wasting, erosion of streambanks, changes in channel stability, and downstream flooding, all of which affect the productivity of fish habitat and the survival of eggs and fry We would suggest that the amount of timber harvest in the rain-on-snow zone under each alternative be used as an indicator of the potential for changes in hydrology and downstream flooding.

COMMENTS ON THE PROPOSED PLAN AND THE PREFERRED ALTERNATIVE

The preferred alternative is unresponsive to the needs of the fisheries resource

We do not favor the preferred alternative (H) It does not provide an adequate balance between timber harvest and fisheries production. In fact, it appears to place more emphasis on protection of scenery than it does on the protection of the fishery resource. It does not identify or provide adequate protection for sensitive streams and watersheds, and would continue heavy logging emphasis in drainages such as Canyon Creek, Finney Creek and Deer Creek which have already been serious diaturbed by past activity This would inhibit habitat recovery from past disturbance and cause addtional degradation and loss of production. The grandious goals for the fisheries resource are unlikely to be attained. There is a heavy reliance on unproven mitigation measures to prevent and control erosion and restore fisheries production. In our opinion, fish runs would continue to decline under alternative H due to sediemnt related habitat degradation deapite minimal investments in habitat rehabilitation. This would be inconsistent with the stock rebuilding and habitat improvement efforts underway such as the Nooksack spring chinook recovery effort, and in fact may contribute to the loss of viablility of some sensitive or depressed stocks of fish. Current levels of production are unacceptable. We think the plan should be more aggressive in identifying particular critical habitats which need protection and restoration. A goal of the plan should be to restore habitat on the forest to prelogging condition and productivity and prevent additonal logging impacts to critical habitats or stocks. We also have a problem with the fisheries MMR to simply maintain viable populations of fish stocks, we certainly have much higher expectations of fisheries production from the forest than to maintain the runs at depleted levels.

The preferred plan fails to significantly lower sediment yield or road building levels, serious damage to fisheries will continue-

Sediment yield under the preferred alternative is projected to decrease only 6% from the levels of the past 20 years Road building levels also remain relatively stable through the first decade. Given the serious damage that has occurred to the fisheries resource over the past 20 years due to sedimentation, we believe that this level of sediment production is too high. The plan should seek to significantly reduce sediment production from past levels. The preferred alternative is unresponsive to this issue because it does not place enough emphasis on preventing sediment production and concentrates on attempting to clean up the pollution after it occurs through mitigation measures. The plan also does not disclose the economic impacts to the fisheries resource from the impacts of the projected sediment yield. It does not discuss the tradeoff that was made between the economic benefits of timber

harvest and the potential damage to the fisheries resource. We question the optimistic view of the condition of the fisheries resource on the forest in ten years. If current rates of sedimentation and related impacts continue, we believe that some sensitive and depleted species such as the Nooksack spring chinook will no longer have viable populations on the Forest in violation of the standards and guidelines and the MMR's

The monitoring program is important but underfunded-

We do support the monitoring program proposed in the forest plan, however we do not think the level of funding is adequate to support the program.

The other alternatives also do not give adequate consideration to the fisheries resource-

Alternatives with lower harvest levels such as C or with greater wild and scenic river protection would probably have a lesser impact on the fisheries resource than the preferred alternative however they share most of the same flaws, ie they do not identify and protect critical fish habitats and stocks or sensitive watersheds, and they zone land for timber emphasis in watersheds which have not recovered from disturbance due to past harvest activity. Basically we think the planning process was used to weigh alternatives balancing timber harvest levels and roadless areas and recreation. The needs of other resource values such as fisheries appear to have been secondary in the planning process

We support the conservationist wild and scenic rivers proposal-

We support the wild and scenic river proposals contained in the conservation alternative, in particular the designation of the North Fork Nooksack, the South Fork Nooksack, the Middle Fork Nooksack, Wells Creek, Bar Creek and Bell Creek in the Nooksack Basin.

Improvements needed in the planning process to address the requirements of NFMA in regards to the fisheries resource-

To meet requirements of NFMA the Plan should be based on recent, accurate fishery information including reasonable estimates of fisheries production on the forest, inventory of habitat conditions and productivity, and identification of critical habitat for various fish stocks, including sensitive, and depleted runs. Streams where productivity has been impaired should be identified Watersheds containing critical habitat, as well as watersheds which due to the nature of their stability or hydrology are sensitive to disturbance, should be identified Timber harvest should be set at levels which will avoid disturbance of sensitive watersheds, allow recovery of previously disturbed habitat, and prevent future disturbance to critical stocks or habitat that have been identified in conjuction with the tribes and state and federal fisheries agencies

The preferred alternative should not be implemented-

We request that the USFS not implement alternative H at this time and undertake the development of another alternative which addressed the critical fisheries issues we have identified

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)-

The Draft EIS is inadequate because it fails to disclose the true impacts of the timber harvest and road building programs on the environment-

The DEIS on the forest plan is very confusing, disorganized and fragmentary It is a morass of contridictory statements that do not add up or make sense Finally, it is a basically misleading document which in the final analysis fails to honestly disclose the true effects of the proposed action.

The direct effects of timber harvest and road building on soil, water and fish are not adequately disclosed-

The information on direct impacts of the proposal on soil, water and fish is fragmented and contradictory. Evidence is presented indicating that the area is extremely susceptible to sedimentation from timber harvest due to slope and soil conditions however no impacts to water quality or the fisheries resource are disclosed from the proposal to harvest 170MMBF of timber or nearly 100 miles of road construction or reconstruction per decade.

The DIES is inadequate because it fails to document the effects of timber harvest and road building on the fisheries resource. The various alternatives presented in the plan propose varying amounts of timber harvest and roadbuilding. Increased timber harvest and roadbuilding are acknowledged to increase sediment production and erosion. Mass wasting is stated to be common and widespread on the forest and the rate of occurrence of debris torrents (which are particularly damaging to fish habitat) is said to be related to timber harvest activity It is predicted that 67,227 tons/year of new erosion will be produced from timber harvest in addition to 72,293 tons/year coming from past harvest areas and existing roads. Much of the timber harvest activity is scheduled to occur within watersheds that have been designated as condition class III, watersheds with high levels of past disturbance where significant impacts have already occurred and future impacts would be expected to be most severe. In Canyon Creek for example, 50% of the timbered area is slated for full timber harvest. However the plan and the DEIS fail to document the decrease in fisheries production associated with sediment related habitat disturbance and degradation. The DEIS states that there will be no decrease in fish production from the current level. In light of the documented damage from past activities and the proposal to continue harvesting timber and building roads at similar levels, this statement is not believalble. There is no

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supporting evidence for this conclusion in the DEIS To the contrary much of the evidence presented in the DEIS supports the conclusion that there would be considerable impact to the fisheries resource due to sedimentation and changes in hydrology related to the timber management program. Consequently we believe the conclusion that there would be no impacts ro fisheries resources from timber management activities is erroneous and represents major flaw in the DEIS.

The plan and analysis in the DEIS rely heavily on unproven mitigation measures which have not been effective in the past-

The DEIS maintains that measures such as riparian zones and current road building practices will prevent sediment from reaching the stream so no damage to fisheries resources will occur. Stream habitat improvement measures are also cited as a means of mitigating for the damage that supposedly will not occur. Unfortunately, the there is overwhelming evidence in the field that timber harvest and roadbuilding are causing an unacceptable level of damage to the fisheries resource In watersheds such as Canyon Creek, Finney Creek and Deer Creek in the Mt Baker Ranger District, sediment from mass wasting and debris torrents associated with management practices has severely degraded fish habitat and is endangering stocks of fish. The damage that occurred is of such a severe magnitude that the productivity of these streams is likely to be seriously impaired for many years While measures such as riparian management zones, better road construction techniques and stream habitat rehabilitation are undoubtably reducing the level of impact from what they were in the past, there is much evidence that degradation of the fisheries resource is still occuring as a result of timber harvest and logging roads. There are serious problems in the successful implementation of many of these measures. Contractors have cut down riparian areas due to safety concerns, incorrectly installed waterbars, caused soil disturbance due to improper use of equipment, ect, despite the best intentions of the Forest Service planning team. Watershed and stream rehabilitation programs are underfunded and the results are undocumented. Only 35 acres a year are rehabilitated to correct erosion problems in the entire forest according to the DIES. Water quality BMP's are not designed to protect fish habitat and fisheries interests are not involved in the process of designing or reviewing them. The DEIS should honestly document the degradation of fish habitat due to sedimentation and hydrologic changes from timber management and predict the impacts on the fisheries resource that would soccur as a result of the timber harvest and roadbuilding proposed in each alternative. Failure to acknowledge these effects is a serious deficiency. Perhaps the construction of a worst case analysis would be the way to address this situation.

The cumulative effects of timber harvest and roadbuilding are not disclosed and the analysis is inadequate-

The cumulative effects analysis in the DEIS is inadequate because it does not disclose the cumulative effects of proposed activity, as well as past and future activities as required by NEPA and related case law.

The so-called cumulative effects analysis in the DEIS is really a watershed classification system based on current watershed condition, sensitivity to erosion and hydrologic impacts, and degree of impact from past management activity. This system should be incorporated in the plan rather than the DEIS and used to determine acceptable rates of harvest for timber land within the watersheds. It could aslo serve as the basis for a cumulative effects analysis, but would have to be combined with information on habitat conditions, proposed harvest plans, and predicted sediment yield in order to predict the effect of the proposed plan and other activities the watershed for the foreseeable future.

The DEIS does not disclose potential irretrievable loss of resources including a Category I fish stock-

The DEIS fails to disclose the potential longterm loss of fisheries production due to habitat degradation from factors such as sedimentation, temperature increases, changes in peak flows, and habitat disruption from debris flows. Related to this loss of productivity is the potential for loss of viable populations of depressed and sensitive fish stocks. An example of this is the Nooksack spring chinook stock in Canyon Creek which is identified as a high priority (Category I) resource by the USfish and Wildlife Service and is on the verge of being extirpated from the creek.

The DEIS should be redone to correct the deficiencies-

We believe the EIS should be redone to honestly disclose and document the potential effects of the program on the fisheries resource and habitat. At the least, a supplemental EIS should be issued to address the deficiencies.

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10,700

MUCKLESHOOT INDIAN TRIBE

May 2, 1988

Mt Baker-Snoqualmie National Forest
Attention Forest Plan
1022 First Avenue
Seattle, WA 98104

Re: The Muckleshoot Indian Tribe's Comments on the Draft Environmental Impact Statement and Draft Forest Plan of the Mt.Baker-Snoqualmie National Forest

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Introduction

The Muckleshoot Indian Tribe ("the Tribe") appreciates this opportunity to comment on the draft environmental impact statement and draft forest plan of the Mt Baker-Snoqualmie National Forest ("the Plan") By participating in this process and providing these comments and other assistance, the Tribe intends to make sure that its treaty rights are preserved. The Forest cannot be managed in such a way that the Tribe's treaty rights are harmed. Though you may find many of the comments contained here highly critical, the Tribe wishes to acknowledge at the outset that the Forest Service's task is immense. The Tribe does not perceive this comment process as merely an opportunity to complain about the Plan. Rather, the Tribe views this comment process as an opportunity to help the Forest Service achieve the goals of managing the Forest in a way consistent with the Tribe's treaty rights

The Muckleshoot Indian Tribe is a federally recognized Indian Tribe and is the successor in interest to various bands of Indians which were parties to the Treaty of Point Elliott (12 Stat. 927) and the Treaty of Medicine Creek (10 Stat 1132). In accordance with federal law the Tribe has adopted a constitution and bylaws which were approved by the Secretary of the Interior on May 13, 1936, and amended June 28, 1977 The Muckleshoot Reservation was established by Presidential Executive Order on January 20, 1857 and enlarged by Presidential Executive Order in 1874 pursuant to the treaties. The reservation is located in King and Pierce Counties, and straddles the White River.

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The Tribe holds federally guaranteed treaty rights in salmon and steelhead fisheries that are directly affected by the Plan United States v. Washington, 384 F Supp 312 (W D Wash. 1974), aff'd 520 F.2d 676 (9th Cir. 1975), cert denied 423 U.S. 1086 (1976). Among the areas in which the Tribe has usual and accustomed fishing places are the Upper Puyallup, White, Green, and Cedar Rivers and in Lake Washington and Elliott Bay Id at 367. The Tribe depends upon the fisheries in these systems in the exercise of its federally guaranteed treaty fishing rights.

The Tribe has spent a lot of time and effort to protect and enhance the fisheries within its usual and accustomed fishing areas. For example, in the White River, as a result of the settlement of the Tribe's long-standing suit against Puget Sound Power & Light Co over the operation of its White River project, the Tribe has the tools to begin restoration of the White River fishery In the Green River, the Tribe has conducted extensive restoration and enhancement activities, including out-planting of juvenile salmonids in the upper watershed of the Green River The Tribe believes that other entities that affect the watersheds within the Tribe's fishing areas have similar obligations under the treaties and other federal laws to protect and restore the fishery

The treaty right to hunt is also held by the Tribe This right extends to federal lands, including Forest Service lands See e g State v. Miller, 102 Wn 2d 678 (1984) The Tribe exercises its treaty hunting rights extensively on lands within the Mt Baker-Snoqualmie National Forest The Tribe also exercises its treaty rights to gather berries and other flora within the Forest, as well as carrying out cultural and religious activities.

The Tribe's primary concerns with the Plan are how implementation of the preferred alternative effects its federally guaranteed treaty rights, as well as other protected activities.

This comment letter is divided into the following sections:

- o General Comments
- o General Technical Critique Of The Plan
- o Specific Technical Comments With Page References

GENERAL COMMENTS

The National Forest Management Act (NFMA) directs the Forest Service to prevent "serious adverse" impacts to fish habitat [1] It is the Tribe's position that the draft plan does not meet this standard, nor assure that the Tribe's federally guaranteed treaty rights will be protected In addition, it is also the Tribe's position that the Forest Service's Draft Environmental Impact Statement (DEIS) contains serious legal and factual deficiencies *Fundamentally, it fails to inform the reader of the real on-the-ground impacts* of any of the proposed actions Whether those impacts, if revealed, would represent real threats to habitat, is unclear

MITIGATION

The fundamental, yet never justified, assumption in the DEIS is that the Forest Service's activities on the Mount Baker-Snoqualmie Forest (MBS) will have no impacts on the quality and quantity of fish habitat on the forest The Forest Service appears to assume, without analysis, that its "mitigation techniques" will, even at the highest levels of timber harvest, maintain fish habitat and fish production at its current level

The Forest Service's position on mitigation of the Plan is insufficient under NEPA An agency cannot rely on undocumented or general assertions of the effectiveness of mitigation techniques. see e g Methow Valley Citizens Council v Regional Forester, 833 F.2d 810 (9th Cir. 1987)

Given the time constraints of reviewing and analyzing in a few weeks documents that have taken nine years to prepare, the Tribe offers here only some examples of the specifics reflecting the inadequacy of the analysis and evaluation of mitigation in the DEIS and draft Plan. For instance, the Forest Service indicates that it has removed from the timber base some 95,500 acres of land because such land is fragile and subject to serious erosion. In fact, 55,000 acres of this total is in high elevations and grows less than 20 cubic feet of timber per acre,

[1] The agency must insure that timber is harvested from national forests only where "soil, slope or other water shed conditions will not be irreversibly damaged . . [or] protection is provided for streams, stream banks, shorelines, lakes, wetlands and other bodies of water from detrimental changes in water temperatures, blockages of water courses and deposits of sediment where harvests are likely to seriously and adversely affect water conditions or fish habitat " 16 U.S.C. Section 1604 (g).

per year Thus with little timber potential, it is unlikely this land would have been cut. Most relevant, the Forest Service offers no explanation of how the agency makes land withdrawal decisions. Predicting soil erosion is a highly inexact science at best This was readily acknowledged by the Forest's soil scientist at a meeting with the Tribe The Tribe encourages the Forest Service to do more than refrain from cutting the very worst while still maintaining a policy to cut the worst when such risk assessment is unclear

A second example is the list of the riparian standards in Appendix D, E-17 to D-18 of the DEIS This list is insufficient under NEPA. The Forest Service cannot merely state the goals while not discussing or analyzing whether these undetermined methods listed will achieve the goals. For instance, harvest and road building are permitted if they "protect" riparian values. But, "protected" as the Forest Service defines it, may be different than a fishery biologist's definition

The Forest Service seems to rely on its "fish habitat capability index" to make predictions about the reliability of its mitigation measures This index is a computer model that calculates *harvest and road related impacts, habitat recovery* rates and overall fish habitat capability. The Forest Service, however, in its Draft plan (page 2-22) admits that among the critical unfulfilled information needs is a validation of the model's accuracy In addition, the Forest Service maintains it must still develop values for estimating the number of fish produced from particular stream environments, and still must analyze the effectiveness of mitigation measures The Tribe maintains that in fact the Forest Service by its own admission, does not know if its mitigation measures will work. Under NEPA, when the Forest Service has important missing data, it either *must fill the gaps or admit uncertainty and do a worst case* analysis. The Tribe requests that the Forest Service now do the necessary analysis to fulfill all requirements under NEPA.

ENHANCEMENT

Along the same lines, the Forest Service claims it will fund $1.9 million worth of habitat improvement projects. Within five years, it claims this money will triple the capacity of the MBS fish habitat Appendix C to the Draft plan lists some of these projects. Still, it is unclear to the Tribe whether this list includes all considerations necessary to accomplish the habitat goals The measures the Forest Service proposes are to blast rearing ponds out of rock, put in gabions to collect spawning gravel and try to prevent sediment from entering the mainstem streams by installing sediment control structures on tributaries The Tribe is aware of expert testimony in other cases showing that there is substantial uncertainty regarding the effectiveness of such measures. see e g National Wildlife

Federation v.U S Forest, 592 F Supp 931 (D. Or 1984), affirmed in part, vacated in part, 801 F 2d 360 (9th Cir 1986). It is thus apparent that there are as many doubts about the effectiveness of the Forest's enhancement plan as there are about the mitigation plan.

SEDIMENT YIELDS

The Forest Service does not identify in the DEIS the techniques used to quantify sediment yields. Rather, the Forest Service seems to simply list the total sediment expected to come off the entire forest per year as a result of any of the alternatives. see DEIS p IV-6 This discussion is insufficient under NEPA. Sediment yield is not distributed evenly throughout the Forest The Forest Service must look at each proposed timber sale, one by one as they effect each watershed or drainage It is the Tribe's position that such generalizations are merely a means for the Forest Service to rationalize cuts without looking at the impacts of that cut on a site specific basis

FAILURE TO ADDRESS ACTUAL SALE PROPOSALS

In Appendix A to the Plan, the Forest Service presents a ten year action plan--sales it anticipates will go forward in the next decade. This Appendix is not sufficient under NEPA to provide the needed information for an environmental review here. Such *generalizations are legally inadequate and fully unjustified* when the agency actually knows where, when and how it intends to cut. see e.g California v Block, 690 F 2d 753 (9th Cir 1982) It is unclear from the information provided by the Forest Service whether the little analysis the Forest Service does perform has a significant relationship to the actual sale plans it prescribes. The Tribe is unclear whether the preferred alternative "H" generated by the FORPLAN model has anything to do with the ten year action plan. The Tribe therefore requests clarification on the correlation between FORPLAN models and the 10 year action plan.

DEFICIENT CUMULATIVE ANALYSIS

The cumulative impact analysis the Forest Service provides here is insufficient under NEPA The Forest Service is required by NEPA to discuss and analyze the cumulative impact of past, present and reasonably foreseeable actions on the environment No such analysis is evident in the DEIS. In reality the Forest Service fails to provide any concrete analysis regarding cumulative impacts. see e g DEIS at IV-22 to IV-25 (cumulative impacts on water, DEIS, at IV-64 to IV-66 (cumulative fish impacts).

For example, the Plan's cumulative impact discussion fails to address the impacts of Forest Service actions when combined

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with actions of other adjacent or interspersed land owners. Such discussion is required under NEPA. Given the land ownership patterns in the MBS, such analysis is crucial. Though the Forest Service admits to these potential impacts at DEIS IV-64 to IV-65, the agency never identifies non-federal actions. Nor does the DEIS assess these actions' effects or consider how these effects will combine or add to impacts of Forest Service actions

HYDRO PROPOSALS IN THE PLAN

The Forest Service attempts to address small hydro proposals in this Plan, see Draft Plan at 4-49 and 4-172 The agency has misinterpreted *its authority under section 4(e) of the Federal* Power Act. That law allows the Forest Service to set hydro license terms and conditions to the extent necessary to fully protect the purposes of its reservation - the forest itself. The Forest Service proposes insufficient standards for hydro developments. The Draft plan at 4-172 actually proposes only one standard, it will require "consultation" and "adequate flows" Given that flows and blockage are two highly critical potential impacts on Tribal treaty fishing rights, the Tribe must insist at a minimum that the Forest Service upgrade and expand its hydro standards.

WILD AND SCENIC RIVERS

Given that the more natural habitat left intact, the more likely natural fish production will thrive, the Tribe requests that all potential wild and scenic rivers within the Forest be given more than the perfunctory consideration for preservation described in the Plan

OLD GROWTH AND SPOTTED OWL HABITAT

It is the Tribe's position that the Forest Service should reserve the maximum number of habitat sites (200 pairs) for spotted owls. Spotted owls are one of a few critical indicator species to help determine the level of environmental degradation in the Forest. If within the planning stages spotted owl habitat nest sites are reduced to the level of the preferred alternative "H" than the Forest Service will *in essence* be building environmental degradation into the Plan This is not only short sighted planning but truly disastrous in the long term analysis considering the continual diminishing of old growth stands in the Northwest

WILDLIFE

The Muckleshoot Tribe is not only a fishing tribe but a hunting tribe as well. In cooperation with the State and under management regulations designed to emphasize conservation of

wildlife resources, the Tribe hunts in season for such ungulate species as deer and elk The Tribe is chiefly concerned with the southern portion of the Forest and how the Forest Service's plan will impact their treaty hunting rights. The Tribe requests that provisions be put in the final plan, to formally include the Tribe in all timber harvest decisions regarding size of cut and timing of harvest Such coordination is crucial in order to insure that the Tribe's treaty rights are not interfered with by the Forest Service and contracting loggers

Additionally, the Tribe is unsatisfied with the extent of impact analysis on wildlife provided by the Forest Service in this Plan.

INDIAN RELIGIOUS AND CEREMONIAL SITES

The Tribe has had several discussions with the Forest Service regarding the threat of destruction of Indian sacred grounds in the Forest by timber harvest activities Little has been done to inventory the central and indispensable sites necessary so that the Tribe's members may carry out their traditional religious practices The Tribe requests that before the Forest Service finalizes its decision to cut an area in the Forest, the Forest Service diligently check with the Tribe to insure that invaluable and sacred religious and cultural burial, quest, berry picking and spiritual sites receive as much protection as possible The Tribe is appalled by the Forest Service's current position that Tribes had better hurry up and inform the agency of all such sites now or forever hold their peace. Such issues are highly sensitive to Tribes To inventory such sites, the Tribe leaders must often include the Tribe's elder population Thus such inventory cannot be expedient. There is a great deal of work to be done to identify and protect Indian religious and spiritual sites The Forest Service must exhibit more understanding of this highly sensitive issue

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TECHNICAL COMMENTS

I General Comments

A. Introduction

The Tribe's intent here is to offer a critical technical evaluation of the proposed alternatives presented in the DEIS

As stated earlier in this comment letter, the Tribe's hope is that its analysis will be applied in a positive manner in order to assure successful implementation of the Forest Plan without jeopardizing Tribal treaty rights It is the Tribe's

position that inequities in the plan must be corrected to assure minimum risk and maximum benefit for the Forest watersheds, wildlife, riparian areas and fisheries habitat.

The Tribe addresses two primary areas of concern. The first concern is the Plan's environmental impacts on fishery production Second is the issue of whether the Plan provides sufficient high quality habitat for wildlife Evidence of past Forest Service management on the Forest indicates that there has always been a problem in the way the Forest Service has managed the Mount Baker Snoqualmie Forest

As discussed earlier, the present plan offers no guarantee that it is likely to succeed regarding implementation of mitigation. The Tribe is greatly concerned about what the Forest Service intends to do if environmental damage occurs as a result of implementation of the Preferred Alternative.

The Preferred Alternative provides no realistic mechanisms to mitigate impacts Moreover. this alternative fails to assure funding to "redo" mitigation attempts that fail The plan does not establish the funding and staffing badly needed to monitor the impacts of project activities Finally, the plan provides no assurance that the Forest Service will be capable of upgrading the data base required to monitor implementation of the plan and associated mitigation in a manner consistent with scientific multiple-use management policies set forth by Congress The result of failing to provide these mechanisms is the risk that management activities will in fact continue as they have in the past. Evaluation of recent land management activities indicates that there has been a gradual decline in natural fish production, a reduction in water quality, and a degradation of wildlife habitat.

The Tribe's concern is that the Preferred Alternative emphasizes mitigation techniques, without the certainty of success from these techniques, simply to justify maximum timber production Funding for mitigation and badly needed preventative measures is never a sure thing. Such funding is based solely on the given political values of a federal administration and Congress. Political entities rarely have the foresight to see that the price for damage done to the forest now as a result of over timber harvest will be paid for 15 to 50 years from now This price is stream degradation, fishery decline and reduction in old growth and wildlife habitat

The Tribe poses the following questions and expects in return specific detailed answers from the Forest Service.

1. How will the Forest Service achieve quality control at the project planning and implementation level?

2. How will monitored project impacts be translated into immediate changes in management practices?

3. What efforts will the Forest Service make to prevent adverse environmental impacts rather than merely to mitigate environmental impacts?

4 What resource inventories will the Forest Service undergo to insure that much needed data be complete to provide the basis for "multiple-use" decision making

5. What assurances can the Forest Service offer to secure the funding needed to implement the Preferred Alternative or any other alternative?

II. Summary of the Tribe's Analysis Process

o Initially the entire set of documents was read and the estimated production levels of fisheries based on current and anticipated *future conditions were extracted. It was difficult* to do this because the data is incomplete and not consistent from year to year

o The estimated output levels for each alternative and documented the basic assumptions used by the Forest Service to estimate fisheries production were examined

o Next, the validity of the data used to estimate and forecast the production levels for current and future conditions was evaluated. The Tribe's position is that such data does not reflect true fishery conditions. For example, the table at III-82 of the DEIS full of errors, and the conclusions drawn are wrong. The Northwest Indian Fisheries Commission is providing a separate comment letter concerning the inadequacy of the fisheries data contained in the EIS The Tribe is willing to work with the Forest Service to develop a realistic data base.

o From a problem solving perspective, ways were developed to correct for deficiencies in data to permit more accurate predictions of fish production levels.

C. Problems With The Plan

1. Assumptions

In the Tribe's review of the Plan, the Tribe concluded that the Forest Service developed alternatives and estimated outputs using the following assumptions:

1. The Forest Service assumed that its benchmark analysis provided appropriate "decision space" for evaluating alternative management scenarios and evaluating associated resource impacts.

Problems with this assumption:

a) Based on the belief that anadromous fishery values and yields would not alter benchmark outputs, the planners elected to omit this information from the FORPLAN model (e.g p B-149)

b) Resident fish values were considered static throughout the planning process and lack opportunity for increased values based on varying investment levels. Based on such conclusions, resident fishery values and potential values are not included in the benchmark analysis

c) FORPLAN is a linear program It does not seem appropriate to rely solely on FORPLAN to analyze non-linear ecological interactions. There are fatal thresholds and non-recoverable impacts that do not function in a predictable linear fashion.

2. The Forest Service assumes that the Standards and Guidelines (S & G) in the Plan provide sufficient guidance and control for resource management decisions

Problems with this assumption

a) The S & Gs that were not used in the Preferred Alternative (see p. D-# through D-36) offer many excellent ways to achieve resource management goals, however this information was left out of the Plan

b) The S & Gs (see p. 4-69 through 4-119) are written more like a wish list rather than standards. Words such as "should and could" are not sufficient to insure that on the

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ground results meet management goals

c) The S & Gs omit many opportunities for alternative land management techniques which could be applied on a site specific basis This is done by restrictive definitions of planning level standards For example on p 4-84, "even-aged silvicultural management" is stated as being the "optimum system for timber production". There is some question here as to what the "best silvicultural technique for "multiple-resource" management is and what is lost by adopting such a conceptually limited standard.

3. The Forest Service assumes, at least as evidenced by the level of production of fish displayed in Table 4-1, that all adverse impacts from the Plan can and will be mitigated.

Problems with this assumption:

a) Not all mitigation projects have positive results nor are they always successful on the "first try". There is no indication in the plan that failure of mitigation techniques is within the realm of possibility. Thus, this document is only a best case scenario.

b) There is no economic analysis to demonstrate that opting for less expensive logging techniques with mitigation is more "cost-effective" than using more expensive techniques with prevention efforts

c) There are many complex ecological interactions within the Forest Thus as the Forest Service has admitted during planning meetings with the Tribe, predictions are impact wild guesses at best Given the data base available, the uncertainty of mitigation success and the lack of understanding of complex ecological interactions, the emphasis and trust in mitigation to salvage this plan is inappropriate.

4. The Forest Service assumes that with an appropriate level of investment, they will be able to "maximize" anadromous fish production within the first 10 years of the plan. They also assume the ability to sustain this level over 5 decades in all high level investment alternatives even though the improvement

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structures have a life expectancy of only twenty years

Problems with this assumption.

a) There is no correlation between investment levels and production success

b) This assumption leaves no room for "natural" dynamic processes and their impact upon production systems

5 The Forest Service assumes that there are no short term impacts on fish growth or production from the varying levels of sediment production. This assumption is evidenced by the lack of variation in investment funding in spite of distinct variations in sediment yield for each alternative.

Problems with this assumption

a) Research has shown that timing and levels of sediment yield can adversely impact growth and survival of salmonids from egg to alevin

b) The Forest Service must generate what ever data it claims is missing rather than disclaim its own predictions merely by asserting that no data exists (see p. 4-26)

6 The Forest Service assumes that they have within their S & G's, the "tools" to eliminate cumulative impacts of the Plan These S & Gs are merely optimistic goals which give no substance to the Forest Service's assumptions here

7 The Forest Service assumes that the only streams important to fisheries are those streams which bear fish now. The Tribe infers this assumption on the basis of allocation decisions made in the admitted absence of data about riparian areas, channel stability, benthic production, large organic debris and entrainable geologic material in Class III & IV streams systems.

Problems with this assumption

a) Major impacts to fisheries can occur due to cumulative effects on small seemingly insignificant, intermittent perennial streams

b) The evolution of the stream resources in the watersheds of the Pacific Northwest has been dependent upon the continuous flow of organic and inorganic materials from the crests of watersheds to the sea. Any interruptions on this process could adversely

impact fish production. The key is determining the acceptable levels of interruption

8. The Forest Service assumes that 2 4 million pounds of fish is an acceptable level of production for the Plan

Problems with this assumption

a) There does not seem to be a correlation between actual production capability and the 2.4 million figure. The Forest Service fails to investigate if there is opportunity for greater habitat expansion thereby creating a higher production potential goal.

b) Artificially capping fish production creates two major problems 1) the efforts to maximize prevention of habitat loss are likely to be less if a cap exists, and 2) rather than striving to achieve the highest possible level of output and allow for creation of "new" markets badly needed by Tribal commercial fishing efforts, the Forest Service reaches what it arbitrarily deems an appropriate level of production and stops Tribal commercial fishing potentials should be no less a consideration than the timber industries concerns to maximize its harvest

9. The Forest Service assumes that resident fish production is immaterial to the decision making process

Problems with this assumption

a) Based on information from the Sports Fishing Institute and other sources, fishing is the most rapidly growing recreational activity in the U S If these growing demands are not met, there is risk of additional impacts on the Tribal commercial fisheries

b) Consideration of resident fish production was not included in FORPLAN thereby biasing the FORPLAN outputs.

2 The Forest Planning Process

A chief problem with the forest planning process is that FORPLAN tends to aggregate all the available ecological data on a forest-wide basis. This type of computerized analysis creates several deficiencies For one, FORPLAN is a linear model yet ecological relationships do not necessarily follow a linear cause and effect line Data for critical and sensitive site specific areas is essentially averaged in with less critical areas thereby creating a dilution affect regarding the plans environmental

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impact for each site Second, in most cases, there is insufficient data, as discussed in the Assumptions Section, to make realistic informed decisions using FORPLAN. Third, the Forest Service planning process relies on monetary investment as the sole means of measuring and assuring that adequate mitigation will indeed occur Money is easily quantified for FORPLAN purposes but there is no guarantee that Congress will appropriate sufficient funds in the long run to implement the Forest Plan.

3. Project Level Planning

Clearly the Forest Service chose the FORPLAN model to try and incorporate as much information as it felt it could assimilate at once. As the Tribe points out here, there are holes in the data thereby distorting FORPLAN predictions Thus FORPLAN cannot be the sole tool to determine impacts Instead FORPLAN should be one of many tools

The critical measure of success of the Preferred Alternative will be how the Forest Service works with the Tribe during project level planning, implementation and post project monitoring to fill in the data holes If the Forest Service revises its current project planning process to incorporate information and recommendations from Tribal representatives the resource management predictions could be significantly improved

The Forest Service must develop a more protective policy towards fishery and wildlife habitat enhancement Timber cuts must be reduced if mitigative measures are not assured.

Regardless of which alternative ultimately is selected, active on-the-ground cooperation on a planning and implementation level is essential for program success The Tribe is willing to actively participate in this planning and implementation process to assure preservation of its Treaty Rights

II. Specific Technical Comments

In the review of the Plan and its associated support documents, the Tribe identified a number of specific concerns These concerns and related questions have been assembled in the attached Table I: List of Concerns/Issues appended as Exhibit A to this comment letter

This listing is not complete. Rather it offers a sample of these issues the Tribe considers most crucial to the planning and resource allocation process.

III. Alternatives: Advantages and Disadvantages

The Tribe's first choice for an alternative is G. The Tribe's second choice is alternative C Often, the assessment of the relative values regarding the various land management alternatives is based solely on the resource output levels associated with each alternative. In most cases, the output levels are measured in dollars. This generally means that non-market valued resources are excluded from the value analysis It also means that the complex interactions that result from resource allocation and use are not factored into the evaluation process. Such is the case here. The Tribe prefers implementation of G or C because these are the two alternatives which include non-market valued resources

CONCLUSION

The Tribe appreciates the Forest Service's efforts to provide the public with this document Clearly there is still much work to be done, however this document is a major improvement over the current forest management practices on the Mt.Baker-Snoqualmie National Forest.

The Tribe hopes that it has made clear in this comment letter that current forest practices have severe physical impacts on tribal fisheries. Erosion, increased turbidity and sedimentation, as well as stream blockage, and flood protection and clean up related to Forest roads and bridges are all environmental impacts due to timber harvest Such impacts translate into reductions in anadromous fish populations and diminishment of habitat for fish and wildlife. There is no doubt that timber harvest practices will never be consistent with habitat preservation no matter what mitigative measures the Forest Service proposes. Given the built in conflict of uses here, it is the Tribe's hope that the Forest Service will secure the necessary funds, fill in the gaps of missing data and test the proposed mitigation and enhancement measures to the fullest extent possible in order to assure success of the Plan throughout the Forest Finally, the Tribe asks the Forest Service to place greater emphasis on preventative measures within the plan

The Tribe looks forward to working with the Forest Service as it endeavors to correct the deficiencies in these draft documents It is essential that the Forest Service, through its activities, carry out the obligations of the federal government as trustee for the Tribe to assure that the Tribe's treaty rights are fully protected.

J-641

If you have any questions or need further information, please do not hesitate to contact Rob Otsea or Laura Lavi at the Tribal offices, telephone number 939-3311

Sincerely,

Sonny D. Bargala

Sonny D. Bargala
Chairman

Enclosures: 1

Table 1 LISTING OF CONCERNS/ISSUES

CONCERN AREA	REF DOC	PAGE #	ISSUE SUMMARY	DEFICIENCY OR PROBLEM
als of fish duction	PL&RMP DEIS	2-4 III-80	2 4 million pounds set as production target for the Forest	1) no apparent data base to support this capability or to identify limiting factors within each of the systems 2) no apparent correlation to State management goals 3) no inventory of Class III and IV was done for this plan
jected fish and	PL&RMP	2-16	It is difficult to determine how the demand data (Figure 2-3) was used to determine the level of demand and that portion to be produced on NFS lands	1) no economic analysis is presented to indicate the relationship between the 2 4 MM pounds of production and any demand data 2) the data in Figure 2-3 is presented as numbers of fish not pounds What is the converation factor?
k of adequate hery/channel bility data	PL&RMP	2-21 2-22 B-8	It appears from The listing of data needs makes it difficult to determine what the validity of the data base used to prepare the proposed plan and conduct an appropriate analysis of the proposed alternatives	1) the disclaimer on page B-8 supports any concern regarding the data inadequacies 2) on page B-19 the Plan indicates that inventories were done on Class I and II streams Is this all Class I and II streams or just a representative sample? What method of inventory was used? Where is the data?
chmark analysis	DEIS APPEND	B-144 thru B-194	Although the objective of this process seems appropriate, the mechanics of the process are extremely difficult to follow	1) on page B-27, the Plan states that fish production numbers were not used in developing the model outputs It does not seem logical to predict the outcomes without having the ability to input the "factors" of production, the varying levels of production based on investment and the results of the complex interactions and impacts associated with forest land management There is no "what-if" analysis or presentation of "best case" to "worst case comparisons The presumption seems to be that money invested will resolve any impacts Any damage can be fixed This kind of logic is inappropriate considering the economic advantages of preventing adverse impacts

EXHIBIT A

LISTING OF CONCERNS/ISSUES

CONCERN AREA	REF DOC	PAGE #	ISSUE SUMMARY	DEFICIENCY OR PROBLEM
Road construction estimates	PL&RMP	3-6 4-28	It appears as though the level of road construction input into FORPLAN is different from that displayed in the 10-year timber action plan (Appendix A, PL&RMP)	1) the plan indicates difficulty in quantifying the affects of forest management on fish production but seems to willing to state that the planned levles of investment will take care of any problems that arise related to fish production Which level of road construction was used to determine the investment needed to correct impacts from road construction activities?
Sediment yield estimates	DEIS	IV-5 thru IV-88, B-44	The estimated amount of sediment yield varies considerably with the different alternatives based on the amount of timber harvested and roads constructed or reconstructed The level of fish production does not seem to vary accordingly See Sigler, John W T C Bjorn, and Fred H Everest 1984 "Effects of Chronic Turbidity on Density and Growth of Steelhead and Coho Salmon Trans Am Fish Soc	1) the major concern here is the *undrlying assumption that no matter* what happens in terms of sediment yield, the amount of effort (funds) needed to maintain high levels of fish production will be invested 2) if 1) above is true, where is this money coming from? KV? FR&T? or other appropriated funds? 3) can the effects of sedimentation be overcome (i e reduced fry survival, poor weight gain in fry etc) or is prevention a better? "After-the-fact" restoration efforts may not be *enough to overcome the adverse impact* of increased sedimentation often associated with increased road construction/reconstruction
Watershed improvement projects	DEIS	III-9	The Plan only identifies 35 acres of watershed improvement projects per year The data base is at least 5 years old There is limited funding for field personnel and there is very limited validation of existing conditions	1) is the intent to say that only 350 acres of the Forest needs restoration or improvement in the next 10 years? 2) why is this effort confined to the north part of the Forest? Are there no acres in need of repair on the south end? 3) what data base was used to determine the acres in need of restoration?
Water Value	DEIS	III-14	In the plan the value of the water is listed at $51,875,000/yr	1) where did this value come from? 2) does this include the value of fish produced in the water? 3) was this based on M&I or domestic use or agriculture or some mysterious combination of uses? 4) is this a pretreated value? 5) does this include land value or the value of land based resources? 6) is recreation value included?

LISTING OF CONCERNS/ISSUES

CONCERN AREA	REF DOC	PAGE #	ISSUE SUMMARY	DEFICIENCY OR PROBLEM
Harvest/Cutting methods	DEIS	APP F	The method of harvest and the cutting technique are differentiated in Appendix F There is no reference to potential impacts to water yield, water quality, channel stability, fish habitat, or insect production	1) it seems innappropriate, in a "multiple use" management scenario to, determine the best" harvest technic using only silvicultural criteria? 2) the Regional Guidelines seem to have ignored the fact that other organisms and food chains exist in the forest 3) the approach to harvest should not be based strictly on logging" or "tree farming' criteria or "stump-to-a??" *economics*
Environmental effects analysis	DEIS	IV-1 thru IV-88	This entire section is difficult to follow given previous admissions about the lack of data for fisheries, water, soils, riparian areas, and water	1) how do they develop condition classes, when the data base is so weak? 2) it is obvious that the impacts of adjacent private lands were not considered in assigning the condition classes or the Greenwater and Clearwater would not have rated as II s 3) the indication is that stream channel stability is a *criteria for condition* but they admit having no info on Class III and IV streams 4) this process further validates the underlying assumption that only streams with fish in them are of any value to a fishery or the production of fish 5) Table IV-1, p IV-5, is difficult to understand Are the numbers cumulative? 6) Table IV-3, same comment as 5) above 7) the comments in the NOTE at the bottom of page IV-8 don't instill a great deal of faith in the sediment yield numbers If the calculations are off by a factor of 10, the impact to aquatic resources may be underestimated by the same factor That would be interesting at budget time! 8) the comments at the top of p IV-10 are an endorsement of Alternative C *If your concerns relate to fish and* water C is the lowest risk alternative based on sediment yield The "Fish" section at the bottom of p IV-11 is additional reinforcement

LISTING OF CONCERNS/ISSUES

CONCERN AREA	REF DOC	PAGE #	ISSUE SUMMARY	DEFICIENCY OR PROBLEM
Environmental affects analysis (continued)				9) on p IV-15, there is an indication that regardless of which alternative is implemented, the water yields will not be substantially different This *statement* seems to contradict the point made immediately before it on p IV-16 Which is true? Also, it is fact that increases in water yield can cause significant changes in channel morphology which could mean reductions in fisheries production 10) although not explicitly stated, the implication of the affects of other alternatives" discussion is an endorsement of Alternative C 11) *on p IV-28, the statement is made* that none of the alternatives are "anticipated to reduce fish populations Is this with or without all the mitigation discussed Th real problem with this Whole Plan is the mistaken believe that all damage is mitigatable and that whatever it takes for funding, the Forest Service, will have available There are two very important points here First, the Congress is noted for NOT funding, budget requests and second, certain types of damages are not always correctable in the short term 12) the most significant comment in the documents is on p B-44 The implication is that there is no research information available that provides direct correlation between forest management practices and the reduction in fish production It appears as though they haven't been to the library lately
Riparian areas and "buffer" widths	DEIS	APP B	The level of data for these areas is not adequate In addition, the width of the "buffer" seems to be fixed by stream class rather than site specific conditions	1) without any inventories of Class III and IV streams, how can the plan propose narrow "buffer" widths The *implication, again, is that the Class* III and IV streams are unimportant to fish production This doesn't fit with commonly accepted ideas about ecosystems and food chains

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LISTING OF CONCERNS/ISSUES

CONCERN AREA	REF DOC	PAGE #	ISSUE SUMMARY	DEFICIENCY OR PROBLEM
General concerns	ALL	na	The general questions concern budget and funding processes	1) with the seeming reliance on mitigation rather than investment in techniques or policies that will prevent damages to fish and water resources, the questions about budget and staffing guarantees are very significant Often, the FS budget reflects full funding of timber management and engineering while most other programs reflect drastic cutbacks 2) knowing the importance of funding, didn't the Forest include the budget advice they already have for the outyears in the plan
Escapement and historic production numbers	ALL	na	There does not seem to be any willingness on the part of the Forest Service to accept responsibility for the affects of management in the parts of the watersheds they do not control There is also no indication that the 2 4 million pounds of fish to be produced has any relationship to any historic level of production	1) the levels of investment and fish production all assume adequate levels of spawner escapement Without a coordinated management approach in each basin and a leveling of impacts on a drainage by drainage basis, the spawner escapement goals may not be met This could bias benifit/cost analyses of the fishery improvement programs and put funding/staffing at risk 2) what is the magic in 2 4 million pounds of production Does it have any relationship to historic (1920 - 1950, for example) levels of production? Is it based on future habitat potential? Is this the upper limit of production for this land base or is there more potential out there? How does this relate to the U S -Canada Treaty goals?

NOOKSACK INDIAN TRIBE
P O Box 157
Deming, Washington 98244
Telephone (206) 592-5176

10,707

4/28/88

FOREST MANAGEMENT PLAN
Mt Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, Wa 98104

J-645

INTRODUCTION

The Nooksack Tribe is a federally recognized tribe in the state of Washington and has federally reserved treaty rights to harvest fish and other natural resources that occupy their usual and accustom places The Nooksack people have a long standing history of reliance upon the renewable natural resouces of Nooksack River and Samish River watersheds for their survival and cultural identity The Mt Baker-Snoqualmie National Forest encompasses the headwater reach of the Nooksack River and many of it's headwater tributaries Given the undisputable fact that water runs downhill, the management of the timber resources in these upland areas has a very significant relationship to the stability and viability of the instream and fisheries resouces of the entire Nooksack watershed and their availability to the people of the Nooksack Tribe The U S Forest Service has a legal responsibility to manage the timber resources of the Mt Baker-Snoqualmie National Forest in a manner that dose not adversely affect or impact water quality and fish habitat It is imperative that the Forest Plan and EIS reflect a management strategy that assures the Nooksack Tribe that the fisheries and instream resources will be managed in a manner that guarantees their protection, viability and availability

The Nooksack Tribe acknowledges the magnitude and difficulty of the task under taken by the U S Forest Service staff in developing a long range Forest Management Plan and Environmental Impact Statement for the Mt Baker-Snoqualmie National Forest We would like to offer the following comments and suggestions to assist and encourage the U S Forest Service to incorporate into the Plan and EIS a more realistic portrayal of the timber harvest related impacts to instream resources and to assure the viability, availability and protection of these resources to the indian and non indian people of Washington State

ASSUMPTION

In attempting to balance timber harvest activities and responsible fisheries resource management, the proposed Plan and EIS are built upon a matrix of unsubstantiated assumptions The driving assumption of the plan in relation to fisheries resource management implies that further timber harvest and road building activities in the Mt Baker Snoqualmie National Forest will not decrease fish production from the current level The Plan and EIS offer a limited and often times misrepresented data base to substantiate their basic no net impact to fish production assumption In our opinion, it is impossible to develop a reliable assessment of present or future fish production and forest harvest related impacts from the data that is presented Without supporting data, the plan and eis fall back on a matrix of assumptions to address fish production, intream habitat quality and quantity, enhancement, mitigation, protection and funding concerns The matrix of assumptions offers little more than an unsupported best case scenario of resource management that transforms the founding assumption of no net impact to fish into an unrealistic and hollow promise

DATA BASE

The Nooksack Tribe would like to complement the U S Forest Service for their efforts to identify the data that needs to be compiled in order to responsibly manage forest and fish resources It would appear that the Service assumes that the data they have provided is adequate to develop and implement a responsible resource management strategy The Tribe finds the fisheries resource and instream habitat data seriously lacking in substance and credibility and offer our assistance to the Service towards developing the necessary data But without an adequate data base to reliably assess past and future timber harvest related impacts to the instream and fisheries resources, the Nooksack Tribe feels that it is essential and the legal responsibility of the U S Forest Service to develop a Plan and EIS that also present a worst case scenareio In our opinion, an honest attempt to portray the reality of balanced resource management exists somewhere between the best and worst case scenarios

It is important to keep in mind that the final Plan and EIS will be used in the future as the bases for managing the Mt Baker Snoqualmie National Forest With accurate and updated data, it will provide a valuable reference source for resource managers and the general public concerned with the successful management of the natural resources of the National Forest Without an accurate data base and a realistic accounting of the interplay of our natural resources, the Plan and EIS will misinform and polarize the different resource interest groups and derail effective, responsible resource management opportunities

FISH PRODUCTION

As stated earlier, the people of the Nooksack Tribe have a long standing history of reliance upon the fisheries and natural resources of their usual and accustom places for their survival and cultural identity In our review of the Plan and EIS, we are discomforted by the underlying assumptions and the outdated, arbitrary, and misrepresented data that has been used to assess and project the interplay between timber and fisheries resource management

The Forest Service has used limited, outdated and inaccurate catch statistics to establish a level 1 anadromous fish production estimate for the Mt Baker Snoqualmie National Forest The Forest Service mistakenly **assume that their fish production estimate represents an accurate accounting of present day level 1 fish production** Fish production estimates based on catch statistics presented in table 111-32 of the EIS are 9 years out dated and misrepresented by a magnitude of 2 decimal places or approximately 1 million fish The forest service would appear to **assume that the forest and commercial fishery are static entities** which is far from the truth The use of outdated and misrepresented data produce an inaccurate estimate of current forest fish production and is unacceptable Inaccurate and outdated catch statistics not only distort the fish production estimate but also the the mitigation/enhancement production and cost estimates, and the timber/fish cost benefit analysis

It is not clear how 1979 and 1980 data used in table 111-32 relate to the 1983 tables 111-30a and b The EIS also does not clarify how it expands the production level 1 estimates to develop level 11 and 111 estimates The production level descriptions reference spawning/rearing habitat, enhancement opportunities and spawner escapement variables but does not offer specifics as to how they are incorporated into expanding the production estimates Cost projections and time lines for implementing levels 1-111 are referenced to 1984 data without specifically identifying the data or the data source Without further clarification of restoration and enhancement sites or enhancement opportunities it is impossible to derive any meaning from the cost table on page 111-80 or to assess whether the proposed monies reflect realistic fish production expectations and expenditures

The Forest Service also **assume that their level 1 fish production estimate represents an acceptable level of production to use as a bench mark to evaluate the costs and benefits of the various alternatives of the plan** The fish production estimate which is unacceptable in its present form dose not address the fact that historical timber harvest activities on the forest have long been subsidized by the tribes and fishery resource interests through the degradation of instream habitat, lost fish production and lost fishing opportunity Anything short of rehabilitating the instream habitat and fish production from the forest is unacceptable

The Plan and EIS assume that the present day level 1 fish production can be maintained at a fixed threshold with minimal capital investment despite further timber harvest and road building activities Though the Forest Service acknowledges that fish production is related to instream habitat quantity and quality they fail to acknowledge that as the result of historic timber harvesting impacts, instream habitat and fish production for the Forest is and has been realistically experiencing a downward production trend This downward production trend will continue until (1) upslope impacts are minimized and rehabiltiated through comprehensive watershed treatment and (2) instream habitats are afforded the time to stabilize naturally or through a significant investment of rehabilitation and enhancement effort and money The EIS identifies 33,000 dollars per year for the entire forest to manage existing habitat for the purpose of maintaining level 1 fish production This level of dollar commitment is a token gesture considering that the forest is comprised of 66 different watersheds and that instream and fish production is experiencing an overall production decline Realistically, a capital commitment of $300,000 for enhancement, mitigation and rehabilitation activities to maintain fish production at current levels in the Forest would be extremely conservative

Essentially, the information that is provided in the Plan and EIS regarding fish production represent a best guess that is not based on currant or accurate data The Plan and EIS are held together with assumptions that do not reflect a realistic estimate of Forest fish production, enhancement/mitigation opportunities, or cost analysis and completely disregard rehabilitation opportunities Extensive commercial fish harvest data is available and the forest service needs to redevelop the forest fish production estimate using a larger, updated and accurate data base With a more realistic fish production estimate in hand, fish production related mitigation, enhancement, rehabilitation, budget and cost/benefit analysis will also need to be redeveloped It would also be beneficial to compare a number of different years of commercial harvest data to develop a fish production trend analysis for the Forest

MITIGATION/ENHANCEMENT

The Forest Service **assumes that mitigation and enhancement opportunity will offset future timber harvest impacts and will account for a 3 fold increase in fish production in 7 of the 10 proposed alternatives** It is our opinion that the Forest Service is offering mitigation/enhancement activities as an unrealistic panacea for future timber harvest related impacts The Plan and EIS fail to clearly define and identify specific enhancement/mitigation structures and techniques Page IV-26 in the EIS states that some timber harvest impacts will be mitigated through fish habitat improvements for each of the alternatives that project a 3 fold increase in fish production If mitigation and enhancement will account for only <u>some</u> of the impacts, it is not clear what will offset the remaining impacts or what will account for a 3 fold increase in fish production

Fish production estimates for enhancement/mitigation opportunities are developed without providing supporting evidence to justify the effectiveness of these opportunities to produce fish We assume, which we must since we are given so little information, that fish production estimates for mitigation/enhancement opportunities are linked to the forest fish production estimate which is based on inaccurate and outdated catch statistics presented in table III-32 of the EIS If this is the case, then enhancement/mitigation fish production estimates are unacceptable and effectively distort mitigation and enhancement benefits The Forest Service has also grossly underestimated the costs of implementing effective instream habitat and fish production enhancement/mitigation activities Though not addressed in either the Plan or the EIS, the annual funding for mitigation

and enhancement activities are subject to the whim and ax of the political climate in Washington D C and can not be guaranteed Though based on the historical priorities of the Forest Service, funding for timber harvest activities are almost certainly assured

The mitigation/enhancement panacea offered in the Plan and EIS to offset timber harvest related impacts to instream habitat and fish production are empty gestures of unsubstantiated good intention that offer the people of the Nooksack Tribe little assurance that the fisheries resources will not continue to subsidize timber harvest activities Without an adequate data base to substantiate the effectiveness of mitigation and enhancement opportunities and offset timber harvest impacts to instream habitat and fish production, the Nooksack Tribe feels is it imperative that the Forest Service develop a worst case scenario, specifically define mitigation and enhancement opportunities, effectively evaluate the fish production capabilities of these opportunities, develop a updated fish production estimate for the forest based on accurate and multiple year catch statistics, and redevelop a realistic budget for sustaining levels 1-3 fish production To assure that the instream and fish resources of the forest are afforded adequate protection, enhancement and management, we recommend that the forest service guarantee a fixed percent, ie 10%, of the gross timber harvest revenues from the Mt Baker-Snoqualmie National Forest be designated for the implementation of fisheries resource management, protection and enhancement We also suggest that the Forest Service change the KV law so that mitigation funds can target projects within the same basin but beyond 200' of the actual timber sale

The Plan and EIS also do not address rehabilitation opportunities or acknowledge that past timber harvest activities have caused a significant decline in fish habitat quality, quantity and production The Plan and EIS essentially sweeps the past under the carpet without accepting responsibility for declining fish production The current level of fish production as stated earlier, is an unacceptable bench mark by which to evaluate the success and failure of Forest resource management In our estimation, the fisheries and instream resources of the Forest have not been responsibly protected and what has been offered as mitigation and enhancement does not begin to amend the impacts of past harvest activities We therefore strongly recommend that the Plan acknowledge its legal management responsibilities by identifying rehabilitation opportunities, strategies and budget commitments towards this end

Anadromous fish mitigation, enhancement and rehabilitation funds should also target projects in areas above anadromous zones as well as anadromous zones Impacts to upland slopes and stream reaches clearly impart significant influence upon the downstream anadromous areas Hence the definition of cumulative effect To limit rehabilitation, mitigation and enhancement efforts to downstream anadromous reaches, which is the currant mainstream policy of the Forest Service, projects become band-aid efforts which deny the holistic nature of the watershed and offers little in the way of long term benefits

J-647

FISH PROTECTION

Increasing the sediment input into a stream environment has been shown to have a direct negative effect on the ability of the instream habitat to support fish **Sediment related impacts are side stepped through the basic assumptions of the Plan that further timber harvest and road building activities will not decrease fish production and that sediment impacts to instream habitat and fish production will be offset by mitigation/enhancement opportunity** Sediment yield tables IV-1, IV-3, and IV-6 are developed in the EIS in relation to timber harvest and road building activities though the background levels are mis-leading The natural background levels should be the same for all alternatives in that they reflect a snap shot estimate and do not incorporate the proposed harvest levels for each of the alternatives To accurately assess sediment impacts, it is imperative that a clear background estimate be redeveloped

The sediment impacts in relation to fish production are not clearly addressed or analyzed in the Plan or EIS and for all intent and purpose, are sidestepped via water quality protection under the Clean Water Act of 1977 Though the Clean Water Act in combination with a 1979 Memorandum Of Understanding with the Wa St Dept of Ecology is designed to maintain existing populations of resident and anadromous fish, it dose not address long term sediment related instream habitat degradation or slide/debris torrent type impacts Consequently, instream habitat and fish production data would support that both resources are declining despite the good intentions of the Clean Water Act and the U S Forest Service It would be very beneficial to have state and tribal fisheries representatives participate in the periodic BPM's review process

Sediment yields are developed and averaged for the entire forest which make it impossible to assess the impacts of proposed timber sales and road building to specific basins It would be beneficial to breakdown background sediment inputs and proposed harvest/road sediment inputs by watershed This would facilitate a watershed by watershed analysis and offer greater protection for those basins already severely impacted

MONITORING

Monitoring is essential to the effective implementation of the Forest Plan and to ensure that the Forest is achieving the desired goals and objectives Though the plan outlines an effective monitoring and data collection strategy for evaluating changes to instream habitat and fish production, it fails to identify or detail a monetary or manpower commitment to this end The plan will represent nothing more than words on paper and hollow assurances without a commitment to implement effective monitoring and data collection It is discomforting and naive to assume that the existing staff and budget resources of the Service will be able to effectively absorb the monitoring and data collection responsibilities that are prescribed in the Plan and that are essential to the responsible management of the natural resources of the Forest The Nooksack Tribe feels that it is important for the Plan to

identify and detail the budget and manpower necessary to implement the prescribed monitoring strategy and that the funds be a guaranteed element of the Forest Service operational budget and not subject to the ax of political whim We also feel it is essential that the Forest Service commit a significant effort towards evaluating and monitoring the fish production effectiveness of the proposed enhancement structures and opportunities Without fish production data for enhancement activities, mitigation becomes an empty yet familiar promise

CONCLUSION

It is our opinion that the forest plan and EIS are based upon and supported by unsubstantiated assumptions that do not realistically characterize the full potential and magnitude of past and future timber harvest activities upon the other natural resources of the forest In our review of the plan and EIS, fish, water quality, and instream habitat resources are consistantly addressed through assumptions built upon assumptions that do not accurately reflect existing or potential timber harvest impacts and that are developed from a limited and misrepresented data base Timber harvest related impacts are minimized, a best case scenario developed and instream resource concerns sidestepped through hollow offerings of protection and mitigation based on ill defined enhancement techniques and monitoring efforts contingent on tenuous and unrealistic funding commitments To derive any measure of assurance that fish and instream resources will receive a significant measure of protection, a tremendous leap of faith is necessary to bridge the gap between assumptions/best case scenario and reality The Nooksack Tribe is unable to make so great a leap of faith

Sincerely,

Brian W Williams

Brian Williams
Nooksack Biologist

cc
Dave Schuet Hames - Lummi Tribe
John Hollowed - NWIFC

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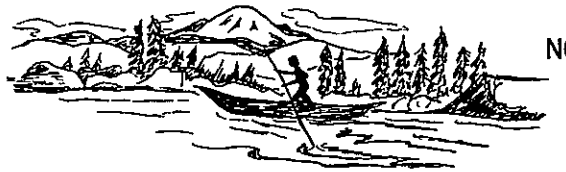

NOOKSACK INDIAN TRIBE
P O Box 157
Deming Washington 98244
Telephone (206) 592-5176

April 29, 1988

U S. Forest Service
Mt. Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, WA 98104

RE: MANAGEMENT PLAN

Gentlemen:

This letter is Comment on Cultural Resources.

We take issue with the inconsistency of the cultural resource goals and activities outlined in the Preferred Alternative, with the interpretation of the American Religious Freedom Act, with the issue of the misunderstanding of the impacts concerning the Preferred Alternative on cultural resources. We take issue with the misunderstanding of the impacts of the Preferred Alternatives of the tribal community We take issue on the incomplete assessment of the future needs for cultural resources and with the incompetency of the agency to respond to Indian use.

We support the Lummi Business Council letter to you, dated April 28, 1988, regarding cultural issues.

We'd like to recommend that the Forestry Service suspend forestry activity in identified Nooksack cultural use sites and resources.

Sincerely,
NOOKSACK INDIAN TRIBE

Mickey Roberts

Mickey Roberts, Historian

J-649

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Samish Indian Tribe
OF WASHINGTON
May 2, 1988

Mount Baker-Snoqualmie National Forest
Supervisor's Office
1022 First Avenue
Seattle, WA 98104

Re: DEIS and Proposed Forest Plan

The Samish Tribal Council is appreciative of the efforts of USFS employees Jim MacDonald, Larry Hudson and Ron Quilliam in discussing the various proposed plans with us.

As Indian people desirous of maintaining as much of the existing spiritual and cultural-use as possible, the concensus of the Samish Tribal Council is no-change. We believe none of the plans address the co-management of the Western Red Cedar as well as the Douglas Fir. We are gravely concerned that the limited old growth Cedar is threatened; after all, a 2 x 4 can be made from any tree. If forced to select a plan, Alternative "C" is preferable to the others.

The recent U.S. Supreme Court decision denying the Northern California Native American Religious and Cultural usage designations is disastrous to the type of working relations the Samish Indian Tribe and the Mount Baker-Snoqualmie National Forest personnel have experienced. It is regretable that the high court reversed the first lower court to rule in favor of the Natives. We again must express our oft-repeated declaration that the United States' Constitution does not include Indian people nor was it intended to. Such decisions does not bode well for any of the citizens of the United States. We truly are concerned.

Thank you for the opportunity to comment; we hope our input will not be ignored.

Respectfully,

Margaret Greene
Margaret Greene
Chairman

C. J. Cagey
C. J. Cagey
Vice-Chairman

Mary McDowell Hansen
Mary McDowell Hansen
Secretary

Catherine Tally
Catherine Tally
Council #2

MAILING ADDRESS P O BOX 217 ANACORTES, WA 98221 OFFICE 708 COMMERCIAL AVE / (206) 293-6404

10,191

THE TULALIP TRIBES

6700 TOTEM BEACH ROAD
MARYSVILLE, WA 98270
653-4585

Board of Directors:
Stanley G Jones, Sr *Chairman*
Bernard W Gobin *Vice-Chairman*
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Roy E. Hatch *Member*
Clarence H Hatch, *Executive Director*

The Tulalip Tribes are the successors in interest to the Snohomish Snoqualmie and Skykomish tribes and other tribes and bands signatory to the Treaty of Point Elliott

Doug MacWilliams, Forest Supervisor
Mt Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, WA 98104

May 2, 1988

RE Comments of the Tulalip Tribes on the Mt Baker-Snoqualmie Forest Plan and Draft Environmental Impact Statement

Dear Mr MacWilliams,

The following constitutes the comments of the Tulalip Tribes to the Mt Baker-Snoqualmie Forest Plan and Draft Enviromental Impact Statement (DEIS) The Tribes appreciate the opportunity to review and comment on this Plan and DEIS The Forest Service Plan and accompanying DEIS propose management practices which impact tribal rights and resources reserved to the Tribes as signatories to the 1855 Treaty of Point Elliott and affirmed by the courts in several cases, most notably U S v Washington, 520 F2d 676 (9th Cir 1975), aff'g 384 F Supp 312 (W D Wash 1974), cert denied, 423 U S 1086 (1976)

The Tulalip Reservation is sited between the mouths of two major river systems which flow from the Mt Baker-Snoqualmie National Forest (MBS) These rivers, the Stillaguamish and Snohomish, have major portions located within the forest The portions of these rivers which are within the forest provide most of the fish and wildlife habitat which is relatively undisturbed when compared to habitat found in downstream areas which are either owned by the state or private interests

The MBS is a valuable resource to our tribal members for a variety of reasons The Forest plays an important role in providing critical spawning habitat for anadromous fish originating in the MBS, particularly natural stocks, to which the Tulalip Tribes have a treaty reserved right to harvest The Forest also provides habitat for wildlife which are hunted by tribal members for both cultural and subsistence uses Moreover, in addition to providing opportunities for gathering, the Forest is utilized by tribal members carrying out traditional religious practices as they have since before the Pacific Northwest was settled by non-Indians

Because the Mt Baker-Snoqualmie Forest is crucial to fisheries constituting a primary economic resource to tribal members and to perpetuating cultural practices and values as reserved by treaty, the Tribes are deeply concerned about management practices the Forest Service proposes for the area. As a Federal Agency, the Forest Service is obliged to carry out its federal trust responsibility to protect and preserve treaty rights Without specific Congressional mandate otherwise, federal agencies must act to safeguard treaty rights See Kittitas Reclamation District v Sunnyside Valley Irrigation District, 763 F 2d 1032 (9th Cir 1985), and Nance v EPA, 645 F 2d 701 (9th Cir 1981)

GENERAL COMMENTS

The Mount Baker-Snoqualmie Forest Plan and DEIS with accompanying Appendices is composed of hundreds of pages of plannning information collected over a period of 8 years by MBS staff The very size of the document makes it next to impossible for detailed review and comment unless the reader selects just a few sections to concentrate on While impressive in size, the document contents are disappointing in several respects. Two things are evident the lack of data from which to develop a coherent plan for the managing the resources of the MBS, and the lack of data used to generate the Plan Alternatives which is relevent to the Mt Baker-Snoqualmie Forest

The Forest Service acknowledges its paucity of information in its proposed plan For example, the plan designates information needs on timber such as an inventory of old growth, and an inventory of riparian habitat Plan at 2-19 Despite having acknowledged a need for inventory data in these areas, the Forest Service plans to release timber sales for old growth and conduct timber harvesting activities in the riparian zone It would seem logical that in order to adequately assess the impacts of timber harvest activities and plan wisely these inventories would be crucial

Of primary concern to the Tribes is the impact of harvesting activities to fish and fish habitat The Plan indicates gross data gaps with respect to a section entitled Fish-Water-Riparian Plan at 2 21 The Forest Service lacks complete stream surveys, an inventory of anadromous streams, instream flow impacts model, assessment of fish production capability linked to habitat improvements and more These data needs are critical if the Forest Service hopes to achieve its standards and specific management directions of maintaining habitat for viable populations of fish See DEIS at II-11

Throughout both the Plan and the DEIS the Forest Service announces its dedication to preserving fish habitat The Forest Service will "[p]rotect, enhance, and provide for desired levels of anadromous and resident fish habitat " Plan at 4-2 It recognizes that "[a]ll the Forest resource activities, timber management activities and road construction, reconstruction, and operation potentially have the greatest effect (direct and cumulative) on fish and fish habitat (on and off the Forest) Because of this, the protection, mitigation, and restoration of

J-650

Plan at 4-41 The Forest Service cannot achieve this goal without the information that they acknowledge they lack

The information the Forest Service uses to develop and assess its planning alternatives is in many cases neither unique nor relevant to the Mt Baker-Snoqualmie Forest Frequently, supporting data constitutes general literature searches which are not geographically relevent to the MBS

FISH

Existing Conditions

The description of existing status of anadromous fisheries resources is misleading, incomplete, inaccurate, and does not provide a sound basis for impact analysis Specifically, we have the following comments,

The DEIS makes broad generalizations regarding the status and production of fisheries resources from the forest DEIS Table III-30a Fisheries production figures are presented for the forest as a whole This presentation indicates that no analysis was done on the status of fish production within the individual major drainage basins within the forest

Salmon and steelhead runs are managed based on the status and escapement needs of their river of origin By providing figures for the entire forest, it makes it impossible to determine how the figures were calculated and whether or not they accurately represent current figures

The salmon production figures are based on one years data (1983) This data does not appear to be consistent with our information and is not representative of production currently

Table III-32 is based on a list of assumptions which are incorrect rendering any analysis based on it highly erroneous and result in the undervaluation of the Forests fish resources

* The value per pound of fish, either commercial or sport harvest are low by at least 50%

* This table uses 1979 WDF and WDG data Finalized harvest data is available within one year of the fishery 1979 data is unrepresentative and underestimates current harvest, particularly by Indian commercial fishermen Either WDF, WDG, or the Tribes can provide much more current data

* This table uses total catch off the Washington coast The correct number to use would include off Alaska, Canada, Oregon and Washington as well as inside Puget Sound harvest These numbers represent total harvest and run sizes and are easily available for any recent fishing year The value used underestimates fisheries production

* This table assumes 15% of these fish are produced by natural production Table III-30a uses a 30% figure. See DEIS III-78 Why is there a difference in these two estimates?

* Applying a 30% rate for estimating natural production is inappropriate for the MBS and causes natural production to be under estimated While the 30% may be accurate for the entire Puget Sound, the MBS contains the only three river systems which are managed for all species for natural production Two of these are the Snohomish and Stillaguamish We believe the other is the Nooksack The MBS therefore contains a disproportianate amount of natural production

* This table also states that only 5% of the Indian harvest is due to natural production This figure is not supported with data in the document We estimate a majority of fish caught by Tribes residing on or near rivers originating in the MBS are to naturally produced How was your percentage calculated?

The management structure for anadromous fish is not accurately described and omits any meaningful discussion of the tribale role Since 1974, the Treaty Tribes of Washington have been co-managers of fisheries resources with the State Currently the management of salmon is governed by a court ordered Puget Sound Management Plan which was drafted by the Tribes and negotiated with the State Further management directives have been imposed by the U S -Canada Salmon Interception Treaty between the United States and Canada This Treaty mandates a rebuilding of salmon and steelhead runs during the next ten years It also has the effect of increasing the importance of Puget Sound produced salmon to the Indian and non-Indian fisherman within Washington state This management structure has been put in place in the years since 1979, the year used for fish data in many tables The effect of this is that Indian and non-Indian harvest is underestimated and under valued

We also believe that the U S /Canada Treaty binds the federal government to a commitment to rebuild depleted salmon stocks within Washington state

The description of demand for fish makes no mention of the Tribal dependency on anadromous fish for commercial, ceremonial, and subsistence needs Fish harvested under federally recognized Treaty rights are the major source of income to the Tribes of Puget Sound, including the Tulalip Tribes DEIS at III-74

We further question the estimate that 50% of the natural production occurs off forest We believe that steelhead, coho and chinook production in Forest Waters is higher than cited by

J-651

the DEIS As previosly mentioned the forest contains a majority of the habitat which could be considered relatively natural How was this percentage estimated? This estimate is not supported by any data we have been able to obtain from MBS staff

The text, and Table III-30b, refers to overfishing and other management problems which are not under the control of the Forest Service but which are affecting production DEIS at III-79 This analysis does not appear to be supported by any data and does not take into account actual management conditions

Impacts to Fish

The analysis of impacts from each alternative to fish resources is again erroneous and contrary to any reasonable scientific conclusion See Chapter IV Specifically the analysis assumes the MMR's will prevent all significant impacts to fish resources This is evidenced in Table IV-18 and throughout the text DEIS t IV-60 and accompanying text There are numerous studies documenting the effects of timber harvest and road building activities on fish resources In fact the DEIS admits that increased sediment effects fish production and that the alternetives identified will affect sediment production See soils section, DEIS at IV-5 Why are these impacts not reflected in the fish production figures?

In addition, Forest Service studies on other forests have documented the increase of sediment production, debris torrents, and road failures, as well as the resultant decrease in fish production caused by forest management activities The DEIS fails to make any attempt at quantifying these impacts to fish resources

Please provide references for any supporting information you might have on this question

The Forest Service hopes to mitigate impacts to fisheries and fish habitat resulting from timber practices through implementation of an enhancement program Neither the Plan nor the DEIS adequately describe the enhancement measures the Service intends to use It is evident from the planning documents that enhancement measures are expressed solely in terms of monetary investment levels For example in the comparison of Alternatives the DEIS states that the " [d]if-ferences between alternatives are a function of investments in habitat improvements a higher level of investment and more restoration/enhancement results in more available fish " DEIS at II-64 There are several difficulties with expressing enhancement options solely by the level of investment made, not the least of which is the uncertainty of achieving funding from Congress

More importantly, the success of Forest Service mitigation measures does not bear a direct correlation to the amount of money spent In fact, the Forest Service admits that it lacks knowledge of the adequacy of its mitigation measures Mitigation is premised in part on the Service's assumptions about fish habitat which are based upon some undescribed "Fish Habitat Capability Index " Yet in the Plan one of the critical information needs expressed by the Forest Service is validation of the Capability Index model accuracy Plan at 2-22

The National Environmental Policy Act of 1970 (NEPA), 42 U S C 4321 et seq requires more than simple assertions that the planned mitigation techniques are effective Courts, particularly in the Ninth Circuit, have repeatedly made it clear that an agency cannot rely on undocumented or general assertions of the effectiveness of mitigation measures See Methow Valley Citizens Council v Peterson, 833 F 2d 810 (9th Cir 1987), Northwest Indian Cemetary Protective Association v Peterson, 565 F Supp 586 (N D Cal 1983) affirmed in part, vacated in part, 795 F 2d 688 (9th Cir 1985) cert granted on another issue 107 S Ct 1971, National Wildlife Federation v U S Forest Service, 592 F Supp 931 (D Or 1984), affirmed in part, vacated in part 801 F 2d 360 (9th Cir 1986) See also, The Steamboaters v FERC 759 F 2d 1382 (9th Cir 1985), rehearing denied 777 F 2d 1384 (1985) (Federal Energy Regulatory Commission), Oregon Natural Resources Council v Marsh, 820 F 2d 1051 (9th Cir 1982) (Corps of Engineers)

The impact analysis indicates that the only factor affecting fish production on the Forest is the amount of dollars spent on rehabilitation DEIS at II-64 We are unaware of any scientific studies which could support this conclusion On the contrary, many if not most of the studies done to date have failed to analize or document increased overall production While we do not wish to infer that these activities should be discontinued, we believe that much further work needs to be done, particularly in the area of pre and post construction monitoring before any claims such as those made in the DEIS could be substantiated

How were these production gains (Table IV-18) calculated? DEIS at IV-60

How was it determined where these enhancement projects would be located?

How was the basin by basin resource need for these projects determined?

Please provide documentation on the detailed location and construction methods regarding the proposed enhancement structures as well as any documentaiton you have regarding their effectiveness and longevity

The document makes no attempt at analyzing basin specific effects of forest management activities on fish runs We are

particularly concerned about areas such as the South Fork Stillaguamish, Canyon Creek, and Deer Creek which have a history of severe impacts from logging and road building These areas contain highly unstable soils, steep terrain, and high rainfall They also contain discrete fish runs which must be managed as such The runs within these areas are considered depressed, but largely to environmental conditions and often constrain mixed stock fishery management In addition, substantial amounts of time and money have been spent in recent years to rehabilitate these runs

How were sensitive areas such as these considered and why are they not reflected in the analysis of the impacts of each alternative?

No worst case analysis was done for any alternative As previously mentioned the DEIS assumes 100% success at protecting fish resources using MMR's This is both outside the realm of any prior experience and does not allow for the NEPA required worst case analysis NEPA requires that the worst case scenario be explored when critical data gaps occur We believe this is clearly the case here Why was no worst case analysis done?

Cumulative Effects

The Forest Service includes a section discussing cumulative impacts for Forest resources as required by NEPA However the cumulative impact analysis is deficient in several respects

The cumulative impact of the Mount Baker-Snoqualmie Forest Plan on the Mount Baker-Snoqualmie Forest is never addressed The impacts analyses are not specific to the MBS or the MBS Forest Plan All of the analyses are theoretical, being extrapolated from results of studies which may bear no direct relevancy to the MBS See DEIS at IV-21 to 23 and IV-64 to 66

The Planning documents do not address the cumulative impacts of Forest activities when combined with other actions adjacent to Forest lands While the Forest Service admits that there are potential impacts to Forest resources from off Forest activities, other non-Forest activities are not assessed See DEIS at IV-64 to IV-65 These potential impacts must be discussed See, National Wildlife Federation v U S Forest Service, supra

Meaningful cumulative impacts analyses were not performed for fish or water resources We can find no calculations regarding how forest activites combine with off forest activities to effect fish populations As mentioned in the DEIS, most watersheds which form on the MBS have substantial areas outside the forest How were activities off the forest considered and quantified in the DEIS and Plan?

Within the brief discussion concerning cumulative effects, there is mention that woody debris from timber harvest can benefit the spawning habitat of salmonids DEIS at IV-61 This statement is misleading Debris introduced from logging is usually too small to be stable and almost never still attached to its root wad Large stable debris which is still attached to its root wad is usually introduced in natural, unmanaged riparian areas

CULTURAL AND RELIGIOUS SITES

General Comments on the Cultural Resource Inventory of 1981

The Forest Service conducted an "Inventory of Native American Religious Use Practices, Localities and Resources" for the MBS for which tribes and tribal groups were interviewed as to location and usage of MBS lands Although the Tulalip Tribes participated in this Inventory, there were other tribes which did not participate The Inventory is therefore incomplete and efforts to update it should be made

In addition to incomplete participation, the Inventory was completed in 1981 The Inventory is old and probably incomplete even as to those who participated It has not been until more recently that many tribes and tribal groups have been willing to come forward with this type of sensitive information Indeed, this type of information is still a well-guarded secret to some Assurances of confidentiality undoubtedly played a role in eliciting much of the information contained in the Inventory Does the Forest Service intend on updating this Inventory?

Consultation Process Between Tribes and the Forest Service

There area several other ares of concern raised by the planning proposal for dealing with impacts to cultural and religious sites First, no planning element adequately describes the consultation process that the Service intends to employ when activities threaten to damage or destroy culturally significant sites See Plan ata 2-4, 2-21, 3-4, 4-45 and DEIS at II-109 For example, does the Forest Service have a process in place for identifying and contacting the appropriate tribe when a site is threatened? Does the Service have a process in place for dealing with sites which are discovered through Forest management activities which have not been formally identified in the Inventory?

Distinction between Indian and Other Cultural Resources

Throughout the Plan documents the Forest Service makes a distinction between "Cultural and Historic Properties" and "American Indian Religious and Cultural Uses" The section on "Cultural and Historic Properties" deals with archaeological resources Under the regulations promulgated pursuant to the Archaeological Resources Protection Act of 1979, 16 U S C 470 aa-11 (ARPA) archaeological resources are defined as "any

material remains of human life or activities which are at least 100 years of age, and which are of archaeological interest " 36 CFR Part 296 3 (a) Undoubtedly many of the sites managed under this section are of Indian origin

While the Plan acknowledges that some of these locationsare of Indian origin this planning element completely ignores the role of the tribes in its consultation process when the Plan states that "[a]ll actions affecting cultural resources will be implemented only after consultation with the State Historic Preservation Officer and Advisory Council on Historic Preservation " Plan at 4-44 The Forest Service intends to use the consultation process to identify alternatives to deal with sites which may be affected The tribes must be included in this process

In discussing the process goals of the Cultural and Historic Properties element the Forest Service states that one of the primary aims is to increase "interpretation of cultural resources " The goal of "interpretation" is to make information more accessible to the public through interpretive facilities, videos and publications There should be more emphasis on preservation than appears in the Plan goals

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There has been a long standing and well publicized debate between tribes and archaeological about how these resources should be treated Tribes often favor leaving an area undisturbed The plan diminishes this alternative Is this an alternative which will be considered and used by the MBS?

Addressing Impacts to Religious and Cultural Areas

The Plan indicates that mitigation measures will be employed to minimize Forest activities on religious and cultural use areas These mitigation measures are not illuminated in the Plan. See Plan at 2-21 and 3-4

There are some disturbing indications as to what some of the mitigation measures are Both the Plan and the DEIS refer to identifying sites which are "best suited" or "most appropriate" for a particular use See Plan at 2-21 In the Ten Year projection the Forest Service states that "[l]ess area will be available for American Indian religious and cultural uses, however, such uses will continue Some users may have to shift locations of spirit and vision questing activities, or find new localities for collecting ceremonial flora " Plan at 4-7
Page 5

Both the Judgement value characterization of site suitability and the suggestion of shifting use sites evidence a startling lack of sensitivity on the part of the Forest Service to tribal cultural needs It is obvious that the Forest Service expects to identify suitable or appropriate alternative locations for tribal members to shift their use to once Forest activities have adversely impacted current use sites This type of treatment is inappropriate when planning Forest activities around these types of sites

The suggestion that one site is Just as good as another for a particular use makes clear that the Forest Service fails to comprehend the meaning tribes attach to these sites Some locations have been utilized over an historic period of time, sometimes the location being passed from generation to generation In many cases, the site itself contains many qualities which make it unique and irreplaceable

Old Growth and Gathering Sites

Gathering is an activity which is secured for the benefit of the Tulalip Tribes in the Treaty of Point Elliott Sites traditionally used for gathering roots berries mushrooms and other flora therefore need particularized consideration by the Forest Service These sites are often immutably altered by Forest activities

Neither the Forest Plan nor the DEIS make mention of how sites discovered during Forest activities will be treated The planning documents only make mention of sites which are identified in the Inventory Can you please describe how these areas will be treated

The Forest Plan and DEIS discuss options with regard to harvest of old growth Old growth provides habitat for several varieties of flora which are found only in old growth areas and are gathered by tribal members

The Forest Service notes that the MBS is perhaps one of the last locations in the Puget Sound area which contains significant old growth acreage Plan at 3-3 The MBS planning documents also indicate that old growth timber production will be almost exclusively on Forest Service lands Plan at 2-15 This is cause for concern because the Forest Service makes harvest projections for cutting almost all of the old growth over a period of years based upon the assumption that "there is sufficient old growth timber in the Forest to maintain the LTSYC until younger age classes can maintain the yield indefinitely " Plan at 4-30

Based upon planning intentions expressed in both the Plan and the DEIS, the Forest Service intends to cut virtually all of the old growth remaining in a Forest which they admit contains almost all of the remaining old growth in the Puget Sound area
Page 6

The opportunities for tribal members to practice their religion and gather traditional materials unique to old growth forests will be gone The prospect of handing down a legacy is very dim

given these Planning objectives

SOILS

The Forest Service is obligated to prevent harvest impacts to fish habitat under the National Forest Management Act 16 U S C 1604 et seq The Service must insure that timber is harvested from the Forest only where "soil, slope or other watershed conditions will not be irreversibly damaged [or] protection is provided other bodies of water from detrimental changes in water temperatures, blockages of water courses and deposits of sediments where harvests are likely to seriously and adversely affect water conditions of fish habitat " 16 U S C 1604 (g) In order to comply with the legal mandate the Forest Service must conduct a soil survey and tailor harvest management practices accordingly

The Forest Service conducted a soil survey in 1972 The soil survey techniques are not described in the DEIS While soil composition may not have changed since the survey was conducted, new information regarding impacts of various activities should be available to update the generalizations made from the survey

The soils survey of the northern half of the MBS is frightening

* "High precipitation and steep slopes plus weakly structured soils in these areas have resulted in a high potential for surface erosion " DEIS at III-6

* " [D]eep unstable colluvial soils occurring on steep toeslopes and midslope drainages " DEIS at III-7

* "Combined with highly weathered bedrock, steep slopes and subterraneous water, the soils in these areas are very unstable Deep-seated mass movement occur even on virgin landscape " DEIS at III-7

* "The natural instability is caused by a combination of steep slopes, fine textured "plastic" subsoils, wet weather and subterraneous water Slumps and slope failures with resulting sedimentation to streams (and damage to fisheries and other resources) have occurred in virgin landscapes, the problems are accelerated with roading, logging or other disturbances " DEIS at III-7

In light of these disturbing characteristics of the northern half of the Forest, the staff opinions regarding timber harvest impacts to fish and fish habitat, and the legal requirements of the NFMA, the Forest Service must implement management practices which protect against these impacts The MMR's described for the soilresource are extremely general and do not appear adequate to prevent significant damage to aquatic resources DEIS at IV-160. How do these MMR's differ from current and recent practices?

The DEIS indicates that there are some 95 000 acres that will be withdrawn from timber harvest because of unstable soils conditions DEIS at III-9 However, 55 000 of these acres are in higher elevations which grow less than 20 cubic feet of timber per acre per year It is highly unlikely that these acres would have been cut to begin with Therefore, claims that 95,000 acres have been withdrawn from cutting because of adverse impacts to soils are misleading unfounded Moreover no management process or criteria are described which show how the Forest Service decided which acres to withdraw Is there a process which the Forest Service uses to review timber sales to determine their impact to soils? Can other acreage be added to that already withdrawn if negative impacts to soils are discovered?

WILD AND SCENIC RIVERS

We would like to support the consideration of those rivers identified as candidates for Wild and Scenic status See Plan at Appendix E However, we request that the South Fork Stillaguamish be added to this list for several reasons

* It possesses outstanding fisheries, wildlife, and water quality resources Contrary to the description, this area receives very high recreational fishing pressure and is a critical salmonid production area for the Stillaguamish River basin

* It contains outstanding and unique scenic qualities This is evidenced by it's extremely heavy recreational use

* Is an important cultural area

PLANS AND POLICIES

This section makes no mention of any of the tribal and state fisheries and water quality management plans such as the Puget Sound Salmon Management Plan, Watershed Plans, Puget Sound Water Quality Management Plan (including the Stillaguamish Early Action Plan), Timber/Fish/Wildlife Agreement (including a Stillaguamish Early Action Plan), or other regional enhancemnt plans

The U S - Canada Salmon Treaty and it's associated fish management and enhancement plans are also omitted and should be considered

The Northwest Power Act and it's associated resource management plans will also have a significant effect on the MBS's fish and wildlife resources and should be identified and discussed

All of these plans were developed with considerable input from "Indian Tribes"

HYDROELECTRIC POWER APPLICATIONS

The MBS Plan makes little mention of how it intends to address applications for small hydroelectric power development within the forest boundaries See Plan at 4-59 4-172 In fact, the Plan only mentions the number of applications pending and their current disposition

Hydroelectric power development severly impacts fish and fish habitat Many of the problems associated with proposed hydroelectric development go well beyond an instream flow issue Of particular concern are the Snohomish and Stillaguamish river basins where over 100 small hydro sites have been identified These projects present significant risks regarding slope stability and sedimentation This in turn has severe implications to water quality and aquatic resources The Forest Service should identify its policies and standards related to hydroelectric development and take an active role in the quantification of these impacts and use it's permitting authority to protect fish soils, wildlife and water quality

The Forest Service has the legal authority to require fish protection measures in any such development on Forest lands Under the Federal Power Act, 16 U S C Section 797 (e) (1982) the Secretary of Agriculture has authority to evaluate hydroelectric license applications and set terms and conditions to protect the Forest resource Under Section 4 (e) the Federal Energy Regulatory Commission (FERC) is authorized

> To issue licenses for the purpose of constructing dams or other project works upon any part of the public lands and reservations of the United States Provided, that licenses shall be issued within any reservation only after a finding by the Commission that the license will not interfere or be inconsistent with the purpose for which such reservation was created or acquired and shall be subject to and contain such conditions as the Secretary of the department under whose jurisdiction such reservation falls shall deem necessary for the adequate protection and utilization of such reservations

The Federal Power Act provides the Forest Service with authority to provide significant protection to the Forest "reservation" through attaching conditions to hydroelectric licenses Despite this clear authority, the Forest Plan makes no policy statement about how the Forest Service intends to deal with such applications and outlines no process or criteria for evaluating such applications except to "assure consideration and establishment of minimum flows " See Plan at 4-172

MONITORING

The DEIS and Plan do not discuss an adequate monitoring plan The Plan must include detailed provisions for monitoring the effectiveness of the Plan MMR effectiveness cultural resource protection measures, and fish enhancement results

CONCLUSION

While we feel it is possible for us to identify an alternative which is acceptable to the Tribe we are concerned that the fundemental data and analysis of impacts of the identified alternatives within the DEIS are so flawed as to make the DEIS highly misleading and totally inadequate for decision making purposes The Tribes recommended alternative has been selected based on our own assessment of the likely impacts of each of the proposed alternatives

We believe that Alternative G provides the neccesary protection to fisheries and cultural resources while allowing for a viable timber harvest This alternative while not perfect would provide for the future needs of forest resources and provide significant economic benefits associated with non-timber uses

We thank you for the opportunity to comment on these documents If we may be of further assistance please contact us

Sincerely
The Tulalip Tribes

Terry Williams Fisheries Director

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Mt. Baker—Snoqualmie National Forest
Forest Service USDA Pacific Northwest Region

FEIS 1990

Tentatively Suitable

SOUTH

Legend

Tentatively Suitable for Timber Production

National Forest Boundary

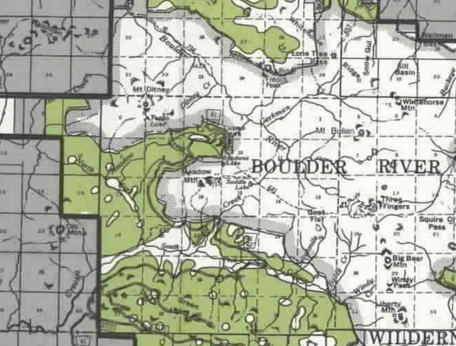
0 1 2 3 4 5 miles
SCALE

Mt. Baker—Snoqualmie National Forest
Forest Service USDA Pacific Northwest Region

FEIS 1990

Tentatively Suitable

NORTH



Legend

Tentatively Suitable for Timber Production

National Forest Boundary

0 1 2 3 4 5 miles

SCALE

Mt. Baker—Snoqualmie National Forest
Forest Service USDA Pacific Northwest Region

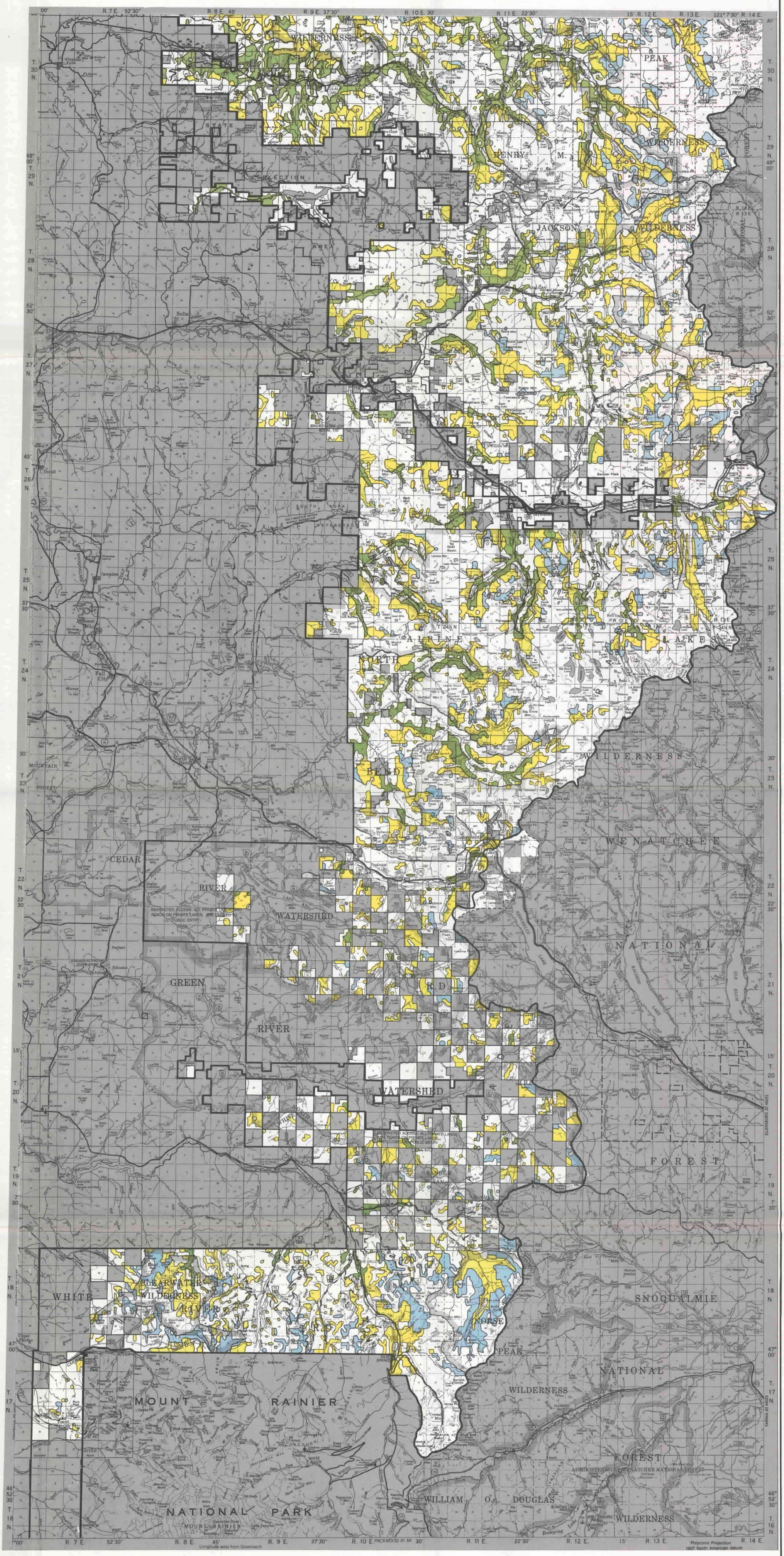
FEIS 1990

Old Growth
SOUTH

Legend

- Old Growth 0– 2500 Feet Elevation
- Old Growth 2501–4000 Feet Elevation
- Old Growth Over 4000 Feet Elevation
- National Forest Boundary

0 1 2 3 4 5 miles
SCALE



Mt. Baker—Snoqualmie National Forest
Forest Service USDA Pacific Northwest Region

FEIS 1990

Old Growth
NORTH

Legend

- Old Growth 0– 2500 Feet Elevation
- Old Growth 2501– 4000 Feet Elevation
- Old Growth Over 4000 Feet Elevation
- National Forest Boundary

0 1 2 3 4 5 miles
SCALE

Mt. Baker—Snoqualmie National Forest
Forest Service USDA Pacific Northwest Region

FEIS 1990

Wildlife
SOUTH

Legend

- Spotted Owl Habitat Area (SOHA)—Preferred Alternative Network
- Marten/Pileated Woodpecker—MR
- Mountain Goat Habitat—MR
- Suitable Owl Habitat
- SOHA Network overlapping Mountain Goat MR
- SOHA Network overlapping Marten/Pileated Woodpecker MR
- Mountain Goat MR overlapping Marten/Pileated Woodpecker MR
- SOHA Network overlapping Suitable Owl Habitat
- Suitable Owl Habitat overlapping Marten/Pileated Woodpecker MR
- Suitable Owl Habitat overlapping Mountain Goat MR
- Overlap of Suitable Owl Habitat, Mountain Goat MR, and SOHA Network
- Overlap of Suitable Owl Habitat, Marten/Pileated Woodpecker MR, and SOHA Network
- Overlap of Suitable Owl Habitat, Marten/Pileated Woodpecker MR, and Mountain Goat MR

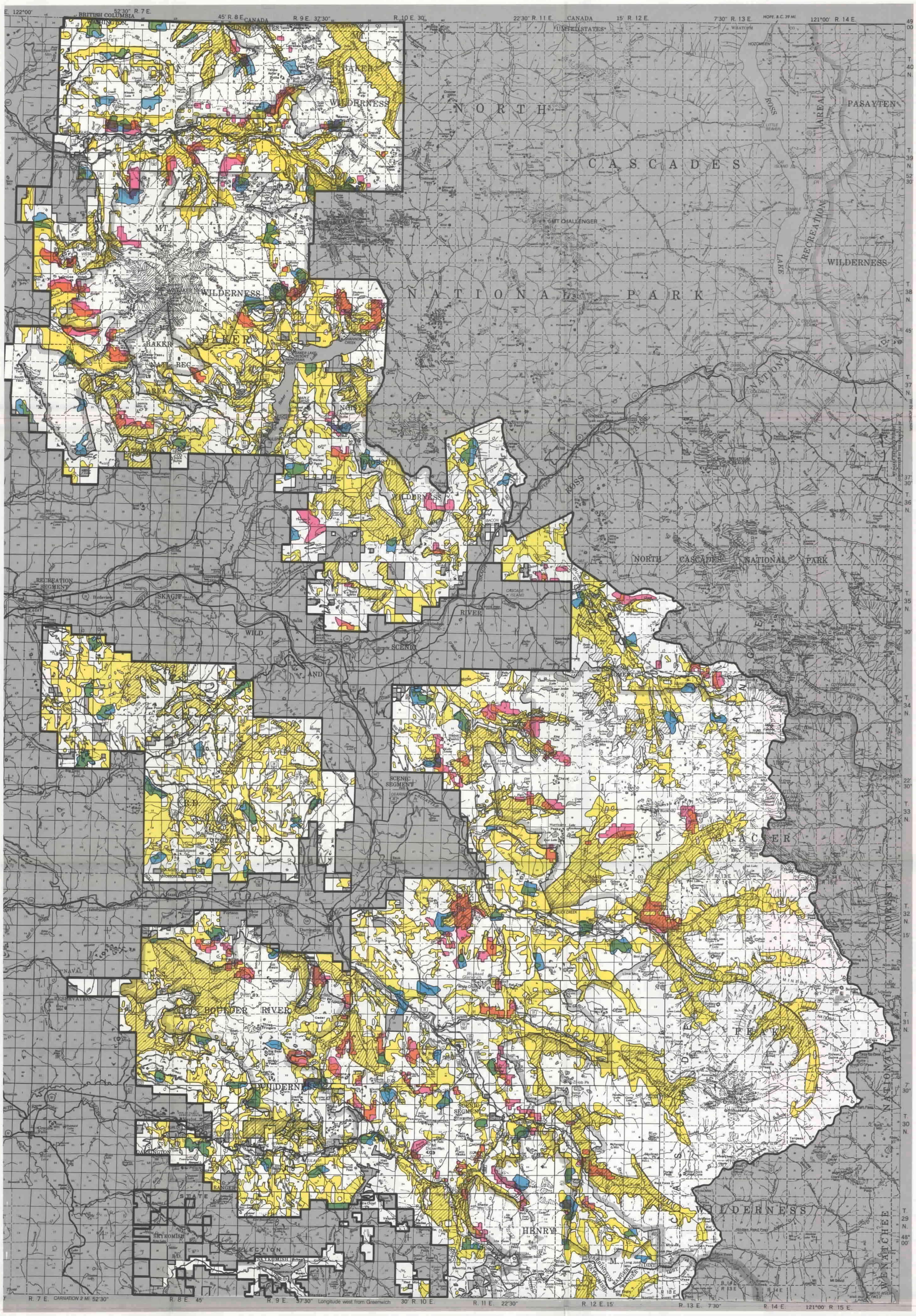
0 1 2 3 4 5 miles
SCALE

Mt. Baker—Snoqualmie National Forest
Forest Service USDA Pacific Northwest Region

FEIS 1990

Wildlife

NORTH



Legend

- Spotted Owl Habitat Area (SOHA)—Preferred Alternative Network
- Marten/Pileated Woodpecker—MR
- Mountain Goat Habitat—MR
- Suitable Owl Habitat
- SOHA Network overlapping Mountain Goat MR
- SOHA Network overlapping Marten/Pileated Woodpecker MR
- Mountain Goat MR overlapping Marten/Pileated Woodpecker MR
- SOHA Network overlapping Suitable Owl Habitat
- Suitable Owl Habitat overlapping Marten/Pileated Woodpecker MR
- Suitable Owl Habitat overlapping Mountain Goat MR
- Overlap of Suitable Owl Habitat, Mountain Goat MR, and SOHA Network
- Overlap of Suitable Owl Habitat, Marten/Pileated Woodpecker MR, and SOHA Network
- Overlap of Suitable Owl Habitat, Marten/Pileated Woodpecker MR, and Mountain Goat MR

Mt. Baker-Snoqualmie National Forest

FEIS 1990

A

Alternative A (No Action)

Brief Description of Alternative:

This is the No Action Alternative. Management of the Mt. Baker-Snoqualmie National Forest will be continued as defined by existing direction in approved management plans, updated to incorporate the NFMA requirements, and existing policies. Alternative A reflects the current level and mix of resource outputs, to the extent possible, projected into the future.

Alternative NC (No Change)

Brief Description of Alternative:

This alternative is based on the existing Timber Management Plan. This Plan was developed in 1963; it was not an integrated resource plan, and consequently did not address all resource uses and outputs. Alternative NC does not comply with all provisions of NFMA. No Management Area acre assignments were mapped for this alternative since it is not geographically based. This Alternative A map approximates the management direction for Alternative NC except for some Management Areas based on NFMA requirements. Refer to Chapter II, FEIS for a discussion of these differences.

Management Areas:

Multiple-use management will be the overall goal of the Mt. Baker-Snoqualmie National Forest. The management areas shown on this map are in response to the issues being addressed by this alternative. Many uses will occur in each management area, but one or more resources or uses will be emphasized as shown in the following legend.

A detailed description of the management prescription for each management area is found in the FEIS and Forest Plan.

Management Area	Description
1E	Areas outside of wilderness managed primarily for roadless dispersed recreation, but some roaded dispersed recreation, including ORV use, may occur. Natural habitat for wildlife is provided. No scheduled timber harvest. This prescription is used only in this alternative.
1F	Remaining parcels of the Mt. Baker Recreation Area established in 1926. The area is managed primarily for recreation and scenic values while also providing natural habitat for wildlife. This prescription is used only in this alternative.
2A	Foreground of visually sensitive landscapes as viewed from major highway corridors and use areas. A diversity of tree species and age classes is maintained with timber managed at less than full yield.
3C	Developed winter sports areas managed by the private sector through special use permits.
4	Mt. Baker National Recreation Area, established by Congress, 1984. Management emphasis is high-elevation dispersed recreation use, such as snowmobiling and cross-country skiing in the winter, and nonmotorized recreation in the summer.

Rivers with the potential for inclusion in the National Wild and Scenic River System. Until a decision is made on whether to include these streams in the System, management will protect the characteristics which make them eligible and suitable for classification.

5A	Recreation River Areas. Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.
5B	Scenic River Areas. Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines undeveloped, but accessible in places by roads.
5C	Wild River Areas. Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

These rivers that are included in this alternative are listed in the table below.

6	Skagit Wild and Scenic River. Skagit River and designated portion of tributaries managed as Recreation and Scenic Rivers in accordance with Skagit River Final Management Plan (Volume II, 1984).

Management Areas 10A, 10B, 10C, 10D, 10E are wilderness, designated by Congress and managed in accordance with the Wilderness Act of 1964.

10A	Transition areas within wilderness. In close proximity to popular trailheads and heavily used trails entering wilderness. Large proportion of day-users, mixed with overnight and long distance travelers. Frequent encounters with other users.
10B	Trailed area within wilderness. Includes all managed system trails extending beyond the transition class. Visitors must be prepared for overnight camping and outdoor living. Less frequent encounters with others.
10C	General Trailless areas within wilderness. No system trails, some user-made trails may exist. Very infrequent encounters with others.
10D	Dedicated Trailless areas within wilderness. Managed forever trailless. Obvious user-made trails are not permitted. No evidence of human use. Cross-country travel with very infrequent encounters with others.
10E	Special areas within wilderness include Congressionally acknowledged areas, areas of significant cultural or historic value, Research Natural Areas, areas with special wildlife considerations and areas with limited management options.
11	Spotted Owl Habitat Areas (SOHA's). Suitable spotted owl habitat for species that depend on or utilize old growth for a significant portion of their habitat. No scheduled timber harvest.
12	Mature and old-growth timber to provide habitat for those species (such as marten and pileated woodpecker) that depend on or utilize such forests for a significant portion of their habitat. No scheduled timber harvest.
15A	Mountain goat habitat needs emphasized, with objective of retaining viable populations. No scheduled timber harvest or new road construction.
17	Emphasis on timber management with roaded dispersed recreation also occurring. A wide range of silvicultural practices will be applied, including clearcutting, thinning and planting.

Note: Management Area 15A (Mountain Goats) Not Mapped. See Wildlife Map for location of areas where Management Area 15A (Mountain Goats) would generally occur.

Management Area	Description
18	Research Natural Areas (RNA's). Sites where natural features are preserved for scientific purposes; natural processes are allowed to dominate. No scheduled timber harvest, recreation use is not encouraged.
20A	Cedar River Municipal Watershed. Exchange all National Forest lands therein to City of Seattle. Current Direction, manage watershed in accordance with 1962 Agreement.
21A	Green River Municipal Watershed. Current Direction, manage watershed in accordance with 1984 Memorandum of Understanding. Land exchanges with the City of Tacoma will be completed. Emphasize timber management, to the extent that water quality goal is met, and dispersed recreation, primarily roaded modified.
22B	Sultan River Municipal Watershed. Current situation, with restricted watershed. Recreation limited to developed site use. Timber management allowed. Protect watershed values beyond legal requirements, maintains fish and wildlife habitat.
23A	National Forest lands in other municipal watersheds. Uses include a mix of timber harvest, modierate recreation, wildlife, and other uses, with primary emphasis on meeting water quality standards.
25B	Electronic Sites. Only Jim Creek mapped. Permits effective and economical facilities with least impact on the natural resources involved.
27	Alpine Lakes Area managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

Brief description of selected allocations:

D	Developed Site: Areas are substantially modified for campgrounds, boating, ski areas, summer home tracts, administrative sites, etc. Sights and sounds of people are evident; concentration of users is often high. Roads, trails, and parking are managed to provide access to the site, with emphasis on nonmotorized activity on the site. No scheduled timber harvest. Vegetative manipulation only for the enhancement or protection of the area.
DR	Dispersed Recreation: Managed primarily in an unroaded condition with emphasis on dispersed recreation, scenic, wildlife or other amenity values. No new road construction. ORV use permitted, depending on the ROS class. No scheduled timber harvest. The only exception is salvage harvest of catastrophic forest loss for the purpose of limiting damage on adjacent lands. Visual Quality Objective is Retention and Partial Retention. Concentration of recreation users is low; relatively minimal contact with other users. If no Alternative road access available for intermingled lands, access may be granted for a non-public minimum standard road.
GF	General Forest: Timber harvest occurs, with a full range of silvicultural prescriptions used on suitable lands. The visual quality objective ranges from Retention to Modification. Dispersed recreation sites are common; encounters between recreationists may be numerous. Motorized activities are common. Rustic facilities may be provided. Land in this allocation is generally accessible by road. Road and trail standards range from optimum, for high-volume mixed traffic, to closed after project completion.
SA	Special Area: Areas protected for their uniqueness and natural conditions, and, where appropriate, to foster public use, enjoyment, or study. Each Special Area has a specific management direction. Refer to FEIS, Alpine Lakes, 1981. No scheduled timber harvest. Roads, facilities (such as parking, picnic areas, and interpretive sites, etc.) will enhance and protect the area. Other resource manipulation, including removal of trees, will occur only for the enhancement or protection of the area.
SF	Scenic Forest: The objective is to retain or enhance viewing and recreation experiences. Developments and use in the seen area from recreation sites, roads, and trails within Scenic Forest will meet visual quality objectives. Use will be integrated with the natural landscape. Timber harvest permitted; a full range of silvicultural prescriptions will be used to meet the visual and recreational objectives.
W	Alpine Lakes Wilderness managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

Management Areas Not Mapped

3A	Existing developed recreation sites such as campgrounds, picnic areas, trailheads, boating and swimming areas. Not mapped due to small acreage.
3D	Organization camps, concession sites, and recreation residence tracts operated by the private sector through special use permits. Not mapped due to small acreage.
7	Includes selected sites and areas identified in the 1981 Inventory of Native American Religious Use, Practices, Localities, and Resources. Not mapped to protect their confidential nature. Consultation with appropriate American Indian tribes shall be conducted before initiating any field activity that may affect these areas and sites.
13	Riparian and fish habitat emphasis. The resource values in riparian areas are maintained and/or improved, with a special emphasis on water quality and fish habitat. Timber management is modified to maintain or improve riparian habitat diversity and integrity. Not mapped, due to small map scale.
16	Habitat for threatened and endangered animal species emphasized. Protect and enhance habitat to meet the recovery objectives and eventual delisting, pursuant to the Endangered Species Act. Not Mapped.
25A	Existing and potential utility corridors. (See Alternative J Map).
26	Administrative sites. Not mapped.

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- MT. BAKER-SNOQUALMIE NATIONAL FOREST BOUNDARY
- ADJACENT NATIONAL FOREST BOUNDARY
- WILDERNESS BOUNDARY
- INTERSTATE ROUTE
- U.S ROUTE
- STATE ROUTE
- 3040 FOREST SERVICE ROUTE
- 1030 FOREST SERVICE TRAIL
- PAVED ROAD
- ALL-WEATHER ROAD
- DIRT ROAD
- PRIMITIVE ROAD
- PACIFIC CREST NATIONAL SCENIC TRAIL
- OTHER TRAIL
- ADJACENT NATIONAL FOREST
- OTHER OWNERSHIP

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B

Alternative B (RPA)

Brief Description of Alternative:

The allocations and outputs in Alternative B are an attempt to meet the 1980 Resource Planning Act (RPA) targets assigned to the Forest through the Regional Guide.

Management Areas:

Multiple-use management will be the overall goal of the Mt. Baker-Snoqualmie National Forest. The management areas shown on this map are in response to the issues being addressed by this alternative. Many uses will occur in each management area, but one or more resources or uses will be emphasized as shown in the following legend.

A detailed description of the management prescription for each management area is found in the FEIS and Forest Plan.

Management Area	Description
1B	Areas outside of wilderness managed primarily to retain a semi-primitive character for nonmotorized recreational uses while also providing natural habitat for wildlife. Fairly remote, low concentration of users, no scheduled timber harvest and no roads permitted.
1C	Areas outside of wilderness managed primarily to retain a semi-primitive character for recreational uses including ORV's while also providing natural habitat for wildlife. Adjacent to roaded areas, no scheduled timber harvest and no system roads permitted.
1D	Areas managed for a variety of recreational uses in a roaded natural habitat setting while also providing natural habitat for wildlife. Timber harvest scheduled for longer rotations to meet visual quality objectives.
2A	Foreground of visually sensitive landscapes as viewed from major highway corridors and use areas. A diversity of tree species and age classes is maintained with timber managed at less than full yield.
3C	Developed winter sports areas managed by the private sector through special use permits.
4	Mt. Baker National Recreation Area, established by Congress, 1984. Management emphasis is high-elevation dispersed recreation use, such as snowmobiling and cross-country skiing in the winter, and nonmotorized recreation in the summer.
6	Skagit Wild and Scenic River. Skagit River and designated portion of tributaries managed as Recreation and Scenic Rivers in accordance with Skagit River Final Management Plan (Volume II, 1984).
8	Areas with unique scenic, historic, biological, botanic or geological features. Management emphasis and purpose is to protect and, if appropriate, foster public use and enjoyment of such areas.
	Management Areas 10A, 10B, 10C, 10D, 10E are wilderness, designated by Congress and managed in accordance with the Wilderness Act of 1964.
10A	Transition areas within wilderness. In close proximity to popular trailheads and heavily used trails entering wilderness. Large proportion of day-users, mixed with overnight and long distance travelers. Frequent encounters with other users.
10B	Trailed area within wilderness. Includes all managed system trails extending beyond the transition class. Visitors must be prepared for overnight camping and outdoor living. Less frequent encounters with others.
10C	General Trailless areas within wilderness. No system trails, some user-made trails may exist. Very infrequent encounters with others.
10D	Dedicated Trailless areas within wilderness. Managed forever trailless. Obvious user-made trails are not permitted. No evidence of human use. Cross-country travel with very infrequent encounters with others.
10E	Special areas within wilderness include Congressionally acknowledged areas, areas of significant cultural or historic value, Research Natural Areas, areas with special wildlife considerations and areas with limited management options.
11	Spotted Owl Habitat Areas (SOHA's). Suitable spotted owl habitat for species that depend on or utilize old growth for a significant portion of their habitat. No scheduled timber harvest.
12	Mature and old-growth timber to provide habitat for those species (such as marten and pileated woodpecker) that depend on or utilize such forests for a significant portion of their habitat. No scheduled timber harvest.
14	Deer and elk winter range with emphasis on improvement of habitat. Timber managed to achieve proper forage/cover ratios and distribution.
15A	Mountain goat habitat needs emphasized, with objective of retaining viable populations. No scheduled timber harvest or new road construction.
15B	Emphasis on mountain goat habitat improvement. Timber managed to achieve proper forage/cover ratios and distribution.
17	Emphasis on timber management with roaded dispersed recreation also occurring. A wide range of silvicultural practices will be applied, including clearcutting, thinning and planting.
18	Research Natural Areas (RNA's). Sites where natural features are preserved for scientific purposes; natural processes are allowed to dominate. No scheduled timber harvest, recreation use is not encouraged.
19	Mountain Hemlock Zone. Area within which study and testing of various silvicultural practices will occur, to determine if such forested areas can be classified as suitable for timber production.
20C	Cedar River Municipal Watershed. National Forest lands will be retained and not exchanged. Wildlife habitat for old-growth and other species will be maintained.
21B	Green River Municipal Watershed. Timber management emphasized to extent that water quality goal is met. Recreation prohibited except for controlled hunts and use of Pacific Crest Trail.

Management Area	Description
22C	Sultan River Municipal Watershed. National Forest lands will be retained. Open watershed, managed for full range of multiple uses.
23A	National Forest Lands in other municipal watersheds. Uses include a mix of timber harvest, moderate recreation, wildlife, and other uses, with primary emphasis on meeting water quality standards.
25B	Electronic Sites. Only Jim Creek mapped. Permits effective and economical facilities with least impact on the natural resources involved.
27	Alpine Lakes Area managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.
	Brief description of selected allocations:
D	Developed Site: Areas are substantially modified for campgrounds, boating, ski areas, summer home tracts, administrative sites, etc. Sights and sounds of people are evident; concentration of users is often high. Roads, trails, and parking are managed to provide access to the site, with emphasis on nonmotorized activity on the site. No scheduled timber harvest. Vegetative manipulation only for the enhancement or protection of the area.
DR	Dispersed Recreation: Managed primarily in an unroaded condition with emphasis on dispersed recreation, scenic, wildlife or other amenity values. No new road construction. ORV use permitted, depending on the ROS class. No scheduled timber harvest. The only exception is salvage harvest of catastrophic forest loss for the purpose of limiting damage on adjacent lands. Visual Quality Objective is Retention and Partial Retention. Concentration of recreation users is low; relatively minimal contact with other users. If no alternative road access available for intermingled lands, access may be granted for a non-public minimum standard road.
GF	General Forest: Timber harvest occurs, with a full range of silvicultural prescriptions used on suitable lands. The visual quality objective ranges from Retention to Modification. Dispersed recreation sites are common; encounters between recreationists may be numerous. Motorized activities are common. Rustic facilities may be provided. Land in this allocation is generally accessible by road. Road and trail standards range from optimum, for high-volume mixed traffic, to closed after project completion.
SA	Special Area: Areas protected for their uniqueness and natural conditions, and, where appropriate, to foster public use, enjoyment, or study. Each Special Area has a specific management direction. Refer to FEIS, Alpine Lakes, 1981. No scheduled timber harvest. Roads, facilities (such as parking, picnic areas, and interpretive sites, etc.) will enhance and protect the area. Other resource manipulation, including removal of trees, will occur only for the enhancement or protection of the area.
SF	Scenic Forest: The objective is to retain or enhance viewing and recreation experiences. Developments and use in the seen area from recreation sites, roads, and trails within Scenic Forest will meet visual quality objectives. Use will be integrated with the natural landscape. Timber harvest permitted; a full range of silvercultural prescriptions will be used to meet the visual and recreational objectives.
W	Alpine Lakes Wilderness managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

Management Areas Not Mapped

3A	Existing developed recreation sites such as campgrounds, picnic areas, trailheads, boating and swimming areas. Not mapped due to small acreage.
3D	Organization camps, concession sites, and recreation residence tracts operated by the private sector through special use permits. Not mapped due to small acreage.
7	Includes selected sites and areas identified in the 1981 Inventory of Native American Religious Use, Practices, Localities, and Resources. Not mapped to protect their confidential nature. Consultation with appropriate American Indian tribes shall be conducted before initiating any field activity that may affect these areas and sites.
13	Riparian and fish habitat emphasis. The resource values in riparian areas are maintained and/or improved, with a special emphasis on water quality and fish habitat. Timber management is modified to maintain or improve riparian habitat diversity and integrity. Not mapped, due to small map scale.
16	Habitat for threatened and endangered animal species emphasized. Protect and enhance habitat to meet the recovery objectives and eventual delisting, pursuant to the Endangered Species Act. Not Mapped.
25A	Existing and potential utility corridors. (See Alternative J Map).
26	Administrative sites. Not mapped.

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- MT. BAKER-SNOQUALMIE NATIONAL FOREST BOUNDARY
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- OTHER OWNERSHIP

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C

Alternative C

Brief Description of Alternative:

In Alternative C, nonmarket and other amenity resources such as wildlife, resident fish, and dispersed recreation are emphasized. Management for other resources will be consistent with the emphasis on amenity resources.

Management Areas:

Multiple-use management will be the overall goal of the Mt. Baker-Snoqualmie National Forest. The management areas shown on this map are in response to the issues being addressed by this alternative. Many uses will occur in each management area, but one or more resources or uses will be emphasized as shown in the following legend.

A detailed description of the management prescription for each management area is found in the FEIS and Forest Plan.

Management Area	Description
1A	Areas outside of wilderness managed primarily to retain a primitive character for nonmotorized recreational uses while also providing natural habitat for wildlife. Fairly remote, low concentration of users, no scheduled timber harvest and no roads permitted.
1B	Areas outside of wilderness managed primarily to retain a semi-primitive character for nonmotorized recreational uses while also providing natural habitat for wildlife. Fairly remote, low concentration of users, no scheduled timber harvest and no roads permitted.
1D	Areas managed for a variety of recreational uses in a roaded natural habitat setting while also providing natural habitat for wildlife. Timber harvest scheduled for longer rotations to meet visual quality objectives.
2A	Foreground of visually sensitive landscapes as viewed from major highway corridors and use areas. A diversity of tree species and age classes is maintained with timber managed at less than full yield.
2B	Middleground of visually sensitive landscapes as viewed from major highway corridors and use areas. A diversity of tree species and age classes is maintained with timber managed at less than full yield.
3C	Developed winter sports areas managed by the private sector through special use permits.
4	Mt. Baker National Recreation Area, established by Congress, 1984. Management emphasis is high-elevation dispersed recreation use, such as snowmobiling and cross-country skiing in the winter, and nonmotorized recreation in the summer.

Rivers with the potential for inclusion in the National Wild and Scenic River System. Until a decision is made on whether to include these streams in the System, management will protect the characteristics which make them eligible and suitable for classification.

5A	Recreation River Areas. Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.
5B	Scenic River Areas. Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines undeveloped, but accessible in places by roads.
5C	Wild River Areas. Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

These rivers that are included in this alternative are listed in the table below.

6	Skagit Wild and Scenic River. Skagit River and designated portion of tributaries managed as Recreation and Scenic Rivers in accordance with Skagit River Final Management Plan (Volume II, 1984).
8	Areas with unique scenic, historic, biological, botanic or geological features. Management emphasis and purpose is to protect and, if appropriate, foster public use and enjoyment of such areas.

Management Areas 10A, 10B, 10C, 10D, 10E are wilderness, designated by Congress and managed in accordance with the Wilderness Act of 1964.

10A	Transition areas within wilderness. In close proximity to popular trailheads and heavily used trails entering wilderness. Large proportion of day-users, mixed with overnight and long distance travelers. Frequent encounters with other users.
10B	Trailed area within wilderness. Includes all managed system trails extending beyond the transition class. Visitors must be prepared for overnight camping and outdoor living. Less frequent encounters with others.
10C	General Trailless areas within wilderness. No system trails, some user-made trails may exist. Very infrequent encounters with others.

Management Area	Description
10D	Dedicated Trailless areas within wilderness. Managed forever trailless. Obvious user-made trails are not permitted. No evidence of human use. Cross-country travel with very infrequent encounters with others.
10E	Special areas within wilderness include Congressionally acknowledged areas, areas of significant cultural or historic value, Research Natural Areas, areas with special wildlife considerations and areas with limited management options.
11	Spotted Owl Habitat Areas (SOHA's). Suitable spotted owl habitat for species that depend on or utilize old growth for a significant portion of their habitat. No scheduled timber harvest.
12	Mature and old-growth timber to provide habitat for those species (such as marten and pileated woodpecker) that depend on or utilize such forests for a significant portion of their habitat. No scheduled timber harvest.
14	Deer and elk winter range with emphasis on improvement of habitat. Timber managed to achieve proper forage/cover ratios and distribution.
15A	Mountain goat habitat needs emphasized, with objective of retaining viable populations. No scheduled timber harvest or new road construction.
15B	Emphasis on mountain goat habitat improvement. Timber managed to achieve proper forage/cover ratios and distribution.
17	Emphasis on timber management with roaded dispersed recreation also occurring. A wide range of silvicultural practices will be applied, including clearcutting, thinning and planting.
18	Research Natural Areas (RNA's). Sites where natural features are preserved for scientific purposes; natural processes are allowed to dominate. No scheduled timber harvest, recreation use is not encouraged.
19	Mountain Hemlock Zone. Area within which study and testing of various silvicultural practices will occur, to determine if such forested areas can be classified as suitable for timber production.
20B	Cedar River Municipal Watershed. Exchange all National Forest lands therein to City of Seattle with stipulation that old-growth stands will be maintained as habitat for old-growth wildlife species.
21A	Green River Municipal Watershed. Current Direction, manage watershed in accordance with 1984 Memorandum of Understanding. Land exchanges with the City of Tacoma will be completed. Emphasize timber management, to the extent that water quality goal is met, and dispersed recreation, primarily roaded modified.
22A	Sultan River Municipal Watershed. Exchange National Forest lands and vacate watershed. Watershed closed to public entry. No activity except production of water and hydropower.
23B	National Forest lands in other municipal watersheds. Emphasis on meeting water quality. No scheduled timber harvest and limited recreation, such as day use and non-water oriented activities.
25B	Electronic Sites. Only Jim Creek mapped. Permits effective and economical facilities with least impact on the natural resources involved.
27	Alpine Lakes Area managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

Brief description of selected allocations:

D	Developed Site: Areas are substantially modified for campgrounds, boating, ski areas, summer home tracts, administrative sites, etc. Sights and sounds of people are evident; concentration of users is often high. Roads, trails, and parking are managed to provide access to the site, with emphasis on nonmotorized activity on the site. No scheduled timber harvest. Vegetative manipulation only for the enhancement or protection of the area.
DR	Dispersed Recreation: Managed primarily in an unroaded condition with emphasis on dispersed recreation, scenic, wildlife or other amenity values. No new road construction. ORV use permitted, depending on the ROS class. No scheduled timber harvest. The only exception is salvage harvest of catastrophic forest loss for the purpose of limiting damage on adjacent lands. Visual Quality Objective is Retention and Partial Retention. Concentration of recreation users is low; relatively minimal contact with other users. If no alternative road access available for intermingled lands, access may be granted for a non-public minimum standard road.
GF	General Forest: Timber harvest occurs, with a full range of silvicultural prescriptions used on suitable lands. The visual quality objective ranges from Retention to Modification. Dispersed recreation sites are common; encounters between recreationists may be numerous. Motorized activities are common. Rustic facilities may be provided. Land in this allocation is generally accessible by road. Road and trail standards range from optimum, for high-volume mixed traffic, to closed after project completion.
SA	Special Area: Areas protected for their uniqueness and natural conditions, and, where appropriate, to foster public use, enjoyment, or study. Each Special Area has a specific management direction. Refer to FEIS, Alpine Lakes, 1981. No scheduled timber harvest. Roads, facilities (such as parking, picnic areas, and interpretive sites, etc.) will enhance and protect the area. Other resource manipulation, including removal of trees, will occur only for the enhancement or protection of the area.
SF	Scenic Forest: The objective is to retain or enhance viewing and recreation experiences. Developments and use in the seen area from recreation sites, roads, and trails within Scenic Forest will meet visual quality objectives. Use will be integrated with the natural landscape. Timber harvest permitted; a full range of silvicultural prescriptions will be used to meet the visual and recreational objectives.
W	Alpine Lakes Wilderness managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

Management Areas Not Mapped

3A	Existing developed recreation sites such as campgrounds, picnic areas, trailheads, boating and swimming areas. Not mapped due to small acreage.
3D	Organization camps, concession sites, and recreation residence tracts operated by the private sector through special use permits. Not mapped due to small acreage.
7	Includes selected sites and areas identified in the 1981 Inventory of Native American Religious Use, Practices, Localities, and Resources. Not mapped to protect their confidential nature. Consultation with appropriate American Indian tribes shall be conducted before initiating any field activity that may affect these areas and sites.
13	Riparian and fish habitat emphasis. The resource values in riparian areas are maintained and/or improved, with a special emphasis on water quality and fish habitat. Timber management is modified to maintain or improve riparian habitat diversity and integrity. Not mapped, due to small map scale.
16	Habitat for threatened and endangered animal species emphasized. Protect and enhance habitat to meet the recovery objectives and eventual delisting, pursuant to the Endangered Species Act. Not Mapped.
25A	Existing and potential utility corridors. (See Alternative J Map).
26	Administrative sites. Not mapped.

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MT. BAKER-SNOQUALMIE NATIONAL FOREST BOUNDARY	PAVED ROAD
ADJACENT NATIONAL FOREST BOUNDARY	ALL-WEATHER ROAD
WILDERNESS BOUNDARY	DIRT ROAD
INTERSTATE ROUTE	PRIMITIVE ROAD
U.S ROUTE	PACIFIC CREST NATIONAL SCENIC TRAIL
STATE ROUTE	OTHER TRAIL
FOREST SERVICE ROUTE	ADJACENT NATIONAL FOREST
FOREST SERVICE TRAIL	OTHER OWNERSHIP

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G

Alternative G-Modified

Brief Description of Alternative:

Alternative G-Modified emphasizes maintenance of natural ecosystems and diversity of native plants and animals, providing uses not found on private lands, and producing timber in a way that is consistent with the other goals and is non-damaging to soils. This alternative provides for larger spotted owl habitat areas than those identified in all other alternatives. Between the DEIS and FEIS, this alternative was *modified to increase the number of trails, adjust the rivers recommended for inclusion in the Wild and Scenic River System, and modify some allocations. These changes were made to better meet the goals and objectives established for this alternative by the Conservation Liaison Group.*

Management Areas:

Multiple-use management will be the overall goal of the Mt. Baker-Snoqualmie National Forest. The management areas shown on this map are in response to the issues being addressed by this alternative. Many uses will occur in each management area, but one or more resources or uses will be emphasized as shown in the following legend.

A detailed description of the management prescription for each management area is found in the FEIS and Forest Plan.

Management Area	Description
1A	Areas outside of wilderness managed primarily to retain a primitive character for nonmotorized recreational uses while also providing natural habitat for wildlife. Fairly remote, low concentration of users, no scheduled timber harvest and no roads permitted.
1B	Areas outside of wilderness managed primarily to retain a semi-primitive character for nonmotorized recreational uses while also providing natural habitat for wildlife. Fairly remote, low concentration of users, no scheduled timber harvest and no roads permitted.
1C	Areas outside of wilderness managed primarily to retain a semi-primitive character for recreational uses including ORV's while also providing natural habitat for wildlife. Adjacent to roaded areas, no scheduled timber harvest and no system roads permitted.
2A	Foreground of visually sensitive landscapes as viewed from major highway corridors and use areas. A diversity of tree species and age classes is maintained with timber managed at less than full yield.
3C	Developed winter sports areas managed by the private sector through special use permits.
4	Mt. Baker National Recreation Area, established by Congress, 1984. Management emphasis is high-elevation dispersed recreation use, such as snowmobiling and cross-country skiing in the winter, and nonmotorized recreation in the summer.
	Rivers with the potential for inclusion in the National Wild and Scenic River System. Until a decision is made on whether to include these streams in the System, management will protect the characteristics which make them eligible and suitable for classification.
5A	Recreation River Areas. Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.
5B	Scenic River Areas. Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines undeveloped, but accessible in places by roads.
5C	Wild River Areas. Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.
	These rivers that are included in this alternative are listed in the table below.
6	Skagit Wild and Scenic River. Skagit River and designated portion of tributaries managed as Recreation and Scenic Rivers in accordance with Skagit River Final Management Plan (Volume II, 1984).
8	Areas with unique scenic, historic, biological, botanic or geological features. Management emphasis and purpose is to protect and, if appropriate, foster public use and enjoyment of such areas.

Management Areas 10A, 10B, 10C, 10D, 10E are wilderness, designated by Congress and managed in accordance with the Wilderness Act of 1964.

10A	Transition areas within wilderness. In close proximity to popular trailheads and heavily used trails entering wilderness. Large proportion of day-users, mixed with overnight and long distance travelers. Frequent encounters with other users.
10B	Trailed area within wilderness. Includes all managed system trails extending beyond the transition class. Visitors must be prepared for overnight camping and outdoor living. Less frequent encounters with others.
10C	General Trailless areas within wilderness. No system trails, some user-made trails may exist. Very infrequent encounters with others.
10D	Dedicated Trailless areas within wilderness. Managed forever trailless. Obvious user-made trails are not permitted. No evidence of human use. Cross-country travel with very infrequent encounters with others.

Management Area	Description
10E	Special areas within wilderness include Congressionally acknowledged areas, areas of significant cultural or historic value, Research Natural Areas, areas with special wildlife considerations and areas with limited management options.
11	Spotted Owl Habitat Areas (SOHA's). Suitable spotted owl habitat for species that depend on or utilize old growth for a significant portion of their habitat. No scheduled timber harvest.
12	Mature and old-growth timber to provide habitat for those species (such as marten and pileated woodpecker) that depend on or utilize such forests for a significant portion of their habitat. No scheduled timber harvest.
14	Deer and elk winter range with emphasis on improvement of habitat. Timber managed to achieve proper forage/cover ratios and distribution.
15A	Mountain goat habitat needs emphasized, with objective of retaining viable populations. No scheduled timber harvest or new road construction.
17	Emphasis on timber management with roaded dispersed recreation also occurring. A wide range of silvicultural practices will be applied, including clearcutting, thinning and planting.
18	Research Natural Areas (RNA's). Sites where natural features are preserved for scientific purposes; natural processes are allowed to dominate. No scheduled timber harvest, recreation use is not encouraged.
19	Mountain Hemlock Zone. Area within which study and testing of various silvicultural practices will occur, to determine if such forested areas can be classified as suitable for timber production.
20B	Cedar River Municipal Watershed. Exchange all National Forest lands therein to City of Seattle with stipulation that old-growth stands will be maintained as habitat for old-growth wildlife species.
21A	Green River Municipal Watershed. Current Direction, manage watershed in accordance with 1984 Memorandum of Understanding. Land exchanges with the City of Tacoma will be completed. Emphasize timber management, to the extent that water quality goal is met, and dispersed recreation, primarily roaded modified.
22B	Sultan River Municipal Watershed. Current situation, with restricted watershed. Recreation limited to developed site use. Timber management allowed. Protect watershed values beyond legal requirements, maintain fish and wildlife habitat.
23A	National Forest lands in other municipal watersheds. Uses include a mix of timber harvest, moderate recreation, wildlife, and other uses, with primary emphasis on meeting water quality standards.
25B	Electronic Sites. Only Jim Creek mapped. Permits effective and economical facilities with least impact on the natural resources involved.
27	Alpine Lakes Area managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.
	Brief description of selected allocations:
D	Developed Site: Areas are substantially modified for campgrounds, boating, ski areas, summer home tracts, administrative sites, etc. Sights and sounds of people are evident; concentration of users is often high. Roads, trails, and parking are managed to provide access to the site, with emphasis on nonmotorized activity on the site. No scheduled timber harvest. Vegetative manipulation only for the enhancement or protection of the area.
DR	Dispersed Recreation: Managed primarily in an unroaded condition with emphasis on dispersed recreation, scenic, wildlife or other amenity values. No new road construction. ORV use permitted, depending on the ROS class. No scheduled timber harvest. The only exception is salvage harvest of catastrophic forest loss for the purpose of limiting damage on adjacent lands. Visual Quality Objective is Retention and Partial Retention. Concentration of recreation users is low; relatively minimal contact with other users. If no alternative road access available for intermingled lands, access may be granted for a non-public minimum standard road.
GF	General Forest: Timber harvest occurs, with a full range of silvicultural prescriptions used on suitable lands. The visual quality objective ranges from Retention to Modification. Dispersed recreation sites are common; encounters between recreationists may be numerous. Motorized activities are common. Rustic facilities may be provided. Land in this allocation is generally accessible by road. Road and trail standards range from optimum, for high-volume mixed traffic, to closed after project completion.
SA	Special Area: Areas protected for their uniqueness and natural conditions, and, where appropriate, to foster public use, enjoyment, or study. Each Special Area has a specific management direction. Refer to FEIS, Alpine Lakes, 1981. No scheduled timber harvest. Roads, facilities (such as parking, picnic areas, and interpretive sites, etc.) will enhance and protect the area. Other resource manipulation, including removal of trees, will occur only for the enhancement or protection of the area.
SF	Scenic Forest: The objective is to retain or enhance viewing and recreation experiences. Developments and use in the seen area from recreation sites, roads, and trails within Scenic Forest will meet visual quality objectives. Use will be integrated with the natural landscape. Timber harvest permitted; a full range of silvicultural prescriptions will be used to meet the visual and recreational objectives.
W	Alpine Lakes Wilderness managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

Management Areas Not Mapped

3A	Existing developed recreation sites such as campgrounds, picnic areas, trailheads, boating and swimming areas. Not mapped due to small acreage.
3D	Organization camps, concession sites, and recreation residence tracts operated by the private sector through special use permits. Not mapped due to small acreage.
7	Includes selected sites and areas identified in the 1981 Inventory of Native American Religious Use, Practices, Localities, and Resources. Not mapped to protect their confidential nature. Consultation with appropriate American Indian tribes shall be conducted before initiating any field activity that may affect these areas and sites.
13	Riparian and fish habitat emphasis. The resource values in riparian areas are maintained and/or improved, with a special emphasis on water quality and fish habitat. Timber management is modified to maintain or improve riparian habitat diversity and integrity. Not mapped, due to small map scale.
16	Habitat for threatened and endangered animal species emphasized. Protect and enhance habitat to meet the recovery objectives and eventual delisting, pursuant to the Endangered Species Act. Not Mapped.
25A	Existing and potential utility corridors. (See Alternative J Map).
26	Administrative sites. Not mapped.

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- OTHER TRAIL
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- OTHER OWNERSHIP

Mt. Baker-Snoqualmie National Forest
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FEIS 1990

H

Alternative H

Brief Description of Alternative:

This was the Preferred Alternative in the DEIS. It provides an increased emphasis on unroaded recreation; protection of scenic values in the foreground and middleground of heavily traveled highway corridors; increasing big game populations; plus emphasis on timber production on tentatively suitable acres not assigned to other objectives.

Management Areas:

Multiple-use management will be the overall goal of the Mt. Baker-Snoqualmie National Forest. The management areas shown on this map are in response to the issues being addressed by this alternative. Many uses will occur in each management area, but one or more resources or uses will be emphasized as shown in the following legend.

A detailed description of the management prescription for each management area is found in the FEIS and Forest Plan.

Management Area	Description
1A	Areas outside of wilderness managed primarily to retain a primitive character for nonmotorized recreational uses while also providing natural habitat for wildlife. Fairly remote, low concentration of users, no scheduled timber harvest and no roads permitted.
1B	Areas outside of wilderness managed primarily to retain a semi-primitive character for nonmotorized recreational uses while also providing natural habitat for wildlife. Fairly remote, low concentration of users, no scheduled timber harvest and no roads permitted.
1C	Areas outside of wilderness managed primarily to retain a semi-primitive character for recreational uses including ORV's while also providing natural habitat for wildlife. Adjacent to roaded areas, no scheduled timber harvest and no system roads permitted.
1D	Areas managed for a variety of recreational uses in a roaded natural habitat setting while also providing natural habitat for wildlife. Timber harvest scheduled for longer rotations to meet visual quality objectives.
2A	Foreground of visually sensitive landscapes as viewed from major highway corridors and use areas. A diversity of tree species and age classes is maintained with timber managed at less than full yield.
2B	Middleground of visually sensitive landscapes as viewed from major highway corridors and use areas. A diversity of tree species and age classes is maintained with timber managed at less than full yield.
3C	Developed winter sports areas managed by the private sector through special use permits.
4	Mt. Baker National Recreation Area, established by Congress, 1984. Management emphasis is high-elevation dispersed recreation use, such as snowmobiling and cross-country skiing in the winter, and nonmotorized recreation in the summer.

Rivers with the potential for inclusion in the National Wild and Scenic River System. Until a decision is made on whether to include these streams in the System, management will protect the characteristics which make them eligible and suitable for classification.

5A	Recreational River Areas. Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.
5B	Scenic River Areas. Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines undeveloped, but accessible in places by roads.
5C	Wild River Areas. Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

These rivers that are included in this alternative are listed in the table below.

Rivers	Miles Classified	Miles Suitable	Miles Private	Description
North Fork Nooksack	38.7	0.0	0.0	38.7
South Fork Nooksack	26.0	0.0	0.0	26.0
Skagit Wild & Scenic	36.1	0.0	0.0	36.1
Sauk Wild & Scenic	34.0	0.0	0.0	34.0
Suiattle Wild & Scenic	23.0	0.0	0.0	23.0
Upper Skagit Wild & Scenic	32.0	0.0	0.0	32.0
Cascade Wild & Scenic	14.0	0.0	0.0	14.0
Middle Fork Snoqualmie	27.0	0.0	0.0	27.0
Tolt Wild & Scenic	14.0	0.0	0.0	14.0
Snoqualmie Wild & Scenic	31.0	0.0	0.0	31.0

1 / Excludes private land

6	Skagit Wild and Scenic River. Skagit River and designated portion of tributaries managed as Recreation and Scenic Rivers in accordance with Skagit River Final Management Plan (Volume II, 1984).
8	Areas with unique scenic, historic, biological, botanic or geological features. Management emphasis and purpose is to protect and, if appropriate, foster public use and enjoyment of such areas.

Management Areas 10A, 10B, 10C, 10D, 10E are wilderness, designated by Congress and managed in accordance with the Wilderness Act of 1964.

10A	Transition areas within wilderness. In close proximity to popular trailheads and heavily used trails entering wilderness. Large proportion of day-users, mixed with overnight and long distance travelers. Frequent encounters with other users.
10B	Trailed area within wilderness. Includes all managed system trails extending beyond the transition class. Visitors must be prepared for overnight camping and outdoor living. Less frequent encounters with others.
10C	General Trailless areas within wilderness. No system trails, some user-made trails may exist. Very infrequent encounters with others.
10D	Dedicated Trailless areas within wilderness. Managed forever trailless. Obvious user-made trails are not permitted. No evidence of human use. Cross-country travel with very infrequent encounters with others.
10E	Special areas within wilderness include Congressionally acknowledged areas, areas of significant cultural or historic value, Research Natural Areas, areas with special wildlife considerations and areas with limited management options.
11	Spotted Owl Habitat Areas (SOHA's). Suitable spotted owl habitat for species that depend on or utilize old growth for a significant portion of their habitat. No scheduled timber harvest.
12	Mature and old-growth timber to provide habitat for those species (such as marten and pileated woodpecker) that depend on or utilize such forests for a significant portion of their habitat. No scheduled timber harvest.
14	Deer and elk winter range with emphasis on improvement of habitat. Timber managed to achieve proper forage/cover ratios and distribution.
15A	Mountain goat habitat needs emphasized, with objective of retaining viable populations. No scheduled timber harvest or new road construction.
17	Emphasis on timber management with roaded dispersed recreation also occurring. A wide range of silvicultural practices will be applied, including clearcutting, thinning and planting.

Management Area	Description
18	Research Natural Areas (RNA's). Sites where natural features are preserved for scientific purposes; natural processes are allowed to dominate. No scheduled timber harvest, recreation use is not encouraged.
19	Mountain Hemlock Zone. Area within which study and testing of various silvicultural practices will occur, to determine if such forested areas can be classified as suitable for timber production.
20A	Cedar River Municipal Watershed. Exchange all National Forest lands therein to City of Seattle. Current Direction, manage watershed in accordance with 1962 Agreement.
21A	Green River Municipal Watershed. Current Direction, manage watershed in accordance with 1984 Memorandum of Understanding. Land exchanges with the City of Tacoma will be completed. Emphasize timber management, to the extent that water quality goal is met, and dispersed recreation, primarily roaded modified.
22B	Sultan River Municipal Watershed. Current situation, with restricted watershed. Recreation limited to developed site use. Timber management allowed. Protect watershed values beyond legal requirements, maintain fish and wildlife habitat.
23A	National Forest lands in other municipal watersheds. Uses include a mix of timber harvest, moderate recreation, wildlife, and other uses, with primary emphasis on meeting water quality standards.
25B	Electronic Sites. Only Jim Creek mapped. Permits effective and economical facilities with least impact on the natural resources involved.
27	Alpine Lakes Area managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

Brief description of selected allocations:

D	Developed Site: Areas are substantially modified for campgrounds, boating, ski areas, summer home tracts, administrative sites, etc. Sights and sounds of people are evident; concentration of users is often high. Roads, trails, and parking are managed to provide access to the site, with emphasis on nonmotorized activity on the site. No scheduled timber harvest. Vegetative manipulation only for the enhancement or protection of the area.
DR	Dispersed Recreation: Managed primarily in an unroaded condition with emphasis on dispersed recreation, scenic, wildlife or other amenity values. No new road construction. ORV use permitted, depending on the ROS class. No scheduled timber harvest. The only exception is salvage harvest of catastrophic forest loss for the purpose of limiting damage on adjacent lands. Visual Quality Objective is Retention and Partial Retention. Concentration of recreation users is low; relatively minimal contact with other users. If no alternative road access available for intermingled lands, access may be granted for a non-public minimum standard road.
GF	General Forest: Timber harvest occurs, with a full range of silvicultural prescriptions used on suitable lands. The visual quality objective ranges from Retention to Modification. Dispersed recreation sites are common; encounters between recreationists may be numerous. Motorized activities are common. Rustic facilities may be provided. Land in this allocation is generally accessible by road. Road and trail standards range from optimum, for high-volume mixed traffic, to closed after project completion.
SA	Special Area: Areas protected for their uniqueness and natural conditions, and, where appropriate, to foster public use, enjoyment, or study. Each Special Area has a specific management direction. Refer to FEIS, Alpine Lakes, 1981. No scheduled timber harvest. Roads, facilities (such as parking, picnic areas, and interpretive sites, etc.) will enhance and protect the area. Other resource manipulation, including removal of trees, will occur only for the enhancement or protection of the area.
SF	Scenic Forest: The objective is to retain or enhance viewing and recreation experiences. Developments and use in the seen area from recreation sites, roads, and trails within Scenic Forest will meet visual quality objectives. Use will be integrated with the natural landscape. Timber harvest permitted; a full range of silvicultural prescriptions will be used to meet the visual and recreational objectives.
W	Alpine Lakes Wilderness managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

Management Areas Not Mapped

3A	Existing developed recreation sites such as campgrounds, picnic areas, trailheads, boating and swimming areas. Not mapped due to small acreage.
3D	Organization camps, concession sites, and recreation residence tracts operated by the private sector through special use permits. Not mapped due to small acreage.
7	Includes selected sites and areas identified in the 1981 Inventory of Native American Religious Use, Practices, Localities, and Resources. Not mapped to protect their confidential nature. Consultation with appropriate American Indian tribes shall be conducted before initiating any field activity that may affect these areas and sites.
13	Riparian and fish habitat emphasis. The resource values in riparian areas are maintained and/or improved, with a special emphasis on water quality and fish habitat. Timber management is modified to maintain or improve riparian habitat diversity and integrity. Not mapped, due to small map scale.
16	Habitat for threatened and endangered animal species emphasized. Protect and enhance habitat to meet the recovery objectives and eventual delisting, pursuant to the Endangered Species Act. Not Mapped.
25A	Existing and potential utility corridors. (See Alternative J Map).
26	Administrative sites. Not mapped.

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FEIS 1990

Alternative I

Brief Description of Alternative:

In Alternative I, resources with an established market price (timber, developed recreation, and minerals) are emphasized. In addition, emphasis is placed on enhancement of big game habitat and the development and maintenance of an extensive trail system to accommodate a wide variety of users on a year-round basis. Other resources will be managed for at economically and environmentally feasible levels, consistent with the emphasis on market-oriented outputs. This alternative was developed in response to public comments on the DEIS and incorporates the goals and objectives identified by the Public Land Users Society.

Management Areas:

Multiple-use management will be the overall goal of the Mt. Baker-Snoqualmie National Forest. The management areas shown on this map are in response to the issues being addressed by this alternative. Many uses will occur in each management area, but one or more resources or uses will be emphasized as shown in the following legend.

A detailed description of the management prescription for each management area is found in the FEIS and Forest Plan.

Management Area	Description
1C	Areas outside of wilderness managed primarily to retain a semi-primitive character for recreational uses including ORV's while also providing natural habitat for wildlife. Adjacent to roaded areas, no scheduled timber harvest and no system roads permitted.
1D	Areas managed for a variety of recreational uses in a roaded natural habitat setting white also providing natural habitat for wildlife. Timber harvest scheduled for longer rotations to meet visual quality objectives.
2A	Foreground of visually sensitive landscapes as viewed from major highway corridors and use areas. A diversity of tree species and age classes is maintained with timber managed at less than full yield.
3C	Developed winter sports areas managed by the private sector through special use permits.
4	Mt. Baker National Recreation Area, established by Congress, 1984. Management emphasis is high-elevation dispersed recreation use, such as snowmobiling and cross-country skiing in the winter, and nonmotorized recreation in the summer.
6	Skagit Wild and Scenic River. Skagit River and designated portion of tributaries managed as Recreation and Scenic Rivers in accordance with Skagit River Final Management Plan (Volume II, 1984).

Management Areas 10A, 10B, 10C, 10D, 10E are wilderness, designated by Congress and managed in accordance with the Wilderness Act of 1964.

10A	Transition areas within wilderness. In close proximity to popular trailheads and heavily used trails entering wilderness. Large proportion of day-users, mixed with overnight and long distance travelers. Frequent encounters with other users.
10B	Trailed area within wilderness. Includes all managed system trails extending beyond the transition class. Visitors must be prepared for overnight camping and outdoor living. Less frequent encounters with others.
10C	General Trailless areas within wilderness. No system trails, some user-made trails may exist. Very infrequent encounters with others.
10D	Dedicated Trailless areas within wilderness. Managed forever trailless. Obvious user-made trails are not permitted. No evidence of human use. Cross-country travel with very infrequent encounters with others.
10E	Special areas within wilderness include Congressionally acknowledged areas, areas of significant cultural or historic value, Research Natural Areas, areas with special wildlife considerations and areas with limited management options.
11	Spotted Owl Habitat Areas (SOHA's). Suitable spotted owl habitat for species that depend on or utilize old growth for a significant portion of their habitat. No scheduled timber harvest.
12	Mature and old-growth timber to provide habitat for those species (such as marten and pileated woodpecker) that depend on or utilize such forests for a significant portion of their habitat. No scheduled timber harvest.
14	Deer and elk winter range with emphasis on improvement of habitat. Timber managed to achieve proper forage/cover ratios and distribution.
15A	Mountain goat habitat needs emphasized, with objective of retaining viable populations. No scheduled timber harvest or new road construction.
17	Emphasis on timber management with roaded dispersed recreation also occurring. A wide range of silvicultural practices will be applied, including clearcutting, thinning and planting.
18	Research Natural Areas (RNA's). Sites where natural features are preserved for scientific purposes; natural processes are allowed to dominate. No scheduled timber harvest, recreation use is not encouraged.
19	Mountain Hemlock Zone. Area within which study and testing of various silvicultural practices will occur, to determine if such forested areas can be classified as suitable for timber production.
20A	Cedar River Municipal Watershed. Exchange all National Forest lands therein to City of Seattle. Current Direction, manage watershed in accordance with 1962 Agreement.
21A	Green River Municipal Watershed. Current Direction, manage watershed in accordance with the 1984 Memorandum of Understanding. Land exchanges with the City of Tacoma will be completed. Emphasize timber management, to the extent that water quality goal is met, and dispersed recreation, primarily roaded modified.
22B	Sultan River Municipal Watershed. Current situation, with restricted watershed. Recreation limited to developed site use. Timber management allowed. Protect watershed values beyond legal requirements, maintain fish and wildlife habitat.

Management Area	Description
23A	National Forest lands in other municipal watersheds. Uses include a mix of timber harvest, moderate recreation, wildlife, and other uses, with primary emphasis on meeting water quality standards.
25B	Electronic Sites. Only Jim Creek mapped. Permits effective and economical facilities with least impact on the natural resources involved.
27	Alpine Lakes Area managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

Brief description of selected allocations:

D	Developed Site: Areas are substantially modified for campgrounds, boating, ski areas, summer home tracts, administrative sites, etc. Sights and sounds of people are evident; concentration of users is often high. Roads, trails, and parking are managed to provide access to the site, with emphasis on nonmotorized activity on the site. No scheduled timber harvest. Vegetative manipulation only for the enhancement or protection of the area.
DR	Dispersed Recreation: Managed primarily in an unroaded condition with emphasis on dispersed recreation, scenic, wildlife or other amenity values. No new road construction. ORV use permitted, depending on the ROS class. No scheduled timber harvest. The only exception is salvage harvest of catastrophic forest loss for the purpose of limiting damage on adjacent lands. Visual Quality Objective is Retention and Partial Retention. Concentration of recreation users is low; relatively minimal contact with other users. If no alternative road access available for intermingled lands, access may be granted for a non-public minimum standard road.
GF	General Forest: Timber harvest occurs, with a full range of silvicultural prescriptions used on suitable lands. The visual quality objective ranges from Retention to Modification. Dispersed recreation sites are common; encounters between recreationists may be numerous. Motorized activities are common. Rustic facilities may be provided. Land in this allocation is generally accessible by road. Road and trail standards range from optimum, for high-volume mixed traffic, to closed after project completion.
SA	Special Area: Areas protected for their uniqueness and natural conditions, and, where appropriate, to foster public use, enjoyment, or study. Each Special Area has a specific management direction. Refer to FEIS, Alpine Lakes, 1981. No scheduled timber harvest. Roads, facilities (such as parking, picnic areas, and interpretive sites, etc.) will enhance and protect the area. Other resource manipulation, including removal of trees, will occur only for the enhancement or protection of the area.
SF	Scenic Forest: The objective is to retain or enhance viewing and recreation experiences. Developments and use in the seen area from recreation sites, roads, and trails within Scenic Forest will meet visual quality objectives. Use will be integrated with the natural landscape. Timber harvest permitted; a full range of silvercultural prescriptions will be used to meet the visual and recreational objectives.
W	Alpine Lakes Wilderness managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

Management Areas Not Mapped

3A	Existing developed recreation sites such as campgrounds, picnic areas, trailheads, boating and swimming areas. Not mapped due to small acreage.
3D	Organization camps, concession sites, and recreation residence tracts operated by the private sector through special use permits. Not mapped due to small acreage.
7	Includes selected sites and areas identified in the 1981 Inventory of Native American Religious Use, Practices, Localities, and Resources. Not mapped to protect their confidential nature. Consultation with appropriate American Indian tribes shall be conducted before initiating any field activity that may affect these areas and sites.
13	Riparian and fish habitat emphasis. The resource values in riparian areas are maintained and/or improved, with a special emphasis on water quality and fish habitat. Timber management is modified to maintain or improve riparian habitat diversity and integrity. Not mapped, due to small map scale.
16	Habitat for threatened and endangered animal species emphasized. Protect and enhance habitat to meet the recovery objectives and eventual delisting, pursuant to the Endangered Species Act. Not Mapped.
25A	Existing and potential utility corridors. (See Alternative J Map).
26	Administrative sites. Not mapped.

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Land and Resource Management Plan
Mt. Baker-Snoqualmie National Forest

FEIS 1990

Alternative J (Preferred)

J
SOUTH

Brief Description of Alternative:

This is the Preferred Alternative. It is a new alternative and was not displayed in the DEIS. Beginning with the draft EIS Preferred Alternative (H), Alternative J was developed to respond to public comment and new information. Differences between the draft and this Preferred Alternative include a considerable increase in trait mileage; an increase in the number of rivers recommended for addition to the National Wild and Scenic Rivers System; allocation of three Special Areas (Botanic, Scenic, and Recreation/Education); an increased emphasis on unroaded recreation; and greater protection of scenic values on travel corridors. Timber production is emphasized on suitable acres assigned to a timber harvest prescription; other resources will be managed at levels commensurate with the objectives of the alternative.

Management Areas:

Multiple-use management will be the overall goal of the Mt. Baker-Snoqualmie National Forest. The management areas shown on this map are in response to the issues being addressed by this alternative. Many uses will occur in each management area, but one or more resources or uses will be emphasized as shown in the following legend.

A detailed description of the management prescription for each management area is found in the FEIS and Forest Plan.

Management Area	Description
1A	Areas outside of wilderness managed primarily to retain a primitive character for nonmotorized recreational uses while also providing natural habitat for wildlife. Fairly remote, low concentration of users, no scheduled timber harvest and no roads permitted.
1B	Areas outside of wilderness managed primarily to retain a semi-primitive character for nonmotorized recreational uses while also providing natural habitat for wildlife. Fairly remote, low concentration of users, no scheduled timber harvest and no roads permitted.
1C	Areas outside of wilderness managed primarily to retain a semi-primitive character for recreational uses including ORV's while also providing natural habitat for wildlife. Adjacent to roaded areas, no scheduled timber harvest and no system roads permitted.
1D	Areas managed for a variety of recreational uses in a roaded natural habitat setting while also providing natural habitat for wildlife. Timber harvest scheduled for longer rotations to meet visual quality objectives.
2A	Foreground of visually sensitive landscapes as viewed from major highway corridors and use areas. A diversity of tree species and age classes is maintained with timber managed at less than full yield.
2B	Middleground of visually sensitive landscapes as viewed from major highway corridors and use areas. A diversity of tree species and age classes is maintained with timber managed at less than full yield.
3C	Developed winter sports areas managed by the private sector through special use permits.
4	Mt. Baker National Recreation Area, established by Congress, 1984. Management emphasis is high-elevation dispersed recreation use, such as snowmobiling and cross-country skiing in the winter, and nonmotorized recreation in the summer.

Rivers with the potential for inclusion in the National Wild and Scenic River System. Until a decision is made on whether to include these streams in the System, management will protect the characteristics which make them eligible and suitable for classification.

5A	Recreation River Areas. Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.
5B	Scenic River Areas. Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines undeveloped, but accessible in places by roads.
5C	Wild River Areas. Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

These rivers that are included in this alternative are listed in the table below.

6	Skagit Wild and Scenic River. Skagit River and designated portion of tributaries managed as Recreation and Scenic Rivers in accordance with Skagit River Final Management Plan (Volume II, 1984).
8	Areas with unique scenic, historic, biological, botanic or geological features. Management emphasis and purpose is to protect and, if appropriate, foster public use and enjoyment of such areas.

Management Areas 10A, 10B, 10C, 10D, 10E are wilderness, designated by Congress and managed in accordance with the Wilderness Act of 1964.

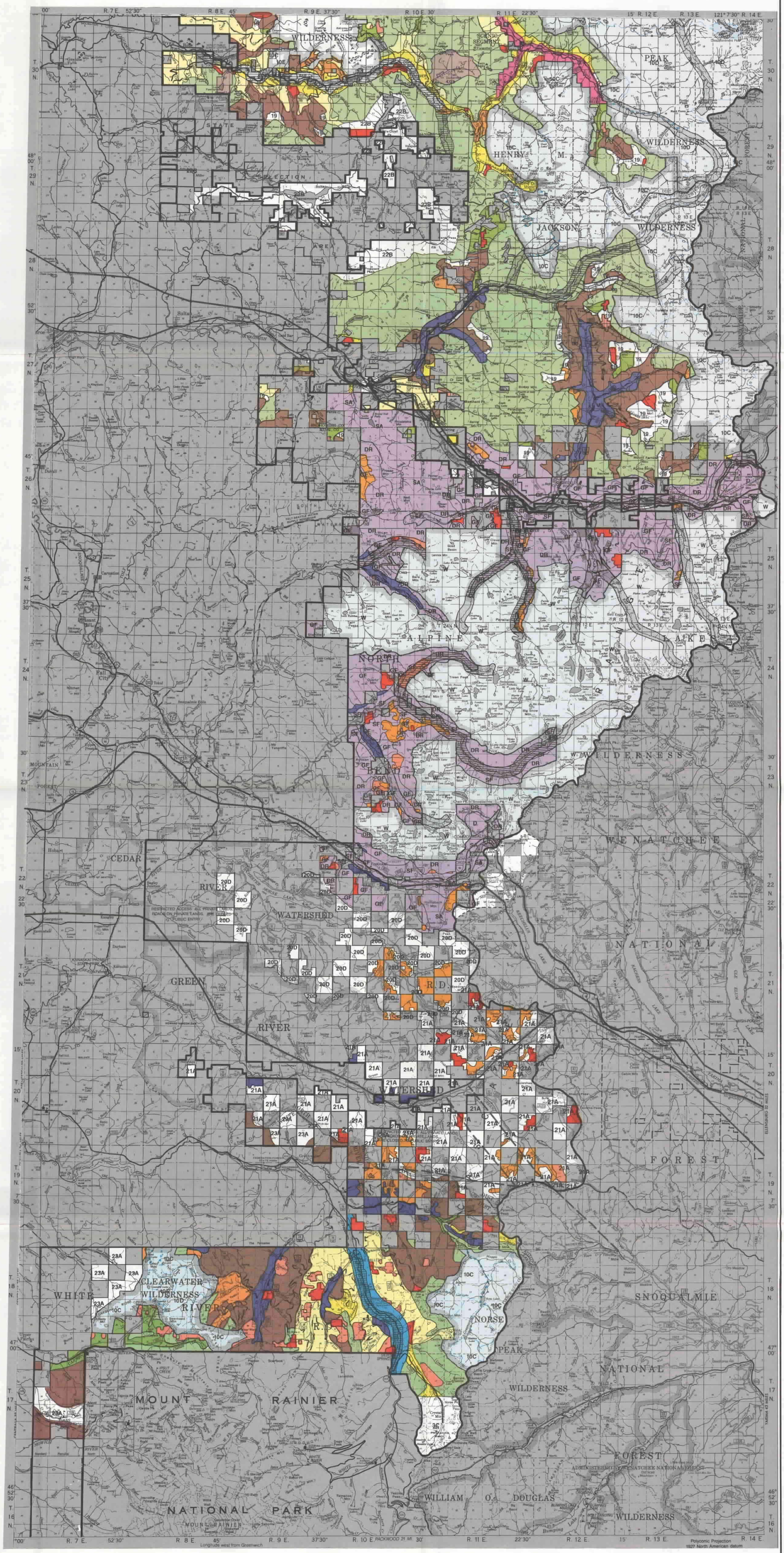
10A	Transition areas within wilderness. In close proximity to popular trailheads and heavily used trails entering wilderness. Large proportion of day-users, mixed with overnight and long distance travelers. Frequent encounters with other users.
10B	Trailed area within wilderness. Includes all managed system trails extending beyond the transition class. Visitors must be prepared for overnight camping and outdoor living. Less frequent encounters with others.
10C	General Trailless areas within wilderness. No system trails, some user-made trails may exist. Very infrequent encounters with others.
10D	Dedicated Trailless areas within wilderness. Managed forever trailless. Obvious user-made trails are not permitted. No evidence of human use. Cross-country travel with very infrequent encounters with others.
10E	Special areas within wilderness include Congressionally acknowledged areas, areas of significant cultural or historic value, Research Natural Areas, areas with special wildlife considerations and areas with limited management options.
11	Spotted Owl Habitat Areas (SOHA's). Suitable spotted owl habitat for species that depend on or utilize old growth for a significant portion of their habitat. No scheduled timber harvest.
12	Mature and old-growth timber to provide habitat for those species (such as marten and pileated woodpecker) that depend on or utilize such forests for a significant portion of their habitat. No scheduled timber harvest.
14	Deer and elk winter range with emphasis on improvement of habitat. Timber managed to achieve proper forage/cover ratios and distribution.
15A	Mountain goat habitat needs emphasized, with objective of retaining viable populations. No scheduled timber harvest or new road construction.
17	Emphasis on timber management with roaded dispersed recreation also occurring. A wide range of silvicultural practices will be applied, including clearcutting, thinning and planting.
18	Research Natural Areas (RNA's). Sites where natural features are preserved for scientific purposes; natural processes are allowed to dominate. No scheduled timber harvest, recreation use is not encouraged.
19	Mountain Hemlock Zone. Area within which study and testing of various silvicultural practices will occur, to determine if such forested areas can be classified as suitable for timber production.
20D	Cedar River Municipal Watershed. Negotiate a new Cooperative Agreement with the City of Seattle. Until a new agreement is reached, no new land exchanges affecting National Forest lands will occur. Pending the new agreement, the 1962 Cooperative Agreement will remain in effect.
21A	Green River Municipal Watershed. Current Direction, manage watershed in accordance with 1984 Memorandum of Understanding. Land exchanges with the City of Tacoma will be completed. Emphasize timber management, to the extent that water quality goal is met, and dispersed recreation, primarily roaded modified.
22B	Sultan River Municipal Watershed. Current situation, with restricted watershed. Recreation limited to developed site use. Timber management allowed. Protect watershed values beyond legal requirements, maintain fish and wildlife habitat.
23A	National Forest lands in other municipal watersheds. Uses include a mix of timber harvest, moderate recreation, wildlife, and other uses, with primary emphasis on meeting water quality standards.
———	Existing Utility Corridor. Permits effective and economical facilities with least impact on the natural resources involved.
– – –	Potential Utility Corridor. Permits effective and economical facilities with least impact on the natural resources involved.
25B	Electronic Sites. Only Jim Creek mapped. Permits effective and economical facilities with least impact on the natural resources involved.
27	Alpine Lakes Area managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

Brief description of selected allocations:

D	Developed Site: Areas are substantially modified for campgrounds, boating, ski areas, summer home tracts, administrative sites, etc. Sights and sounds of people are evident; concentration of users is often high. Roads, trails, and parking are managed to provide access to the site, with emphasis on nonmotorized activity on the site. No scheduled timber harvest. Vegetative manipulation only for the enhancement or protection of the area.
DR	Dispersed Recreation: Managed primarily in an unroaded condition with emphasis on dispersed recreation, scenic, wildlife or other amenity values. No new road construction. ORV use permitted, depending on the ROS class. No scheduled timber harvest. The only exception is salvage harvest of catastrophic forest loss for the purpose of limiting damage on adjacent lands. Visual Quality Objective is Retention and Partial Retention. Concentration of recreation users is tow; relatively minimal contact with other users. If no alternative road access available for intermingled lands, access may be granted for a non-public minimum standard road.
GF	General Forest: Timber harvest occurs, with a full range of silvicultural prescriptions used on suitable lands. The visual quality objective ranges from Retention to Modification. Dispersed recreation sites are common; encounters between recreationists may be numerous. Motorized activities are common. Rustic facilities may be provided. Land in this allocation is generally accessible by road. Road and trail standards range from optimum, for high-volume mixed traffic, to closed after project completion.
SA	Special Area: Areas protected for their uniqueness and natural conditions, and, where appropriate, to foster public use, enjoyment, or study. Each Special Area has a specific management direction. Refer to FEIS, Alpine Lakes, 1981. No scheduled timber harvest. Roads, facilities (such as parking, picnic areas, and interpretive sites, etc.) will enhance and protect the area. Other resource manipulation, including removal of trees, will occur only for the enhancement or protection of the area.
SF	Scenic Forest: The objective is to retain or enhance viewing and recreation experiences. Developments and use in the seen area from recreation sites, roads, and trails within Scenic Forest will meet visual quality objectives. Use will be integrated with the natural landscape. Timber harvest permitted; a full range of silvercultural prescriptions will be used to meet the visual and recreational objectives.
W	Alpine Lakes Wilderness managed in accordance with the Record of Decision Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

Management Areas Not Mapped

3A	Existing developed recreation sites such as campgrounds, picnic areas, trailheads, boating and swimming areas. Not mapped due to small acreage.
3D	Organization camps, concession sites, and recreation residence tracts operated by the private sector through special use permits. Not mapped due to small acreage.
7	Includes selected sites and areas identified in the 1981 Inventory of Native American Religious Use, Practices, Localities, and Resources. Not mapped to protect their confidential nature. Consultation with appropriate American Indian tribes shall be conducted before initiating any field activity that may affect these areas and sites.
13	Riparian and fish habitat emphasis. The resource values in riparian areas are maintained and/or improved, with a special emphasis on water quality and fish habitat. Timber management is modified to maintain or improve riparian habitat diversity and integrity. Not mapped, due to small map scale.
16	Habitat for threatened and endangered animal species emphasized. Protect and enhance habitat to meet the recovery objectives and eventual delisting, pursuant to the Endangered Species Act. Not Mapped.
26	Administrative sites. Not mapped.



Mt. Baker-Snoqualmie National Forest
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Land and Resource Management Plan
Mt. Baker-Snoqualmie National Forest

FEIS 1990

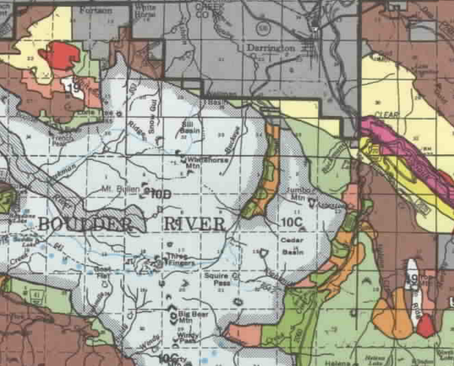
J

NORTH

Alternative J (Preferred)

Brief Description of Alternative:

This is the Preferred Alternative. It is a new alternative and was not displayed in the DEIS. Beginning with the draft EIS Preferred Alternative (H), Alternative J was developed to respond to public comment and new information. Differences between the draft and this Preferred Alternative include a considerable increase in trail mileage; an increase in the number of rivers recommended for addition to the National Wild and Scenic Rivers System; allocation of three Special Areas (Botanic, Scenic, and Recreation/Education); an increased emphasis on unroaded recreation; and greater protection of scenic values on travel corridors. Timber production is emphasized on suitable acres assigned to a timber harvest prescription; other resources will be managed at levels commensurate with the objectives of the alternative.



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
F. DALE ROBERTSON, CHIEF

- MT. BAKER-SNOQUALMIE NATIONAL FOREST BOUNDARY
- ADJACENT NATIONAL FOREST BOUNDARY
- WILDERNESS BOUNDARY
- INTERSTATE ROUTE
- U.S ROUTE
- STATE ROUTE
- FOREST SERVICE ROUTE
- FOREST SERVICE TRAIL
- PAVED ROAD
- ALL-WEATHER ROAD
- DIRT ROAD
- PRIMITIVE ROAD
- PACIFIC CREST NATIONAL SCENIC TRAIL
- OTHER TRAIL
- ADJACENT NATIONAL FOREST
- OTHER OWNERSHIP

0 1 2 3 4 5 miles
SCALE

Management Areas:

- 1A Primitive
- 1B Semi-Primitive Nonmotorized
- 1C Semi-Primitive Motorized
- 1D Roaded Natural
- 2A Foreground
- 2B Middleground
- 3C Winter Sports Resorts
- 4 Mt. Baker National Recreation Area
- 5A Recreational River
- 5B Scenic River
- 5C Wild River
- 6 Skagit Wild and Scenic River
- 8 Special Areas

Wilderness

- 10A Transition
- 10B Trailed
- 10C General Trailless
- 10D Dedicated Trailless
- 10E Special Area
- 11 Spotted Owl Habitat Areas (SOHA's)
- 12 Mature and Old-Growth Wildlife Habitat
- 14 Deer and Elk Winter Range
- 15A Mountain Goat Habitat
- 17 Timber Management Emphasis
- 18 Research Natural Areas (RNA's)
- 19 Mountain Hemlock Zone
- 20D Cedar River Municipal Watershed
- 21A Green River Municipal Watershed
- 22B Sultan River Municipal Watershed
- 23A Other Municipal Watersheds

Special Uses — Utilities

- Existing Utility Corridor
- Potential Utility Corridor
- 25B Electronic Sites
- 27 Alpine Lakes Area
  - D Developed Site
  - DR Dispersed Recreation
  - GF General Forest
  - SA Special Area
  - SF Scenic Forest
  - W Alpine Lakes Wilderness

Management Areas Not Mapped

- 3A Public Sector Sites
- 3D Private Sector Sites
- 7 American Indian Religious and Cultural Use
- 13 Riparian and Fish Habitat Emphasis
- 16 Threatened and Endangered Species
- 26 Administrative Sites

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Department of
Agriculture

Forest Service

**Pacific
Northwest
Region**

June 1990

Land and Resource Management Plan

Mt. Baker-Snoqualmie National Forest

LAND AND RESOURCE MANAGEMENT PLAN

Final Environmental Impact Statement
Mt. Baker-Snoqualmie National Forest

PREFACE

This National Forest Land and Resource Management Plan (Forest Plan) guides all natural resource management activities and establishes management standards and guidelines for the Mt. Baker-Snoqualmie National Forest. It describes resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management.

The Forest Plan will be reviewed, and updated if necessary, at least every five years. It will be revised on a ten-year cycle, or at least every 15 years.

This Forest Plan replaces previous land and resource management plans for the Mt. Baker-Snoqualmie National Forest, with the exception of the Alpine Lakes Area Land Management Plan and the Skagit Wild and Scenic River Management Plan, which are both incorporated. Upon approval, subsequent activities affecting the Mt. Baker-Snoqualmie National Forest must be in compliance with this Forest Plan. In addition, permits, contracts and other instruments for the use and occupancy of National Forest System land must be in conformance with this Forest Plan.

If any particular provision of this Forest Plan, or the application thereof to any person or circumstances, is found to be invalid, the remainder of the Forest PLan and the application of that provision to other persons or circumstances shall not be affected.

Information regarding this Plan can be obtained from:

Forest Supervisor
Mt. Baker-Snoqualmie National Forest
1022 First Avenue
Seattle, WA 98104

(206) 442-5400

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CHAPTER 1 - INTRODUCTION

A. PURPOSE OF THE FOREST PLAN

This Land and Resource Management Plan (Forest Plan) guides all natural resource management activities and establishes management standards and guidelines for the Mt. Baker-Snoqualmie National Forest. It describes resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management.

The Forest Plan:

- o establishes Forest-wide multiple-use goals and objectives;
- o establishes Forest-wide standards and guidelines applying to future activities;
- o establishes management area direction, including management area prescriptions and standards and guidelines applying to future management activities in that management area;
- o establishes the allowable sale quantity for timber and identifies land suitable for timber management;
- o establishes monitoring and evaluation requirements;
- o recommends 30 rivers be added to the National Wild and Scenic River System.

The Forest Plan embodies the provisions of the National Forest Management Act of 1976 (NFMA), the implementing regulations, and other guiding documents. Land use determinations, standards and guidelines, and management prescriptions constitute a statement of the Forest Plan's management direction. However, the projected outputs, services, and rates of implementation are estimates and are dependent on the annual budgeting process. See Chapter 5, Budget Proposals for additional detail.

The Forest Plan will ordinarily be revised on a 10-year cycle, or at least every 15 years. It also may be revised whenever the Forest Supervisor determines that conditions or demands in the area covered by the Plan have changed significantly or when changes in Resource Planning Act policies, goals, or objectives would have a significant effect on Forest level programs. The Forest supervisor will review the conditions on the land covered by the Plan and the demands of the public at least every 5 years to determine whether either has changed significantly.

B. RELATIONSHIP OF THE FOREST PLAN TO OTHER DOCUMENTS

Relationship to the FEIS and Record of Decision

This Forest Plan sets forth the direction for managing the land and resources of the Mt. Baker-Snoqualmie National Forest. The plan results from extensive analysis and considerations addressed in the accompanying Environmental Impact

Statement (EIS) and Record of Decision (ROD). It is based on Alternative J as presented in the FEIS and in the Record of Decision. Many aspects of the Forest Plan reflect numerous suggestions from the public in response to the Draft Environmental Impact Statement and accompanying Proposed Land and Resource Management Plan. The planning process and the analysis procedures used to develop this Plan are described or referred to in the FEIS. The FEIS also describes and analyzes other alternatives considered in the planning process.

Specific activities and projects will be planned and implemented to carry out the direction in this Plan. The Forest will perform environmental analyses on these projects and activities. This subsequent project-level environmental analysis will use the data and evaluations in the Plan and FEIS as its basis. Environmental analysis of projects will be tiered to FEIS accompanying this Forest Plan.

Relationship to the Regional Guide

The Regional Guide for the Pacific Northwest Region, as amended December 8, 1988, provides direction for National Forest Plans. It includes standards and guidelines addressing the major issues and management concerns considered at the Regional level, to facilitate Forest Planning.

Relationship to Special Area Plans

In recent years, the United States Congress has enacted legislation that affects the management of two areas on the Mt. Baker-Snoqualmie National Forest: Alpine Lakes Management Area and the Skagit Wild and Scenic River.

The regulations (36 CFR 219.2(b)) guiding the development of Forest Plans state that "if in a particular case, special area authorities require the preparation of a separate special area plan, the direction in any such plan may be incorporated without modification." For this reason the Alpine Lakes Area Management Plan and the Skagit Wild and Scenic River Management Plan will be incorporated unchanged in the Forest Plan.

The Alpine Lakes Area Management Plan

The Alpine Lakes Area Management Act of 1976 (PL 94-357) required that a separate plan be developed for the Alpine Lakes Area. This plan and its accompanying Environmental Impact Statement was developed with extensive public involvement, and implemented in early 1982.

The Alpine Lakes area has been managed under the above Plan for approximately eight years. The Forest Plan holds constant the land designations and management as presented in the Alpine Lakes Area Management Plan. Problems which surface will be handled administratively, or when the Forest Plan is revised, in approximately ten years.

Management direction for the Alpine Lakes Management Area will be as set forth in the Alpine Lakes Area Management Plan, Final Environmental Impact Statement and Record of Decision, dated November 2, 1981.

The Skagit Wild and Scenic River Management Plan

The Skagit Wild and Scenic River was designated in 1978 (PL 95-625) and is managed under the 1984 Final River Management Analysis and Plan. This plan was developed with extensive public involvement and implemented in 1984.

The Skagit River area has been managed under the above plan for approximately six years. To date, neither the Forest Service nor the public have identified any major problems with the implementation of the Skagit Wild and Scenic River Management Plan. The Forest Plan holds constant the management direction as presented in the River Management Analysis and Plan. Problems which surface will be handled administratively, or when the Forest Plan is revised, in approximately ten years.

Management direction for the Skagit Wild and Scenic River Management Area will be as set forth in the River Management Plan - Skagit River Record of Decision dated August 8, 1984.

Copies of both the Alpine Lakes Plan and the Skagit River Plan are available for review at the Mt. Baker-Snoqualmie National Forest Supervisor's Office, 1022 First Avenue, Seattle, Washington 98104.

Relationship to Project Planning

This Forest Plan serves as the single land management plan for the Mt. Baker-Snoqualmie National Forest. All other land management plans are replaced by the direction in this plan, including :

Multiple Use Plan, Glacier Ranger District
Multiple Use Plan, Baker River Ranger District
Multiple Use Plan, Darrington Ranger District
Multiple Use Plan, Monte Cristo Ranger District
Multiple Use Plan, Skykomish Ranger District
Multiple Use Plan, North Bend Ranger District
Multiple Use Plan, White River Ranger District
Timber Management Plan, Mt. Baker National Forest
Timber Management Plan, Snoqualmie National Forest
Wilderness Management Plan, Glacier Peak Wilderness
Land Adjustment Plan, Snoqualmie National Forest
Land Adjustment Plan, Mt. Baker National Forest

This Forest Plan document is used primarily by Forest Service field personnel in the planning and implementation of natural resource management activities. Refer to the above discussion regarding project-level planning, environmental analysis required, and tiering to the FEIS.

The management direction provided by this Forest Plan provides the framework within which project planning and activities will take place. The Plan defines management area goals and management standards that guide project activities toward achieving a desired future condition for the management area and, collectively, for the Forest. The Plan specifies a schedule for project activities and management practices. It provides guidance concerning potential projects and project limitations, including assumptions about the appropriate

vegetation management practices for timber sale projects. On-the-ground project analysis verifies the appropriateness of those assumptions.

Within this guidance, projects are developed to most efficiently and effectively accomplish management goals and objectives. All projects will comply with all National Environmental Policy Act (NEPA) requirements.

Project environmental analyses provide an essential source of information for Forest Plan monitoring: new or emerging issues or management concerns may be identified as project environmental analyses are completed; project analyses validate the management direction designed to achieve management area goals; and site-specific data may be used to update or correct data reported in the Forest Plan. All of this information is used, in the monitoring process, to determine when changes should be made in the Forest Plan.

C. PLAN ORGANIZATION

The Forest Plan contains five chapters, a brief references section, a glossary, and appendix material.

Chapter 1 - Introduction: includes a discussion of the purpose of the Plan, its relationship to other planning documents, and describes the planning area.

Chapter 2 - Summary of the Analysis of the Management Situation: summarizes the supply and demand conditions for significant market and non-market goods and services associated with the planning area. The focus is on those that relate to the major issues, concerns, and activities that are addressed in this Plan. Information and research needs identified during the planning process are listed at the end of the chapter.

Chapter 3 - Issues and Concerns: displays how the management plan addresses and responds to major public issues, management concerns, and resource opportunities identified during the planning process.

Chapter 4 - Forest Management Direction: is the heart of the Plan. It includes the management goals, objectives, and standards and guidelines that establish resource and project management direction for the next 10 to 15 years covered by this Plan. Also included is a general discussion of the desired future condition of the Forest in ten years, and - if the Plan were to remain unchanged - for fifty years. Chapter 4 contains the projected resource outputs, activities, and budget necessary to achieve the Forest Plan goals, and brief summaries of how the resource and activities will be managed under the Plan.

Chapter 4 also contains the Forest-wide standards and guidelines and the prescriptions for each Management Area (MA). These apply to all on-the-ground projects. The Forest-wide standards and guidelines generally apply to all areas of the Forest. The MA prescriptions define the types of activities that can occur within each Management Area.

The Forest Plan map (Preferred Alternative- J), published with the FEIS, shows the location of the various management areas discussed in Chapter 4.

Chapter 5 - Implementation of the Forest Plan: contains implementing direction for the Plan and the monitoring and evaluation program. Collectively, these sections explain how management direction will be implemented, how implementation activities will be monitored and evaluated, and how the Plan can be kept current in light of changing conditions and other findings.

The remainder of the Plan contains a list of references, a glossary, and set of appendices - the projected activity schedules, by resource.

D. FOREST DESCRIPTION

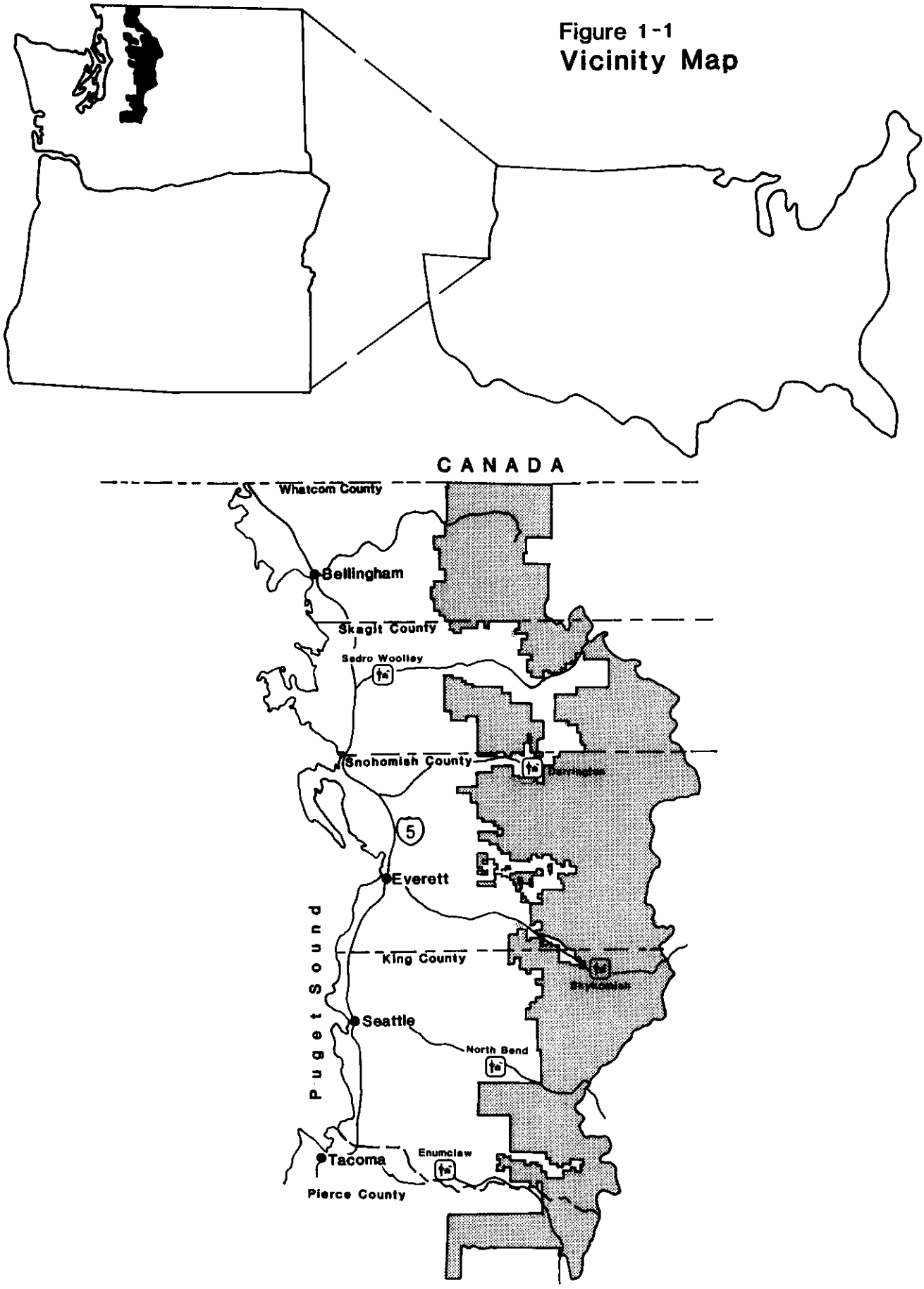
The Mt. Baker-Snoqualmie National Forest contains 1.7 million acres, located in Washington State, on the west side of the Cascade Mountains, within five counties of the Puget Sound area. The Forest includes land from the Canadian border to the northern boundary of Mt. Rainier National Park, and is also adjacent to the North Cascades National Park and the Wenatchee National Forest. Refer to Figure 1-1, the vicinity map on the following page.

Over half of the state's population live in the five-county area, a total of 2.5 million people in 1988. An additional 3.0 million reside in the Vancouver, Canada metropolitan area, just north of the Forest. The Puget Sound economy is quite diverse today, although the aerospace industry is still a major employer (Pascall and others 1989). The metropolitan area is a major center for finance, trade - especially to Pacific Rim nations - administration, and government. The forest products industry has experienced major changes over the last decade; wood products manufacturing outputs have been up the last three years, but with 25 percent fewer employees. In 1986, 47 out of 87 lumber mills in the Puget Sound area (which does not include the 35 export mills) were one-third to 100 percent dependent on National Forest logs for their operations. Nearly all the timber cut from the Mt. Baker-Snoqualmie is consumed in the local area.

The Forest contains some of the nation's most beautiful country, including much of the rugged and glaciated North Cascade Mountains. Annual precipitation near the Cascade Crest is 100-200 inches; above 2,500 feet, most winter precipitation falls as snow. The upper reaches of seven major river systems are located on the Forest and provide both seasonal and year-round spawning and rearing habitat for anadromous and resident fish. There are 18 municipal watersheds on the Forest. The vegetation of the Forest consists of dense stands of western hemlock, Douglas-fir, and western redcedar at lower elevations, blending into Pacific silver fir, mountain hemlock, and true firs at the higher elevations. Above 6,000 feet, the vegetation is composed almost entirely of low growing species. The diversity of plant and tree communities provides a variety of habitats for wildlife species. Four Federally listed threatened and endangered species may occur on the Forest.

The Forest is rich in recreation opportunities and receives over 5 million recreation visits annually. Dispersed day-use recreation is emphasized. There are over 1,380 miles of trails. Hiking, horse use, and motorized recreation, plus alpine skiing at seven ski areas are among the many uses. Nearly 42 percent of the Forest is designated wilderness. Other designated areas include the 158 mile long Skagit Wild and Scenic River System, the Mt. Baker National Recreation Area (8,700 acres), and the multiple use Alpine Lakes management unit (148,000 acres). The diversity of both the physical and social settings adds to the complexity of issues and concerns facing Forest managers.

Figure 1-1
Vicinity Map



CHAPTER 2 - SUMMARY OF THE ANALYSIS OF THE MANAGEMENT SITUATION

A. INTRODUCTION

This chapter summarizes the management situation at the time these plan decisions were made. It focuses on the supply and expected future demand conditions for significant market and non-market goods and services, tied to the major issues and concerns. It also addresses the capability of the Forest to meet (or not meet) those demands. The benchmarks are revisited, to provide information about the the maximum and minimum biological and economic production opportunities of the Forest. Chapters II and III of the FEIS contain additional supply/demand data. The benchmarks are discussed in more detail in Chapter II, FEIS and Appendix B. Also, refer to the Mt. Baker-Snoqualmie National Forest, Analysis of the Management Situation, May 1985.

The last section of this chapter is a list of information and research needs, identified during this extensive planning process.

B. BENCHMARK ANALYSIS

The analysis of the current management situation includes, as part of the requirements of NFMA, a "benchmark" analysis. The benchmarks had several purposes: they helped define the maximum economic and biological resource production opportunities on the Mt. Baker-Snoqualmie; assisted in evaluating compatibilities and conflicts between market and nonmarket objectives; defined the range - or the "decision space" - within which integrated alternatives will be developed; and were used to analyze the implications and opportunity costs of legal and policy constraints.

Benchmarks, like alternatives, were a combination of land capability, management practices, and schedules to achieve certain objectives. The benchmarks were "run" using FORPLAN, a linear computer model; the resource outputs or results were then reported and analyzed. Unlike alternatives, benchmarks are not designed to respond to all the ICO's. In addition, not all of the benchmarks were formulated to meet the management requirements (MR's) of 36 CFR 219.27. By comparing those benchmarks with and without MR's, the opportunity costs of the MR's could be quantified.

Required Benchmarks

There are several benchmarks that were required by the regulations [36 CFR 219.12(e)] and National direction. They include:

Minimum Level. This benchmark specified the minimum level of management which would be needed to maintain the Mt. Baker-Snoqualmie National Forest as part of the National Forest System.

Maximum Present Net Value Based on Established Market Price. This benchmark specified the management of the Forest at a level which will maximize the present net value of those outputs that have an established market price.

Maximum Present Net Value Including Assigned Values. This benchmark specified the management which will maximize the present net value of those outputs that have either an established market price or assigned monetary value (such as dispersed recreation.)

Current Level. This benchmark specified the management of the Mt. Baker-Snoqualmie most likely to be implemented in the future if current direction is followed. This benchmark forms the basis for the "no action" alternative.

Maximum Resource Levels. Each of these benchmarks estimated the maximum capabilities of the Forest to provide a single resource emphasis level. On the Mt. Baker-Snoqualmie, the maximum resource benchmarks included Timber and Primitive and Semi-primitive Nonmotorized Recreation.

Summary of Benchmark Production Potentials

The production potentials determined by the benchmarks are compared with current management direction and Alternative A (No Action), as displayed in the accompanying FEIS, in Table 2-1. Outputs, effects, benefits and costs related to significant issues, concerns, and opportunities (ICO's - see Chapter 3, Forest Plan for more information on ICO's) are displayed for comparison. Benchmarks 1 and 3 did not include the MR's; therefore, they did not meet requirements of NFMA.

Present net value (PNV) is affected most by the discounted costs and benefits of timber activities. The discounted costs and benefits of recreation activities did not vary much between benchmarks. This reflects the rather narrow decision space for potential recreation use and capacity, especially in unroaded.

Table 2-1
Benchmark Outputs and Effects

	Minimum Level	Biological Tmbr Potent. without MR's (Run #1)	Max PNV w/out MR's (Run #3)	Max PNV with MR's (Run #7)	Max Timber with MR's	Max. Primitive Semi-Prim Rec. with MR's	Alt. A (No Act)
Discounted Benefits ($MM)							
Timber	Not	3057 6	2870.6	2189 5	2534.1	1191.1	1806.6
Recreation	Est	1792.9	1790.9	1787.6	1791.7	1761.7	1915.2
Other		not estimated					33.7
TOTAL		4850.5	4661.5	3977.1	4325.8	2953.5	3755 5
Discounted Costs ($MM)							
Timber	Not	1927.4	1719.1	1286.9	1689.9	684.9	1083 0
Roads	Est.	267 3	256 0	253 5	277.5	169.8	168.8
Recreation		33 7	33.7	33 7	33 7	33 5	34.8
Other		not estimated					
TOTAL		2228.3	2008.1	1574 1	2001.1	888.2	1444.2
PNV ($MM)	Not Est.	2599.7	2630.9	2254.0	2302 3	2050 5	2319.8
Budget ($MM)	3 0	25 1	23 4	28.2	33.4	19.0	22.0
Allowable Sale Quant. (MMCF)							
Decade 1	No Timber	68.4	63 9	37.5	57 2	26.7	31.0
Decade 2	Management	68.4	63 9	37 5	57 2	26.7	36.7
Decade 3	Activities	68.4	63.9	37.5	57.2	26.7	39.0
Decade 4		68.4	63.9	37.5	57.2	26.7	39.0
Decade 5		68.4	63.9	37.5	57.2	26.7	39.0
Long Term Sustained Yield Capacity (MMCF)	N/A	72 6	66 2	37 5	62.9	27.8	39.0
Acres Suitable for Timber Harvest Acres)	N/A	606.9	606 9	463.8	529 7	300.9	412.5
Recreation Use (MRVD/Year)							
Roaded	829	2177	2177	2177	2177	2099	2060
Unroaded	100	203	203	211	209	240	201
Wildlife Pop Levels 1/							
Bald Eagle (Pairs)	4	4	4	4	4	4	4
Elk (Summer Range Pop.)	Not Est	1080	1080	1080	1080	1080	1240
Deer (Summer Range Pop.)	Not Est	19660	19660	19660	19660	19660	19750

1/ Bald eagle numbers are derived from recovery plan population objectives for pairs in breeding territories. Deer and elk values are population estimates based on maximum habitat potential for each range type.

Discounted recreation benefits for Alternative A are higher than in any benchmark, but PNV is less than all the benchmarks except Max Recreation. The combination of MR constraints and allocation of tentatively suitable acres to other resource benefits in Alternative A (no such allocations were made in benchmarks), reduced the timber outputs in Alternative A and, thus, PNV.

The decision space for harvest levels that included MR's ranged from 57.2 MMCF (the Max Timber benchmark), to 26.7 MMCF (the Max Recreation benchmark). Alternative A harvest level falls in the lower portion of this benchmark decision space. Due to MR's and existing land use constraints (including Congressional designations), the practical upper limit for timber outputs was approximately 38 MMCF (Benchmark #7).

Long-term sustained yield capacity (LTSYC) was not reached until after Decade 5 in the benchmarks.

C. RESOURCE DEMAND PROJECTIONS

This section includes additional demand projections for selected resources. Some outputs and activities, while included in the RPA targets and reported in the output tables in the FEIS, do not have a true demand-supply relationship, and are not discussed here (such as precommercial thinning and road construction).

Demand is generally defined as the quantity of a good or service demanded at a certain price. A substantial change in price can result in a far different quantity demanded. This definition is appropriate for market commodities with a price (or user fee), such as timber and developed recreation.

Demand for non-market goods and services, such as wilderness and wildlife resources or facilities, do not fit the general definition. Although recreation costs are incurred by the visitor, the outdoor recreation resource or facility is generally available at zero or nominal charge. The thousands of days of outdoor recreation currently being consumed are those demanded at the prevailing zero or near zero-prices for these resources. If prices were raised substantially, a different quantity would be demanded or consumed.

As used in this section of the document, "demand" is used to identify a particular point or instant on a demand schedule. As such, it reflects an intersection at a particular point in time between a demand schedule (a list of willingness-to-pay values for various levels of offerings) and a supply schedule (a list of volumes the seller is willing to offer at various prices).

Recreation Demand

Recreation demand was projected using regression analysis. This form of analysis uses historical trends and expected population growth to predict future recreation use. Demand is expressed as a range (±10% from the absolute figures developed in the analysis process) due to the uncertainty of projecting recreation demand so far into the future.

Currently, the demand for developed recreation (which is primarily alpine skiing and developed campgrounds) is well below the Forest capacity. Alpine ski areas currently have more than enough capacity, and are now expanding to meet a market demand for a higher quality skiing experience. Developed campgrounds are operating well below capacity except for selected summer weekends, and in certain geographic areas.

Current capacity for roaded dispersed recreation far exceeds the current demand. Future capacity will be able to accommodate expected demands on the Forest until the fourth decade, when population growth begins to affect all recreation sectors.

Unroaded dispersed recreation use currently exceeds the capacity of the Forest. The result, at present, is a reduction in the quality of the local experience, or a displacement to another location to satisfy current demand. With future population growth, this situation will not improve.

Wilderness on this Forest is nearing its practical capacity, due in large part, to its proximity to the Puget Sound metropolitan area. By the second decade, projected demand will have exceeded capacity.

Table 2-2
Summary of Projected Supply and Anticipated Demand

	Decade 1	Decade 2	Decade 5
Recreation			
Developed Recreation Use (MRVD/Year)			
Projected Supply (Capacity)			
Alternative A (No Action)	5,382	5,792	6,842
Forest Plan	5,598	6,098	7,238
Anticipated Demand 1/	2,834-3,464	3,848-4,702	6,718-8,210
Dispersed Recreation Use (Non-wilderness) Including Wildlife and Fish Use (MRVD/Year)			
Projected Supply (Capacity)			
Alternative A (No Action)	4,092	4,482	5,142
Maximum Recreation Benchmark 2/	7,458	7,468	7,481
Forest Plan	4,030	4,487	4,751
Anticipated Demand	2,539-3,121	3,774-4,708	6,589-8,072
Roaded Recreation Use (MRVD/Year)			
Projected Supply (Capacity)			
Alternative A (No Action)	3,343	4,097	4,902
Maximum Recreation Benchmark	7,219	7,231	7,248
Forest Plan	3,277	3,730	3,991
Anticipated Demand	1,854-2,266	2,837-3,467	4,817-5,887
Unroaded Recreation Use (MRVD/Year)			
Projected Supply (Capacity)			
Alternative A (No Action)	201	164	115
Maximum Recreation Benchmark	239	237	233
Forest Plan	208	182	149
Anticipated Demand	225-293	382-492	713-890
Timber			
Allowable Timber Sale Quantity (MMCF/Year)			
Projected Supply			
Alternative A (No Action)	31 0	36 7	39.0
Maximum Timber Benchmark	68 4	68 4	68.4
Forest Plan	22.4	25.7	29.7
Anticipated Demand 3/	22 4	25 7	29.7

1/ Anticipated recreation demand is based on historical use figures projected into the future and Puget Sound population projections

2/ FORPLAN Alternative runs (1989) have undergone changes in recreation modeling since the Benchmarks were run (Mar 85) to better reflect the spatial characteristics of the recreation opportunity spectrum (ROS) from a per acre to a per area basis.

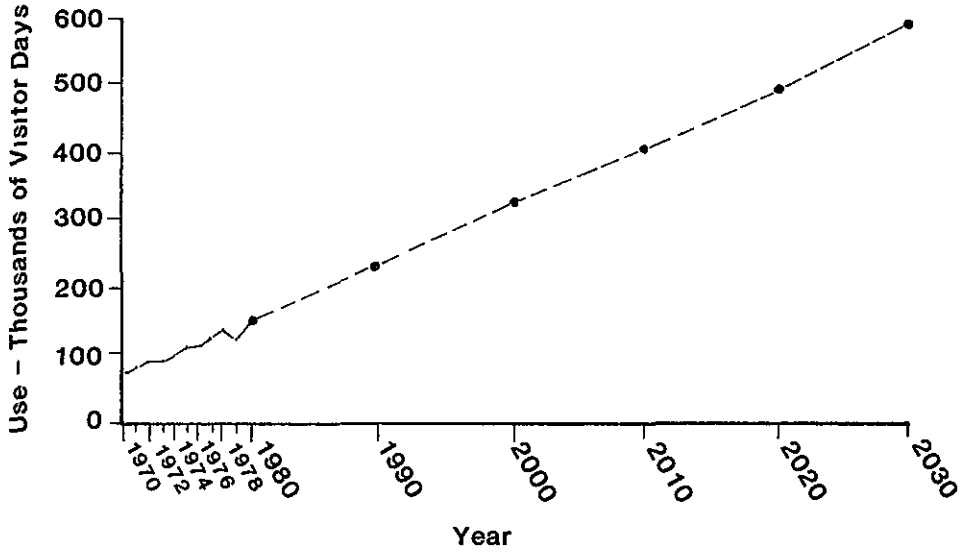
3/ Projections indiate that demand for timber from the MBS will remain sufficiently high to allow the Forest to sell all the timber it can produce from lands allowing harvest, with no downward effect on prices

Wildlife Demand

The demand for wildlife takes the form of hunting, wildlife study, viewing, and photography. Figure 2-1 shows past and projected demand for all types of hunting on the Forest.

Hunting, especially for big game, has been a dominant demand on the wildlife resource for the past 20 years. During recent years, non-consumptive use has accounted for a larger percent of the total wildlife-related demand. Estimates indicate that non-consumptive use exceeds consumptive use by about 33 percent on all lands and is growing at a faster rate (USDA 1980). The projections shown below are based on land area to support a given density of hunters, rather than the availability of animals to hunt. Future demand may be lower than indicated below if hunter success decreases drastically as a result of reaching the carrying capacity for hunted animals. Because of the large population growth in the Puget Sound area, the demand for non-consumptive fish and wildlife use will continue to increase at a fast rate.

Figure 2-1
Hunting Use
(All Types)



Demand for Fish

The demand for anadromous fish is twofold: commercial (non-treaty commercial ocean fishing and American Indian commercial harvest) and sport. The current demand for commercially caught fish is assumed to equal the current annual harvest (USDA and State of Washington 1981-85).

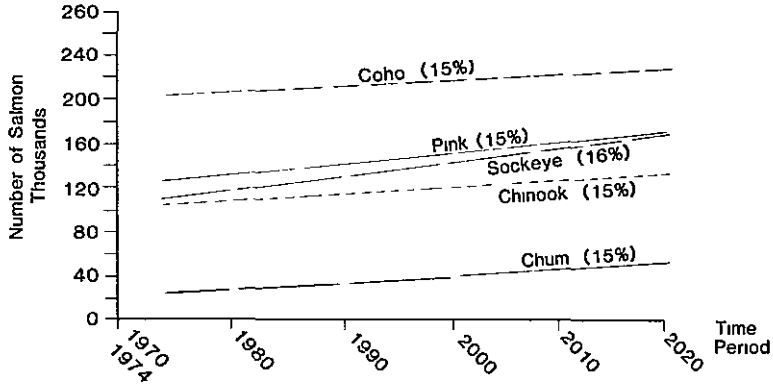
This estimate of demand is conservative. There are more commercial fishermen in the industry than there are fish. If more fish were produced, they could be harvested with little additional cost. Therefore, actual demand at current prices is probably higher than shown.

The National demand for edible fishery products increased 52 percent from 1967 to 1976. This increase was a result of a growing population and an increased per capita consumption rate. This increase is projected to continue nationally and worldwide (USDA 1980).

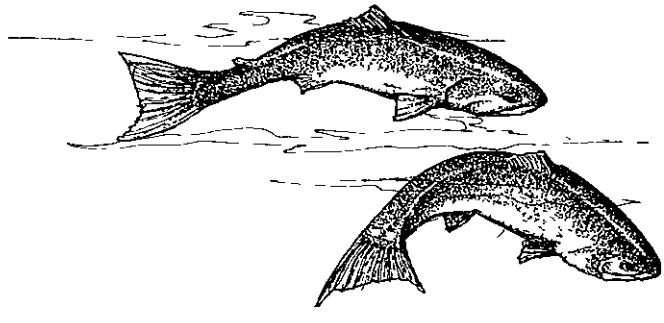
Figure 2-2 shows the estimated demand for salmon produced from all ownerships in the Statewide Comprehensive Plan's Area 1; this includes most of the western half of the state, north of the Cowlitz River and including all of the Olympic Peninsula. It is assumed that the projected increase in demand for fish produced on the Forest will be similar to that for Area 1, though the actual number of fish produced on the Forest is much smaller.

Figure 2-2

Demand For Salmon Produced in Area 1



The numbers in (%) is the percentage increase in demand of each species from period 1970 to 2000



Most of the salmon sport fishing in the Puget Sound area occurs in salt water. There is little salmon fishing on rivers and streams; exceptions include a small salmon sport fishery on the Nooksack and Skagit Rivers. There is also some incidental harvesting of salmon during the sea-run trout sport fishery.

Sea-run trout sport fishing occurs almost entirely in the stream and river systems. Steelhead, sea-run cutthroat, and Dolly Varden are caught almost exclusively in freshwater systems. The freshwater sport fishing demand for sea-run and resident fish produced on the Forest has steadily increased since the early 1970's. Projections indicate that this demand, measured in angler days, will increase by 25 percent by the year 2000. The demand for saltwater sport fishing for all anadromous fish produced on the Forest is likely to increase 25-50 percent over present demand.

Sport fishing demands are conservative. The Puget Sound region has more recreational sport fishermen than desirable fish. If more desirable sport fish were produced, they could be absorbed by the recreational sport fishery.

Timber Demand

The following is a brief summary of the timber demand discussion found in Chapter III of the FEIS.

Demand for lumber and wood products from the Puget Sound Economic Area followed the trends of the Pacific Northwest, with a drastic decline in the early 1980's compared to the highs during the 1970's. Production of wood products in the period 1980-84 was slightly less than 80 percent of that experienced during the 1970's. The structure of the wood products industry in the Puget Sound Area put it at a competitive disadvantage with imports from Canada and Southern U.S. production.

The pulp and paper industry avoided the deep declines in demand and production of the early 1980's. Strong demand for paper, domestically and abroad, helped pull that sector of the wood products industry through the recession in fairly good shape. Over the past decade, the number of pulp and paper mills in the Puget Sound area has dropped by almost 20%, but the installed capacity of the remaining mills has increased by about 10%. This is similar to the structural changes found in other sectors of the industry. As of 1986, about 5% of the Forest's annual harvest went to Puget Sound area pulp mills, which represented about 7% of the mills' roundwood consumption. Regionally, roundwood consumption represents only about 30% of the total fiber input for pulp production.

The restructuring of the timber industry in the Northwest during the early 1980's was a response to the declining market share and an attempt to regain market share. The projected future decline in production from Canada and a continuing growth in exports to the Pacific Rim Countries are likely to result in a shift in demand for Puget Sound Economic Area logs. The timing and magnitude of this shift in demand, however, are speculative. Increased production from Puget Sound Area mills during the past three years is an indication that the industry is improving the efficiency of its wood processing and thus improving its ability to compete for market share nationally and internationally.

The supply/demand situation in other economic areas around the state also influences the availability of timber in the Puget Sound area. The Puget Sound area mills (including export facilities) consume more logs than are harvested in the area. During the 1980's, approximately 66 percent of the logs consumed in Puget Sound originated from Puget Sound; approximately 26 percent came from the Olympic Peninsula; 5 percent from Central Washington; and 3 percent from other areas, including out of State. A similar pattern of imports into the area occurred during the 1970's.

While the Puget Sound area has historically imported approximately 35% of the logs needed for its mills, it has used about 95% of the wood harvested in the are within the region. Only about 5% of the harvest from the Puget Sound area is going to processing elsewhere. (Exporting logs overseas is considered part of the local processing industry.) So the Puget Sound area is a net importer of logs, which come from other parts of Western Washington, along with a minor amount from the east side of the Cascades.

Depending on markets, mill capacity, price and local harvest level fluctuations, one part of the State may have a greater demand for logs at any given time than another. The relative demand for logs among processing areas may change seasonally, or from year to year. Prices in the areas with a greater need for logs will tend to float upward, drawing more supply to that area. As that need is met and prices stabilize, a shift may occur to another region. Prices serve as the leveling agent to direct the log supply to the areas with greatest demand. In extreme cases, prices may not be able to go high enough to bring in the needed lumber and a structural shortage of logs may develop for an area. If that continues for any length of time, mills in that area will be faced with closure. Competitive mills will tend to survive such periods, but marginally efficient mills may drop out. The changing of prices to moderate log flows have to operate within limits, which are set primarily by the prices of finished wood products in the regional market.

Because of the local and regional interactions in the roundwood markets, it is difficult to make quantitative estimates of future demand for logs from the Puget Sound area. One can not really assume that the consumption by the Puget Sound mills is a measure of the demand for Puget Sound logs, when other regions may assert a need, as reflected through relative prices, for those logs as well. However, estimates of relative levels and trends in demand for timber can be made, given what is known about current consumption patterns, expected changes in regional, national and international demand for wood products, and projected physical/biological supply.

For the next 20 years, demand for wood products is expected to grow, but slowly. This is based on a continuing, though not rapidly expanding, need for wood for new construction and for remodeling and repair. Export markets will decline somewhat over that time period, but will still remain very active. Canadian wood imports will continue to decline from the high levels they held in the early 1980's because of decreased competitiveness and increasing restrictions on logging in Canada. In all, given no economic shocks, the demand for roundwood will stay at least at current, to somewhat higher, levels.

In the face of this demand, available inventory from private industrial forest lands will be declining, as will harvests from National Forest lands, particularly in Northwestern Washington. Other private land harvests may come up somewhat, but probably not enough to offset the declines in these two ownerships. And after the mid-1990's, almost all old growth timber that is still harvested will come from National Forest lands. Therefore, it appears the next 20 years will find fairly tight physical/biological supplies juxtaposed with demand that stays at least at current levels. The expected result will be fairly rapidly rising prices in the range of 1.5 to 4 percent per year (Adams, 1989), but no timber supply "crisis," as prices play a moderating effect - eliciting more supply from the private nonindustrial forest lands, and dampening final demand for wood products by consumers because of increased cost.

The declining inventory of sawtimber of harvestable age in the next two decades will have less effect on the pulp and paper sector than on the lumber and plywood sectors. Pulp mills can use much smaller material, chipped either in the woods or at the mill, than can sawmills. Thus, the age-class gap in the inventory will not be as limiting for pulpwood supply. Other economic factors, though, may combine to place an increasing squeeze on pulp prices. Better log utilization and on-site use of residues by the primary manufacturers leaves less low-cost residue available for pulp. Declining harvests regionwide and in western Canada will also reduce residues available. If the export demand for chips remains strong, additional pressure will be placed on prices.

Over the next decade or two, these supply and demand factors may put the Northwest pulp producers at a greater cost disadvantage than East Coast or Southeast producers, who already produce the major portion of pulp and paper products in the country. Mitigating factors for the industry are likely to be continued technological changes, allowing more use of species little utilized to date, and greater use of recycled paper as feedstock. Supply changes from the Mt. Baker-Snoqualmie National Forest are expected to have little effect on the local area or regional pulp and paper sectors.

D. INFORMATION NEEDS

This section lists the information, inventory and research needs that have been identified during the planning process for the Mt. Baker-Snoqualmie National Forest. Information needs form the foundation for ongoing efforts by the research and planning communities (U.S. Forest Service Pacific Northwest Research Station, Pacific Northwest Region of the Forest Service, and the Mt. Baker-Snoqualmie National Forest) to identify management needs, and to build and implement the information and research programs necessary to support plan accomplishments. The concept used to organize and develop these needs recognizes that biological, physical and social ecosystems are the foundation for the planning process.

The remainder of this chapter is devoted to listing research, inventory and data needs identified during the planning process.

Recreation

1. Recreation use database to be brought up to date and should reflect accurate levels of use based on measurement rather than estimates. This should be tied to ROS.

2. A uniform method for determining and applying demand for various forms of recreation with ties to ROS needs to be developed.

3. Update Forest Existing Visual Condition mapping in the Forest Data Base every 5 years.

4. Review and update closure orders every 5 years.

5. Collect baseline vegetation and soil information using permanent transects in camps, trails, and other areas that currently appear to be well within acceptable standards but have potential for future degradation.

6. Complete Vegetation Management Plans for all developed recreation sites.

7. Develop Forest-wide inventory of sensitivity levels for trails, roads, and wild and scenic rivers.

Human Community

1. Prior to the update of the Forest Plan (in 10 to 15 years), complete an economic-base analysis (or the equivalent) for certain towns, including any or all of the following: Darrington, Granite Falls, Skykomish, and Enumclaw. Others may be studied if deemed necessary.

American Indian Religious and Cultural Uses

1. Work with Tribes and religious practitioners to update the inventory of religious use areas and predict future use trends.

2. Consult with Tribes and religious practitioners on specific projects and to develop more effective mitigation measures through consultation.

3. Examine integrated resource inventory to determine location and volume of old-growth cedar stands.

Archaeological and Historical Properties

1. Complete inventory of reported cultural resource sites. Use thematic or district approach. Conduct evaluations of National Register eligibility within this context.

2. Develop new techniques to identify prehistoric cultural resources. Take advantage of ground disturbance (road construction, timber harvest, trail use etc.) to discover new sites. Investigate new site discovery techniques (subsurface probing, soils testing, etc.) to identify previously unidentified sites. Use this new information to understand distribution of sites across the landscape and more effectively plan future surveys.

3. Develop cultural resource field sampling survey strategy based on Forest overview and land type analysis. Refine the strategy based on results of information needs of the above.

4. Identify how the Forest cultural resources can best contribute to general knowledge of prehistory and history. Coordinate with State and regional efforts to establish appropriate research goals.

5. Identify cultural resources best suited to interpretation. Consider accessibility and representation of major historic themes. As a start, improve interpretive information at the Public Service Centers, the Joint Information Center, and other public contact points.

6. Expand efforts to repair and rehabilitate historic resources listed on the National Register of Historic Places.

Wilderness

1. Verify and refine the limits of acceptable change through monitoring. Especially, need to refine data on social impacts in the wilderness, such as what are the "real" implications of encounters and camps visible, to wilderness use levels and experiences.

2. Develop and maintain a database on wilderness use and impacts. Inventory wilderness campsites.

3. Further research is needed on what the appropriate level of outfitter-guide use should be in the wilderness.

4. Locate and define the wilderness boundary on the ground for both wilderness and other management activities outside of wilderness.

5. Collect vegetation, soil condition, and impact trend information in heavily-used camp areas near trails and other heavy-use areas (such as stock-hitching areas) that appear to be near the limit of acceptable change.

6. Identify air quality related values that would be potentially impacted by changes in air quality in Class I areas.

Air Quality

1. Complete inventories of baseline conditions for visibility, water chemistry, vegetation vigor, aquatic habitats and other identified air quality related values.

Wildlife

1. Complete bald eagle roosting, foraging and nesting habitat inventory and monitor these and other potential use sites. Validate the effectiveness of standards and guidelines for bald eagle habitat areas, and determine the need for changes or additional mitigation measures.

2. Delineate active and potential bald eagle nest sites in accordance with the recovery plan, and develop a management plan for these areas.

3. Determine the significance of recreational activities impacts on bald eagles feeding on salmon carcasses on the Skagit River, and any other area where both activities occur. Determine the best way to manage both resources.

4. Complete peregrine falcon nesting habitat survey and map potential habitat on the Forest. Determine whether there is any reproduction occurring on the Forest. Survey periodically for any nesting use.

5. Determine whether there are resident populations of gray wolves and whether breeding is occurring on the Forest. Develop inventory procedures which are reliable and cost-effective. While bald eagle inventory methods are currently reliable and relatively efficient, methods of inventorying for grizzly bear or gray wolf numbers are lacking. We do not currently have a good idea of how many individuals of these species are using the Forest, how they use the habitat, or whether they are successfully reproducing.

6. Determine whether there are resident grizzly bears on the Forest and whether they are breeding. Examine the effects of recreational uses, road traffic and other activities on any such bears. The U.S.D.I. Fish and Wildlife Service will be making a decision as to whether or not the North Cascades area will be a recovery zone. There is a need to develop information and educational means of teaching the public how to recreate and work safely in the presence of black bears, and potential presence of grizzly bears.

7. Determine baseline numbers for populations of bald eagles, gray wolves, peregrine falcons and grizzly bears.

8. Define potential habitat and habitat types on the Forest for grizzly bear and gray wolf. Determine what would constitute viable populations of these species.

9. Determine how to maintain and create usable dead and defective tree habitat (standing and down) in timber harvest units, while meeting State logging safety requirements. Determine whether created snags provide useful habitat, and how long it takes for them to do so.

10. Inventory current conditions for dead and defective, standing and down, tree habitat.

11. Inventory pileated woodpecker, pine marten and spotted owl populations.

12. Develop more accurate baseline inventories for deer, elk, goats, cavity excavators, and sensitive species.

13. Develop reliable and cost-effective techniques for inventorying indicator species and sensitive species.

14. Refine deer and elk winter, summer, and transition range habitat inventories, and identify critical wintering areas, fawning and calving areas, and migration and travel corridors.

15. The FSEIS and U.S.D.I. (1988) list a large number of information needs for the spotted owl. Refer to these documents. Needs described therein include defining habitat size, dispersal, reproductive, and feeding requirements, year-round habitat needs and information on mortality and survival of adults and young.

16. Validate wildlife ecological indicator species and identify the need for changes in species used. Validate MR habitat requirements for these species, and identify any need for changes in the MR habitat requirements.

17. Validate the critical nature of optimal thermal cover to maintain MR populations of mountain goats and desired levels of deer and elk.

18. Determine the effects of vehicular traffic on roads on species other than elk, which have been well-researched. Determine acceptable threshold levels of road densities for species sensitive to road disturbance. Validate road densities allowed in deer and elk winter range and goat MR areas, and determine whether there is a need to change the allowed density.

19. Determine habitat requirements of, and develop management guides for,sensitive animal species.

20. Determine the effects of forest fragmentation of habitat on wildlife species, particularly those which use mature and old growth habitats. Validate minimum block sizes for habitat pieces. Identify needs and requirements for connecting habitat between blocks of older forest habitats and develop methods for achieving these needs.

21. Revise and improve models for deer and elk habitat capability. Refine coefficients used for various habitat stages. Develop a nonlinear model which fully reflects needs for a balance of optimal cover and forage.

22. Complete and improve mountain goat inventory and goat habitat inventory. Identify critical habitats, and needs for revisions or additions to MR habitat areas. Identify kidding areas, and areas needing protection from human disturbance. Information is needed on the numbers of humans in critical goat habitat areas and the effects of their presence on goat--stress, avoidance, reproductive failure.

Continue to investigate, with the Washington Department of Wildlife, causes for the apparent decline in goat populations and current levels below calculated habitat capability. Areas to be further examined include the effects of parasites, genetic problems from small herd numbers, over-harvesting (legal and illegal hunting) and harassment from human recreational and other activities. Determine the need for additional mitigation measures for goat habitats.

23. Establish, with the State, population objectives for deer, elk and goats on the Forest. Currently, the Forest's shares of statewide species population objectives have not been established.

24. There is a need for a complete inventory of cave and cave-like habitats on the Forest. An extensive (rather than intensive) inventory of these sites was completed by Perkins (1988) under contract with the Forest Service. Inventories of use of these sites by sensitive bat species need to be continued.

25. Talus and cliff habitats on the Forest need to be inventoried and mapped.

26. There is a great need for information, and improved methods for measuring the use of, and demand for, appreciative and consumptive uses of wildlife. Current measures of WFUDS are probably inaccurate and underestimate appreciative (nonconsumptive) uses. There is the same need to improve the methods for, and accuracy of, valuing the economic benefits of wildlife uses on the Forest. In addition, other measures, such as what is called "existence value" of Forest wildlife resources needs to be measured. In short, there is a great need for accurate measures of the importance and values of the Forest's wildlife to the public.

Fish-Water-Riparian

1. Complete and update stream surveys for all fish bearing streams, to include an assessment for presence of fish migration barriers posed by natural and man-caused events.

2. Inventory all fish bearing streams for distribution and volume of large woody debris.

3. Determine the amount and composition of streamside vegetation required for bank and channel stability and its influence on fish habitat capability.

4. Determine what deviations, due to forest management activities, from the existing riparian vegetation types identified as critical riparian vegetation are acceptable for maintaining bank stability and fish habitat capability.

5. Determine what percentage of loss (of the previously established riparian area vegetation) within a project area has resulted in a reduction in the habitat capability to support wildlife dependant species (over a 5 year period).

6. Determine what deviations in baseline flow (high and low periods), resulting from forest management activities, impact fish populations, and/or fish habitat within, and downstream of the project areas.

7. Develop and maintain a data base on Forest lake surveys and fish stocking.

8. Validate the parameters that comprise the Anadromous Fish Habitat Capability Index. Correlate habitat capability parameters to fish use and abundance (numbers of smolts and pounds of fish).

9. Develop forest-wide values for estimating the number of fish that could be produced by implementing habitat improvements (structural and non-structural types). Use actual improvement sites and fish populations present to make these evaluations.

10. Inventory and map riparian areas (to include wetland areas) during project design; develop forest wide data base for this information/data.

11. Stream classification designations will require re-evaluation and possible reclassifications based on new information and additional data.

12. Validate the amounts of area identified in the forest plan's FORPLAN model as riparian acres (streamside class I, II, and III class streams). Also determine if the conceptual modeling of 25% non-harvest, 50% extended rotation yield, and 25% normal rotation is being accomplished and meeting other riparian resource objectives on the ground.

13. Determine what bird, mammal, reptile and amphibian species are dependant on riparian habitat, and what the necessary components of their habitat are.

14. Identify plant indicator species for riparian habitats.

15. Determine the effectiveness of all the stated mitigation measures addressing effects (direct, indirect and cumulative) on fish and water. If ineffective, determine what additional measures will be required.

16. Determine the extent of the transient snow zone and it probability of occurrence of rate of water delivery to soil during rain-on-snow conditions.

17. Determine the effects of different types of forest cover (new clearcut, mature forest, 15-year-old unthinned plantation, etc.) on rate of water delivery to soil during rain-on-snow conditions.

18. Determine under what site conditions forest roads collect and redirect subsurface water.

19. Determine the relative importance of sediment from valley glaciolacustrine deposits reworked by major streams and from Type 4 and 5 streams (as classified in Washington Forest Practices Rules and Regulations) in adversely affecting spawning gravels of anadromous fish.

20. Identify riparian wildlife indicator species.

21. Validate adequacy of riparian standards and guidelines for meeting riparian wildlife habitat needs. Determine effectiveness of riparian mitigation measures for wildlife, and whether additional measures will be required.

22. Determine appropriate widths of riparian travel corridors for wildlife. Determine needs for corridors connecting riparian habitats with upland habitats.

23. Develop improved understanding of seeps, bogs, wet meadows, forested wetlands, marshes, springs and other wetlands, and how they are impacted by project work. Validate the effectiveness of riparian standards and guidelines and mitigation measures in protecting these areas. Develop guidelines for addressing very small wetlands which occur interspersed with forested, suitable timberlands, where they are sometimes difficult to manage.

Sensitive Plants and Vegetative Diversity

1. Identify plant indicator species for riparian, special and unique communities.

2. Inventory entire Forest for threatened, endangered and sensitive plant species, with emphasis on all proposed project areas, RNA's, botanical Areas, wilderness and other areas where timber harvest is not emphasized. Determine management standards and guidelines needed for maintaining species viability, and develop management guides incorporating them. The new Sulphur Creek Botanical Area is a high priority for inventory.

3. Identify tree species whose gene pools are shrinking and develop plans to ensure that they continue to exist on the Forest in their natural range. Some of these species have special medicinal, religious or cultural uses. Identify potential cedar preserves.

4 Inventory the distribution, abundance and habitat requirements of forest plant products, other than trees, collected for commercial uses. These include mushrooms, salal, beargrass, mosses, ferns and other plants, and collection of seed. Determine the effects of harvesting these species, and need for, and means of regulating or restricting collection.

5. Information is needed on the role of the fungal flora in the ecosystems, and how to manage to preserve these elements--their viability, diversity and distributions. The role of fungi in maintaining forested ecosystems needs to be much better understood.

6. Identify future potential Botanical Areas and Research Natural Areas.

7. Determine the effects of using non-native, but already present, plant species for revegetating and stabilizing sites and for forage enhancement. Determine the appropriateness of using these species, and whether there is a need to restrict seeding to only native species.

8. Identify plant zones other than old growth which may need large, viable examples preserved in order to maintain species and community viability through time.

9. Determine prescriptions for reforesting timber harvest units, and subsequent timber management to maintain a diversity of tree species in these areas.

10. Identify effects of fragmentation on plant communities--their viability, diversity and composition.

11. Continue to inventory horizontal and vertical structural diversity of forest stands, to better understand structural differences among age classes, and to identify structural management goals for experimental silvicultural management, to produce desired stand structural components.

12. Complete a Forest inventory of mature and old growth forest communities which includes information on species composition, structure, and other ecological components. A new, more complete inventory of this type was begun in 1990.

Timber

1. Determine what portion of the Mountain Hemlock Area (Management Area 19) can be reclassified as tentatively suitable for timber production.

2. Reinventory the timber resource. Stratify forest land by productive potential and other significant characteristics.

3. Inventory old growth forest land to determine area and location.

4. Develop managed yield tables to project timber growth and yield in forest stands that are predominately true fir, western hemlock, or mountain hemlock species.

5. Determine effects of logging damage on true firs and hemlock and whether or not to plan commercial thinning in these species.

6. Validate areas of J-8 and S-8 suitability classification on the ground.

7. Complete inventory of riparian habitat on the Forest.

8. Conduct provenance testing of Pacific silver fir to determine the genetic variability of this species.

CHAPTER 3 - PLAN

RESPONSIVENESS TO ISSUES, CONCERNS, AND OPPORTUNITIES

This chapter is included to describe how this Forest Plan responds to the major issues, concerns, and opportunities identified during the planning process. The major ICO's and their development are discussed in detail in Chapter I, and Appendix A of the FEIS accompanying this Plan. The reader is encouraged to review those sections.

The major issues, concerns, and opportunities are:

- Development versus Nondevelopment of the Forest
- Timber Supply
- Old Growth Ecosystems and Fish, Wildlife, and Plant Diversity
- American Indian Religious and Cultural Use
- Recreation Opportunities
- Wild and Scenic Rivers
- Management of Municipal Watersheds
- Effects of Timber Management and Related Activities
- Adjacent and Intermingled Lands

Implementation of this Plan will result in rather subtle changes during the first 10 to 15 years (the planning period). The forest visitor will not observe drastic changes from the way the Forest is currently being managed; however, the issues and concerns have focused attention on past forest management practices. These practices have been reviewed and revised, as indicated on the following pages, to address the ICO's.

OVERALL EMPHASIS OF THE FOREST PLAN

The Land and Resource Management Plan reflects the importance of the Mt. Baker-Snoqualmie National Forest as a vital and major contributor of recreation opportunities, plant and animal diversity, and forest goods and services to the Puget Sound region, the Pacific Northwest, and the nation. The Plan recognizes the interrelationships of the many and varied resources of the Forest. It attempts to carefully balance the importance of the nonmarket resources such as dispersed recreation opportunities, scenic quality, fish, wildlife, water, and air quality with the continued use of the Forest to produce sustained yields of timber. As choices were made among individual resources, the tradeoffs and compromises between nonmarket values and market values were given careful consideration.

The Forest Plan emphasizes unroaded recreation; protection of scenery along major highway corridors; increased big game populations; an increase in the Wild and Scenic Rivers System; high quality water; and stable supplies of wood fiber. The Plan maintains roadless areas; provides wildlife habitat for game and nongame wildlife species to maintain viable populations; and provides for increased trail development.

Chapter 3

PLAN RESPONSIVENESS TO THE ICO'S

Development versus Nondevelopment of the Forest

How should the released, unroaded areas be allocated and how will the resources be managed?

At what rate should the Forest Service enter those roadless areas that are allocated for development?

Background: There are approximately 403,000 acres of undeveloped, unroaded lands that were released from wilderness consideration by the Washington State Wilderness Act of 1984. Until the Forest Plan is revised, either at the 10-15 year update or during any earlier revisions, these acres are available for a full range of resource uses. The allocation and management of these acres continues to be a highly controversial issue. The areas contain a vide variety of resource values.

Response: In this Forest Plan, 309,214 acres (77 percent of the "released" acres) are maintained in a roadless character. The remaining 93,716 acres (23 percent) are allocated to various levels of development involving road construction and production of both market and nonmarket outputs.

The total Forest acres assigned to nondevelopment land allocations including wilderness, wildlife habitat areas, dispersed recreation areas, and research natural areas are about 1,132,000 acres or 66 percent of the entire Forest.

Management of the roadless areas on the Forest will proceed according to their land use allocations. Approximately 20,000 acres of the 94,000 acres of roadless area allocated to development will be affected by development (including timber sales) in the next 10 years and no longer meet the definition of roadless as used in RARE II. By the end of fifteen years, an additional 12,000 acres of roadless areas will be affected by development. Proposed development activities scheduled for roadless areas will receive appropriate environmental analysis and documentation before they are implemented.

Table 3-1 shows the general assignment of the unroaded areas, by parcel. This table refers to the acres allocated to development or nondevelopment prescriptions; the acres shown are those ultimately remaining either undeveloped or developed. Refer to Appendix C, FEIS, for more information.

Table 3-1
Roadless Area Disposition - Acres

Area	Developed	Undeveloped
Mt. Baker (Canyon Creek)	2,976	22,070
Mt. Baker (North Block)	5,612	10,813
Mt. Baker (West Block)	9,688	17,130
Mt. Baker (South Block)	2,152	4,223
Mt. Baker (Noisy-Diobsud)	5,486	44,899
Oakes Peak	654	950
Alma Copper	1,752	6,441
Hidden Lake	569	6,083
Glacier Peak H	2,153	5,786
Glacier Peak I	2,850	9,905
Glacier Peak G	378	8,359
Glacier Peak J	11,373	14,598
Glacier Peak M	695	360
Glacier Peak A	0	443
Glacier Peak L	2,360	11,867
Glacier Peak B	3,482	15,164
Glacier Peak K	6,776	38,733
Pressentin	7,157	7,900
Higgins Mountain	7,517	5,660
Prairie Mountain	2,237	1,585
White Chuck Mountain	1,603	4,120
Boulder River	5,465	26,842
Eagle Rock	1,625	31,551
Tolmie Creek	274	0
Clearwater	4,092	4,711
Lonesome Lake	42	253
Sun Top	1,244	1,142
Silver Creek	105	950
Norse Peak	3,417	6,676
TOTAL	93,716 (23 %)	309,214 (77 %)

Timber Supply

What is the capability and suitability of the Forest to produce timber?

What should the timber harvest level be, considering all resources on the Forest and their relationship to social, economic, and environmental factors including local, regional, and national demands?

Background: A key public issue and management concern, and an area of great controversy. Additional facets are the amount of old growth remaining and jobs. While the timber industry is a small part of the overall Puget Sound economy, it is still important; lumber production provides just over 4% of the wage and salary jobs in Skagit County, 2-3% of wage jobs in Whatcom, Pierce,

and Snohomish Counties, and less than 1% in King County (1988). About 35 percent of the total Mt. Baker-Snoqualmie acres were tentatively suitable.

Response: Timber production will occur at levels that are consistent with providing for increased emphasis on unroaded recreation; greater protection of scenic values on travel corridors; increased miles of trails; increased number of rivers recommended for Wild and Scenic River designation; and allocation of three Special Areas. Timber will be managed on about 346,000 acres, of which about 49 percent will be managed on long rotations of 100 years or more to meet nontimber resource objectives. About 2,900 acres are clearcut annually. Approximately 1,000 acres are precommercially thinned and 200 acres commercially thinned each year to improve stand density and species mix.

Timber is managed on a nondeclining flow harvest schedule. This harvest level reflects a balance between jobs, demand for wood products, income to the Treasury, and protection of the various nonmarket values desired by Forest users. The first decade ASQ is 108 MMBF. All of the ASQ assumes the use of even-aged silvicultural practices. Uneven-aged silviculture practices are considered in the project planning process, as individual stands are investigated for harvest opportunities.

The tentatively suitable acres not selected for timber production include those necessary to meet viable population levels for wildlife species dependent on mature and old-growth forest habitat, and portions of the riparian zone necessary to provide for the protection of riparian values. The tradeoffs are minimized through selection of most MR acres from lands that are not tentatively suitable and those that would be assigned to produce at reduced yield. Only those MR acres necessary for wildlife population dispersion requirements and those necessary to insure hydrologic cumulative effects do not result in unacceptable adverse effects are located on tentatively suitable lands. Annual timber outputs for Decades 1 and 5 of the Forest Plan are compared to the planned historic outputs in the table below.

Table 3-2
Planned Historic and Forest Plan Timber Outputs

	Historic	Plan Implementation	
	1979-88	Decade 1	Decade 5
Long-term Sustained Yield Capacity 1/			
- Million Cubic Feet	Not	30.4	----
- Million Board Feet	Calculated	----	----
Allowable Sale Quantity			
- Million Cubic Feet	47.0	22.4	29.7
- Million Board Feet	229.8	108.0	----
Suitable Land			
- Thousand Acres	547.0	346.0	346.0

1/ Board foot volume not calculated for long-term sustained yield capacity.

Old Growth Ecosystems and Fish, Wildlife, and Plant Diversity

What management direction is needed and where should action be taken that will maintain and/or enhance old growth and diversity to meet multiple use objectives?

Background: Old-growth and maintenance of diversity is of particular concern and has become a significant and controversial agency and public issue. In the past, much of the focus for this issue has been spotted-owl habitat; the issue now has a much wider scope. Old growth contains a wide variety of resource values, including wildlife habitat, aesthetic, forest diversity, recreation, and commercial timber. These areas are also valued by American Indians for religious and cultural use. In addition, there is increasing recognition within the scientific community that ecosystem diversity is important. Nearly all of the old-growth forest that remains in the Puget Sound Area is located in the National Forests or National Parks.

The most recent (1976) vegetation inventory for the Forest, updated to reflect harvest through 1988, indicates there are about 643,500 acres of old growth (trees 21" or greater DBH) within the Forest. Approximately 232,500 acres (36%) are located in wilderness and not available for harvest. An additional 134,400 acres outside wilderness are considered unsuited for timber production (either withdrawn from timber production or unsuited because of highly unstable soils and difficulty in reforesting the areas).

The northern spotted owl is closely related to the old-growth issue. About 500,000 acres of suitable spotted owl habitat have been identified on the Forest. Between 1980 and 1989, 55 pairs of spotted owls and 177 individuals have been sighted on the Forest. The FSEIS amending the Regional Guide estimated spotted owl habitat capability on the Forest at 121 pairs.

The Forest provides habitat for a variety of wildlife species, including four federally-listed threatened and endangered species. The variety of elevation, aspect, soil depth, climate, and vegetation create a naturally diverse mosaic of habitats within the Forest boundary. An important facet of this issue is the distribution and protection of suitable habitat to ensure species viability through genetic exchange.

There are approximately 1,500 stream miles and over 12,000 lake acres on the Forest that serve as both seasonal and year-round spawning and rearing habitat for anadromous and resident species. Indian tribes, sport and commercial fishing interests, and state and federal fishery agencies are increasingly concerned about the effects of water quality on the anadromous fish resource.

Response: The Forest Plan maintains approximately 502,500 acres of old growth in allocations not suitable for timber production (e.g. wilderness, unstable soils, regeneration difficulties, dispersed recreation, special areas, spotted owl habitat, mountain goat habitat, Research Natural Areas, etc.). No areas are specifically allocated for old-growth management for amenity values. At the end of the first decade, 624,500 acres of the current 643,500 acres of inventoried old-growth is expected to remain.

A spotted owl habitat network consisting of 76 habitat areas each containing 2,200 acres, if possible, is established. The network consists of dedicated SOHA's outside wilderness areas, habitat areas in

Wildernesses, and other habitat areas in management areas without scheduled timber harvests. Other spotted owl habitat outside the network remains available for the owl as a result of other allocation decisions that preclude development of those acres. Of the nearly 500,000 acres of suitable spotted owl habitat on the Forest, about 350,000 acres (71%) will be protected in SOHA's and through other allocation decisions.

Further changes in direction for protection of spotted owl habitat are likely. The recent release of the report of the Interagency Scientific Committee to Address the Conservation of the Northern Spotted Owl and the upcoming decision of the U.S. Fish and Wildlife Service on the listing of the species may require changes in the direction of the Forest Plan. As new national and regional direction is established, the Plan will be amended to incorporate that direction.

The Forest Plan allocates 174,000 acres specifically for the protection, maintenance, and/or improvement of wildlife habitat including the 54,200 acres specifically set aside for northern spotted owl habitat. Allocations made specifically for other wildlife habitat protection, improvement, and maintenance are:

19,300 acres for pine marten, pileated woodpecker, and associated species;
47,000 acres for riparian dependent species and fish habitats;
34,000 acres for deer and elk habitat;
17,100 acres for mountain goat habitat; and
2,800 acres for northern bald eagle habitat.

Land allocations and standards and guidelines are used to meet part of the riparian management requirements and fish habitat needs. To fully meet riparian and water quality management requirements, a constraint is established on the maximum number of acres that can be harvested in a given watershed in a decade. These limits on final harvest are incorporated as Forest Plan standards and guidelines. High levels of investments will be made in habitat improvement projects to benefit anadromous and resident fish.

Classification is recommended for five new Research Natural Areas, totaling 9,306 acres: the North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge. The three existing RNA's are retained.

One botanic area is allocated - Sulphur Creek Botanic Area; it contains a unique, low-elevation vegetative community (silver fir and associated species) on a lava flow. Two other special areas are allocated: Mather Memorial and Heather Meadows.

American Indian Religious and Cultural Use

What policy and management direction is needed to comply with the Native American Religious Freedom Act and various treaties?

What are the effects of meeting this direction in terms of outputs, costs?

Background: At least 23 American Indian tribes have occupied or used territory within the National Forest boundary. Currently, about 15 tribal groups use the

Forest for religious, ceremonial, and/or cultural purposes. The Forest has inventoried 450,000 acres of use areas and sites. Of concern to a number of the Tribes are the effects of management activities on water quality and protection and enhancement of anadromous fisheries. Cedar is also an important resource.

Response: High protection of religious and cultural use areas for American Indians will be provided on lands where no timber harvest of road construction is planned and lands where the expected frequency of human contact is low. Moderate protection includes areas where no timber harvest or road construction is planned, but where human encounters are more likely. The Plan will afford a high to moderate degree of protection for the following acres, displayed in Table 3-3. Lands are not specifically allocated to "Indian Religious Use" nor are these acres shown on the map, to protect confidentiality. A total is not appropriate here, as there is overlap among acres protected.

The existing consultation process (with Tribes prior to any ground-disturbing project proposed in a use site or area) is continued.

Table 3-3
Religious and Cultural Use Areas With Moderate to High Protection From Development

	.....Approximate Acres.....		
	Type of Protection		Total Area Managed
Type of Sites/Area	Moderate	High	for Nondevelopment
Spirit Quest Sites	13,326	59,532	72,858
Legend Sites	1,288	3,083	4,371
Cedar Areas	15,543	50,262	65,805
Ceremonial Flora Areas	19,809	73,238	93,047
Cemeteries	0	317	317

In addition, the Plan will provide for a high level of investment for habitat enhancement for anadromous (and resident) fish. The hydrologic cumulative effects management requirement is designed to insure that effects of management activities prescribed by this Plan meet the intent of water quality laws and regulations.

A Forest-wide standard and guideline is included in this Plan to favor regeneration of western red cedar on sites where it now occurs or where it could successfully occur.

Chapter 3

Recreation Opportunities

To what extent can the Mt. Baker-Snoqualmie provide recreation opportunities and how should they be managed.

Background: The Mt. Baker-Snoqualmie contains some of the most scenic areas in the State. Its proximity to the major metropolitan areas along Puget Sound and the variety of opportunities available is reflected in the continual growth of recreation use. Use is now approximately five million RVD's per year (1989). It is expected that the demand for recreation on the Forest will grow through the end of the century.

The Recreation Opportunities issue includes several sub-issues or facets. The more significant ones are: developed recreation needs and opportunities; dispersed recreation needs and opportunities, including roadless and undeveloped areas; wilderness use and management; and trail needs and opportunities.

The Forest has 38 campgrounds that can accommodate about 500,000 recreation visitor days use per year. There are seven alpine ski areas that can accommodate approximately 40,000 skiers at one time. Trail mileage on the Forest is made up of 849 miles outside wilderness and 545 miles within wilderness. A variety of types of trails are provided, but the majority are hiker and pack and saddle trails. The Forest contains all or parts of eight wilderness areas with a total of approximately 722,000 acres within the Forest. Developed recreation demand (primarily alpine skiing and developed campgrounds) is well below the Forest capacity. Roaded dispersed recreation capacity far exceeds current use. Unroaded dispersed recreation use outside wilderness currently exceeds the capacity of the Forest. Wilderness use is nearing the practical capacity of the Forest. It is likely that wilderness demand will exceed capacity in the near future.

Response: In this Plan, the overall emphasis will continue to be on dispersed recreation; however, future demand for developed recreation is also addressed.

Developed Recreation. Rehabilitation of existing sites would be a top priority; about 10% of existing units will be reconstructed each year for the next ten years. In the first decade, approximately 100 new units (500 people at one time) would be added to existing campgrounds to provide additional capacity if needed. Limited expansion of day use facilities will occur to meet projected increases in demand

Dispersed Recreation and Trails. Land allocations in the Forest Plan result in approximately 27 percent (273,400 acres) of the Forest outside wilderness being available for nonwilderness, unroaded dispersed recreation. The majority of these opportunities will be in the semi-primitive nonmotorized recreation opportunity spectrum (ROS) class. This will provide alternatives to recreationists impacting wilderness, and help reduce conflict between different recreation uses groups in other areas.

Approximately 200 miles of new, nonwilderness trail will be constructed in the first decade; 30.5 of these will be open to motorized use. Trail reconstruction, first decade, will be done on another 493 trail miles.

These trails will generally be constructed in the semi-primitive nonmotorized and roaded natural ROS areas. Trail system planning will become an integral part of all project planning to assure continuation of a top-quality trail program. Approximately 25 miles of existing roads will be closed to passenger vehicles to provide more opportunity for unroaded dispersed use and discourage access to over-used, fragile destination areas. Management direction in the Mt. Baker National Recreation Area will provide for motorized use (snowmobiles) during those months with adequate snow cover, and for nonmotorized use during the remainder of the year.

Wilderness. The physical, social, and managerial settings within wilderness would be managed to meet standards set under Limits of Acceptable Change (LAC's) in the wilderness recreation spectrum (WRS). Approximately 20 miles of new trail would be built. Within wilderness, General Trailless areas (457,000 acres) will usually remain trailless; Dedicated Trailless areas (191,600 acres) will be managed forever trailless.

Visual Quality. The public concern for the visual condition of the Forest is addressed in this Plan: 23,400 acres of scenic viewshed, foreground and 95,800 acres middleground, along heavily-used, scenic highways are managed for visual quality and other resource uses. Standards and guidelines provide for timber harvest at 65 percent of full yield on the suitable acres in the foreground, and 86 percent of full yield on suitable middleground acres.

Wild and Scenic Rivers

How should the potential wild and scenic rivers of the Forest be managed and their values protected?

Background: There is one designated Wild and Scenic River on the Mt. Baker-Snoqualmie - the Skagit, designated in 1978. Portions of the Skykomish River are designated a State Scenic River (applicable to city, county, and state lands). There are 47 eligible rivers on the Forest; outstandingly remarkable values include fisheries, scenery, wildlife, recreation, and ecology. There is considerable public and agency interest in this issue.

Response: In this Forest Plan, 30 rivers - totaling 451.8 miles - are recommended for inclusion in the National Wild and Scenic River System. Until Congressional action, the values contributing to a river's particular classification (wild, scenic, or recreation) will be protected. Forest lands adjacent to the 30 suitable rivers will be managed to maintain their eligibility. Refer to Appendix E, FEIS for more detailed information.

Skagit Wild and Scenic River. Management direction for this Congressionally designated river system (158.5 miles and totaling 38,939 acres) will follow the River Management Plan, Skagit River Record of Decision, August 8, 1984, which is incorporated into the Forest Plan.

Chapter 3

Management of Municipal Watersheds

What activities should be permitted within municipal watersheds?

What measures should be taken that will maintain or enhance water quality?

Background: The Forest contains a significant portion of the watersheds supplying the cities of Seattle, Bellingham, Everett, and Tacoma. A number of smaller municipalities also obtain water from the Forest. Maintaining high water quality is an objective of many agencies and individuals; there is concern about the effects of management activities, including recreation, on water quality. In the Cedar River Watershed, the management goals of the 1962 Agreement (between the City of Seattle and the Forest Service) have recently been modified for city-owned lands, by the City of Seattle's Secondary Use Policies.

Response: Best Management Practices for this Plan are described in Appendix I. In addition, the Plan responds to this issue by meeting water quality management requirements, which are expressed as a maximum number of acres available for final timber harvest, by watershed. Refer to Chapter 4 of this document, Forest-wide Standards and Guidelines for Water Resources and Riparian Areas. Water quality will be maintained or enhanced by adherence to Regional and Forest standards and guidelines. Maintenance of riparian values in riparian areas is emphasized and timber yields in those management areas will be approximately 63 percent of full yield. In all municipal watersheds, water and water quality are recognized as key resources.

In the Cedar River Watershed, the Forest Service will initiate negotiations on a new Cooperative Agreement between the City of Seattle and the Forest to re-establish goals and objectives for management of the watershed. Until a new agreement is negotiated, the Mt. Baker-Snoqualmie will not enter new land exchanges affecting National Forest land in the watershed. Pending a new agreement, the 1962 Agreement will remain in effect. When a new agreement is reached, the Forest Plan will be amended to incorporate its goals and direction.

The Green River Watershed will be managed under the terms of the 1984 Memorandum of Understanding with the City of Tacoma. As land exchanges are completed with the City, public use rights are relinquished on roads no longer needed to access National Forest land. Dispersed recreation is emphasized; overnight camping is allowed.

The Sultan River Watershed will be managed under the terms of the 1963 Memorandum of Understanding between the Forest Service, the City of Everett, and the Snohomish County Public Utility District. Management emphasizes watershed protection, recreation use at developed sites (no water contact sports),timber production, and maintenance of fish and wildlife habitat. Dispersed recreation is permitted, but not encouraged.

Other municipal watersheds will be managed for a full range of outputs, including timber harvest and recreation. Road construction/reconstruction and maintenance are permitted. Dispersed recreation, including overnight use and ORV use, is permitted in designated locations.

Effects of Timber Management and Related Activities

What management direction is needed for timber harvest and road construction activities to benefit or maintain the quality of other resources?

Background: Management for the commercial production of timber includes a number of activities: road construction and/or reconstruction, preparation of the land for planting seedlings, possible thinning, etc. These activities have direct and indirect effects on other resources, including: fish and wildlife habitat, soil, and water. Also, recreation opportunities and the visual condition of the Forest change in response to these activities. For example, the visual impact of clear-cutting and loss of habitat for some wildlife species is a major concern of environmentalists, wildlife advocates, and some hunting interests.

Each step in the process of timber harvesting, including road construction, may have a number of short-term and long-term impacts. Timber harvesting may enhance elk habitat (increased forage in clearcuts) but reduce the visual quality and the amount of wildlife habitat available for species dependent on mature conifer forests.

Response: Unacceptable adverse effects to Forest resources will be prevented or mitigated using the Regional, Forest-wide, and management area standards and guidelines. Best Management Practices will be selected and applied (site-specific) to achieve water quality regulations. Refer to Appendix I of the FEIS. To fully meet riparian and water quality management requirements, a constraint is established on the maximum number of acres that can be harvested in a given watershed in a decade. These limits on final harvest are incorporated as Forest-wide Standards and Guidelines.

An environmental analysis will be prepared for each project to assess the impacts on other resources, unit size and dispersion requirements, logging methods and practices, road location, design and construction standards, silvicultural prescriptions, and other pertinent considerations. Analysis will include appropriate documentation, to meet the National Environmental Policy Act (NEPA) and implementing regulations.

Adjacent and Intermingled Lands

How should National Forest lands adjacent to lands of non-federal owners be managed?

What management activities should be conducted on National Forest lands that are located near private development?

Background: Thirteen percent of the lands within the Mt. Baker-Snoqualmie National Forest are non-Federal, located mostly in the south half of the Forest. In most cases, the objectives and subsequent land practices of the non-Federal owners differ from those of the Forest Service, yet directly affect management of National Forest lands. Concern and conflicts arise because of these different management practices. For example, it is not uncommon that old-growth National Forest lands are surrounded by harvested lands in other ownership.

Response: In this Forest Plan, Best Management Practices will be selected and applied for site-specific projects, to achieve water quality regulations. Refer to Appendix I of the FEIS. In addition, to fully meet riparian and water quality management requirements on National Forest lands, a constraint is established on the maximum number of acres that can be harvested in a given watershed in a decade. These limits on final harvest are incorporated as Forest-wide Standards and Guidelines. It is the intent of this Plan that the quality and quantity of these resources not be diminished, but maintained at current levels or improved, if possible. Specifically, this means that timber harvest activities on National Forest lands will be deferred if the MR's for wildlife, soil, and water cannot be met.

A Land Adjustment Plan has been developed and is included as Appendix G in this Forest Plan. The goal of landownership adjustment is to achieve an ownership pattern that best accommodates the land and resource objectives of this Forest Plan. There will be a continued need for road cost-share agreements until such time as ownership consolidation is achieved.

National Forest management adjacent to privately owned lands will be coordinated with approved County Plans and County Planning Departments.

CHAPTER 4 - FOREST MANAGEMENT DIRECTION

This chapter - Forest Management Direction - is the heart of the Plan. It has five major sections.

Part A includes the Forest Management Goals: multiple use and other goals established in the planning process and used to develop this Plan.

Part B, Desired Future Condition: this narrative is a brief description of what the Mt. Baker-Snoqualmie National Forest should look like at the end of ten years, and - if the Plan were to remain unchanged - for fifty years.

Part C, Forest Management Objectives: this section includes the levels of goods and services, outputs and activiites, and necessary budget which are anticipated as this Plan is fully implemented. Included is a narrative Resource Summary of how each resource and its activities will be managed under the Plan.

Part D includes the Forest-wide Standards and Guidelines, which direct all resource management activities and uses on the Forest. The Forest-wide standards and guidelines generally apply to all areas of the Forest, (unless exceptions are noted in specific Management Area prescriptions. The Forest-wide standards and guidelines provide standards for performance, and establish bounds and constraints for these activities and uses.

Part E, Management Area Prescriptions: the prescriptions identify the management activities that can occur within each management area and the standards and guidelines that apply to each.

A. FOREST MANAGEMENT GOALS

Forest-wide management goals describe the state or condition of Forest resources and uses that the Plan is designed to achieve. Management objectives and standards and guidelines are then developed to guide the achievement of these goals.

The following factors aided in developing management goals:

- Capability, availability, and suitability of the Forest to produce goods and services
- Applicable Laws and Regulations
- National and Regional Goals
- Public Issues and Management Concerns

Goals

Recreation

1. Provide a broad spectrum of recreation opportunities, with an emphasis on those opportunities which require a natural setting.

2. The forest will be responsive to a greater diversity of forest customers by emphasizing the needs of the very young and old, the disabled, and those of culturally and economically diverse background.

3. Become more knowledgeable of the forest's customer. Embark on market research techniques to assure that recreation facilities, opportunities and services focus on the needs of our customers.

4. Encourage a sense of ownership through expanded Interpretation and Education activities; emphasize traditional values of "conservation", and market the "special places", special activities and special opportunities of the MBS.

5. Provide a full spectrum of recreation facilities (from full service resorts to trailheads) to serve all of the recreation users, providing amenities (hot water, showers, trailer dumps) where necessary and appropriate, that allow the recreating customer to enjoy the natural setting while creating a sense of quality, comfort and security.

6. Encourage partnerships of public and private suppliers of recreation services and facilities and administer the partnerships to ensure and enduring relationship of mutual gain.

7. Recreation is a co-equal partner in Multiple Use Management that is guided by the need to Regain Public Trust through Quality Management. This needs do serve as a tool to minimize conflicts between users and resources.

8. Professional recreation management flows from a work force with a full spectrum of career opportunities dedicated to the traditional values of conservation, demonstrating exceptional skills, providing quality service, and projecting a favorable image of the Forest Service.

Wilderness

1. Manage wilderness for the use and enjoyment of people in such a manner as will leave wilderness values unimpaired for future.

2. Wilderness is to be managed to prevent degradation. The non-degradation principle seeks to maintain each wilderness in at least as wild a condition as it was at the time of classification.

3. Provide for the protection of the area, preservation of its wilderness character through dissemination of information regarding proper use.

4. Manage wilderness using strategies that will facilitate natural ecosystems and processes, including prescribed burning.

Wildlife and Fish including Threatened and Endangered Species

1. Maintain the vitality, distribution and abundance of animal populations. At a minimum, maintain viable populations of existing native and desired non-native vertebrate species on National Forest lands. No species should be elimanated from an area. Maintain the longterm productivity of wildlife habitats.

2. Identify Threatened, Endangered, and Sensitive plant and animal species habitat. Protect, maintain and/or enhance this habitat in accordance with Recovery Plans. The overall goal is to prevent the Federal listing of Sensitive species and /or, to pursue the delisting of Federally listed species. Develop management guides for T & E species which carry out these goals.

3. Enhance habitat for all native and desired non-native vertebrate species on National Forest lands, with the goal of providing habitat, and a variety of consumptive and non-consumptive fish and wildlife related recreation opportunities.

4. Develop a KV program to accomplish fish and wildlife habitat improvement and/or mitigation needs within timber sale areas.

5. Encourage partnerships with the public and private entities to build rapport with consumptive and non-consumptive user groups and committees, as well as completing habitat enhancement, inventory, and monitoring projects.

6. Cooperate with Washington State Wildlife and Fisheries Agencies and American Indian Tribes to provide habitat for desired levels of resident and anadromous fish.

7. Provide designated habitat areas for Management of Indicator Species.

8. Develop complete inventories of threatened, endangered, and sensitive species. Develop reliable and accurate baseline indicies for other management indicator species, and monitoring procedures for accurately determining the responses of these species to management activities.

9. Provide opportunities for the public to enjoy wildlife through consumptive and non-consumptive activities. Emphasize informational and educational opportunities for Forest users to learn about wildlife and their habitats. Increase opportunities for wildlife viewing and photographing on the Forest.

10. Manage for the highest levels of populations of indicator species and other desired wildlife appropriate to an area and compatable with the Management Area allocation.

11. Protect special and unique habitats and ensure the maintenance of habitats which are fragile or uncommon.

Longterm Productivity and Diversity

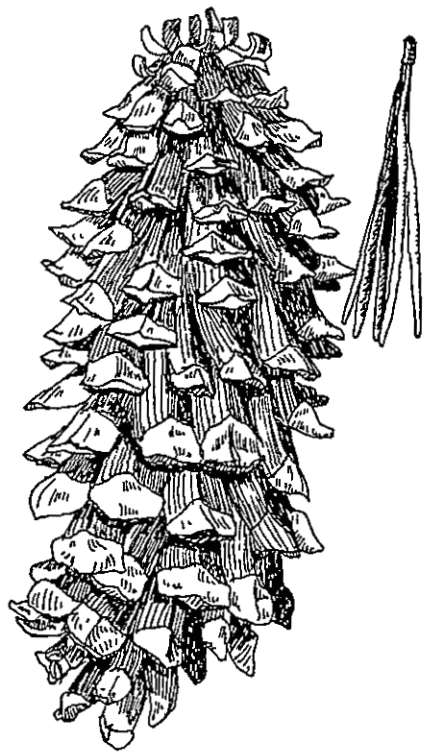
1. Maintain native and desirable non-native plant and animal species and communities.

2. Provide for all seral stages of terrestrial and aquatic plant associations in a distribution and abundance to maintain the productivity of these communities.

3. Provide for wildlife diversity through genetic interchange by linking late seral stage areas with corridors of mid to late seral stage vegetation.

4. Conserve or enhance long-term site productivity. For example, maintain down large and fine woody material following timber harvest.

5. Provide diversity within forested stands by maintaining more than one horizontal vegetative layer.



Range

1. Develop opportunities, where needed, to utilize transitory range by domestic and recreation livestock where they don't conflict with other resource goals, including those for wildlife and riparian management.

Timber

1. Apply appropriate silvicultural systems to attain long-term sustained yield on all suitable lands assigned to timber production, either full or partial yield.

2. Utilize silvicultural systems which best meet needs of site, species, and other multiple use objectives.

3. Conduct mortality salvage harvest on all accessible, available, capable, and suitable lands in a timely manner compatible with other resources and uses.

4. Increase utilization of wood residues to minimize site preparation and hazard reduction costs when compatible with other resource objectives.

5. Utilize burning only as a last resort method of disposal or where site preparation through burning is needed.

6. Provide maximum opportunities for gathering of firewood commensurate with resource objectives.

7. Maintain prime forest lands in timber production.

8. Utilize genetically improved stock for reforestation.

9. Promptly reforest all capable, available, and suitable lands following harvest, fire, insects, etc.

10. Maintain or expand timber land base in land exchange actions.

11. Utilize appropriate logging systems to achieve multiple use and silvicultural objectives in a cost-efficient manner.

12. Use KV funds to enhance recreation, fish, wildlife where appropriate.

Soil, Water, Riparian and Air

1. Maintain soil and water resources and do not allow significant or permanent impairment of the productivity of the land.

2. Protect streams, lakes, wetlands, and other bodies of water. Protect soil and riparian vegetation by appropriate buffer zones or modified silvicultural prescriptions, reflecting local topographic, soil, and vegetative conditions.

3. Restrict or prohibit developments and require "flood proof" road crossings in flood plains and wetlands.

4. Maintain water quality by complying with State of Washington Water Quality Management Plan developed pursuant to Federal Water Pollution Control Act. Provide high water quality to meet the needs of the users of that water, including fish populations.

5. Develop a KV program to provide for improvement and mitigation of soil and water resources in timber sale areas.

6. Manage municipal-supply watersheds to provide a level of water quality and quantity which, with adequate treatment by the purveyor, will result in a satisfactory and safe water supply.

7. Do not allow significant or permanent impairment to air quality or air quality related values.

8. Maintain the air quality over the Forest to meet Federal and State standards and protect air quality related values from pollutants generated within or downwind of the Forest.

9. Manage air pollutant generated activities to insure compliance with State and Federal Laws.

Minerals and Energy

1. Support orderly exploration and development of mineral and energy resources.

2. Include special stipulations in leases and permits, as necessary, to integrate exploration and development with the protection and management of other resources and uses.

3. Minimize adverse environmental effects of mineral and energy resource exploration, development, and extraction on other resources and uses.

Lands

1. Improve administration and management efficiency through appropriate land ownership adjustments. Give priority to land exchanges that maintain or improve the capability of the Forest to produce goods and services.

2. Give preference to use of purchase authorities to acquire lands important for wilderness, wildlife, or recreation resources.

3. Acquire road and trail easements which provide for public and commercial access to all National Forest lands.

4. Advocate that hydro-electric project license provide recreation opportunity development, operation, and maintenance to meet the recreation demand generated by the project, and protect and enhance affected fisheries.

5. Advocate land exchange and purchase which support recovery programs for threatened and endangered species.

Facilities

1. Build and maintain transportation system facilities to the minimum standard needed to support planned uses and activities.

2. Manage the transportation system at minimum standard necessary to provide for public safety.

3. Encourage the development and use of mass transit facilities to heavy public use areas, such as winter sports complexes.

4. Locate support facilities to provide for management efficiency, public service, and energy efficiency.

5. Utilize alternative energy sources for water and space heating.

6. Minimize adverse effects of vehicular traffic on wildlife.

Protection

1. Establish areas and conditions under which prescribed fire, through the use of planned and unplanned ignitions, will be used to meet management objectives.

2. Treat natural and created fuels to levels needed to meet resource needs.

3. Cooperate with the appropriate agencies in fire prevention, presuppression and suppression activities.

4. Cooperate with the appropriate agencies in law enforcement activities on National Forest lands.

4. Utilize integrated pest management processes in determining needed control actions.

Wild and Scenic Rivers

1. Utilize State, County, local and other Federal agency authorities for management of River segments on private lands.

2. Provide opportunities for public access and use of the rivers while providing for the rights of adjoining private owners.

3. Maintain a leadership role in protecting designated Wild and Scenic River values.

Visual Quality

1. Establish and implement visual quality objectives for all Forest lands.

2. Maintain the visual variety that is characteristic of the Northwest Cascades.

Archaeological and Historical Properties

1. Inventory, evaluate and protect cultural resources on all Forest lands. Give priority for inventory and evaluation to those areas where ground-disturbing activities are planned and where cultural resources are most likely to be found.

2. Work towards thematic evaluations in conjunction with Washington State Historic Preservation Officer.

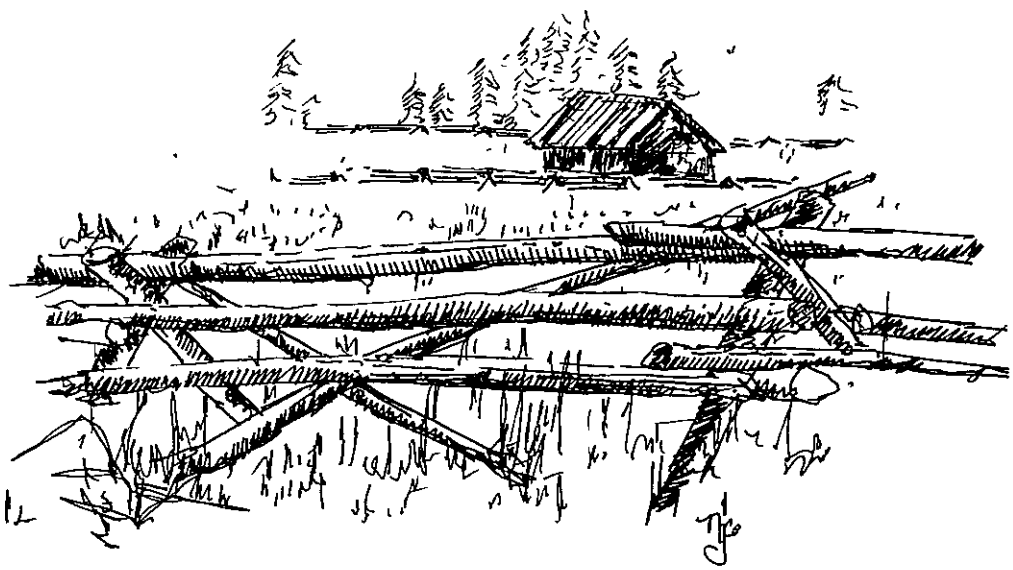
3. Protect and interpret resources representing the full range of cultural resource types present on the Forest. Priority in protection activities will be based on level of significance (National, State of local), and frequency of the resource type within the Forest. Protection will be explicitly considered for all significant resources.

4. Coordinate interpretive efforts with Federal, State and local Agencies, local historical societies, universities, businesses, volunteer associations and other interested groups.

American Indian Religious and Cultural Uses

1. Coordinate with American Indian tribal leaders to improve the inventory of religious and cultural use sites on National Forest lands.

2. Consult with American Indian tribal leaders during planning and design of proposed projects within inventoried sites.



B. DESIRED FUTURE CONDITION

Implementation of this Forest Plan is an incremental step in progressing from the current situation (Chapter 2) to the desired future condition of the Forest. In many instances this desired future condition cannot be attained during the life of this Plan (10-15 years) but will require several decades.

The incremental change in any particular decade can best be characterized as evolutionary as opposed to revolutionary.

The desired future condition of the Forest cannot be summarized in a single statement, as it differs between management areas. The long-term desired future condition for each of the management areas is discussed later in this chapter, in Part E, Management Prescriptions. A general discussion of some of the more significant changes on the Forest is presented below.

The Forest In Ten Years

The physical and biological changes in the structure of the Forest, as a result of carrying out the management practices contained in this plan, will be subtle on a Forest-wide basis, but may be more dramatic on an area-specific basis.

A spectrum of dispersed recreation opportunities from primitive to roaded modified will exist on the Forest. There will be a slight reduction in the availability of primitive and semi-primitive nonmotorized opportunities, as some areas currently providing these recreational opportunities become developed. Opportunities for large group activities in primitive and semi-primitive nonmotorized settings will have decreased to the point that they may be unavailable or restricted at the more popular destination points. Forest trails will have increased in mileage and will be in better condition, safe and well maintained. Summer ORV use will be limited to a few specific sites and trails.

Opportunities for a variety of developed recreation activities will exist. The condition of the physical facilities at developed sites will have improved to the point that all facilities in place will be safe, functional, and attractive.

Use at the more popular destination sites in wilderness will have increased to the point that physical, biological, and social changes have approached, or reached, the Limits of Acceptable Change (LAC). Management controls to limit use will have been implemented. Efforts to rehabilitate areas of overuse will have been implemented, but methods and techniques to accomplish needed rehabilitation will still be in the developmental stage. The effects of fire in wilderness may be more visible, as prescribed fire is used more frequently to alter vegetative patterns.

The roadless areas of the Forest will have decreased by 20,300 acres. This figure equates to 94% of the original roadless acres.

The foreground of scenic viewsheds will have changed very little from the condition they were in at the time this Plan was implemented. Occasional small clearcut harvest units will be visible, but will borrow from or repeat the form, line, color, and texture of the natural landscape. An exception will be in areas of intermingled ownership, where nearly all non-Federal lands will have undergone clearcut timber harvest.

Scenic viewshed, middleground, will have undergone more change than foreground, but the management activities will be subordinate to the natural landscape. An exception will be in areas of intermingled ownerships.

More than 50% of the Forest's acreage will be inventoried for cultural resources. All reported archaeological and historical sites have been recorded. Interpretation of these cultural resources is fully integrated into the recreation program, with a variety of established interpretative sites and programs.

Less inventoried use area will remain suitable for American Indian religious and cultural uses; however, such uses will continue. Some users may have to shift locations of spirit and vision questing activities, or find new localities for collecting ceremonial flora.

Habitat necessary for wildlife species that prefer or require old growth forests will have been reduced, but will still be well above that needed to maintain viable population levels and will be distributed so as to provide genetic viability. Wildlife preferring younger successional stages of forest habitat will show an increasing trend in populations. This trend may not be measurable except in areas of intermingled land ownership, where timber harvest on non-Federal lands has proceeded at a faster rate than on National Forest lands.

Deer and elk will increase, and mountain goat populations will remain essentially the same as they are currently. Vegetative manipulation on winter and summer range through timber harvest activities and forage improvement projects will have brought about short term increases in deer and elk populations.

Populations of bald eagles on winter feeding grounds will remain the same or show a slight increase. Populations of nesting bald eagles on National Forest lands will remain the same or show a slight increase. Populations of grizzly bear, American peregrine falcon, and gray wolf will be similar to current populations, although much more accurate census data will be available for these species.

Bald eagle nesting and roosting areas, and any known peregrine falcon nesting areas will be managed under approved site management plans. Management guides will have been developed for all sensitive species, and some species may have been removed from the sensitive list through management protection or enhancement.

The Forest will have developed opportunities for the public to view wildlife and to increase their understanding and appreciation of wildlife. Programs, displays and publications help the public learn to experience wildlife in ways that are least impactful to their habitat and populations.

Partnerships have been formed with a wide variety of users for habitat enhancement, protection and species inventories and monitoring.

Anadromous fish habitat will have improved significantly on National Forest lands, through habitat improvements and more refined management practices in riparian areas. Resident fish habitat will also have improved, through enhancement projects.

Progress towards reaching the desired future condition on that portion of the Forest managed for timber production will have been steady, but slow. A total of 28,650 acres will have been converted from older age classes to younger ages. Age class distribution will now favor the younger age classes of 110 years or less (204,000 acres out of 346,000), mortality will remain higher than desired, and growth will be lower than that possible when a fully managed condition is reached. Approximately one percent (2,865 acres) per year of the lands suitable for timber production will have been harvested. Approximately 66% (18,879 acres) of the total acres be old growth, and nearly all of the harvesting will be by clearcut harvest systems.

The quality of raw water flowing from municipal watersheds will continue to be of good quality. Increased requirements for public health will have resulted in some of the larger water purveyors having installed filtration equipment. Several of the smaller municipal watersheds will have been abandoned in favor of wells or alternative water sources.

There will be no significant change in activity related to locatable minerals. Minor increases will occur in leasable minerals area with increasing interest in geothermal resources. Anticipated downturn in use of common variety materials for forest development will be offset by increases in public demand for these minerals.

Opportunities for the Forest to help enhance the vitality of surrounding communities will occur through a Regional initiative called the Pacific Northwest Strategy. It is envisioned that the Pacific Northwest Strategy will be a new focus of operation for many people, one that empowers Forest Service people and local citizens to look and work beyond the traditional boundaries. At the same time, it reaffirms and emphasizes working with other government agencies, local businesses, and the communities themselves in a spirit of interdependency and cooperation that has always existed at the local Ranger District level. As the Strategy becomes an integral part of doing business, its central focus will be to foster and enhance communication, cooperation, and partnerships.

The Forest In Fifty Years

This Forest Plan will be reviewed every five years and revised every 10 to 15 years. The following describes the progress being made towards the desired future condition of the Forest if this Plan were to remain unchanged for 50 years. The desired future condition varies by management area and is included in the management area prescriptions, Part E in this chapter. The following is a general description of the Forest as a whole.

Chapter 4
Desired Future Condition

A wide range of dispersed recreation opportunities will exist on the Forest. Acres available by recreation opportunity spectrum (ROS) class will have stabilized. Competition for use of primitive and semi-primitive nonmotorized areas will be high and some form of use limitation will have been imposed to maintain the attributes of isolation, solitude, and an unmodified natural environment.

A wide variety of developed recreation opportunities will exist. New developments will have been added to meet an increased demand. Facilities will be well maintained, and attractive. New facilities will generally be set back from bodies of water to lessen the impacts on riparian resources.

Wilderness use will have stabilized at carrying capacity levels in all wilderness on the Forest. Use will be controlled through a variety of management techniques, but a permit system will have been implemented for at least the more popular areas of all wilderness. More of a mosaic of vegetative patterns will be evident as a result of the use of prescribed fire, although a large majority of the wilderness will still support vegetation in the later successional stages.

Scenic viewsheds will display more of a mosaic of differing age classes of vegetation than when the Plan was implemented. All age classes will still be represented. Desired visual quality levels will still be met and management activities will either not be evident or will be visually subordinate to the natural landscape. Viewsheds within areas of intermingled ownership will be more visually appealing than 10 years after implementation, when nearly all non-Federal lands had been recently clearcut harvested. Areas that were logged during the railroad era will be undergoing harvest of the second-growth stands.

The Forest will be completely inventoried for archaeological and historical properties. Protection and interpretation of a full range of cultural resources remains an integral component of the recreation program.

Acres available for American Indian religious and cultural uses will have stabilized.

On the portion of the Forest where vegetative manipulation occurs, habitat for wildlife species that prefer or require old-growth forests will have stabilized at the level necessary to maintain viable populations. Populations on a Forest wide basis will remain above viable population levels, due to additional available habitat in areas where no habitat manipulation occurs. Forest-wide distribution requirements are met. Wildlife species that prefer younger successional stages will still be increasing.

The implementation of habitat improvements over the past 50 years will have resulted in maintaining a high level of habitat capability for elk and deer. Mountain goat habitat capability may have decreased slightly.

Wintering populations of bald eagles on National Forest lands will have increased slowly over the past five decades. Bald eagle and American peregrine falcon nesting habitat on National Forest lands necessary to meet recovery objectives will be available. As recovery population objectives have not been developed, information is not available to suggest population trends for grizzly bear or gray wolf.

The public is provided with a variety of opportunities to view and photograph wildlife and to become informed on wildlife species, their habitat needs, and ways to enjoy them unobtrusively.

Anadromous fish habitat will be of high quality and little changed from that existing at the end of the first decade. Resident fish habitat will be of similar quality.

Age class distribution on lands suitable for timber production will have progressed towards a more even distribution, with a decrease in the older age classes (111,800 acres remaining), and an increase in those age classes younger than 100 years (234,600 acres). Mortality would have decreased and growth increased substantially, as a result of the younger age classes on the suitable lands.

The quality of raw water flowing from municipal watersheds will continue to be of good quality. All water purveyors will either be providing secondary treatment or have switched to sources other than surface water supplies.

Levels of mineral activity will increase in all areas.

Each community will have capitalized on its uniqueness and involved its citizens in the development of a desired future. The activities associated with the Pacific Northwest Strategy will continue to support the goals and plans of resource-dependent communities.

C. FOREST MANAGEMENT OBJECTIVES

This section describes Forest management objectives that support Forest management goals and set the Forest on a schedule toward achievement of desired future conditions. Plan objectives, expressed as average annual resource outputs and activities, are projected for the five-decade RPA planning period in the multi-page Table 4-1. The projected outputs are estimates of goods and services that should result as the Plan direction is fully implemented. Projected outputs and activities in the first RPA decade are averages for the first 10 years of Plan implementation. These projected resource outputs and activities tie directly to the data presented for Alternative J (Preferred) in the Final Environmental Impact Statement. Data comes directly from FORPLAN run reports or was estimated using data extracted from the FORPLAN run files.

Table 4-1 Page 1 of 5
Forest Plan Resource Outputs and Activities

Output/Activity	Unit of Measure	Decade 1	Decade 2	Decade 3	Decade 4	Decade 5
Developed Recreation Capacity	MRVD's/Year	5,598	6,098	6,654	7,210	7,238
Non-wilderness Dispersed Rec. Capacity						
Roaded	MRVD's/Year	3,277	3,730	3,817	3,904	3,991
Unroaded	MRVD's/Year	208	182	160	149	149
Wilderness Capacity	MRVD's/Year	539	539	539	539	539
Trail Construction	Miles/Year	22	22	1	3	1
Trail Reconstr.	Miles/Year	49	2	5	5	5
Developed Site Construction	PAOT/Year	130	100	0	0	100
Developed Site Reconstruction	PAOT/Year	220	900	900	900	1,000
Recommended Wild & Scenic River	Total Miles 1/	452.1	.....	.....	.....	>
Recreation R.	Miles	168.9	.....	.....	.....	>
Scenic River	Miles	149.6	.....	.....	.....	>
Wild River	Miles	133.6	.....	.....	.....	>
Future Visual Condition						
Preservation	M Acres	772.0	733.5	730.9	729.6	729.6
Retention	M Acres	395.4	284.2	255.9	241.8	242.0
Partial Retent.	M Acres	204.2	335.5	353.9	363.0	363.0
Modification & Max. Modif.	M Acres	257.0	275.3	287.9	294.1	294.0

1/ Includes 176 miles outside National Forest Boundary.

Table 4-1

Output/Activity	Unit of Measure	Decade 1	Decade 2	Decade 3	Decade 4	Decade 5
Roadless Areas 2/	M Acres	402.9				>
Roadless Areas 2/ Assigned to Roaded Mgmt. Prescript. but not developed in next 15 years.	M Acres	93.1				
Roadless Areas Assigned to Unroaded Mgmt. Prescriptions	M Acres	298.8				
Wildlife and Fish Use 3/	Total M WFUD'S/ Year	825	876	947	1,002	1,052
Hunting	M WFUD's/Year	418	443	463	474	474
Non-consumptive	M WFUD's/Year	25	26	27	28	28
Resident Fish	M WFUD's/Year	382	407	457	500	550
Anadromous Fish 4/	M WFUD's/Year	864	864	864	1,070	1,070
Mgt. Indicator Species 5/						
Bald Eagle	HC for Pairs 6/	4 (one active, 3 potential)				
Amer. Peregrine Falcon & Grizzly Bear	[Occasional sightings of these species have been recorded. Standards and guidelines address habitat management if confirmed to be present.]					
N. Spotted Owl	HC for Pairs 6/	114	104	95	87	83
Pine Marten	No. of Animals	4,440	4,070	3,710	3,420	3,260
Pileated Woodpecker	HC for Pairs 6/	890	810	740	680	650
Primary Cavity Excavators	% of Potential Population	40	40	40	40	40

2/ RARE II unroaded areas released by the Washington State Wilderness Act of 1984. The total 402,930 acres includes about 160,000 acres tentatively suitable for timber production.

3/ Figures used in calculating WFUD's are based on preliminary data. There is currently additional data that shows trends towards larger increases in non-consumptive fish and wildlife, and consumptive fish use with a smaller increase in consumptive wildlife use.

4/ WFUD's for anadromous fish occuring off-Forest not included in totals above.

5/ Other than bald eagle and primary cavity excavators, values are population estimates based on maximum habitat potential. Bald eagle numbers are derived from recovery plan breeding population objectives. Primary cavity excavators are % of potential population on lands suitable for timber production only; outputs will be 80% in riparian areas & 100% in wilderness.

6/ Habitat Capability for Pairs.

Table 4-1

Output/Activity	Unit of Measure	Decade 1	Decade 2	Decade 3	Decade 4	Decade 5
Roosevelt Elk						
Winter Range	HC for Indiv 7/	770	690	660	680	710
Summer Range	HC for Indiv 7/	1,240	1,250	1,270	1,280	1,280
Black-Tailed Deer						
Winter Range	HC for Indiv 7/	15,160	13,310	12,510	12,840	13,580
Summer Range	HC for Indiv 7/	19,720	19,640	19,480	19,580	19,650
Mountain Goat	HC for Indiv 7/	1,450	1,440	1,430	1,420	1,420
Wildlife Habitat Improvement	Structures/ Year	1,520	1,520	1,520	1,520	1,520
	Acres/Year	885	885	885	885	885
Anadromous Fish Commercial Harvest	Total M Pounds/ Year	8,874	9,000	9,000	9,000	10,000
Habitat Improvement Over Present	M Pounds/Year	1,065	1,200	1,200	1,200	1,300
Range-Permitted Grazing	M AUM's/Year	1.....				>
Old Growth Remaining 8/	M Acres	625	599	580	561	535
Lands Suitable for Timber Production	Acres	346,411.....				>
Timber Harvest						
Clearcut	Acres/Year	2,865	2,980	3,278	3,409	3,409
Commercial Thin 9/	Acres/Year	200	200	200	200	200
Allowable Sale Quantity	MMCF/Year	22.4	25.7	27.9	29.7	29.7
	MMBF/Year	110	N/A	N/A	N/A	N/A
TSPQ	MMCF/Year	25.5	28.5	30.5	31.9	31.6
	MMBF/Year	122	N/A	N/A	N/A	N/A
LTSYC	MMCF/Year	30.4				>
Fuelwood	MMCF/Year	1.234	1.238	1.149	0.817	0.408
Reforestation 10/	Acres/Year	2,865	2,980	3,278	3,409	3,409
Planting	Acres/Year	2,239	2,541	2,395	2,700	2,705
Natural Stocking	Acres/Year	626	439	883	709	704
Timber Std. Improv	Acres/Year	996	2,911	1,801	2,137	2,124

7/ Habitat Capability for Individuals
8/ Decade 1 old growth remaining at the end of the decade.
9/ Commercial thinning planned outside of FORPLAN model.
10/ Includes all areas harvested by clearcut.

Table 4-1

Output/Activity	Unit of Measure	Decade 1	Decade 2	Decade 3	Decade 4	Decade 5
Fuel Treatment 11/	Acres/Year	2,865	2,980	3,278	3,409	3,409
Water Yield	M Ac-Feet/Year	15,616	.....	.....	.....	>
Sediment						
Background	M Tons/Year	53.8	.....	.....	.....	>
Activity Over Background	M Tons/Year	34.7	34.3	32.8	32.5	32.4
Improved Watershed Condition	Acres/Year	35	.....	.....	.....	>
Energy Minerals	Billion BTU's Produced/Year	0	86	Unest.	Unest.	477
Non-energy Minerals	Cases/Year	115	Unest.	Unest.	Unest.	Unest.
Special Uses	Permits/Year	590	600	600	600	600
Road Construction						
Arterials and Collectors	Miles/Year	.8	.7	0	0	0
Timber Purchaser	Miles/Year	12.6	11.1	10.0	8.1	7.9
Timber Purchaser Road Reconstruct.	Miles/Year	40.1	46.0	50.0	54.0	53.4
Roads Suitable for Public Use by Passenger Car	Miles	1,039	1,204	1,271	1,317	1,353
Roads Suitable for Public Use, High Clearance Vehicle	Miles	1,483	1,719	1,816	1,881	1,932
Road Maintenance	Miles/Year	3,034	3,152	3,252	3,332	3,411
Local Roads Closed to Public Use 12/	Miles	512	229	165	34	126
Land Line Location	Miles/Year 13/	18	18	18	18	18

11/ Include's all types of treatment inc. broadcast burning, piling and burning, loping and scattering etc.

12/ These are local or timber purchaser roads that are closed but will be opened for timber sales in the future.

13/ Miles of land line marked and posted to standard.

Table 4-1

Output/Activity	Unit of Measure	Decade 1	Decade 2	Decade 3	Decade 4	Decade 5
Human Resource Prog.	Person-Yrs/Yr	29.....>				
Jobs	M Jobs/Year	28.8	38.6	46.3	52.6	59.0
Income	MM $/Year	522	Unest	Unest.	Unest.	Unest.
Payments to Counties	MM $/Year	4.9	6.3	6.7	8.1	9.6
Operational Costs	MM $/Year	13.3	15.3	14.1	14.6	14.7
Capital Investment Costs	MM $/Year	4.7	4.0	1.4	1.2	1.1
Total Budget	MM $/Year	18.0	19.3	15.6	15.8	15.9
Returns to Treasury	MM $/Year	16.8	23.9	25.7	31.4	37.7

Resource Summaries

The following resource summaries include a brief description of the resource program, how the resource and activities will be managed, and a description of outputs and activities to achieve management objectives. Detailed schedules of activities to achieve management objectives are in the appendices. These planned activities will be the foundation for developing the Forest's annual budget and program of work.

Recreation

The following section describes the dispersed and developed recreation programs and resource outputs planned and expected as a result of management under the Plan.

Dispersed Recreation

The assignment of land in the Plan will result in 16% of the total Forest acres (273,400 acres) being available for nonwilderness, unroaded dispersed recreation. These acres will provide the opportunity for 165,105 RVD's. The majority of these opportunities will be in the semi-primitive nonmotorized recreation opportunity spectrum (ROS) class.

An additional 93,100 acres will remain unroaded during the first decade, although assigned to management prescriptions that project future development. This will result in an additional 51,205 RVD's of unroaded recreation, available through Decade 1.

The primary management activities in the assigned unroaded recreation areas over the next decade will: provide alternatives to impacting wilderness, and help reduce conflict between different recreation user groups in other areas. Increased trail construction, greatly increased reconstruction, and maintenance will aid in accomplishing this goal. Approximately 200 miles of new nonwilderness trail will be constructed in the first decade. Twenty miles of wilderness trail will be constructed. Another 493 trail miles will be reconstructed during the first decade. For further details on the trail program, see Appendix E of this document.

Dispersed winter sports activities, such as cross-country skiing and snowmobiling, will continue to be encouraged. Where opportunities exists, both winter and summer dispersed recreation will be enhanced through timber sale activity by providing use sites, parking, trail access, and vegetative improvement. Additional Sno-Park facilities will be encouraged where the need is demonstrated.

The "Trail Management Plan" in Appendix E will attempt to reduce recreational conflicts between user groups. Whenever practical, these different uses (trail bikes, horses, hikers and mountain bikes) will be separated if conflicts cannot be avoided or minimized thru public information and education.

Roaded recreation will ultimately occur on 37% of the Forest (630,550 acres). These figures represent the rural, roaded natural and roaded modified ROS classes combined. This will provide the opportunity for 3,277,000 RVD's of recreational opportunities in a roaded environment in the first decade, rising to 3,991,000 RVD's by the fifth decade.

Commercial outfitters and guides will continue to be utilized as a method of meeting public demand, but new permits will be limited to a level that permits a balance between the individual non-guided user and those availing themselves of guide services.

Developed Recreation

Developed recreation will continue to be an important program on the Forest. By the end of Decade 1, demand for developed recreation will likely range form 2.8 to 3.5 million RVD's; this range is still below the existing practical developed capacity of the Forest. By the end of the fifth decade, the demand range is 6.7 to 8.2. New construction to meet this demand is described below.

The emphasis for the first decade will be placed on improving existing popular campgrounds. Also, those campgrounds that are non-fee and capable of a favorable cost/revenue ratio will be converted to fee status by the installation of facilities required to meet the criteria as fee sites. Selection of sites to be converted to fee status will be selective and is not expected to have a substantial displacement on the users of non-fee facilities.

A top priority will be rehabilitation of existing sites that currently need heavy maintenance. In Decade 1, an average of 10% of the existing units per year will be reconstructed, rebuilding most of the sites within the next 10 years. This equates to about 170 units, or four campgrounds per year on the Forest. After the first decade, it is expected the facilities would be in good enough condition that reconstructive maintenance could be reduced to 5% per year.

As early as the latter years of Decade 1, some new construction of developed campgrounds is anticipated, as more capacity may be needed. As many as 100 units (500 PAOT's) may be added. This will most likely be expansion of existing campgrounds rather than new site development, but several new sites are proposed late in the first decade. Refer to Appendix D for the lists of specific sites for reconstruction or improvement.

An additional emphasis will be construction/reconstruction of developed recreation facilities for the day user. Picnic sites, vistas, interpretation and nature walks are the types of recreation experiences anticipated to be in the highest demand. Planned construction for Decade 1 includes the completion of the Heather Meadows Day Use project. To increase day-use capacity, 8 to 12 day-use sites averaging 20 units each will be added in the next few decades (see Appendix D). This will result in an 800-1200 PAOT increase in capacity.

All ski areas that have expansion capacity under approved Ski Area Master Plans are expected to add development facilities. Expansion should be commensurate with expected improvements in service, and permitted on the basis of actual public need. It is anticipated that some ski areas will have base-area expansion, particularly to enhance overnight and mid-week resort opportunities.

Public information and interpretative services will be expanded in the first decade of the Plan and thereafter to respond to public demand. Expansion will encompass staffing as well as facilities, displays, equipment, and published materials. Emphasis will continue towards sharing of information services with other agencies and partnerships with private outlets where possible. Emphasis will also be given to intensifying the Forest's public outreach programs to allow certain segments of the public to become more familiar with recreation opportunities on the National Forest.

Trails

The System Trail Inventory, in Appendix E, provides direction for the management of the Forest's approximately 1383 miles of system trails.

Generally, trails will be constructed or reconstructed as needed for resource protection and to complement the objectives of the management prescriptions. When possible, through-trails will be routed away from areas of concentrated use, such as lakes and popular focal-points, to avoid unnecessary visitor encounters and environmental impacts.

Each trail will have a "primary objective" for management. While there may be other users allowed on any given trail, the trail standards and maintenance activities will reflect the standards for that primary objective and difficulty level that the trail is to be managed for (see FSH 2309.18 for standards) .

The Forest policy is to restore trail mileage disrupted by management activities or to replace them with equal miles in the same general location. The intent is to not diminish the trail miles in the local area. The cost of this will be charged to the management program causing the dislocation. Loop trails will be favored. Special emphasis will be given to the planning and construction of low-elevation, snow-free trails.

The reconstruction of existing trails will be emphasized over the construction of new trails, if budgetary constraints force prioritization.

The following sections briefly discuss specific types of trails. For further information on trails refer to the Trail Management Plan, Appendix E.

Pacific Crest National Scenic Trail. There are 96 miles of this trail located within the Mt. Baker-Snoqualmie, along the crest of the Cascade Mountains. The trail will be maintained to the standards established and meet the objectives of the "Pacific Crest National Scenic Trail (PCNST) Comprehensive Plan." Where the trail passes through wilderness, location, design, construction, and maintenance standards will be modified to the extent needed to meet the intent of the WRS class through which the trail passes.

National Recreation Trails. The Forest has four trails given national recognition for outstanding recreational values. The designated national recreation trails are shown in Table 4-2.

Table 4-2
National Recreation Trails

Trail Name and Number	Ranger District	Miles
Shadow of the Sentinels #623	Mt. Baker	0.5
Ice Caves Trail #723	Darrington	1.2
Deception Falls Nature #1078	Skykomish	0.5
Skookum Flats Trail #1194	White River	7.6

The trails listed in Table 4-3 will be proposed for National Recreation Trail status by this Plan when they are brought to a maintenance standard appropriate for this designation.

Table 4-3
Proposed National Recreation Trails

Trail Name and Number	Ranger District	Miles
Artist Ridge Trail #669	Mt. Baker	0.7
Fire and Ice Trail #684	Mt. Baker	1.0
Picture Lake Trail #735	Mt. Baker	1.0
Table Mountain #681	Mt. Baker	2.7
Heliotrope Ridge #677	Mt. Baker	3.0
Sulphur Moraine #603.1	Mt. Baker	8.0
Sauk Mountain #613	Mt. Baker	2.0
Iron Goat Trail #1074	Skykomish	7.6
Lake Serene Trail #1068	Skykomish	3.0
Franklin Falls Trail #1036	North Bend	1.0
Granite Mountain Trail #1016	North Bend	2.0
Snoqualmie Pass Wagon Rd. #1021	North Bend	1.0
Annette Lake Trail #1019	North Bend	3.6

Wilderness Trails. There are currently 580 miles of system trails in wilderness; this represents 42 percent of the total trail mileage on the Forest.

Approximately 20 miles of new trail will be constructed within wilderness during the first decade of the Plan. This construction will be for the purpose of protecting wilderness from further resource damage. The trails to be constructed are listed in Appendix E of this Plan.

Reconstruction of existing trails within wilderness is a much higher priority than new construction. Approximately 130 miles will be rebuilt in the first decade of the Plan. Trails will be reconstructed to protect the wilderness resource and to meet the objectives of the WRS class through which it passes. The second highest priority for reconstruction will be those trails where use is causing resource damage. The highest priority will be those short trail segments posing hazards to users.

Third priority for reconstruction will be relocation of long trail sections where current use is causing resource damage to adjacent areas away from the trail itself (i.e., trails routed near fragile lake shores, or through the middle of alpine meadows). Fourth priority will be reconstruction of long segments as needed to change existing trail standards to meet the objectives of the Plan (i.e., upgrading a trail for use by horses).

As user demands on wilderness continue to increase and as cross-country travel becomes more popular, user-travel routes are expected to appear within the general trailless WRS class. Upgrading will take place only if it has been determined, based on LAC standards, that a travel route is causing unacceptable resource damage, and when user awareness and other reasonable measures have failed to prevent the unacceptable impacts of the travel route.

Nonwilderness Trails. There are 803 miles of nonwilderness trails on the Forest. Of these, 425 miles are closed to motorized use. The current emphasis on hiker-only and horse trails will remain in effect.

The Plan calls for the construction of 134 miles of new trail outside of wilderness to provide alternative recreation opportunities. These trails will generally be constructed in the semi-primitive nonmotorized and roaded natural ROS areas and will meet the management objectives of those classes. Trail system planning will become an integral part of all project planning to assure continuation of a top quality trail program.

Cross-country Ski Trails. Cross-country ski trails have been developed and maintained over the years by the Forest Service and volunteers. There are approximately 129 miles of these trails. Many additional miles of skiing opportunities exist on snow-covered Forest roads. Expansion of ski touring trails is anticipated in the first decade. Groomed trails (with a pre-set track) will also expand as demand grows and funds become available.

Snowmobile Routes. The miles of roads and trails available for snowmobile use will vary from year to year based on weather conditions, wildlife habitat management, and logging activities. Over 200 miles of Forest roads and trails will be available for this use. In addition, certain areas of the Forest, such as Easton Glacier, have been identified as unroaded snowmobile areas.

Off-road Vehicle and 4x4 Routes. Four-wheel driveways are very low standard travel-ways to be used by short wheelbase vehicles. There are approximately 25.7 miles of this type of route available on the Forest. The most popular areas for this type of use are Naches Pass Wagon Road, Evans Creek ORV Area, and the Greenwater Drainage.

The Off-Road Vehicle Plan in Appendix H identifies specific road, trail, and area closures for ORV use. The ORV Plan will be updated periodically and will indicate which trails are open or closed to motorized use and any seasonal variations. Coordination with wildlife habitat management, such as seasonal closures, will be included.

Scenery

The Mt. Baker-Snoqualmie National Forest contains some of the nation's most scenic forest landscapes. Management under the Plan will help assure maintenance of this scenic resource. This subsection describes visual resource guidelines and plans, and the visual resource program.

Visual Resource Guidelines and Plans

The principles are contained in "National Forest Landscape Management, Volumes 1 and 2" and handbooks in the "Visual Management System" are to be used in managing the visual resource.

Application of visual management principles in wilderness administration is necessary for the continued maintenance of high quality scenery. Construction, rehabilitation, or reconstruction of trails or campsites require application of the "visual absorption capacity" concept to protect and maintain scenic values.

The Mather Memorial Parkway and Stevens Pass viewshed plans are available to provide further direction for management of the visual resource in those areas. Additional viewshed plans will be completed during the next decade for such areas as the Mt. Baker Highway, Baker Lake Highway, Mountain Loop Highway, and others.

Visual Resource Program

Scenic quality will be maintained and gradually improved within seven scenic viewsheds: Mather Memorial Parkway, Mountain Loop Highway, Stevens Pass Highway, North Cascades Highway, Mt. Baker Highway, Baker Lake Highway, and Snoqualmie Pass Highway. Lands within these scenic corridors will be managed at a high visual quality level in both the foreground and middleground. A total of 25,300 acres are to be managed at the retention level, and an additional 83,600 acres will be managed under the partial retention classification. On the 42,400 acres where inventoried deer and elk winter range overlaps with these scenic viewsheds, the objectives for both scenic and winter range will be met. Refer to Figures 4-1a and 4-1b for the location of these scenic corridors.

Within wilderness, 721,718 acres will be managed at the preservation VQO, while 726,000 acres outside of wilderness will be managed for a VQO of partial retention or higher. Of the 444,840 acres suitable for timber management, approximately 120,000 acres will have retention or partial retention VQO's to protect visual quality.

Outside of specified viewsheds, wilderness, and unroaded areas, scenic quality will moderately decline. Moderately to heavily altered landscapes will exist in many of the Forest's viewsheds, among them: Cascade River, Illabot Creek, Rapid River, Crystal Mountain, and Corral Pass. Table 4-4 shows the complete summary of visual management by viewshed. A total of 275,035 acres of the Forest will be managed under modification or maximum modification VQO. These lands will appear as altered or heavily altered when viewed from Forest roads. Even though alteration of the natural appearance of these lands is allowed, visual management principles will be applied, to blend alterations with natural landforms.

With the proper application of the visual management direction contained in the management prescriptions and standards and guidelines (this chapter), and visual management handbooks, the predicted visual appearance of the inventoried viewsheds is as indicated in Table 4-4.

Table 4-4 Page 1 of 2
Visual Resource Summary (Viewsheds)

Viewshed Name	Acres	EVC 2/	VMS 3/	Expected Visual Condition 1/ Year 10	Year 50
North Fork Nooksack River	10,707	S	S	S	S
Ruth Creek	1,035	S	S	M(-)4/	M(-)
Galena Creek	1,858	M	S	S(+)	S(+)
Canyon Creek	4,076	H	M	H	H
Swamp Creek	1,521	M	M	M	S(+)
Wells Creek	3,527	H	M	H	M(+)
Deadhorse/Cascade Creeks	1,288	H	M	M(+)	M(+)
Glacier Creek	2,935	S	M	M(-)	H(--)
Sulphur Creek	4,414	H	S	H	M(+)
Baker Lake	19,851	S	S	S	S
Anderson Creek	1,837	H	S	M(+)	M(+)
Middle Fork Nooksack River	1,330	H	M	M(+)	M(+)
Loomis Mountain	5,026	H	M	H	H
Shannon Creek	1,858	M	M	M	M
Sauk Mountain	465	H	S	H	H
Skagit River	802	M	S	S(+)	S(+)
Bacon Creek	2,386	H	M	H	M(+)
Cascade River	4,878	S	S	M(-)	M(-)
North Fork Cascade River	253	N	S	N	N
Sibley Creek	676	M	M	S(+)	S(+)
Vee Creek	718	M	M	H(-)	H(-)
Illabot Creek	4,794	H	M	H	H
Hilt Creek	443	H	M	M(+)	M(+)
North Fork Stillaguamish River	1,943	M	S	M(-)	H(-)
Sauk River	12,967	S	S	S	S
Whitechuck River	3,780	M	S	H(-)	H(-)
Suiattle River	8,025	M	S	M	M
French Creek	443	N	M	M(--)	M(--)
Green Mountain Pasture	1,056	H	M	M(+)	M(+)
South Fork Stillaguamish River	9,672	M	S	S(+)	S(+)
Green Mountain	10,749	H	M	H	H
Bear Lake	1,457	H	M	M(+)	M(+)
Deer Creek	1,035	M	M	S(+)	S(+)
Beaver Creek	1,183	H	M	M(+)	S(++)

Table 4-4

Viewshed Name	Acres	EVC 2/	VMS 3/	Expected Visual Condition 1/ Year 10	Expected Visual Condition 1/ Year 50
North Fork Sauk River	2,386	S	M	S	S(+)
North Fork Skykomish River	6,167	M	S	M(+)	M(+)
Skykomish River (Highway 2)	25,616	M	S	M	M
Barclay Creek	739	H	M	M(+)	M(+)
Upper North Fork Skykomish River	2,893	M	S	S(+)	N(+)
Rapid River	2,851	H	M	H	H
Beckler River	7,117	H	M	H	H
Money Creek	2,661	M	S	S(+)	S(+)
East Fork Miller River	2,788	M	S	S(+)	S(+)
Foss River	2,344	S	M	M(-)	M(-)
Lennox Creek	2,745	M	M	M	M
Maloney/Evans Creek	781	H	M	H	M(+)
Tonga Ridge	1,837	H	M	H	M(+)
Taylor River	2,893	N	S	S(-)	S(-)
Middle Fork Snoqualmie River	8,701	M	S	S(+)	S(+)
South Fork Snoqualmie River	8,468	H	S	H	M(+)
White River	5,660	M	S	S(+)	S(+)
Crystal Mountain	3,104	M	S	H(-)	H(-)
Greenwater River	2,576	M	M	H(-)	H(-)
Suntop	1,077	H	M	M(+)	M(+)
Cayada Creek	1,732	M	M	H(-)	H(-)
Corral Pass	887	M	M	H(-)	H(-)

1/ Visual Condition Codes:

N = Naturally Appearing. Area appears untouched by humans; changes are not visually evident; corresponds to VQO of preservation or retention.
S = Slightly Altered. Changes may be noticed by the average visitor but do not attract attention; natural appearance dominates. Corresponds to VQO's of retention and partial retention.
M = Moderately Altered. Changes easily noticed by average visitor and may attract attention; disturbances are apparent. Corresponds to VQO's of partial retention and modification.
H = Heavily Altered. Changes strong, obvious to average visitor; changes dominate landscape but may resemble natural patterns when viewed from 3-5 miles; disturbances are major. Corresponds to VQO's of modification and maximum modification.

2/ EVC = Existing Visual Condition. Many of the acres currently in a heavily altered condition will remain that way for several decades. A viewshed's EVC rating or future visual condition (FVC) is an average for the seen area.
3/ VMS = Visual Management System. The expected visual condition if attempts to achieve the inventoried VQO's were implemented.
4/ The (+) and (-) indicate positive or negative change in visual quality compared to the existing visual condition (EVC).

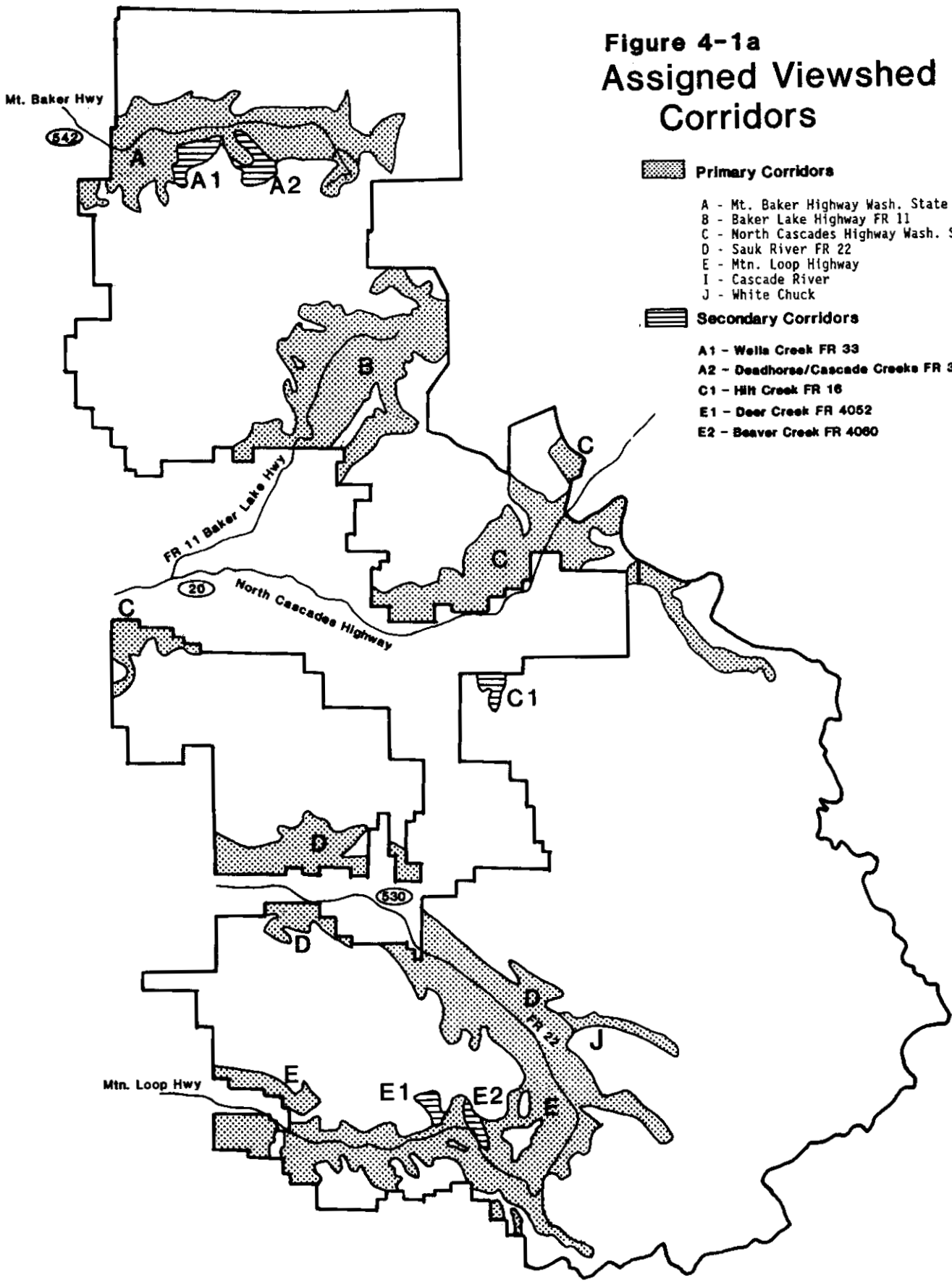


Figure 4-1a
Assigned Viewshed Corridors

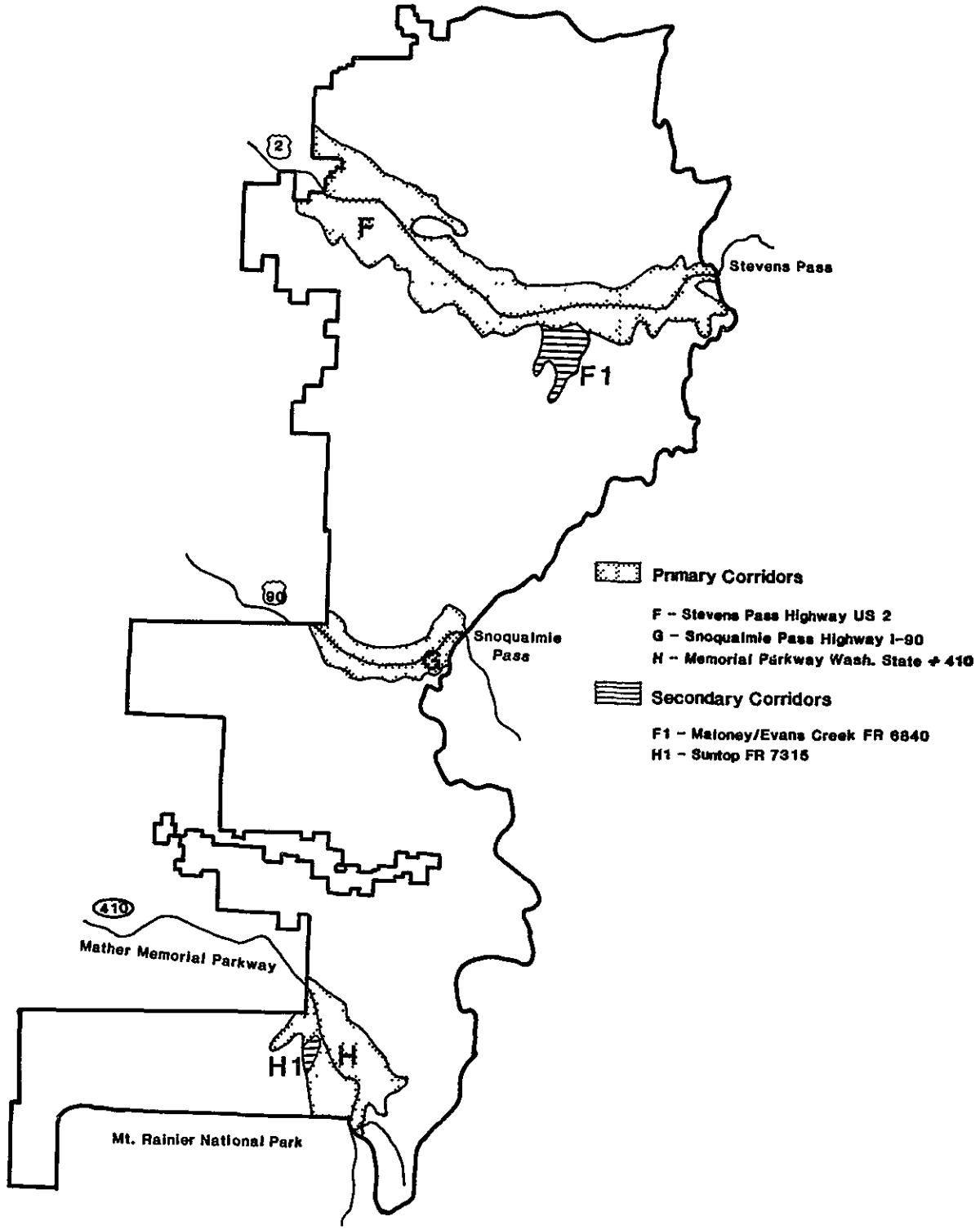
Primary Corridors

A - Mt. Baker Highway Wash. State #542
B - Baker Lake Highway FR 11
C - North Cascades Highway Wash. State #20
D - Sauk River FR 22
E - Mtn. Loop Highway
I - Cascade River
J - White Chuck

Secondary Corridors

A1 - Wells Creek FR 33
A2 - Deadhorse/Cascade Creeks FR 37
C1 - Hilt Creek FR 16
E1 - Deer Creek FR 4052
E2 - Beaver Creek FR 4060

Figure 4-1b
Assigned Viewshed Corridors



National Recreation Area

Management of the Mt. Baker National Recreation Area will focus on providing snowmobile and cross-country skiing opportunities during the winter, and non-motorized recreational uses during the summer season.

During the winter, snowmobile access will be provided on road #13 to Schrieber's Meadow, into upper Rocky and upper Sulphur Creeks, the upper Railroad Grade, Metcalfe Moraine, and lower Easton Glacier. A new road being developed by a Federal Regulatory Commission (FERC) applicant will also access this area. The Forest will work with the Washington State Sno-Park Program and various user groups to manage the winter use in this area. Snowmobile and cross-country ski traffic will be separated where possible, by such methods as providing an alternate access route to Schrieber's Meadow and surrounding alpine areas.

Summer use will focus on hiker and horse use. Construction of the Easton Crossing trail segment will complete a loop trail system for overnight use. Horse use will be permitted on the western edge of the area.

Wild and Scenic Rivers

During implementation of the Plan, steps will be taken to recommend for formal designation the river segments shown below, to the recommended classifications. This recommendation is a preliminary administrative recommendation that will receive further review and possible modification by the Chief of the Forest Service, Secretary of Agriculture, and the President of the United States. The Congress has reserved the authority to make final decisions on designation of rivers as part of the National Wild and Scenic Rivers System. Until Congressional action, the values contributing to a rivers' particular classification will be protected.

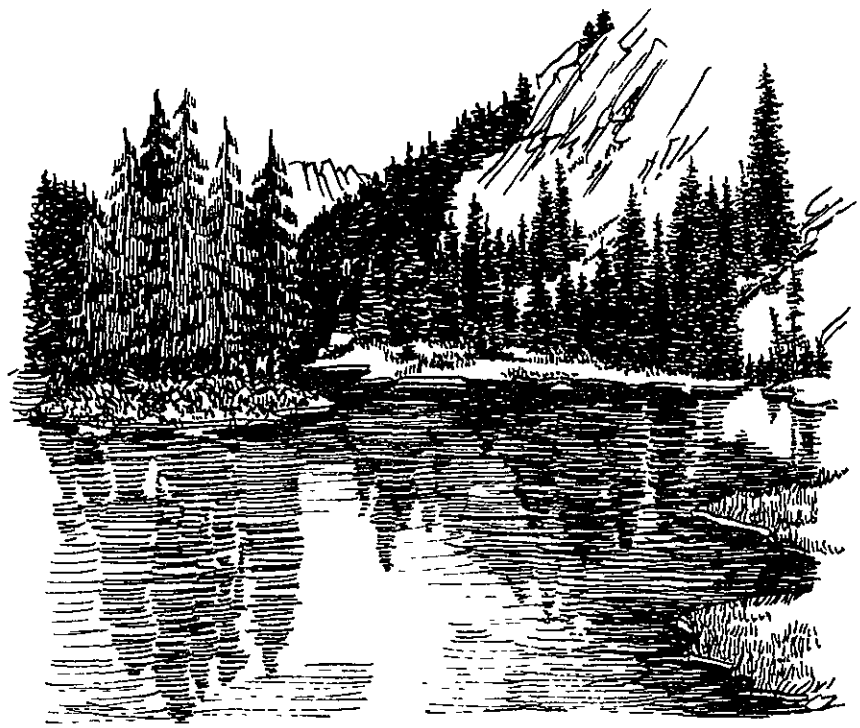


Table 4-5 Page 1 of 3
Recommended Wild and Scenic Rivers

River	Segment	Recommended Classification	Miles
North Fork Nooksack	* Headwaters in the North Cascades National Park to the Mt. Baker Wilderness boundary.	Wild	3.5
	* Mt. Baker Wilderness Boundary to Nooksack Falls diversion dam.	Scenic	9.9
	* Nooksack Falls diversion dam to Nooksack Falls power plant.	Recreation	1.6
	* Nooksack Falls power plant to the fish hatchery near Kendall.	Scenic	18.8
	* Fish hatchery to the confluence with the South Fork Nooksack.	Recreation	9.5
South Fork Nooksack	* Headwaters of the South Fork Nooksack to Bell Creek.	Wild	2.3
	* Bell Creek to the Mt. Baker-Snoqualmie National Forest boundary.	Scenic	4.3
Bell Creek	* Bell Creek headwaters on Loomis Mtn to confluence with South Fork Nooksack.	Scenic	3.0
Baker River	* Headwaters in North Cascades National Park near Perfect Pass to Blum Creek.	Wild	11.2
	* Blum Creek to Baker Lake.	Scenic	2.1
Noisy Creek	* Headwaters on Bacon Creek to Baker Lake.	Wild	6.1
Diobsud Creek	* Headwaters on Mt. Watson to the south section line of Section 24.	Wild	8.3
	* South section line of Section 24 to the confluence with the Skagit River.	Recreation	2.2
Illabot Creek	* Headwaters to Glacier Peak Wilderness boundary.	Wild	4.3
	* Glacier Peak Wilderness boundary to confluence with Skagit River.	Recreation	11.0
Buck Creek	* Headwaters to Glacier Peak Wilderness boundary.	Wild	10.1
	* Glacier Peak Wilderness boundary to the confluence with the Suiattle River.	Scenic	1.0

Table 4-5 Page 2 of 3

Downey Creek	* Headwaters on Lizard Mtn. to Glacier Peak Wilderness boundary.	Wild	10.0
	* Glacier Peak Wilderness boundary to the confluence with the Suiattle River.	Scenic	.8
White Chuck River	* Headwaters to Glacier Peak Wilderness boundary.	Wild	10.5
	* Glacier Peak Wilderness boundary to confluence with Sauk River.	Recreation	12.0
North Fork Sauk River	* Headwaters to the boundary of the designated Skagit Wild and Scenic River.	Wild	9.2
Boulder River	* Headwaters to Boulder River Wilderness boundary.	Wild	9.0
	* Boulder River Wilderness boundary to confluence with NF Stillaguamish River.	Recreation	4.0
South Fork Stillaguamish	* Headwaters between Morning Star and Lewis Peaks to Canyon Creek.	Scenic	36.6
	* Canyon Creek to the confluence with North Fork Stillaguamish River.	Recreation	15.9
North Fork Skykomish	* Headwaters to the end of FS Road #63.	Wild	8.2
	* Road end to Troublesome Creek.	Scenic	8.4
	* Troublesome Creek to confluence with South Fork Skykomish River.	Recreation	12.0
Troublesome Creek	* Headwaters at Blanca Lake to FS Rd #63.	Wild	4.4
	* FS Road #63 to the confluence with the North Fork Skykomish River.	Scenic	0.1
West Cady Creek	* Headwaters to bridge in Sec. 21.	Wild	4.8
	* Bridge to confluence with North Fork Skykomish River.	Recreation	2.7
South Fork Skykomish	* Confluence with Tye and Foss Rivers to the confluence with the Snohomish.	Recreation	28.3
Tye River	* Headwaters of the Tye River to the confluence with the South Fork Skykomish and Foss River.	Recreation	14.5
Miller River (to fork)	* Miller River from the confluence of the East and West Forks of the Miller River to the confluence with the South Fork Skykomish River.	Scenic	3.7
West Fork Miller River	* Headwaters to the Alpine Lakes Wilderness boundary.	Wild	2.1
	* Alpine Lakes Wilderness boundary to the confluence with the East Fork Miller River.	Scenic	4.2

Table 4-5

East Fork Miller River	* Lake Dorothy to the Alpine Lakes Wilderness boundary.	Wild	0.8
	* Alpine Lakes Wilderness boundary to the confluence with the West Fork Miller River.	Scenic	6.0
Foss River (to fork)	* Confluence of East and West forks of Foss River to confluence with Tye River.	Recreation	4.4
West Fork Foss River	* Headwaters at Delta Lake to the Alpine Lakes Wilderness boundary.	Wild	3.1
	* Alpine Lakes Wilderness boundary to the confluence with the East Fork Foss River.	Recreation	1.5
East Fork Foss River	* Headwaters at Lynch Glacier to the Alpine Lakes Wilderness boundary.	Wild	6.7
	* Alpine Lakes Wilderness boundary to the confluence with the West Fork Foss River.	Recreation	1.2
Deception Creek	* Headwaters at Trico Lake to the Alpine Lakes Wilderness boundary.	Wild	9.8
	* Alpine Lakes Wilderness boundary to the confluence with the Tye River.	Recreation	0.5
NF Snoqualmie River	* Wagner Bridge to confluence with Middle Fork Snoqualmie River.	Scenic	12.1
MF Snoqualmie River	* Headwaters near La Bohn Gap to the Alpine Lakes Wilderness boundary.	Wild	6.4
	* Alpine Lakes Wilderness boundary to the confluence with the Taylor River.	Scenic	13.2
	* Taylor River confluence to near the community of Tanner.	Recreation	15.9
	* Tanner to the confluence with the North Fork Snoqualmie River.	Recreation	4.2
Taylor River	* Snoqualmie Lake to the Alpine Lakes Wilderness boundary.	Wild	1.2
	* Alpine Lakes Wilderness boundary to Quartz Creek Road.	Scenic	5.4
	* Quartz Creek Road to the confluence with Middle Fork Snoqualmie River.	Recreation	1.6
Pratt River	* Headwaters at Melakwa Lake to the Alpine Lakes Wilderness boundary.	Wild	1.6
	* Alpine Lakes Wilderness boundary to confluence with MF Snoqualmie River.	Recreation	7.9
White River	* Headwaters at Emmons Glacier to Huckleberry Creek.	Scenic	20.0
	* Huckleberry Creek to the confluence with the Clearwater River.	Recreation	17.7

It is also the responsibility of the Forest to protect the "outstandingly remarkable" values on those rivers which where eligible for designation but not selected as suitable in the preferred alternative. Refer to Appendix E of the FEIS for further details.

Sensitivity Levels of Wild and Scenic River Corridors:

Table 4-6, shows the sensitivity levels for the wild and scenic river corridors. This table is used in conjunction with the guidelines contained under Forest Wide Standards and Guidelines for Visual Resources, and guides visual resource management in designated wild and scenic river corridors

Table 4-6
SENSITIVITY LEVEL - WILD AND SCENIC RIVERS

River Name	Sensitivity Level	Suitable for Designation
Silesia Creek	2/3	No
North Fork Nooksack	1	Yes
Wells Creek	2/3	No
Middle Fork Nooksack	2/3	No
South Fork Nooksack	2/3	Yes
Bell Creek	2/3	Yes
Baker River	1	Yes
Noisy Creek	2/3	Yes
Diobsud Creek	1	Yes
Illabot Creek	2/3	Yes
Buck Creek	2/3	Yes
Downey Creek	2/3	Yes
White Chuck River	1	Yes
North Fork Sauk River Extension	2/3	Yes
South Fork Sauk River	1	No
North Fork Stillaguamish	2/3	No
North Branch	2/3	No
Deer Creek	2/3	No
Boulder River	2/3	Yes
South Fork Stillaguamish	1	Yes
Canyon Creek (to fork)	2/3	No
South Fork Canyon Creek	2/3	No
South Fork Skykomish	1	Yes
North Fork Skykomish	1	Yes
Troublesome Creek	2/3	Yes
West Cady Creek	2/3	Yes
Tye River	1	Yes
Miller River (to fork)	1	Yes
West Fork Miller River	1	Yes
East Fork Miller River	1	Yes
Foss River (to fork)	1	Yes
West Fork Foss River	1	Yes
East Fork Foss River	1	Yes
Beckler River	2/3	No

Table 4-6
SENSITIVITY LEVEL - WILD AND SCENIC RIVERS

River Name	Sensitivity Level	Suitable for Designation
Rapid River	2/3	No
Deception Creek	2/3	Yes
South Fork Tolt River	2/3	No
North Fork Snoqualmie River	1	Yes
Lennox Creek	2/3	No
Middle Fork Snoqualmie	1	Yes
Taylor River	1	Yes
Pratt River	1	Yes
South Fork Snoqualmie River	1	No
Carbon River	2/3	No
White River	1	Yes
Clearwater River	2/3	No
Greenwater River	2/3	No

American Indian Religious and Cultural Uses

The 1981 "Inventory of Native American Religious Use, Practices, Localities and Resources" (Blukis Onat and Hollenbeck 1981) resulted in the identification of over 300 sites and approximately 450,000 acres of significance to 15 different Indian tribes. Five categories of use areas and sites were mapped and described in the Inventory: (1) spirit quest sites; (2) legend sites; (3) cedar areas; (4) ceremonial flora areas; and (5) archaeological sites and cemeteries.

Archaeological sites and cemeteries are addressed in the following resource summary, "Archaeological and Historic Properties." All cemeteries will be protected from development impacts.

As a minimum, the Forest will consult with affected Tribes when proposed ground-disturbing projects fall within inventoried use areas or sites, as noted in the Forest-wide Standards and Guidelines. Appropriate mitigation measures will be developed by the Forest Service and Tribal religious leaders.

While over 450,000 acres were identified as sites and areas important for religious and cultural practices, the Inventory stressed that religious and cultural significance was not limited to the identified areas. Additional areas, yet to be specifically identified, contain the potential environmental conditions suitable for religious practices and use. Suitable environmental conditions include unmodified streams, old-growth forest, cedar, ceremonial plants, the qualities of isolation, privacy, and purity of the environment. Scheduled studies will refine the data in the 1981 Inventory.

Archaeological and Historic Properties

The emphasis of the cultural resource program will be 1) continued support of Forest development activities in compliance with historic preservation law; 2) improvement of the data base for management of the resources; and 3) increasing the protection and interpretation of archaeological and historical sites.

Together with areas used by American Indians for religious purposes, these sites are called "cultural resources". A "Cultural Resources Overview" has recently been completed for the Forest. It summarizes knowledge of the prehistoric, ethnographic, and historic resources and is the basis for planning future management actions. These fall into two categories: inventory/evaluation and protection/interpretation.

The prehistory of the forested uplands of western Washington is little known; much is merely an extrapolation from adjacent geographic areas. Within the Forest, only 20 sites have been adequately recorded, although at least 80 more have been reported. A major obstacle to the discovery of prehistoric sites on the Forest is the heavy vegetative cover, the low visibility of the ground surface, and the ephemeral nature of many of the prehistoric remains. New approaches must be developed to effectively and reliably inventory the Forest for prehistoric sites.

The ethnographic use of the Forest provides some clues as to expected land and resource use patterns, site locations, and interpretations of sites. It also provides some background on the history of the local Indian groups, many of whom still use the Forest for religious and cultural purposes.

Through records searches, historic sites can be more easily predicted and located. About 250 have been formally recorded, and another 750 have been reported on the Forest. The historic overview sets forth major themes of Forest history including: transportation development, mining, logging, Forest Service administration, recreation, and water development. This historic context provides for the identification of many areas which could be targeted for inventory based on a thematic or district approach.

The historic district approach has been used for the Stevens Pass Historic District and may be appropriate for 14 distinct mining areas, 6 transportation areas, and 8 logging areas. Specific examples include the Snoqualmie Pass Wagon Road, the Northern Pacific Railroad corridor, the Mt. Baker, Silverton, or Index Mining Districts, and logging in the Stillaguamish and Sauk River drainages. Thematic studies already exist for Depression-era administrative buildings and fire lookouts, and may be appropriate for timber claim cabins, native allotments, and water developments.

Inventory and Evaluation

Cultural resource inventories will continue to be undertaken in compliance with historic preservation law and regulations; that is, to allow assessment of the effects of other activities (e.g. timber harvest) on cultural resources. In addition, it will be necessary to undertake inventories not tied to these activities. In both cases, it will be necessary to develop techniques to reliably identify prehistoric sites. This may require more intensive monitoring during road construction and timber harvest. It may also require more systemized use of subsurface probing to test for prehistoric site areas.

The Forest is currently developing an inventory plan which will outline recommendations for survey of prehistoric sites. All sites located during project-related survey will be documented to Regional standards.

Approximately 12,000 acres of the Forest will be inventoried each year, in the course of compliance inventories. In addition, about 15,000 acres of inventory will be necessary on the areas of the Forest not affected by other activities during the life of this Plan. Such inventory is needed to adequately understand the nature and distribution of the resource and eventually obtain a complete cultural resource inventory of the Forest.

There is a backlog of 750 known sites which have not yet been adequately recorded. These sites will be recorded and evaluated using a thematic or district approach. Highest priority will be assigned to those areas targeted for timber harvest and road construction over the next 10 years. However, other forces which cause deterioration to cultural resources, such as natural weathering or vandalism, cannot be ignored. For instance, in some of the heavily used wilderness areas such as Alpine Lakes and Mt. Baker, specific mining districts will be targeted for inventory. The goal will be to record and evaluate 70 sites or 2 districts or thematic groups per year.

There will be an evaluation of significance (determination of eligibility) of all cultural resources before the implementation of any activity may affect them. The evaluation of significance is the basis on which sites are selected for further investigation, preservation and protection, or interpretation. Evaluations are also critical in making decisions to permit alteration or destruction of the cultural resource. Sites will be treated as individual properties, thematic groups, or historic districts. The program emphasis will be away from evaluation of single sites and toward evaluation within a broader historic context and geographic area.

Of the 25 known prehistoric archeological sites most, if not all, are likely to be eligible to the National Register. Those located in project areas or experiencing deterioration will require test excavations as part of formal evaluations. In some cases, full-scale data recovery in the form of extensive excavations may be necessary. The need for this level of cultural resource work is expected to be greatest on the White River Ranger District.

There are 15 historic sites and buildings on the Forest which have already been determined eligible to the National Register. At this time, management plans have not been developed for many of these resources. Such management plans should identify maintenance needs and provide for appropriate use and interpretation. Top priorities for management plans include the Stevens Pass Historic District, Naches Pass Trail, and fire lookouts. The Stevens Pass Historic District and the Naches Pass Trail are shared with the Wenatchee National Forest and these plans are expected to be joint efforts.

Protection and Interpretation

As in the past, action will be taken to avoid or mitigate any adverse effects on cultural resources resulting from other Forest activities. All actions affecting cultural resources will be implemented only after consultation with the State Historic Preservation Officer and Advisory Council on Historic Preservation and other interested parties such as American Indian tribes. As determined in the consultation process, projects may be re-designed to avoid sites, important data may be recovered, or the sites recorded to the standards of the Historic American Buildings Survey.

As a result of performing inventories not tied to specific projects, implementation of the Plan will result in an assessment of the effects of such impacts as erosion, structural decay, and vandalism on cultural resources. Measures such as stabilization or patrol will be instituted to protect the resources from these impacts.

Implementation of this Plan will result in an increase in interpretation of cultural resources. Interpretation makes their scientific, historical, aesthetic, and social values more accessible to the public. Interpretive opportunities will be identified during the process of evaluating the significance of cultural resources. Several resources, including the Stevens Pass Historic District, administrative sites and lookouts are already known to have high interpretive potential. Interpretive facilities, publications, and videos will be developed for the resources judged to have the highest level of interpretive potential.

Wilderness

The 721,718 acres of wilderness on the Mt. Baker-Snoqualmie National Forest will be managed to preserve the areas' wilderness character for the use and enjoyment of visitors, and administered in a manner consistent with the Wilderness Act of 1964.

The physical, social, and managerial settings within wilderness will be managed to meet standards set under Limits of Acceptable Change (LAC's) in the wilderness recreation spectrum (WRS). Five zones are established under the WRS, listed in the table below. Using this system, an average capacity for wilderness visitor use has been estimated. Refer to Chapter II, Chapter III, and Appendix B of the FEIS for more discussion on capacity. The acres and capacity of each zone are shown in Table 4-7.

Table 4-7
Wilderness Recreation Spectrum

Zone	Acres	RVD's
Transition	15,078	226,170
Trailed	49,015	183,806
General Trailless	457,000	114,250
Dedicated Trailless	207,930	14,945
Special Area	9,017	Not Estimated
Total	721,716	539,171

During Plan implementation, wilderness managers must seek to gain a better understanding of factors affecting the wilderness resource and the users' experience. This requires that the capacity of specific sites within the WRS classes to absorb use, be monitored to adjust capacities to meet the objectives of the Plan, and to use indirect management tools (user education) and direct management tools (mandatory permits or road closures outside wilderness) to regulate use.

Specific wilderness management direction is contained in the Forest-wide Standards and Guidelines, and MA prescriptions. The overall wilderness management goal will be to reduce or eliminate the adverse effects associated with human use, when use approaches or exceeds the established LAC. Specific management actions will be undertaken at overused sites where LAC's are now exceeded, or where the level of use or impacts is approaching levels specified for that WRS class. The Wilderness Rehabilitation Schedule is in Appendix F.

Several areas within wilderness presenting unique management problems, such as the existence of structures, RNA's, and a popular climbing route, are assigned to the special area WRS class. The intent of this class is to allow changes in management guidelines for unique situations; areas do not qualify for this class for administrative convenience in dealing with overuse. The historic lookouts at Winchester Mountain, Park Butte, Miners Ridge, Three Fingers, Green Mountain and Granite Mountain will be allowed to remain as non-conforming uses. The Coleman Glacier Climbing Route on Mt. Baker and will have special LAC's in recognition of the unique opportunities present. An interdisciplinary team will examine the recreational use of Mt. Baker and recommend further refinements in these guidelines. The USGS Glacial Research Station in the Glacier Peak Wilderness and authorized electronic sites in wilderness will continue to operate under special use permit.

Approximately 20 miles of new trail will be built within wilderness in the first decade of the Plan. This construction will be to protect the wilderness resource where overuse is occurring. In total 73 miles of new trails are proposed within the wilderness. In addition, necessary trail access will be reconstructed. Refer to the Trail resource summary in this chapter and to the Trail Management Plan in Appendix E.

There are several large areas without trail access where cross-country trips, as long as a week, are possible. They provide for a pristine wilderness experience but generally occur in extremely fragile alpine areas that are vulnerable to overuse. The intent is to manage these dedicated trailless areas to prevent overuse. Already, hiker-created trails are appearing, favorite campspots are being denuded and the opportunities for solitude are diminishing. If not managed, these cross-country routes will lead to the establishment of new trails, greatly reducing the trailless opportunity. This will be the most difficult of the wilderness classes to manage, for the manager must attempt to allow continued use in these areas without any resulting physical impacts.

Standards and Guidelines permit using some naturally occurring fires (i.e. lightning caused) to accomplish wilderness vegetation management objectives such as maintaining vegetation diversity and allowing natural processes to prevail. The parameters under which these fires will be permitted to burn will be closely monitored and suppression actions will be taken immediately on those fires that exceed prescriptions. Under these guidelines it is expected that most fires will be less than 10 acres in size through it is possible that once every 20 years or so an individual fire may approach 1000 acres in size. It is expected that approximately 75 acres per year will be burned where naturally occurring fires are used to accomplish wilderness vegetation management objectives. No areas have been identified where planned, human induced, prescribed burning is needed to modify fuel accumulations to meet wilderness fire protection needs.

The LAC's will act as monitoring guidelines for the physical and social settings within the wilderness. Periodic monitoring of these indicators will assist in preservation of the pristine attributes of wilderness.

Watershed

The watershed program on the Mt. Baker-Snoqualmie National Forest provides the means to obtain protection, maintenance, and rehabilitation of soil and water resources. It provides leadership in defining the allowable level of manipulation of the watershed environment. The watershed program provides support to other functional areas. It initiates and is responsive to changes in Forest needs, goals, and direction, and public issues. This program will be carried out through various activities that have been determined to have a high priority for accomplishment. These activities are described below.

Close involvement to provide support and advice to ground-disturbing resource management will be done to help protect the soil and water resources. The primary involvement will be with the timber program. Timing of support will be tied to the development of individual timber sales. The program will involve initial consultation on inventory and needs of the soil and water resources, through evaluation of management practices as the timber sale is completed. The level of involvement will vary depending upon the complexity of the project, with the greatest involvement occurring with complex sales that have potential for resource damage.

Consultation and involvement will also occur with management activities other than timber sales when ground-disturbing activities are proposed. These would include, but are not limited to: fisheries, fuels, recreation development, engineering, and seed orchard and fertilizer trials. Schedules for many of these resource projects are found in the appendices.

The application of Forest-wide Standards and Guidelines, Best Management Practices (site-specific), and meeting management requirements for water quality and riparian areas will ensure at least minimal protection over the entire Forest, with increased protection in some areas and within several Management Areas, such as (MA 5) Potential Wild and Scenic River,(MA 6) Skagit Wild and Scenic River, and (MA 13) Watershed, Wildlife, and Fisheries Emphasis in Riparian Areas.

Emphasis will be placed on the protection of riparian areas so that their integrity is maintained. This involves working with other resource personnel in the design and application of riparian area protection techniques. Training will be provided to resource personnel in riparian area design.

Inventories for watershed rehabilitation needs will be conducted first in the sensitive watersheds. Identified projects will be funded by available sources including P&M and KV. It is expected that about 35 acres per year will be rehabilitated.

Monitoring of the effects of the Plan will be done to determine if changes are occurring to the soil and water resources. Details of the "Monitoring and Evaluation Plan" can be found in Chapter 5. The objectives of soil and water monitoring are to determine if standards and guidelines have been met, and to assess their adequacy and make changes if necessary. Monitoring will be done at several levels of intensity; the most common method will be end-product reviews, which are highly cost and time effective. More intensive monitoring will be done as needs arise. A feedback loop will be utilized to help improve the design and implementation of future projects.

Coordination regarding management concerns will continue with the involved municipalities of the municipal watersheds on the Forest. Coordination will also continue with the public basin groups, especially for the large sensitive watersheds, where there is a high potential for resource impact and serious political implications.

Air

Application of standards and guidelines, and management prescriptions (this chapter) associated with the programs and activities included in the Plan will assure that the effects on long-term air quality are positive and supportive of State and national goals to improve air quality of the Region. All management activities that generate smoke will be executed in strict conformance with the Washington State Implementation Plan, which restricts the quantity and timing of activities to minimize impacts on human health and quality of life.

The overall objective of the prescribed burning program is to limit it's application to accomplishment of those objectives that can be accomplished no other way. As an example, on-site burning of logging residue should be the last choice as a fuel treatment method. The Forest will reduce emissions from prescribed burning consistent with State goals for 1990.

The effects of the various management activities involving prescribed burning on localized air quality will be monitored based on the production of total suspended particulates (TSP) emissions. The level of TSP emission produced will be calculated annually (refer to the monitoring plan, Chapter 5) based on the fuel moisture, time of year, and total tons of available fuel consumed at the time of burning.

In addition to the forest management activities that may cause air quality impacts over the forest, the Federal Clean Air Act requires that Air Quality Related Values (AQRV's) of the forest be protected from all off Forest sources of air pollution. Monitoring activities will establish baseline conditions for these values and the Prevention of Significant Deterioration provisions of the Clean Air Act provide the mechanism for the forest to review and evaluate all planned activities that have potential to impact the AQRV's of the forest.

Wildlife

This section contains two parts: a brief description of the wildlife program; and a summary of how the wildlife resource and activities will be managed under the Plan, including descriptions of the estimated outputs.

Wildlife Program

Primary emphasis of the wildlife program will be habitat improvement and coordination with other resource management, especially timber, road, and recreation, to improve or maintain wildlife habitat.

Standards, guidelines, and prescriptions for wildlife reflect the integration of wildlife habitat requirements and other Forest activities, assuring that at least minimum acceptable habitat conditions are provided for Management Indicator Species (MIS) and their represented species. Forest-wide standards and guidelines address general wildlife management as well as protection of special habitats, particularly breeding and wintering areas, from ground-disturbing activities. Animals using these special habitats are protected from disturbance during breeding seasons and wintering periods.

The Forest Management Indicator Species are:

- Bald eagle, American peregrine falcon, gray wolf and grizzly bear (T&E wildlife habitat MIS);
- Mountain goat (mountain goat habitat MIS);
- Northern spotted owl (old-growth habitat MIS);
- Pine Marten and pileated woodpecker (mature and old-growth habitat MIS);
- Primary cavity excavators (snag and downed log MIS).

Management prescriptions with major emphasis on meeting wildlife objectives are:

- MA 11 - with emphasis on old-growth wildlife habitat, using the northern spotted owl as the MIS;
- MA 12 - with emphasis on mature and old-growth wildlife habitats, using the pine marten and pileated woodpecker as MIS;
- MA 14 - with emphasis on deer and elk winter range;
- MA 15 - with emphasis on mountain goat habitat; and

- MA 16A, 16B, 16C, and 16D - with emphasis on T&E wildlife habitat for bald eagle, grizzly bear, American peregrine falcon, and gray wolf.

The habitat and wildlife characteristics and habitat relationships described in the Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington (Brown 1985) and other available literature will be used in evaluating habitat, identifying opportunities, developing and testing habitat and use assumptions, and assessing direct, indirect, and cumulative effects.

Inventories and data gathering will be carried out to update existing information, provide baseline data for monitoring, and develop habitat relationship models. Habitat inventories, wildlife use surveys, and development of habitat analysis systems will be coordinated with WDW, USFWS, and other agencies or studies. A list of information and research needs is found at the end of Chapter 2.

Monitoring is a major part of implementing the Plan. Details of the monitoring actions for wildlife are in Chapter 5. Management indicator species and all T&E wildlife will be monitored to ensure that assumptions concerning the effects of management activities on wildlife habitat and populations are appropriate. Evaluation of estimated outputs and expected conditions in the FEIS will determine if wildlife habitat and population trends are as planned, and will form the basis for adjusting Plan direction when appropriate.

The Forest will coordinate with State, local, and other Federal agencies, basin planning groups, and other concerned groups regarding management programs and activities. Activities involving Federally threatened or endangered wildlife species will be coordinated with the USFWS.

Wildlife Activities and Outputs

The goals and objectives of the wildlife program will be carried out through various activities to provide and manage habitat, resulting in the estimated Forest-wide wildlife population levels shown in Table 4-1. The production of Wildlife-Fish User Days (WFUD's) is a secondary output related to both wildlife populations and demand for consumptive (hunting/trapping) and nonconsumptive (viewing, nature study, etc.) wildlife uses.

The following activities, described below, have a high priority for accomplishment: (1) coordination; (2) T&E wildlife habitat management; (3) big game habitat management; (4) mature and old-growth habitat, snag, and riparian area management; (5) habitat improvement; and (6) education.

Coordination. Coordination will be an on-going process to ensure that wildlife habitat needs are incorporated as appropriate into all projects. Extensive coordination of wildlife objectives and standards and guidelines with other resources will be emphasized, especially for ground-disturbing activities such as timber harvest, road construction, mining, small hydroelectric developments, and recreation developments. This includes evaluating habitat condition, quantity, and arrangement and the opportunities, effects, and mitigations relating to the proposed management activity. Coordination of wildlife Standards and Guidelines with recreational use management will be an important and growing priority, as high recreational use levels increase even further. Pre-project coordination and planning will be done as well as utilizing KV funds for post-project mitigation measures and habitat improvement.

T&E Wildlife Habitat Management. The Forest will participate in maintaining or reestablishing four nesting pairs of bald eagles (Federally threatened) to meet the "Final Pacific States Bald Eagle Recovery Plan" (1988) objectives. Assigned habitat (with the associated standards and guidelines) and improvements (where appropriate) will be carried out for one existing nest site, three recovery nest sites, communal roosts, and foraging areas. Recovery nest sites, and communal roost and foraging areas will be identified and the use of all existing and recovery areas will be monitored.

Habitat inventories will be completed for the American peregrine falcon (Federally endangered) and for the grizzly bear (Federally threatened). All important or critical habitat will be protected or improved to meet recovery objectives of the "Pacific Coast Recovery Plan for the American Peregrine Falcon" (1982) and the "Grizzly Bear Recovery Plan" (1982). Occasional and/or transient use of Forest lands by peregrine falcon and grizzly bear will be documented. Gray wolf (Federally endangered) sightings will be evaluated and consulted on with the USFWS. The Forest Plan will be modified as needed to support new recovery objectives in revisions of these recovery plans, or as new recovery plans become available.

The Forest has initiated consultation on the Forest Plan with the USDI Fish and Wildlife Service. A biological evaluation of the effects of the Plan on threatened and endangered species is on file at the Supervisor's Office.

Big Game Habitat Management. Selected big game winter ranges will be managed to provide high quality cover and forage conditions.

The habitat capability of deer and elk winter range will increase as a result of improved winter range where it is assigned to MA 14, and where inventoried winter range overlaps with compatible MA's, particularly MA's 1D, 2AB, 4, 5AB, 6, 15, and 27. In these areas, timber harvest methods will be used to develop the desired cover and forage relationships (ratio, size, and arrangement) where appropriate. About 240 acres/year of seeding and fertilization will be done to improve forage during the first decade. Road density will average no more than two miles per square mile in winter range areas. Thermal and optimal cover will be retained in MA 14.

Mountain goat populations will benefit from improved winter range where it is assigned to MA 15. In these areas, about 200 acres/year of seeding and fertilization for forage production may be done in the first decade. Prescribed burning may be used if determined to be ecologically acceptable to the specific site, beneficial to goat forage production, and compatible with the areas management prescription. Road density will average no more than two miles per square mile and no new roads will be built in Goat MR areas. Thermal and optimal cover will be retained in MA 15. Overall mountain goat habitat capability and populations are expected to decrease due to decreased thermal cover during this same period. Emphasis will be placed on inventory of actual goat use areas, determining goat populations, and investigating causes for the apparent decline in goat numbers. These activities will be done in conjunction with the Washington Department of Wildlife.

Deer, elk, and mountain goat summer ranges overlap with winter ranges in some cases, or are assigned to other resource management areas, with protection for special areas, e.g., fawning, calving, and kidding areas. A minimal level of big game summer range maintenance is provided through application of Regional harvest dispersion constraints. Summering populations of deer and elk fluctuate slightly due to the effect of Forest management activities as well as habitat conditions on off-Forest winter ranges that support 50% or more of the summering populations.

The primary emphasis of big game habitat inventories will be to update deer and elk winter range boundaries and to complete mountain goat habitat boundaries. Secondary emphasis will be on identifying summer and transition ranges and special areas, i.e., fawning, calving, and kidding areas, wallows, and travel corridors.

Mature and Old-growth Habitat, Snag, and Riparian Area Management. Old-growth and mature forests can provide habitat for the northern spotted owl, pine marten, pileated woodpecker, deer, elk, and mountain goat, depending on each wildlife species' specific old-growth habitat needs or preferences. Big game old-growth needs (thermal and optimal cover) are discussed above. Elevational requirements and vegetative type affect how much of the old growth may be suitable habitat for spotted owls. Fragmentation of the mature and old-growth habitats by timber harvest units is expected to reduce use by these animals, especially the spotted owl.

At the end of the first decade, there will be about 624,660 acres of old growth habitat remaining, including large areas of old-growth in wilderness, research natural areas, dispersed recreation areas of the Alpine Lakes Area management unit, and unsuited timber lands. This acreage will decrease overall, to 535,100 acres, by the end of the fifth decade.

Spotted owl, pine marten, and pileated woodpecker populations will decline in the next five decades, due to the continuous decrease in old-growth habitat from harvesting and environmental factors such as windthrow. Populations will remain viable during this period.

Where green trees are left in timber harvest units, without dead trees also being retained, snags will be created on suitable lands to maintain at least 40 percent of the population potential of primary cavity excavators. Dead and down logs will be left in project areas, using the guides from Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington (Brown 1985) to meet Forest wide Standards and Guidelines for diversity. Existing snags and down logs and future, naturally occurring snags and logs, will be retained in MA's without timber harvest.

Management Area 13 protects and manages riparian areas important to a large number and variety of wildlife and fish species. Deer and elk habitat often occurs in these areas, as well as habitat for many mature and old-growth wildlife species. Habitat for primary cavity excavators will be managed at or above the 80% population potential level in riparian areas. Nest boxes and platforms for such species as wood duck, common loon, and osprey will be installed in riparian areas.

Habitat Improvement. Habitat improvement includes developments and habitat manipulation that improve the quantity, quality, and/or arrangement of wildlife habitat. Improvement projects to benefit wildlife are listed and scheduled in Appendix C. Habitat improvement will be designed to maintain or increase wildlife populations such as T&E wildlife, big game, and others. Also, habitat improvement will be used to mitigate those management activities incompatible with the wildlife species of concern in specific areas. Some projects are dependent on additional surveys and inventories to better define how and where to apply needed habitat improvement. Examples are mountain goat projects, where site-specific surveys are needed first.

Improvements include those mentioned above as well as road closures for T&E wildlife and MIS, and other appropriate developments or habitat manipulation.

Education. A relatively new and growing emphasis for the wildlife program will be the development of a public education program; its emphasis will be educating the public about opportunities on the Forest for viewing, studying and photographing wildlife and their habitats. Public interest in these activities is high and growing at a rapid rate. Cooperative efforts aimed at inventories, monitoring, and habitat enhancement and protection will be forged with a wide variety of citizen user groups.

Fish

This section summarizes the fisheries program and how the fisheries resource and activities will be managed under the Plan, including descriptions of the resulting outputs.

Fisheries Program

Maintenance, protection, mitigation or restoration, and enhancement of the fishery habitat capability will be objectives in the fishery resource area. This will be accomplished by a mixture of land allocations and standards and guidelines at the Forest Plan level, and by best management practices (BMP's) and habitat improvement capitol investment at the project level.

Anadromous fish management indicator species include chinook, coho, pink, and chum salmon, as well as steelhead and sea-run cutthroat trout. Resident fish MIS include rainbow, cutthroat, and bull trout.

One emphasis of the fishery program will be the coordination with other resource management. Of all the Forest resource activities, timber management activities and road construction, reconstruction, and operation potentially have the greatest effect (direct and cumulative) on fish and fish habitat (on and off the Forest). This fact was recognized and was addressed in the cumulative effects analysis (refer to Appendix H, in the accompanying FEIS). This analysis resulted in a method to meet water quality and riparian management requirements (MR's), expressed as a set maximum number of acres available for timber harvest, by decade, by watershed. See Table 4-18, Forest-wide Standards and Guidelines for Water and Riparian Areas, later in this chapter.

Protection, mitigation, and restoration of habitat will be a primary emphasis in the fishery program. This would include pre-project coordination and planning as well as utilizing KV funds for post-project mitigation measures and monitoring. Also, Forest Roads and Trail (FR&T) funds will be used to correct road-related damage to fish habitat.

Another resource area where the fishery program will coordinate closely with other resource management is developed recreation. Developed recreation sites on the forest are usually located close to aquatic systems; many of these systems contain one or more anadromous or resident fish species. Certain developed recreation sites or activities can impact or affect these fish populations or their habitats. Most of the impact ,or the potential for impact, is alterations or modifications of the in-channel or the adjacent riparian area conditions. Existing and potential campgrounds, boating and swimming sites, alpine ski resorts, organizational camps, and recreational residences are examples of developed recreation sites or activities that can impact the Forest fishery resources.

Another emphasis area is habitat capitol investment for anadromous and resident fish. Opportunities exist in the seven major river basins located within the Forest boundary to improve or restore either spawning or rearing habitat for salmon, sea-run trout or resident trout. Habitat improvement projects to benefit these species are listed and scheduled in Appendix C. Some of these projects improve spawning and rearing habitat, while others provide fish passage to presently unused or inaccessible areas. Most projects will benefit more than one species. Most projects require additional survey work or design before they can be implemented. To be effective (to increase the capability of Forest habitat to produce more fish), this anadromous and resident fish habitat improvement program must be a stable, multi-year program.

Under the USFS nation-wide initiative, Rise to the Future, the Forest has developed a 5 year action plan called "Catch-the-Action". This action plan will be the major document to guide the Forest's fishery program in implementing the fishery management portion of the Forest Plan.

Additional inventories and data information needs will be carried out to update and complete existing (baseline) data. A list of fishery data needs is found at the end of Chapter 2.

Monitoring is a major part of implementing the Plan. Details of the monitoring needs for fish and water are in Chapter 5.

The Forest will coordinate with State, local, and other Federal agencies and with the various Puget Sound Indian tribes regarding management programs, projects, and activities.

Fishery Activities and Outputs

The Forest will provide and manage habitat for anadromous and resident fish species.

Habitat capability for anadromous fish will be managed at a high production and capitol investment level. The resident fish program will also be managed at the highest capitol investment level. This is management intensity 13D.

The present estimated annual anadromous fish production (escapement and harvested fish) resulting from the habitat within the Forest boundaries is 1,093,000 adult fish. The estimated annual production of anadromous juveniles (smolts) is approximately 16,000,000. With a high capital investment in habitat restoration and/or improvement this annual value could be increased to approximately 18,000,000 smolts. It would take 5-10 years of high capital investment to reach this production level. The present annual value of the anadromous fish produced from the Forest (commercial and sport fish value) is approximately $18.9 million dollars.

The present estimated public demand on the resident fishery from within the Forest boundaries is a little over 1.1 million angler days. This use has a present annual value of a little over $4.25 million dollars.

Three fishery outputs (as mentioned in Table 4-1) will be monitored:

1. Pounds of anadromous fish commercially harvested;

2. Smolts produced (anadromous) as a result of habitat improvement;

3. WFUD's from resident sport fishery (this value is added to the wildlife WFUD value).

Vegetation

The diverse vegetative communities, successional vegetative change process and current vegetation conditions on the Forest are described in Chapter III of the FEIS associated with this Plan. In this section, brief summaries are included for the timber, vegetative diversity, forage, old growth, and threatened, endangered, and sensitive plant resources. Included are tabular and graphic displays with narrative explanation of how planned management activities will change the resource from the present to future conditions.

Timber Program

The timber program is described for the following areas:

- o Timber resource land suitability classification;
- o Mountain hemlock study;
- o Timber program output objective;
- o Potential increase in the ASQ;
- o Vegetative management practices;
- o Insects and disease;
- o Long term sustained yield capacity;
- o Timber productivity classification; and
- o Present and future Forest conditions.

Timber Resource Land Suitability Classification. Table 4-8 lists land classification acres resulting from the timber resource land suitability classification process. This process is required by NFMA, 36 CFR 219.14. Appendix B in the FEIS describes, in detail, the process on this Forest. Refer to the glossary for definitions of technical terms.

Table 4-8
Land Classification 1/

Classification		Acres
1. Non-Forest land (includes water) 2/		422,086
2. Forest land		1,301,399
3. Forest land withdrawn from timber production		442,204
4. Forest land not capable of producing crops of industrial wood		0
5. Forest land physically unsuitable:		
- irreversible damage likely to occur		95,476
- not restockable within 5 years		159,739
6. Forest land - inadequate information 3/		6,700
7. Tentatively suitable forest land (item 2 minus items 3, 4, 5 and 6)		597,280
8. Forest land not appropriate for timber production 4/		250,869
- Management Requirements	81,168	
- multiple-use objectives	93,335	
- cost efficiency scheduling	76,366	
9. Unsuitable forest land (items 3, 4, 5, 6, and 8)		954,988
10. Total suitable forest land (item 2 minus item 9)		346,411
11. Total National Forest land (items 1 and 2)		1,723,485

1/ 36 CFR 219.14; or see Timber Resource Land Suitability Classification in Glossary.

2/ Includes water (17,356 acres) and forest lands developed for non-forest use (22,513 acres).

3/ Lands for which current information is inadequate to project growth or yield responses to timber management.

4/ Includes uneconomical, and not scheduled lands.

Federal regulations require that all forested lands designated not suited for timber production in the Plan be reviewed for suitability at least every ten years. Unsuitable lands may be reviewed and designated suitable for timber production due to changed conditions at any time. Such designation would require an amendment to the Plan.

Mountain Hemlock Study. Approximately 76,000 acres of forested land in the Mountain Hemlock association were classified unsuitable because of regeneration difficulty: not restockable within five years. The "Study Plan for the Determination of Suitability for Timber Management of the Mountain Hemlock Zone of the Mt. Baker-Snoqualmie National Forest" (available at the Forest or Regional Office) prescribes a study to determine what portion of these lands could be designated suitable for timber production. The study will collect information on 25 sale units of 6 to 12 acres each, with varying combinations of applied silvicultural regeneration systems and management practices. To facilitate the study, timber sale contracts will require completion of the purchaser's on-the-ground obligations within one year.

Timber Program Output Objective. Adherence to Forest management direction should assure that Plan timber production output objectives and coordination of timber management activities with other resource management objectives are achieved. Timber production areas should provide the highest levels of other desired resource values possible within timber production objectives. Forest wide Standards and Guidelines will be followed. The monitoring and evaluation process described in Chapter 5 requires reports and evaluation of how well the timber management program is meeting management direction and projected activities and outputs. Evaluation reports may include recommendations to change direction, adjust projected outputs, or amend the Plan.

The allowable sale quantity (ASQ) of 22.4 MMCF is the output objective driving the timber program for achievement of planned levels; see Tables 4-1 and the following table, 4-9. The ASQ is a limit on the quantity of timber planned for sale from suitable land for the ten-year time period specified for the Plan. The ASQ is usually expressed on an average annual basis for the Plan period, yearly amounts may be above or below the annual average limit established for the decade, as long as the decadal limit is not exceeded. Timber volume chargeable to the ASQ is specified in Forest-wide Standards and Guidelines. The timber sale volume chargeable to the ASQ must be stated in the final sale preparation package.

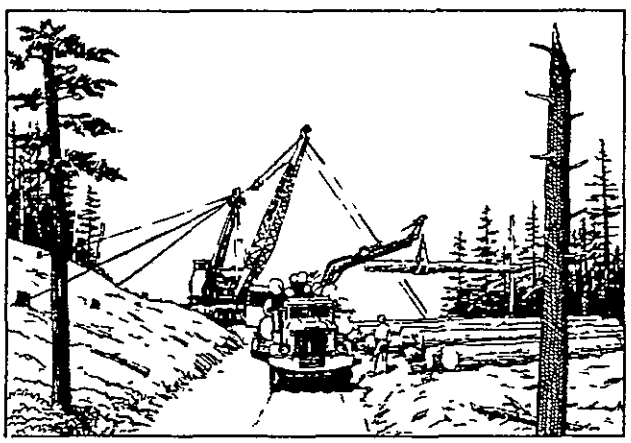


Table 4-9
Allowable Sale Quantity and Timber Sale Program Quantity
(Annual Average for First Decade)

	Allowable Sale Quantity (MMCF)	
	Sawtimber	Other Products
Regeneration harvest:		
Clearcut	22.0	
Shelterwood and seed tree		
-Preparatory cut	0	
-Seed cut	0	
-Removal cut	0	
Selection	0	
Intermediate harvest:		
Commercial thinning	0.4	
Salvage/sanitation	0	
Total	22.4	

	Additional Sales 1/ (MMCF)	
	Sawtimber	Other Products
Total for All Harvest Methods	1.3	1.8

	Timber Program Output Objectives	
	MMCF	MMBF 2/
Allowable Sale Quantity	22.4	108
Timber Sale Program Quantity 3/	25.5	122.1

1/ Includes nonchargeable volumes from suitable and/or unsuitable lands. Other products is an estimate of fuelwood based on a percentage of unutilized material associated with regeneration harvest.

2/ Scribner Decimal C Board Foot Measure.

3/ Total of allowable sale quantity and additional sales.

The ASQ may be estimated 1/ as 96.2 percent of the total net timber volume meeting Forest utilization standards to be sold from suitable land within the boundary of a regeneration harvested clearcut, or within the boundary where all timber is removed in other activities, e.g. clearing for road construction. All live or green volume in commercial thinning sales and salvage sales outside regeneration harvest units are in management areas allowing scheduled timber harvest. This volume is also chargeable to the ASQ.

Control of the ASQ timber quantity is expressed in cubic foot measure, and harvested acres, for the total Plan period and may vary from year to year. Conversion to board feet measure in this Plan is 4.79 board feet per cubic foot unless otherwise specified.

Projected annual outputs and activities necessary to meet the ASQ planned level are included in Table 4-1; included are miles of road construction and reconstruction, acres of timber harvested by clearcut and commercial thinning, acres of reforestation, and acres of timber stand improvement. Table 4-10 lists average annual acres of vegetation management practices scheduled in the first decade. Road and bridge construction and reconstruction schedules appear in Appendices A and B. The latter includes capital improvements in arterial and collector roads and bridges. Appendix A, Timber Program Activity Schedule, lists timber purchaser road construction and reconstruction scheduled for each timber sale.

Approximately 30% of the planned ASQ of 22.4 MMCF/yr (107.5 MMBF/yr) is produced from Management Areas other than MA 17, where the production of wood fiber is not the primary objective of management. The acres receiving vegetative management, and the amount of wood fiber produced, by management and other identifiers, will be tracked in Forest Plan monitoring (see Chapter 5, Monitoring Plan).

The ASQ output requires a substantial investment in precommercial thinning, 996 acres per year, as shown in Table 4-10. If full achievement of this intensive forestry practice is not possible due to lack of funding or other reasons, or if a higher level of achievement occurs, it may be necessary to adjust the ASQ accordingly. Approximately 2,800 acres of precommercial thinning per year has been accomplished in recent years. The first two decades of the Plan average 1,993 acres per year.

1/ This estimate was calculated as follows: (0.301 MCF per acre of net salvable dead volume per acre determined in 1976 Forest inventory) divided by (mean net live or green MCF volume per acre of existing pole and larger timber condition classes in suitable lands plus 0.301 MCF per acre of net salvable dead volume per acre) x 100 = 3.8%; 100% - 3.8% = 96.2% net live or green volume per acre. "Timber to be sold" is significant in this estimating guideline; any net timber volume meeting Forest utilization standards left to benefit wildlife, or for other purposes would be excluded from the 96.2% multiplier.

Table 4-10
Vegetation Management Practices
(Annual Average in First Decade for Suitable Lands)

Practice 1/	Acres
Regeneration Harvest	
Clearcut	2,865
Shelterwood and seed tree: 2/	
-Preparatory cut	0
-Seed cut	0
-Removal cut	0
Selection 2/	0
Intermediate Harvest	
Commercial thinning	200
Salvage/sanitation	84
Timber Stand Improvement	996
Reforestation	
Planting	2,239
Natural Stocking	626

1/ Regeneration and Intermediate Harvest acres by sale and Ranger District are listed in the Ten-Year Timber Sale Schedule, Appendix A of this document.

2/ Miscellaneous amounts of these regeneration harvests may occur.

If annual monitoring determines that the precommercial thinning acres are plus or minus 10 percent from 996 acres per year, the ASQ may be adjusted based on additional analysis. The Plan would be amended to portray the new ASQ.

The average annual ASQ and additional sales (including fuelwood) planned for annual sale in the first decade is the timber sale program quantity (TSPQ), 25.5 MMCF (122.1 MMBF) as shown in Table 4-9. The timber program activity schedule in Appendix A lists, by each Ranger District, the proposed timber sales for the first three years (FY 1990-92) and a proposed pool of projects thereafter. Listed for each scheduled sale are: 1) sale name, 2) description of legal location, 3) total acres for each harvest method, 4) total volume, 5) miles of road construction and reconstruction, 6) the Management Areas in which the sale is located, and 7) other pertinent remarks.

Some sales require five or more years of preparation between a probable sale area and the sale date. The ten-year timber sale schedule is based on current conditions and information available. Conditions and new information at any time may eliminate, delay, or revise a scheduled sale. The timber sale schedule may be modified during the implementation of this Plan. The degree of modification will determine whether the Plan needs amendment, in accordance with the required processes. (Refer to Chapter 5, Amendment and Revision.) Final section locations are undetermined for some of these sales.

Vegetative Management Practices. Table 4-10 lists the average annual acres of vegetation management practices scheduled for Decade 1. Planning projections in FORPLAN were made using clearcutting as the only regeneration harvest cutting method. Clearcutting is the most commonly appropriate harvest cutting method in this Forest. Appendix F of the FEIS describes the criteria and rationale for selection of the harvest cutting method.

Miscellaneous amounts of suitable acres (less than 50 per year) may be harvested using the shelterwood or selection system. When this occurs, it will reduce the number of acres being harvested via clearcuts. Salvage sales are scheduled on 84 acres per year. Regeneration harvest clearcut acres calculated by FORPLAN are 2,865 acres per year.

Scheduled sales average more volume per acre than projected regeneration harvest acres.

This difference in volume per acre is attributable to specific sale areas versus Forest-wide average yield tables; the latter are net green timber volume versus net green and dead timber volume in scheduled sale estimates. Deductions of 3% were made from FORPLAN timber yield tables to aid in maintaining primary cavity excavator populations at 40% of their biological potential. In addition, the clearcut acres scheduled for a sale are those shown on the sale area map, while the volume shown for those clearcut acres includes volume from acres of road construction and reconstruction clearing (and as noted above, miles of scheduled road construction are almost twice the miles projected). The timber sale contract differentiates between acres of harvest in clearcuts and road construction.

Commercial thinning harvest (HTH) is a prescribed practice in Forest-wide and management area standards and guidelines. A total of 200 acres per year of HTH sales have been scheduled in the first decade (Table 4-11). The structure of the Forest's model precluded HTH outputs from FORPLAN until later decades. First decade HTH acres scheduled were planned outside the FORPLAN model. The number of acres of HTH were estimated for Decades 2, 3, 4, and 5. Dead and defective, standing and down tree habitat needs will be provided for in commercial timber harvest areas.

Annual reforestation of 2,865 acres (Table 4-11) will be required to restock regeneration cuts. Planting will average 2,239 acres per year and natural stocking 626 acres per year in the first decade.

Planned acres of precommercial thinning (timber stand improvement) and the relationship of accomplishment to the ASQ has been reviewed above. Other timber stand improvement practices prescribed in standards and guidelines will be conducted as necessary to meet the timber management objectives of the applicable management area.

Fertilization to increase timber yield is one practice that will be used to the extent practical. The yield increase will not be an "earned" harvest, as in the case of precommercial thinning. As more field projects are conducted and research continues, the gain from fertilization may be included in yield tables used in the next Plan revision.

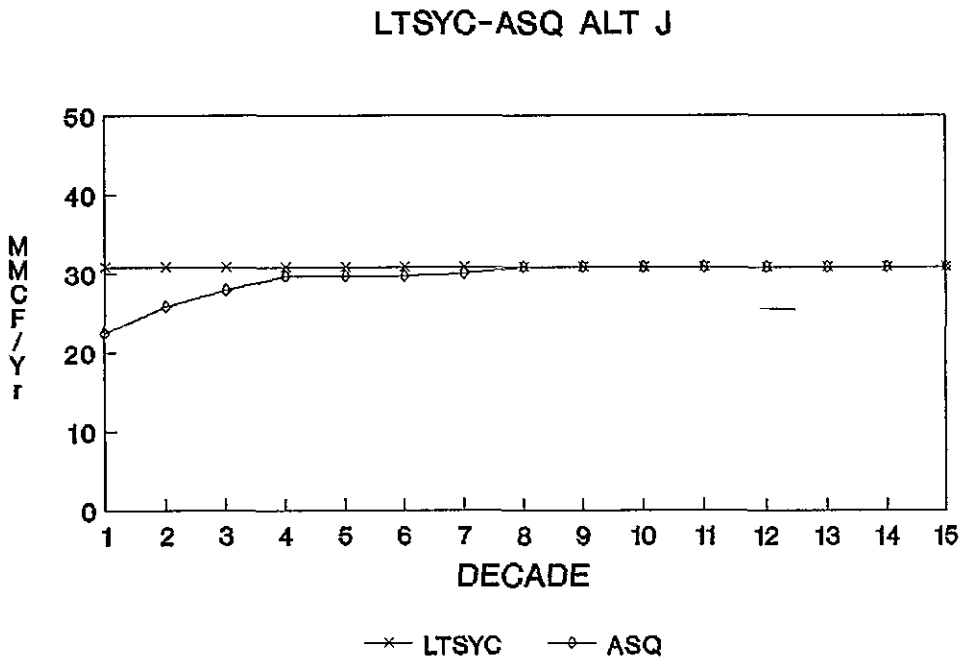
All of the above vegetative management practices may also occur on acres identified as unsuitable for timber production unless otherwise noted in the management area standards and guidelines. Trees may be cut or removed for the following reasons, provided that Forest-wide Standards and Guidelines, and the management direction for the area are achieved:

- Salvage trees or stands killed or substantially damaged by fire, windthrow, or other catastrophe;
- Control the spread of insect or disease outbreaks;
- Conduct research;
- Provide for the safety of Forest users (this includes hazard tree removal in camp and picnic grounds, in administrative sites, and along roads open to the public;
- Maintain or enhance fish and wildlife habitats;
- Improve the visual resource by opening scenic vistas or by improving visual variety;
- Construct new facilities such as roads, trails, administrative facilities, recreation facilities, and so forth.

Insects and Disease. Insects and disease on this Forest have all been associated with the vegetation resource. During the interdisciplinary review process used for developing project plans for timber sales or other vegetation-disturbing activities, insects and diseases are considered. The review process identifies specific actions that must be taken to minimize their effect on the vegetative resource or their effects on other resources or resource issues.

Long Term Sustained Yield Capacity (LTSYC). LTSYC was calculated by the FORPLAN model using beginning inventory volume, 1,805.6 MMCF, existing timber condition classes, and managed timber yield intensities assigned to analysis areas in suitable lands, producing a LTSYC of 30.4 MMCF/Year. Figure 4-2 displays LTSYC and ASQ over the 15-decade planning horizon.

Figure 4-2
ASQ and LTSYC - 15 Decades



LTSYC - 30.4 MMCF

Timber Productivity Classification. Table 4-11 shows suitable and unsuitable forested lands by potential growth productivity classes. Sixty-six percent of suitable lands fall into the 85-119 and 119-164 CF/ac/yr potential growth classes. The Max Timber Benchmark LTSYC (119 CF/ac/yr) and Biological Potential Benchmark LTSYC (120 CF/ac/yr) reflect the approximate mean productivity of these two classes. The Plan produces an estimated ASQ in the fifth decade of 85.9 CF/ac/yr, and LTSYC of 87.8 CF/ac/yr (beginning in the sixth decade) from suitable lands. This difference in yield reflects timber production foregone to provide multiple-use opportunities and outputs for other resources and resource uses.

Present and Future Forest Conditions. Table 4-12 shows a tabular history of volume, growth, mortality, rotation age, and age class acres of forested land at the present time and projected into the 15th. decade.

The footnotes clarify acres used and sources of volume estimates. Growing stock volume is live timber 9 inches DBH and greater at present, and live timber 7 inches DBH and greater in the future. Live cull is volume from live trees that were less than 25% sound when inventoried. Rotation ages include two years of lag time to reforest regeneration harvest areas, except four years lag time is included in the natural final harvest intensity (MA 17A) rotations.

Table 4-11
Timber Productivity Classification 1/

Potential Growth (CF/Ac/Yr)	Suitable Lands	Unsuitable Lands
	.....Thousand Acres.....	
Less than 20	0	238
20-49	15	32
50-84	65	133
85-119	118	248
120-164	109	226
165-224	38	76
225+	1	2
Total	346	955

1/ Includes all forest land (See Item 2, Table 4-8).

Timber productivity classification calculated from the 1976 Forest Inventory measurements was unsatisfactory. The above productivity classification was calculated using Forest Inventory plot data and following the process used to calculate the site index of productivity used in developing managed timber yield tables (1984). This process is documented in Forest Planning Records.

By Decade 15, the suitable lands are well distributed in age classes 10 to 200+. There are acres in the present 30-, 40-, 50-, and 60-year age classes but they are not shown because of the age class grouping in mapping and modeling. These acres are grouped into the 20- and 70-year age classes, mostly in the former. Future Forest inventories should better define the younger age classes. The most striking change is the reduction in the 200+ age class. The future growing stock volume is sufficient to continue the LTSYC on beyond the 15-decade horizon indefinitely.

Table 4-12
Present and Future Forest Conditions

Forest Component	Unit of Measure	Forested Land	
		Suitable	Unsuitable 1/
Present Forest			
Growing Stock 2/	MMCF	1,859.0	4664.56
	MMBF	8,908.4	22,343.0
Live Cull 3/	MMCF	54.3	104.3
	MMBF	260.1	672.0
Salvable Dead 4/	MMCF	79.7	206.0
	MMBF	381.7	986.0
Annual Net Growth 5/	MMCF	16.2	42.2
	MMBF	77.6	202.0
Annual Mortality 6/	MMCF	10.9	28.2
	MMBF	52.4	135.3
Future Forest			
Growing Stock	MMCF	1,612.1 7/	
Annual Net Growth	MMCF	34.8 7/	
Rotation Age	Years	60 8/ to 120	

Age Class Distribution Acres On Suitable Lands 9/	Suitable Forested Land	
Age Class	Present	Future
	.....acres.....	
10	46,049	32,310
20	49,810	32,310
30	0	32,310
40	0	32,310
50	0	32,310
60	0	32,310
70	17,560	34,091
80	20,594	27,512
90	0	27,839
100	47,322	24,265
110	0	11,296
120	0	10,412
130	0	4,264
140	9,932	7,320
150	14,326	688
200+	140,817	4,865

Footnotes for Table 4-12 are listed on the following page.

1/ Volume estimates were made for 684,273 acres having a productivity of 20 CF or more per acre per year, and acres of poles and larger size timber; this includes pole and larger material from table 4-8, items 3,5,and 8.

2/ Suitable volume: Calculated at the midpoint of Decade 1 before harvest using empirical yield tables for existing forest condition classes selected as suitable acres. In FORPLAN report F10.6, this growing stock volume in suitable acres is 1,805.6 MMCF which is 3% less than shown above; the yield tables in FORPLAN are reduced 3% to maintain the population of primary cavity excavators at 40% of potential.

3/ Suitable and unsuitable volume: Used National Forest Inventory Statistics for the Mt. Baker-Snoqualmie National Forest, 1976 Forest Inventory, Table 4, May 20, 1978, unpublished. Sound cull plus rotten cull per acre for acres of pole and larger timber.

4/ Suitable and unsuitable volume: Used 1,441 board feet/acre determined from reference cited in 3/ above, Table 3 (corrected), and multiplied times acres of pole and larger timber. A conversion of 4.79 board feet per CF was used.

5/ Suitable and unsuitable volume: Used the first decade growth from FORPLAN Report F10A for suitable volume. Unsuitable volume used average growth rate of 61.64 CF/ac/yr (poles and larger material) from FORPLAN report F10A, multiplied by forested acres, pole and larger material.

6/ Suitable and unsuitable volume: Used 41.284 CF/acre/year determined from reference cited in 3/ above, Table 5 (corrected), and multiplied times acres of pole and larger timber.

7/ Growing stock volume is at the midpoint of Decade 15 before harvest and growth is from Decade 14 to 15 of the planning horizon as reported in FORPLAN.

8/ A range of rotation ages for regenerated stands on lands with timber emphasis, Management Area 17.

9/ From FORPLAN run; present and future are at the start of the first decade and the mid-point of the 15th decade, before harvest.

Forage

Forage for grazing animals is available, to some degree, in all vegetation types. Forage for wildlife is included in the wildlife resource summary. The range-permitted grazing projection in Table 4-1 is 1,000 animal unit months per year. This projection reflects portions of two sheep grazing allotments on the Forest; neither permit has been used in the past five years. Transitory range is available - the grass-forb plant succession stage lasts two to five years - in clearcut harvest units. The demand for transitory range has been low to nonexistent since an unsuccessful temporary permit to graze sheep in 1978.

Old Growth

Old growth existing on the Forest has been functionally defined for analysis purposes in this plan as existing mature large sawtimber (S1 in the R2MAP Forest Planning Data Base) before harvest in Decade 1. Existing old growth averages 240 years of age on the northern end of the Forest, and 260 years on the southern end of the Forest. Old growth as defined here may or may not meet the definition in the Region 6 Regional Guide. An old growth inventory is necessary to determine this relationship. This inventory is scheduled to begin in 1990.

Old growth on the Forest presently totals 643,538 acres. There are 232,500 acres of old growth in wilderness; 134,400 acres in other Forest lands unsuitable for timber production; 135,821 acres in Forest lands not appropriate for timber production; and 140,817 acres in lands suitable for timber production.

There are 140,817 acres of old growth in suitable acres in the Plan. In the first decade, 18,879 acres of this suitable old growth will be harvested. By the end of Decade 5 (50 years), only 32,373 acres will remain in suitable lands; however, a total of 535,094 acres will remain Forest-wide.

The management of old growth on the Forest will focus on the protection and maintenance of older forest stands allocated for MR wildlife habitat areas, and in other compatible management areas. Research and development of management guidelines for old growth will be an emphasis in the research branch of the Forest Service, and in cooperative Forest Service - Washington State Department of Wildlife studies. Experimental silvicultural treatments may be developed from this research. A major question posed will be whether it is possible to manage for old-growth forest, of for the habitat components required by certain mature and old-growth forest dependant species.

An up-to-date inventory of older forest stands, with data on horizontal and vertical structure, plant composition, longterm productivity, and special habitat components will be completed. Information on fungal, invertebrate, and herptile components, neglected areas of old-growth forest emphasis, will be collected.

Needs and methods for connecting "islands" of old-growth habitat with each other via travel corridors containing protective cover and feeding habitat will be identified and better defined.

Diversity Management and Long-term Productivity

Diversity will be approached from the perspective of long-term forest productivity, rather than as an issue related to individual resource areas. Silviculturalists, fuels managers, ecologists, botanists, wildlife biologists and others will work in concert to achieve mutual objectives for diversity and long-term productivity. Prescriptions will be integrated resource plans for maintaining diversity and achieving the management objectives assigned to an area.

Diversity management will begin with maintaining soil productivity over time, include management of dead and down large and small woody materials, standing dead and defective trees, maintaining viable populations and distributions of native and desired non-native plant and animal species, and maintaining all natural communities on the Forest. Special emphasis will be placed on management of threatened, endangered and sensitive species and fragile and scarce communities. Minimum levels of these types of diversity will be maintained in all parts of the Forest. Diversity will be maintained at the highest possible levels compatible with other resource objectives in all areas.

The effects of fragmentation of natural communities, and means of maintaining fully viable areas of these communities, particularly old growth, and connecting habitat areas will be explored and management guidelines validated and improved.

Threatened, Endangered, and Sensitive Plants

No federally-listed threatened or endangered plant species have been found on the Forest. Two plant species, suspected but not known to occur on the Forest, are Category 2 candidates for Federal listing. They are Calamagrostis crassiglumis and Castilleja cryptantha.

Twenty-six species from the Region 6 Forest Service list of Sensitive Plants are known to occur on the Forest, and another fourteen are suspected to occur (See Table 4-13). Sensitive species are not protected under the Endangered Species Act. However, Forest Service policy requires that these plants be managed to maintain viable populations and avoid a need for placing them on the Federal list.

The list of plant species will continue to change, as inventories produce more information on the occurrence, numbers, and distributions of species. Species may be removed from the list if additional information shows that they are not as rare as once thought, or as management plans are developed to ensure their viability. Species may also be added to the list as they are discovered to occur on the Forest, or if they are more rare than presently thought.

Table 4-13

Region 6 Forest Service
Sensitive Plant Species On The
Mt. Baker-Snoqualmie National Forest
(June 1989)

Species Known to Occur on the Forest:

Scientific Name	State Category
ASTER SIBIRICUS VAR MERITUS	Sensitive
BOTRYCHIUM LANCEOLATUM	Sensitive
BOTRYCHIUM LUNARIA	Sensitive
BOTRYCHIUM MINGANENSE	Sensitive
BOTRYCHIUM MONTANUM	Sensitive
BOTRYCHIUM PINNATUM	Sensitive
CAMPANULA LASIOCARPA	Sensitive
CAREX BUXBAUMII	Sensitive
CAREX PAUCIFLORA	Sensitive
CAREX SCIRPOIDEA VAR SCIRPOIDEA	Sensitive
CAREX STYLOSA	Sensitive
CHAENACTIS THOMPSONII	Sensitive
COPTIS ASPLENIFOLIA	Sensitive
DODECATHEON PULCHELLUM VAR WATSONII	Sensitive
DRYAS DRUMMONDII	Sensitive
FRITILLARIA CAMSCHATCENSIS	Sensitive
GENTIANA DOUGLASIANA	Sensitive
GENTIANA GLAUCA	Sensitive
LYCOPODIUM DENDROIDEUM	Sensitive
PEDICULARIS RAINIERENSIS	Sensitive
PLATANTHERA CHORISIANA	Threatened
PLATANTHERA OBTUSATA	Sensitive
PLEURICOSPORA FIMBRIOLATA	Sensitive
RANUNCULUS COOLEYAE	Sensitive
SAXIFRAGA DEBILIS	Sensitive
SAXIFRAGA INTEGRIFOLIA VAR APETALA	Sensitive

Species Suspected to Occur on the Forest:

Scientific Name	State Status
AGOSERIS ELATA (Nutt) Greene	Sensitive
CALAMAGRSTIS CRASSIGLUMUS Thrub	Threatened
CAREX COMOSA Boott	Sensitive
CAREX MACROCHAETA C.A. Meyer	Sensitive
CAREX SAXATILIS L. Var. Major Olney	Sensitive
CASSIOPE LYCOPODIOIDES (Pall) D. Don SSP. CRISTAPILOSA Calder and Taylor	Sensitive
CASTILLEJA CRYPTANTHA Pennell & G. N. Jones	Threatened
CIMICIFUGA ELATA Nutt in T&G	Sensitive
DRABA AUREA Vahl in Hornem	Sensitive
LOBELLA DORTMANNA L.	Sensitive
LOISELEURIA PROCUMBENS (L.) Desv.	Sensitive
LUZULA ARCUATA (Wahlenb.) WahlenB	Sensitive
MICROSERIS BOREALIS (Bong.) Schultz-Bip.	Sensitive
SAXIFRAGA CERNUA L.	Sensitive

The emphasis of this program will be on the inventory of proposed project areas, reserved areas, and areas where vegetative management is precluded or minimal for threatened, endangered and sensitive (T&E&S) plants. A data base of sensitive plant locations will be developed, and information on habitat requirements, range, and distribution of these plants will be developed.

This information will be used to develop species management guides for all of these species over the decade, with priority given to those plants which are federally-listed, candidates for federal listing, or likely to occur in areas where management activities which remove or affect vegetation are proposed. Threats to species' survival will be identified in these plans. Protected populations or subpopulations will be identified, across a species' range on the Forest, and, where appropriate, experimental populations will be identified. These experimental populations will be used to increase our understanding of the effects of management activities on a species. Permitted and restricted activities at sites of protected populations will be identified in the management guides, as will plans for monitoring protected and experimental populations.

All areas where projects or activities are proposed which may affect T&E&S plants will be inventoried prior to management decisions. Botanical areas, RNA's, wilderness areas, MR mature and old-growth areas and other "protected" habitats will also be inventoried, to identify T&E&S plant populations.

Inventories, management guides and monitoring plans will all be coordinated with the Washington Department of Natural Resources Natural Heritage Plant Program, the Forest Service Regional Office, and adjacent Forests. Where federally-listed plants are involved, activities will be coordinated with the U.S.D.I. Fish and Wildlife Service.

Research Natural Areas

Research natural areas (RNA's) are tracts of land set aside as examples of typical or unique natural ecosystems or habitats. They are preserved in as near a natural state as possible. Their main purposes are to provide: baseline areas against which effects of human activities in similar areas can be measured; sites for study of natural processes in undisturbed ecosystems; and gene pool reserves for plant and animal species, especially those that are classified as threatened, endangered, and sensitive.

This section describes the established and recommended RNA's on the Forest.

Established RNA's

The Mt. Baker-Snoqualmie National Forest has three established RNA's. Lake Twenty-two RNA, on the Darrington Ranger District, is 790 acres in size and represents a western redcedar/western hemlock forest with subalpine lake. It was established in 1947. Heavy recreation use is well established and will be allowed to continue as long as it does not degrade the RNA quality for which it was established. However, while recreation use will be allowed, it will not be encouraged. Only minor reconstruction or rerouting of existing trails will be permitted, provided it does not compromise the purposes of the RNA.

The Long Creek RNA is located two miles northeast of Lake Twenty-Two RNA, within the Boulder River Wilderness on the Darrington Ranger District. It is 640 acres in size and was established in 1947 to represent western hemlock forests and climax red alder forest.

The North Fork of the Nooksack River RNA on the Mt. Baker Ranger District is 1,407 acres in size and represents Douglas-fir and western hemlock forests. It was established in 1937.

All three existing RNA's have been proposed as potential National Nature Landmarks.

No new trail or facility construction will be allowed in any of these areas. Recreation use will be allowed, but not encouraged.

Recommended RNA's

Five candidate areas, identified by the Regional Research Natural Area Committee, are recommended for designation as RNA's in this Plan. Designation occurs after an establishment report is prepared and approved by the Chief of the Forest Service.

Table 4-14 is a summary description of the recommended RNA's. Four of these are located partially or totally within wilderness. In these cases, the most restrictive management prescription (wilderness intensity or RNA) shall be applied in those portions of the RNA that fall within wilderness.

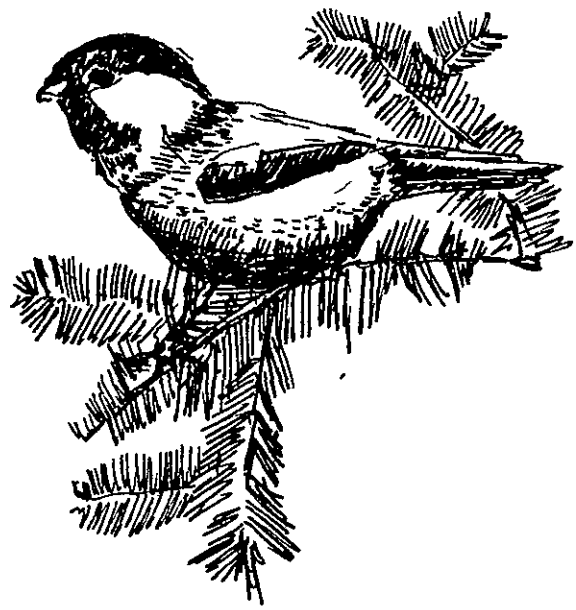


Table 4-14
Recommended Research Natural Areas

Area Name	Acres	Location	Ecosystem
North Fork Nooksack Addition	2,460	Mt. Baker Wilderness, Mt. Baker Ranger District	Douglas-fir with 75-year-old burn, wide array of sub-alpine communities.
Lily Lake	800	Clearwater Wilderness, White River Ranger District	High elevation mountain hemlock/ Pacific silver fir forest, typical mid- to high-elevation subalpine lake.
Perry Creek	2,066	Darrington Ranger District	Unique assemblage of rare fern species, also has Alaska cedar (in stand with mountain hemlock and sub-alpine fir, and heather/huckleberry community).
Green Mountain	2,060	80% within Glacier Peak Wilderness, Darrington Ranger District	Subalpine parkland mosaic, heather/ huckleberry community, and sub-alpine lush herbaceous communities.
Chowder Ridge	1,920	Mt. Baker Wilderness, Mt. Baker Ranger District	Alpine community mosaic with Krummholz tree groups.

Minerals

This section contains: (1) a brief description of the minerals management program; and (2) a summary of how the mineral resources and activities will be managed under the Plan.

Minerals Management Program

Management of mineral resource activities will continue to be largely responsive in nature. The Forest will use the Plan's standards and guidelines to direct mineral activities to insure they are conducted to the extent possible in a manner that is as compatible with other resource objectives. Even though the Forest Service's objective is to ensure that no unnecessary or undue degradation of the environment occurs, extreme care will be used to ensure that environmental protective stipulations and reclamation objectives are reasonable, enforceable, cost effective, and successful.

At times, mineral activities will be incompatible with management objectives identified in this Plan. In these situations, reasonable reclamation objectives will be established and ensured by adequate bonding, but the activity will be encouraged.

Within withdrawn areas, valid existing rights must be confirmed before approving any mineral development activities. However, once confirmed, the Forest will facilitate and encourage any mineral development activities authorized by those rights. In many withdrawn areas, prospecting activities can be conducted in a manner compatible with the purposes of the withdrawal. Such activities provide no rights to develop the mineral resources; when proposed, they will be encouraged. The results of any such prospecting will be used when reviewing withdrawals as required by the Federal Land Policy and Management Act of 1976 (FLPMA). If mineral resources are discovered and mineral development is determined to be the highest and best use for an area that is presently withdrawn, the withdrawal may be revoked.

As with other resources, monitoring actions will be an important part of the minerals management program. Through monitoring, the processing of mineral management activities can be made more efficient; reclamation techniques can be made more successful; and objectives can be made more achievable. The actual effects that mineral activities have on sensitive resources will also be monitored and evaluated.

As industry's ability to conduct activities in sensitive areas increases, management objectives which tend to restrict mineral-related activities may be modified. In addition, the mineral supply and demand situation will be monitored and newly acquired mineral resource information will be evaluated. If this information justifies changes, the Forest Plan will be appropriately modified or amended.

Mineral Resource Activities

The Plan provides for mineral resource activities to occur, with minimal to moderate restrictions, on 506,923 acres or 29% of the total Forest acres. Under this Plan, the amount of area designated as wilderness will not be changed; however, 85,613 acres (less than 5% of the total Forest area) will be recommended for withdrawl from mineral entry for reasons other than wilderness. An additional 409,230 acres (24% of the total Forest area) will be managed under highly sensitive management prescriptions.

Table 4-15 shows more specifically how these prescriptions affect areas identified as having potential for the occurrence of locatable, nonenergy mineral resources, and areas identified as being "prospectively valuable" for energy mineral resources.

Table 4-15
Effects of Withdrawal and Highly Restrictive Management
On Mineral Resource Potential Areas

Identified Mineral Resource Potential Area	Portion of That Area Withdrawn from Mineral Entry by Prescription 1/	Portion of That Area Managed by Highly Restrictive Management Prescriptions
Area identified as having a "high" and "moderate" locatable mineral potential	Less than 1% (1,774 acres)	35% (51,613 acres)
Area identified as being "prospectively valuable" for oil and gas resources	Less than 0.5% (84 acres)	36% (6,547 acres)
Area identified as being "prospectively valuable" for geothermal resources	Less than 6% (68,613 acres)	25% (301,358 acres)
Area identified as being "prospectively valuable" for coal resources	Less than 5% (5,491 acres)	34% (36,999 acres)

1/ Does not include wilderness.

It is assumed that there will be at least a continuing interest and possibly an increasing interest in the mineral resources on the Mt. Baker-Snoqualmie National Forest. Because of all the variables having influence on mineral activity, the actual amount of activity may significantly vary from that which has been predicted.

Landownership and Uses

Land Classification and Adjustment

The goal of landownership adjustment is to achieve an ownership pattern that best accommodates the land and resource objectives of the Plan. To meet these goals, the Forest will engage in approximately 221,000 acres of land exchange in the first decade. Of this, 67,000 acres is scheduled to occur in the next three years in six exchanges: (1) DNR #3; (2) City of Tacoma; (3) Snohomish PUD; (4) Champion International; (5) Weyerhaesuer; and (6) Murray Pacific.

Landownership guidance is provided in each management prescription. Overall priorities for landownership adjustments are: (1) those that make possible improved resource management; and (2) those that increase management efficiency and reduce management costs.

Additional guidance is in the "Alpine Lakes Management Plan" and "Skagit River Management Plan."

The "Landownership Classification and Adjustment Plan," based on the guidance in the prescriptions, may be found in Appendix G.

Special Land Uses

The major special land uses on the Forest are utility corridors and small hydroelectric proposals.

Existing utility corridors would be continued. Capacity would be increased to the degree feasible to accommodate increased energy needs (e.g., 115 kv line might be increased to 230 kv). One potential new corridor is identified. This corridor would be located in the area of Tacoma Pass to Pyramid Peak running northwesterly toward the Puget Sound area.

The number of small hydroelectric proposals for the Plan are estimated at about 109. Of these proposals, 16 appear to be precluded from development by the management prescriptions. Another 64 proposals have the potential to be compatible with management prescriptions, and 29 proposals will be further evaluated for development potential and the ability to meet management prescriptions and standards and guidelines. Five to ten of these proposals could be expected to reach the Federal Energy Regulatory Commission (FERC) license stage.

Roads

The goal of road management in the Plan is to provide and manage the road system to serve the long-term resource needs and objectives of the management areas. The prescriptions involved in the Plan are intended to maintain a viable transportation system in accordance with road management objectives, which will include identification of anticipated traffic needs, road closures needed for resource management, and identification and correction of road and bridge deficiencies. As funding levels vary, primary priority will be given to resource management and protection, with secondary priority given to user convenience.

The proposed management for all existing Forest Development Roads is documented in the "Forest Road Management Plan," located in the Forest Supervisor's Office. This includes the road management objective for each arterial and collector road, and for individual, or categories of local roads. The road management objective defines the anticipated use of the road, the existing and future road standards, the traffic service and road maintenance level, and any planned closures. This document, along with the bridge inventory and base map of all existing roads comprise the Forest Development Transportation Plan required by NFMA.

The road design, construction, and reconstruction process found in Forest Service Handbook (FSH) 7709 ensures that all new roads are designed and operated to standards that are responsive to the prescribed resource objectives.

Ultimately, the road system will total 3,411 miles, a 18% increase over the present mileage. A total of 134 miles or 26 percent of this new mileage will be completed within the first decade. Of the 511 miles of new road expected to result from the implementation of the Plan, 496 miles will be locals, and 15 miles will be arterials/collectors. The average annual construction rate will be 12.6 miles for locals, and 0.8 miles for arterials/collectors through the first decade.

About 25 miles of existing roads, located in areas assigned to unroaded dispersed recreation, will be permanently closed. Roads permanently closed by the Plan include Elliot Creek, Deer Creek Pass, the end of North Fork Skykomish River, Crystal Creek, and others.

Approximately 34% of the road system will be open to passenger vehicles (maintenance levels 3-5), and 49% will be available for high clearance vehicles (maintenance level 2). The remaining 17% will be temporarily closed (maintenance level 1) during the first decade.

Some roads in deer, elk, and goat wintering habitat and T & E species habitat will be closed during the use season to reduce harassment. Needs for roads to be open will be examined closely to minimize open road density and wildlife harassment whenever possible.

Road construction and reconstruction miles scheduled (Appendices A and B) differ significantly from miles projected in Table 4-1. Timber purchaser road construction projected, 12.6 miles per year, is approximately 44 percent of the scheduled 28.8 miles per year. Possible explanations are: the Ranger Districts are scheduling more sales in roadless areas than FORPLAN projected in the first decade; the model coefficients used to project road construction miles are in error; or the Ranger Districts are overestimating the miles of road construction that will actually be necessary to service the sales.

Road reconstruction projected at 57.7 miles per year, is approximately 144 percent of the scheduled 40.1 miles per year in the first decade. This difference is understandable because reconstruction is dependent on road condition from road use and damage from unpredictable weather events, resulting in flooding and "washout" of roadbeds and drainage structures. Also, road reconstruction projects vary from minor improvements to major road relocation.

Road maintenance will be accomplished on all National Forest system roads each year to the prescribed service level (see Traffic Service Levels on Table 4-16).

It is estimated that 3,034 miles of National Forest roads will be maintained each year during the first decade.

During the first Decade, approximately 70 miles of road will be built into unroaded areas released by the Washington State Wilderness Act of 1984. Refer to Appendix A, "Ten-Year Timber Sale Action Plan," for further information.

While the majority of the arterial/collector road system is established, roads and bridges do periodically wear out and require reconstruction. See Appendix B for the proposed road construction/reconstruction schedules.

The Plan will not preclude the construction of the Naches Pass Road. This project would be subject to a site-specific environmental analysis, should it be proposed.

A summary of the service levels for the arterial/collector system on each Ranger District is shown below, Table 4-16. The service levels are defined on the first page of the table.

Traffic Service Levels

	Service Level A	Service Level B	Service Level C	Service Level D
Flow	Free flowing with adequate passing facilities.	Congested during heavy traffic such as during logging or recreation activities.	Interrupted by limited passing facilities, or slowed by the road condition.	Flow is slow or may be blocked by an activity. Two-way traffic is difficult, may require backing to pass.
Volumes	Uncontrolled. Will accommodate the experted traffic volumes.	Occasionally controlled during heavy use periods.	Erractic. Frequently controlled as capacity is reached.	Intermittent and usually controlled. Volume limited to that associated with the single purpose.
Vehicle Types	Mixed. Includes the critical vehicle and all vehicles normally found on public roads.	Mixed. Includes the critical vehicle and all vehicles normally found on public roads.	Controlled mix. Accommodates all vehicle types including the critical vehicle. Some use may be controlled to minimize conflicts between vehicle types.	Single use. Not designed for mixed traffic. Some vehicles may not be able to negotiate. Concurrent use by commercial and other traffic is restricted.
Critical Vehicle	Clearances are adequate to allow free travel. Overload permits are required.	Traffic controls needed where clearances are marginal. Overload permits are required.	Special provisions may be needed. Some vehicles will have difficulty negotiating some segments.	Some vehicles may not be able to negotiate. Loads may have to be off-loaded and walked in.
Safety	Safety features are a part of the design.	High priority in design. Some protection is accomplished by traffic management.	Most protection is provided by traffic management.	Need for protection is minimized by low speeds and strict traffic controls.
Traffic Management	Normally limited to regulatory, warning, and guide signs and permits.	Employed to reduce traffic volume and conflicts.	Traffic controls frequently needed during periods of high use by the dominant resource activity.	Used to discourage or prohibit traffic other than that associated with the single purpose.
User Costs	Minimize. Transportation efficiency is important.	Generally higher than A because of slower speed and increased delays.	Not important. Efficiency of travel may be traded for lower construction costs.	Not considered.
Alignment	Design speed is the predominant factor within feasible topographic limitations.	Influenced more strongly by topography than by speed and efficiency.	Generally dictated by topography and environmental factors. Design speeds are generally low.	Dictated by topography, environmental factors, and the design and critical vehicle limitations. Speed is not important.
Road Surface	Stable and smooth with little or no dust, considering the normal season of use.	Stable for the predominant traffic for the normal use season. Periodic dust control for heavy use or environmental reasons. Smoothness is commensurate with the design speed.	May not be stable under all traffic or weather conditions during the normal use season. Surface rutting, roughness, and dust may be present, but controlled for environmental or investment protection.	Rough and irregular. Travel with low clearance vehicles is difficult. Stable during dry conditions. Rutting and dusting controlled only for soil and water protection.

Table 4-16
Arterial/Collector Road System Service Levels

Road Number	Road Name	Type	Current Service Level	Future Service Level
Mt. Baker Ranger District				
1030	Sauk Mountain	C	C	C
1040	Olson Creek	C	C	C
1050	Diobsud Creek	C	C	C
1060	Bacon Creek	C	C	C
11	Baker Lake Hwy	A	A/B	A/B
1106	East Bank	C	A	A
1107	Anderson Creek	C	C	C
1118	Dry Creek	C	B	B
1124	Sandy Creek	C	C	C
1127	Sandy Ridge	C	C	C
1130	Marten Lake	C	C	C
1131	Boulder Ridge	C	C	C
1144	Morovitz Creek	C	C	C
1152	Shuksan Creek	C	C	C
12	Loomis Nooksack	A	B	B
1230	Blue Lake	C	C	C
13	Schrieber's Meadow	A	C	C
14	Jackman Thunder	A	C	C
1420	Thunder Lakes	C	C	C
1540	Sibley Creek	C	C	C
1550	Irene Creek	C	C	C
1570	Found Creek	C	C	C

Table 4-16
Arterial/Collector Road System Service Levels

Road Number	Road Name	Type	Current Service Level	Future Service Level
Mt. Baker Ranger District, cont.				
16	Illabot Creek	A	B/C	B/C
1610	West Boundary	C	C	C
1620	Illabot Peak	C	C	C
17	Finney-Cumberland	A	B/C	B/C
1705	Gee Creek	C	C	C
1720	Gee Pt-Pressentin	C	C	C
1730	Clendenen Creek	C	C	C
1731	Alder Pass	C	D	D
1735	Finney Peak	C	C	C
1750	DeForest Creek	C	C	C
1755	Little Deer Peak	C	C	C
1775	Claims	C	C	C
18	Segelson	A	B	B
1810	East Big Deer	C	C	C
1820	Westside Higgins	C	C	C
3071	Anderson Creek	C	C	C
31	Canyon Creek	A/C	B/C	B/C
3120	West Church	C	C	C
3130	Kidney Creek	C	C	C
3140	Canyon Ridge	C	C	C
32	Hannegan	A	B	B
33	Wells Creek	A	B	B

Table 4-16
Arterial/Collector Road System Service Levels

Road Number	Road Name	Type	Current Service Level	Future Service Level
Mt. Baker Ranger District, Cont.				
36	Grouse Butte	C	C	C
37	Dead Horse	A	C	C
38	Middle Fk Nooksack	A	C	C
39	Glacier Creek	A	A/C	A/C
3910	Thompson Creek	C	C/D	C/D
Darrington Ranger District				
18	Segelson	A	B	B
20	Mtn. Loop, MP 0.0-6.4	A	A	A
20	Mtn. Loop, MP 6.4-20.4	A	B	A
2010	French Cr, MP 0.0-1.0	C	B	B
2010	French Cr, MP 1.0-2.1	C	C	C
2010	French Cr, MP 2.1-8.3	C	D	D
2060	Clear Creek	C	C	C
2070	Murphy Creek	C	C	C
2080	Falls Creek	C	C	C
2081	Goodman Creek	C	C	C
2083	Peekaboo	C	D	D
2140	Prairie Mountain	C	B	C
22	N.Side Sauk River	A	C	C
2210	Gold Hill (4 Mile)	C	D	D
23	White Chuck	A	B	B
2311	Pugh Ridge	C	C	C

Table 4-16
Arterial/Collector Road System Service Levels

Road Number	Road Name	Type	Current Service Level	Future Service Level
Darrington Ranger District, cont.				
24	Dans Creek	A	C	C
2420	Dans Creek Divide	C	C	C
25	So. Side Suiattle	A	B	B
2510	Conrad Creek	C	C	C
26	Suiattle, MP 0.0-9.8	A	A	A
26	Suiattle, MP 9.8-24.2	A	B	B
2640	Grade Creek	C	C	C
2642	West Grade Creek	C	C	C
2660	Tenas Creek	C	C	C
27	Straight Creek	C	C	C
28	N.F. Stillaguamish	A	B/C	B/C
2810	North Mountain	C	C	C
2811	Texas Pond	C	C	C
29	Rinker Ridge	A	B/C	B/C
4020	Schweitzer Creek	C	B	B
4030	Mallardy Creek	C	B/C	B/C
4037	River	C	C	C
4052	Deer Creek	C	B	B
4060	Coal Lake	C	B	B
41	Tupso Pass	A	B	B
4110	Green Mountain	C	C	C
42	Pilchuck	C	B	B

Table 4-16
Arterial/Collector Road System Service Levels

Road Number	Road Name	Type	Current Service Level	Future Service Level
Darrington Ranger District, Cont.				
49	Curry Gap	A	C	C
North Bend Ranger District				
50	Cedar River/ Snow Creek	A	B/C	B/C
5040	Five Hundred	C	C	C
5040-110	Five Hundred 30	C	C/D	C/D
5060	Snow Creek	C	C	C
5062	Rooster Comb	C	C	C
5066	Six-O-Two	C	C	C
5078	Upper Snow Creek	C	C	C
51	Two Hundred	A	B	B
5134	Three Hundred	C	C	C
5140	Two 10/Two 11	C	D	D
52	Twin Camp	A	C	C
5210	Intake Creek	C	C	C
5220	Twin Camp Creek	C	C	C
54	Green River	A	B/C	B/C
5403	Tunnel	C	C	C
55	Tinkham	A	B/C	B
5510	Hansen	C	C	C
56	Middle Fork	A	C	B
5620	Goldmeyer	C	C/D	C/D
5640	Quartz Creek	C	D	C/D

Table 4-16
Arterial/Collector Road System Service Levels

Road Number	Road Name	Type	Current Service Level	Future Service Level
North Bend Ranger District, Cont.				
5630	Taylor River	C	C	C
57	Lennox Creek	C	C	C
58	Denny Creek	C	B	B
5730	North Fork	C	C	C
9020	Garcia	C	C/D	C/D
7034	Sawmill Rdg	C	C	C/D
Skykomish Ranger District				
6022	Heybrook LO	C	D	D
6024	Barclay Creek	C	B	B
61	Sultan Basin	A	B	B
6120	Williamson Creek	C	B/C	B/C
62	No Name Creek	A	C	C
63	N. Fk. Skykomish	A/C	B	B
6320	Trout Creek	D	D	D
6330	Salmon Creek	C	C	C/D
6412	E. Fk. Miller River	C	B	B/D
65	Beckler River	A	A/B	A
6510	Bolt Creek	C	C/D	C/D
6514	Eagle Creek	C	C	C/D
6520	Johnson Creek	C	B	C/D
6522	County Line	C	D	D
6530	Rapid River	C	C	C/D

Table 4-16
Arterial/Collector Road System Service Levels

Road Number	Road Name	Type	Current Service Level	Future Service Level
Skykomish Ranger District, Cont.				
6546	Fourth of July Creek	C	C	C/D
6548	Boulder Creek	C	C/D	C/D
6550	East Beckler River	C	D	D
6554	Evergreen Creek	C	B	C/D
6570	San Juan Hill	C	C/D	C/D
6580	West Cady	C	C	C/D
66	Beckler Peak	c	C	C/D
6710	Martin Creek	C	C	D
68	Foss River	A/C	A/B	A/B
6830	Tonga Ridge	C	B	B
6840	Maloney Ridge	C	B	B
White River Ranger District				
70	Greenwater	A	A/B	A/B
7010	Midnight Creek	C	C	C
7012	Divide Ridge	C	C	C
7030	Whistler Creek	C	C	C
7032	Williams Hole	C	C	C
7036	Green Divide	C	C	C
7060	Lower Pyramid	C	C	C
7120	Lido	C	C	C
7125	Slippery Creek	C	C	C
7130	Christoff	C	C	C

Table 4-16
Arterial/Collector Road System Service Levels

Road Number	Road Name	Type	Current Service Level	Future Service Level
White River Ranger District, Cont.				
7160	Buck Creek	C	C	C
7174	Corral Pass	C	C	C
72	28 Mile/Lightning Cr	A	C	C
7220	Echo Lake	C	C	C
7222	Forest Lake	C	C	C
7250	28 Mile Creek	C	C	C
73	Huckleberry Creek/ Eleanor Creek	A	C	C
7315	Suntop	C	C	C
7320	W. Huckleberry	C	C	C
74	W. Fk. White River/ Martin Gap	A/C	A/C	C
7415	West Valley	C	C	C
7430	Viola Creek	C	C	C
75	Jim Creek	A	C	C
7550	East Valley	C	D	D
7710	South Prairie	C	C	C
7810	Cayada Creek	C	C	C
7920	Poch Peak	C	C/D	C/D
7930	Poch Ridge	C	C	C
7530	Lonesome Lake	C	C	C

Chapter 4
Resource Summaries

Fire

The fire protection and use program on the Mt. Baker-Snoqualmie is a service program which supports the other resource management programs identified in the Plan. The program includes all activities for: (1) the protection of resources and other values from wildfire; and (2) the use of prescribed fire to meet land and resource management goals and objectives. Fire management's role is to coordinate, plan and implement fire protection and use programs consistent with the standards and guidelines and management prescriptions.

Fire protection and use activities have a direct effect on the physical and biological environment, including air quality. Monitoring the effects of the fire management program will help determine if management practices are changing the physical and biological environment and if the cost of the program activities meet the "cost plus net value change" criteria associated with the implementation of the Forest's fire protection and use program (refer to Chapter 5, Monitoring and Evaluation Program.) The fire protection and use programs are described below.

Fire Protection Program

The fire protection program includes fire prevention, presuppression (i.e. detection, dispatching, fire danger rating, fire weather forecasting, and training), suppression, and fire management analysis and planning activities. The collective application of all fire activities required to meet the fire management direction for each management area, including fuels management, will be documented in a detailed fire management action plan to be completed within one year after approval of the Plan.

An appropriate suppression response (i.e., containment, confinement, or control) based on location, conditions, and resource values will be taken on all wildfires. Natural ignitions occurring in wilderness areas will be treated as prescribed fires until declared a wildfire. Human-caused fires in wilderness are wildfires and will receive an appropriate suppression response. The standards and guidelines outlined in the Plan are estimated to result in no increase in the number of wildfires on the forest. The acreage burned from wildfires will average no more than 150 acres per year. Fires sizes will typically be less than 5 acres though a fire in the 25-30 acre size range can be expected each year. Guidelines for the selection of appropriate suppression response for each management area will be included in the fire management action plan.

Implementation of the fire protection program involves considerable external coordination. The majority of this coordination involves formal fire protection agreements with neighboring fire suppression organizations. The Forest has reciprocal agreements with the State of Washington, Department of Natural Resources, Bureau of Indian Affairs, Puget Sound Agency, and National Park Service (North Cascades and Mt. Rainier National Parks). The Forest also cooperatively protects lands administered by the Bureau of Land Management located within and adjacent to the Forest.

Fire Use Program

The fire use program involves the planning, administration and direct implementation of prescribed fire activities for the protection, maintenance and enhancement of resource productivity.

D. FOREST-WIDE STANDARDS AND GUIDELINES

Standards and guidelines state the bounds or constraints within which all practices will be carried out in achieving the resource objectives of the alternatives. The management of the Mt. Baker-Snoqualmie is subject to all applicable laws and regulations. Standards and guidelines are intended to help the manager achieve the goals and objectives, while staying within constraints prescribed by law.

There are two categories of standards and guidelines: Forest-wide, applying to all management areas (discussed in Part D, below); and standards and guidelines specific to individual management areas (Part E of this chapter).

Development of Standards and Guidelines

The Forest-wide standards and guidelines and management prescriptions were developed according to Regional Direction, for the purpose of: 1) identifying anticipated potential direction for activities on the MBS, and 2) assist in directing formulation of the Forest's planning model and alternatives. The Forest-wide standards and guidelines contain management requirements (MR's) and other important direction.

Both the Forest-wide standards and guidelines and the individual management area (MA) prescriptions contain a goal statement, reflecting the expected results for a forest resource, activity, or land area. They provide direction emphasis for the Mt. Baker-Snoqualmie, supplementing Forest Service manuals, handbooks, and the Regional Guide. Both respond to Forest ICO's, appropriate laws, regulations, and existing direction, land capabilities, and professional judgement.

Forest-wide Standards and Guidelines and Management Area Prescriptions

Management direction for the Mt. Baker-Snoqualmie is defined by both the Forest-Wide Standards and Guidelines and the individual Management Prescriptions. The Forest-Wide Standards and Guidelines are applicable to all areas of the Forest, unless exceptions are specifically noted in an individual management prescription. The Management Prescriptions are sets of management practices scheduled for application on a specific Management Area.

Definitions

To understand the intent of the Forest-wide and MA standards and guidelines, the interpretations of the terms used are critical.

The first intent is conveyed by the word **"shall"** (also, "must" and "will"). The action is **mandatory** in all cases.

The second is conveyed by the word **"should."** With this degree of restriction, action is required unless justifiable reason exists for not taking action. This direction is intended to require a practice unless it entails unacceptable hardship or expense. Exceptions to "should" are expected to occur infrequently.

The third type of direction uses the word **"practicable"** and acknowledges that a given practice is not always feasible and practical in every situation. It is intended to encourage, but not require, a practice.

The fourth uses the word **"may"** and has to do with activities which may or may not be appropriate, depending on circumstances. This direction is intended to allow for taking advantage of compatible opportunities, or to provide for exceptions when the objectives of a particular standard can be met through alternate methods.

The following is a list of the contents of this section of Chapter 4, Part D, The Forest-wide Standards and Guidelines.

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Fire Prevention Levels....4-151

GENERAL PROCEDURES

Goal: Meet identified land, resource, and support activity goals.

1. Activities affecting forest system lands and resources will be analyzed through NEPA analysis.

2. Economic efficiency will be a consideration in forest and project level planning and development.

3. Improve net benefits of all resources by reducing unit costs through improved management efficiency and new and emerging technology.

4. Management of forest system lands, resources, and activities will be coordinated with appropriate local, State, Federal agencies, private landowners, Indian tribes, and interest and user groups.

RECREATION

Goal: Provide a broad spectrum of recreation opportunities and experiences on the Mt. Baker-Snoqualmie National Forest.

General

1. Encourage public and other agency participation in recreation planning.

2. Implement practices that will reduce costs of recreation operation and increase revenues from recreation use where cost effective to accomplish.

3. Whenever possible, other resource activity planning such as road and timber sale developments should incorporate plans to provide or improve compatible recreation facilities or services.

4. Provide public with appropriate information on recreation opportunities and knowledge of forest resource management.

5. Update the existing situation Recreation Opportunity Spectrum (ROS) map in the Forest data base or Geographic Information System (GIS) every five years.

Dispersed

1. Provide for a broad spectrum of ROS settings and recreational opportunities such as hunting, fishing, gathering forest products, viewing scenery, camping, hiking, floating, etc.

2. Inventory, evaluate, and manage dispersed occupancy sites.

3. Manage public use as necessary to protect resource values, provide a quality experience and provide for public health and safety.

4. Identify the potential change of any proposed activity on Recreation Opportunity Spectrum (ROS) classes in all project environmental analysis.

5. Evaluate opportunities to allow for expanded public recreation service through commercial outfitter-guide operations.

Developed

1. Provide public information that informs the user about recreation opportunities and how to care for forest resources.

2. Appropriate recreation facilities will be evaluated for recreation mitigation for all proposed hydroelectric projects.

3. Developed facilities will be administered and maintained to provide visitor safety and sanitation, protect facility and site resources, and provide for visitor recreation needs and convenience; while reducing unit costs. Work towards concentrating developed campground facilities in high use zones where cost and service efficiency is highest.

4. Developed facilities will be kept in a satisfactory condition, otherwise they should be closed to use, or removed.

5. The minimum level of management for any developed site will be determined by Forest Service monitoring for health and safety. The public will be expected to provide self service or to pay a user fee where such measures will help reduce net federal expenditures.

6. Evaluate opportunities for private operation of Mt. Baker-Snoqualmie recreation facilities.

7. Developments operated under Special Use Permit shall be administered to assure the permittee is following the terms of the permit.

8. Encourage year-round recreation use at winter-sports sites. Permit summer facilities that are compatible with or enhance natural resource-based recreation opportunities and in keeping with the Recreation Opportunity Spectrum (ROS).

9. No additional recreation residence tracts will be created. As the renewal date approaches on each permit, the permit will be reviewed in terms of the highest public use for land. If a determination is made that the permit site is needed for a higher public use, the permit shall be terminated and the improvements removed after appropriate notification.

   Existing permits will have the following clause included: "Where existing improvements are destroyed by fire, flood, etc., the permit may be considered for termination."

Recreation
Forest-wide S&G

Trails

Overall Objectives Applicable to the Entire Forest.

1. To provide a system of trails with routes, construction standards and maintenance standards that compliment the resource capabilities and management objectives of the area served. The system will also provide for necessary administrative access, provide for safe use on various difficulty levels of trails, and have minimum impact on soil, water, visual and other sensitive values.

2. To provide on a Forest-wide basis (not necessarily on each Ranger District) a broad spectrum of trail travel opportunities including: trails at various elevations, trails in diverse settings, and trails suitable to various kinds of users and modes of travel.

3. To proceed from the present trail system to an optimum future system as rapidly as is practicable through reconstruction, relocation, new construction, and the rehabilitation of unneeded trails to a natural condition.

4. To achieve a unified trail system, on and adjacent to the Forest, and assure that the Forest trail system complements management of adjacent land and vice-versa.

5. To assure that the trail system meets the needs of trail users, while remaining consistent with resource capabilities and land allocations.

6. To apply available funds to the highest priority trail reconstruction, construction, and maintenance projects.

7 Trails shall assume the visual quality level of the management area they pass through.

Specific Policies Applicable to the Entire Forest.

1. A broad spectrum of trails will be provided, varying in degree of ease and convenience. Trails will meet the primary objective and difficulty level standards as described in FSH 2309.18.

2. Trails may be provided where soil and vegetation, on and adjacent to the trail route, are suitable for such uses.

3. Each trail shall be managed to a particular "primary objective" (user type). If conflicts arise they will be minimized thru information and education, or as a last resort, closed to users other than the primary objective user.

4. Motorized and/or pack and saddle use of existing trails will be allowed only where the trail, as presently constructed (and soils and vegetation adjacent to the trail), can absorb such use without unacceptable damage.

In some cases the long range "primary objective" may not exist until the trail is reconstructed to that standard. Closures may exist until the trail meets the planned "primary objective" standard.

5. Existing and potential heavy use areas (focal areas) will receive special attention in planning so that necessary facilities are provided, and trails do not introduce undesirable use. Such planning will be completed prior to major construction and/or reconstruction affecting such focal areas.

6. Hiker-only trails shall, when feasible, be separated from trails open to other kinds of users. Trails open to other kinds of users should not dead-end at a hiker-only trail.

7. Trails for pack and saddle use should, when topographically possible, by-pass focal areas, such as alpine lakes, by at least 200 feet in elevation or 500 yards horizontally.

8. Trail systems should provide for loop trails and interconnecting links where consistent with other needs, constraints, and land allocations.

9. Special emphasis will be given to identification and planning for trails at elevations where the ground is usually snow free for at least half of the year.

10. Seasonal use restrictions will be used where appropriate to protect soil, vegetation, wildlife, and to manage conflicts in use.

11. Maps showing restrictions on the use of trails will be developed and made available to the public.

12. Only system trails are considered safe for use. Only system trails will be signed on the ground and shown on maps. Publishers of guidebooks will be encouraged to follow a similar policy.

13. Priority for use of trail funds will generally be as follows:

    a) Maintenance of the existing system.

    b) Reconstruction and relocation of existing trails to protect the resources.

    c) Reconstruction and relocation of existing trails for user safety and convenience.

Within these priority levels, individual projects will be prioritized based on such factors as environmental protection concerns, user safety, volume of use, and length of season of use.

14. The use of volunteers for trail maintenance will be encouraged.

15. Wheeled motorized vehicles will be prohibited on groomed snowmobile and cross-country ski trails.

Specific Policies Applicable to Certain Management Areas on the Forest.

1. Wilderness.

   a. Management objectives will be aimed toward providing a primitive recreational experience in a natural wilderness setting.

   b. Trail management objectives will be closely related and coordinated with the WROS zone to be served.

   c. A diverse spectrum of opportunities and experiences by difficulty level, mode of travel, distance and kind of destination will be sought.

   d. Visitors will be discouraged from establishing additional informal trails.

   e. Normally, no new trail construction or major reconstruction will be undertaken until an environmental analysis has been completed for the site specific project.

   f. The major objective in trail planning is to minimize the impact of trails on soils, vegetation, visual and other resource values.

   g. Trail construction and maintenance in wilderness areas using motorized equipment may be allowed only with approval of the Regional Forester. Approval will be on a one-time, case-by-case basis.

   h. Bridges will be provided only when:

      - The most suitable and logical crossings cannot be safely negotiated during primary periods of use.

      - When less formal devices (i.e., footlogs) are likely to be frequently destroyed by flood waters.

   i. Native materials (wood, local rock, bank-run gravel) that blend with the trails environment will be used where such materials are necessary as a part of trail construction.

   j. Signing will be held to a minimum and consist of rustic white oak signs showing trail destination.

2. Unroaded Management Areas Outside of Wilderness. This includes all areas of sufficient size to constitute a manageable entity that, based on classification, resource capability, and/or land use planning recommendations, will continue to be managed in a roadless condition for the foreseeable future. The following specific policies will apply to each such area:

   a. The trail system will be based on, and consistent with, the resource capability and management objectives of the area.

   b. In most areas, management objectives will aim at providing a primitive recreational experience in a near-natural setting.

c. Compared to wilderness, a greater degree of modification of the natural environment will be allowed in trail construction and maintenance, if necessary to achieve standards consistent with management objectives. Non-native materials and motorized equipment may be used.

3. Roaded Management Areas. This includes all areas that are presently roaded or that, based on classification, resource capability and/or land use planning recommendations, will be roaded in the foreseeable future. The following specific policies will apply to such areas:

   a. This Trail Plan and Trail System planning will be an integral part of project planning.

   b. Significant trail opportunities will be identified and managed as the road systems are developed. Examples of "significant trail opportunities" include:

      - Trails from a road to a significant feature or attraction such as a fishing stream or viewpoint.

      - Trails that will be snow-free for at least half the period from November through April.

      - Trails of historical significance.

      - Trails that are part of a continuous route from low to high elevations.

   c. Trails interrupted by logging or road construction will be restored or substitute trails with the same primary objective and difficulty level provided so that the mileage of trails in the same general area is not diminished. Trails will be kept open, and clear directions for users provided during interrupting activities.

   d. Where resource capabilities and management objectives permit, consideration will be given to the development of trails suitable for motorized use.

   e. Abandoned or closed portions of the road system will be considered for management as trails.

   f. Hiker & interpretative trails should be provided near most large campgrounds to provide for visitor use and enjoyment. Some of these should be suitable for barrier free access.

   g. Trails suitable for barrier free users will be provided so as to make recreation opportunities more available to them.

4. Pacific Crest National Scenic Trail. This is a part of the National Trail system by Act of Congress. It is managed for hiker and pack/ saddle use. Standards for construction and maintenance have been established for its entire length. The following specific policies will apply:

a. Where the trail passes through wilderness; location, design, construction and maintenance standards will be modified to the extent needed to meet the intent of WROS zone through which it passes.

b. In non-wilderness areas manage to meet standards of ROS zone that the trail passes through.

c. Management will be fully coordinated with the Wenatchee National Forest and the National Park Service.

d. Motorized use will not be allowed on any trail or segment of trail that terminates at the Pacific Crest Trail, unless there is a logical destination point of attraction prior to the PCNST.

e. Mountain bikes are not allowed on the Pacific Crest Trail, as per Regional Forester closure notice, August 31, 1988.

5. National Recreation Trails. The National Recreation Trails System highlights certain trails that provide outstanding opportunities for recreational use located near centers of population.

a. Potential National Recreation Trails will be identified that meet the established criteria.

b. Priority will be given to bringing existing and potential NRT trails to standard.

c. As they are brought to standard, they will be formally proposed for designation.

6. Areas Where Public Use is Prohibited or Not Encouraged. This includes some municipal watersheds and the Research Natural Areas. The following specific policies will apply to such areas:

a. In Research Natural Areas, research personnel will be consulted about any trail plans or proposals.

b. Public use of existing trails in Research Natural Areas may be allowed to continue, but increases in such use or off-trail use will not be encouraged.

c. Trails in, or on the border of municipal watersheds will not be constructed or reconstructed before local officials have been contacted.

7. Trailhead Policy. A trailhead is the place where a trail connects with a road or a navigable body of water. Trailhead use, and therefore trailhead development, varies greatly. The following specific policies will apply to trailheads:

a. Trailheads are part of the transportation system and will be developed and maintained with Forest Roads Program funds.

b. As a minimum, a trailhead will provide adequate parking for an average peak season weekend day's use. This may be provided by turnouts located within 1/4 mile of the trail. Signs and posters needed to inform the trail user should be provided.

c. Heavier use situations may include off-road parking, horse-handling facilities, toilets and garbage containers. Only under unusual circumstances will such facilities as potable water and camping facilities be provided at trailheads.

d. When a trail will be intersected by new road construction, the needed trailhead facilities should be part of the road construction "package".

8. Maintenance.

a. Annual trail management plans list the total requirements for maintaining the trail system. The following criteria are normally used in establishing priority for trail maintenance work:

Generally, the first priority for maintenance activities would be the correction of unsafe conditions relative to the management objectives. Following this, maintenance activities (see section 4.23 of FSH 2309.18) are based on the primary objective and difficulty level (See Trail Maintenance Activity Matrix, MBS Trails Handbook).

Winter Recreation

1. Each major winter recreation activity (Alpine and Nordic skiing, snowmobiling, and snow play) will have areas designated and managed to accommodate them. Other activities occurring within these areas should be limited or prohibited if they conflict with the primary activity, or if overcrowding develops.

2. Ranger District Mountain Weather/Avalanche Advisory Systems will be coordinated with the R6, NW Avalanche Center System. The Forest will provide public information and education on avalanche conditions and safety.

3. Patrol and safety may be provided through a combination of permittee and/or volunteer ski patrols. The Forest Service may provide leadership and training in such patrol activity.

4. Different skill levels of users shall be provided for and considered when designing trails and related facilities. A spectrum of opportunities for winter recreation will be maintained, including primitive dispersed opportunities with no facilities.

5. National Forest managers will coordinate with and support the Sno-Park and Snowmobile programs. Normally, provision for plowed parking will be made through these programs.

6. Alpine ski permittees will be encouraged to integrate winter dispersed recreation into their operations if and when the opportunity and demand exists.

7. Where a need for groomed trails is identified, such facilities will normally be provided through special use permits. The permittee may be allowed to charge user fees.

8. Winter recreation facilities, such as parking lots, groomed ski trails, motorized use zones, and cross country ski trails, should attempt to avoid south-facing aspects where significant wildlife winter use occurs.

Motorized Vehicle Use

1. Ensure that motorized use, including over snow type is managed to mitigate their impacts on other resources, promote safety of users, and minimize conflict. (Executive Order 11644, as amended by EO 11989).

2. Provide a diverse system of maintained trails for the enjoyment of all users and to meet the needs for administrative and resource management purposes.

3. Use ORV closures only when needed to minimize disturbance of wildlife, minimize recreation use conflicts, or to protect soil and water resources.

VISUAL RESOURCE MANAGEMENT

Goal: Provide an attractive forest setting, emphasizing the natural appearance of areas seen from major roads and recreation sites.

1. The minimum visual quality objective is maximum modification.

   a. Maximum modification provides that vegetation and land form alterations resulting from management activities may dominate the characteristic landscape. However, when viewed as background, cut blocks, patches, or strips are shaped and blended to the extent practicable with the natural terrain.

   b. When viewed as foreground or middleground, management treatments may not appear to completely borrow from naturally established form, line color, or texture. Alterations may also be out of scale or contain detail which is incongruent with natural occurrences, as seen in foreground or middleground.

   c. The introduction of structures, roads, slash, and other project-related debris must remain visually subordinate to the proposed composition when viewed as background.

   d. For this level of management, the reduction in visual contrast of activities and treatments with their surroundings should be accomplished within 5 years (Agriculture Handbook Numbers 462 and 559).

2. Management of the foreground of the Pacific Crest Scenic Trail will meet at least the level of the ROS environment that the trail passes through.

3. In evaluating management activities within the viewsheds (including outside the river corridors) of designated "wild", "scenic" and "recreation" rivers the following visual conditions shall apply.

River Classification	Visual Quality Objectives		
	Classified Corridor (1/4 mile foreground)	Viewshed Beyond Classified Foreground	
		Sensitivity Level 1	Sensitivity Level 2&3
Wild	**Preservation** Retention may be used for necessary recreation facilities	**Retention** middleground **Partial Retention** background	**Partial Retention** middleground **Modification** background
Scenic	**Retention** Partial retention may be used for necessary structural facilities	**Partial Retention** middleground **Partial Retention** background	**Modification** middleground **Modification** background
Recreation	**Partial Retention** Modification may be used for necessary structural facilities	**Partial Retention** middleground **Partial Retention** background	**Modification** middleground **Modification** background

4. Update Forest Existing Visual Condition (EVC) and Visual Quality Objective (VQO) mapping every five years, in the Forest data base or in Geographic Information System (GIS).

5. The Scenic Byway designation applies to the following scenic drives:

   Mt. Baker Highway Scenic Byway, and Proposed Scenic Byways on the Mt. Loop Highway and Stevens Pass Highway when designated.

   a. Recreation facilities will be planned in the roaded natural and rural recreation opportunity spectrums. Facilities will accommodate families, the elderly and will be barrier free where possible.

   b. Interpretive plans shall be prepared. Wayside exhibits and interpretive trails will be added to enhance the publics knowledge of cultural and natural features and resource management.

   c. Trails with an "easiest" hiking standard shall be planned where appropriate.

WILD AND SCENIC RIVERS

Goal: Maintain recommended rivers and streams to protect their highest classification level until Congress takes actions on preliminary administrative recommendation.

1. Recommend to Congress 30 rivers for addition to the National Wild and Scenic Rivers System. Refer to Chapter 4, Resource Summaries for a listing of these rivers.

2. Maintain or enhance the recreation, visual, wildlife, fisheries and water quality values of the existing and recommended wild, scenic, and recreation rivers.

3. Recommended wild and scenic rivers shall be managed to protect those characteristics that contribute to the eligibility of these rivers at their highest potential classification until Congress formally determines their status.

4. Encourage participation and cooperation of public and private landholders in the study and implementation of river classification on non-national forest lands.

5. In the recommended wild, scenic, or recreational river corridors, a no-surface occupancy stipulation shall be required in mineral leases.

6. Commercial outfitting and guide permits should be allowed where there is a demonstrated management and public need compatible with general public use and Limits of Acceptable Change.

7. In recommended and existing wild, scenic, and recreation river corridors, new dams, diversions, or hydroelectric power facilities shall be prohibited to the extent of Forest Service authority. Existing facilities may be maintained.

8. Each River Management Plan shall include an estimated capacity for the river using the Limits of Acceptable Change (LAC) process.

COMMUNITY AND HUMAN RESOURCES MANAGEMENT

Goal: Promote human resources, civil rights, and community development within the zone of influence of the Mt. Baker-Snoqualmie National Forest.

Management

1. Conduct compliance reviews as required by Title VI of the Civil Rights Act of 1964 and the established Forest Service standards.

2. The Forest will actively pursue the employment of the handicapped and ensure that the needs of the handicapped are considered in the design of forest facilities.

3. The Forest will participate in human resource programs that support community and economic development.

4. Provide employment opportunities for senior citizens.

5. Utilize volunteers in various activities such as in trail work, wildlife inventories, campground hosts, and other projects.

AMERICAN INDIAN RELIGIOUS AND CULTURAL USES

Goal: To assure the availability of sites and areas for religious and ceremonial use by American Indian tribes within the planning area. (Any areas and sites which contain artifacts or features will be considered cultural resources. These will undergo inventory, evaluation, protection, and enhancement as previously described.)

1. Maintain and update the "Inventory of American Indian Religious and Cultural Use, Practices, Localities, and Resources".

2. Protect confidentiality of American Indian religious and cultural use areas.

3. Identify specific sites and areas according to the nature of the religious use or ceremonial practice:
   a. Spirit Quest and legendary sites
   b. Cedar area
   c. Ceremonial flora and plant areas
   d. Cemeteries

4. Protect a portion of religious and cultural use areas as a result of allocation to management areas which maintain conditions suitable for religious and cultural use.

5. Review the "Inventory of American Indian Religious and Cultural Use, Practices, Localities, and Resources" during the scoping phase of environmental analyses.

6. Present information about planned project activities in all management areas (i.e., protected and otherwise) to religious and political leaders of tribal groups whose traditional practices might be affected.

7. Where projects will affect American Indian religious and cultural use sites, protection and mitigation measures shall be worked out with the leaders of the affected tribal groups on a project specific basis or through Memoranda of Agreement.

8. Project level protection and mitigation measures shall consider the nature of the religious site, type, and duration of use and other factors of concern to tribal leaders in determining what appropriate measures can be designed to protect site values. They shall maximize retention of purity, privacy, and isolation, consistent with overall Plan objectives.

9. In the event that religious artifacts or features are discovered during implementation of a project, follow the procedures of 36 CFR 800.II. Notify the affected tribe(s).

10. National Forest lands shall be managed to recognize and reduce social and administrative barriers to religious uses of the forest by American Indians.

ARCHAEOLOGICAL AND HISTORICAL PROPERTIES

Goal: To provide for management and protection of cultural resource values through a program which integrates inventory, evaluation, protection, and enhancement.

Inventory

1. Maintain a cultural resource overview of the Forest. The overview should summarize all previously recorded cultural resource information for the Forest, provide a framework for evaluating cultural resources identified through the inventory process, develop a research design to guide future surveys, inventories, and scientific investigations, and identify opportunities for interpretation of a range of cultural properties.

2. A professionally supervised cultural resource inventory program will be conducted, on a project specific level, for all activities which might affect resources eligible for the National Register of Historic Places, including land exchanges and facility maintenance. A systematic program of inventory of areas not affected by projects will be implemented, in order that a complete inventory of Forest cultural resources be assembled.

3. A Cultural Resource Inventory Plan will be developed to guide all inventory activities, specifying types and intensity of survey by geographic area within the Forest.

4. Results of project level cultural resource inventories shall be documented through environmental analysis for the project. Cultural resource compliance shall be documented according to the current Memorandum of Understanding between the Washington State Historic Preservation Office (SHPO) and the Mt. Baker-Snoqualmie National Forest.

5. The Forest Cultural Resource Overview site list shall be updated regularly to reflect additions to the data base. The backlog of sites that lack complete records will be reduced through a systematic program of recordation.

Evaluation

1. Evaluate the significance of inventoried sites by applying the criteria for eligibility to the National Register of Historic Places. This will be accomplished by a professional cultural resource specialist. Sites may be treated as individual properties, thematic groups, or historic districts. Give priority to those properties that may be affected by project activities. Evaluations will be coordinated with the criteria contained in the Cultural Resource Overview and State Historic Preservation Plan.

2. Consider the effects of all National Forest undertakings on significant cultural resources.

3. Develop management plans, in consultation with the Washington SHPO, Advisory Council and other interested parties as defined in 36 CFR 800, for National Register-eligible sites. Plans are to specify measures to protect and maintain the cultural integrity of the sites, objectives for management

of the setting, identify levels and types of other resource uses compatible with the cultural values of the sites, an interpretive design if appropriate, and a schedule to carry out the objectives of the plan. Adaptive or compatible modern uses of historic properties, such as use as Forest Service administrative facilities, should be encouraged. Priorities will be established based on the significance of the resource and the level of on-going impacts.

4. Develop Programmatic Memoranda of Agreement and/or management plans (in consultation with the SHPO) for the evaluation of classes of prehistoric and historic resource properties found on the National Forest. Examples include mining improvements, timber claim cabins, prehistoric lithic scatters, stripped cedar trees, railroad logging sites.

5. Initiate a systematic program to nominate cultural resources that meet the criteria for eligibility to the National Register of Historic Places.

Protection

1. Until proper evaluation occurs, all known cultural resource properties shall be protected.

2. Develop measures, in consultation with the Washington SHPO, Advisory Council, and other interested parties as defined in 36 CFR 800 to protect significant sites from adverse effects due to Forest development or management practices. Avoidance of impacts (leaving resources undisturbed) shall be explicitly considered for all significant resources. Other measures may range from avoidance of the site and protection of its environmental setting to data recovery or recordation to Historic American Buildings Survey or Historic American Engineering Record standards. Actual measures will be determined through Programmatic Memoranda of Agreement or during consultation for specific projects.

3. Confidentiality of cultural resource site location shall be maintained as required by Section 304 of the National Historic Preservation Act.

4. Based on management plans, protect eligible cultural resources from degradation due to public use and natural deterioration. Protection activities may include, but are not limited to, scientific study and collection (as outlined in a data recovery plan), the use of fences and barriers, proper use or removal of signs, stabilization techniques, closure orders, patrol and site monitoring, maintaining site anonymity, and gaining public understanding and support through education.

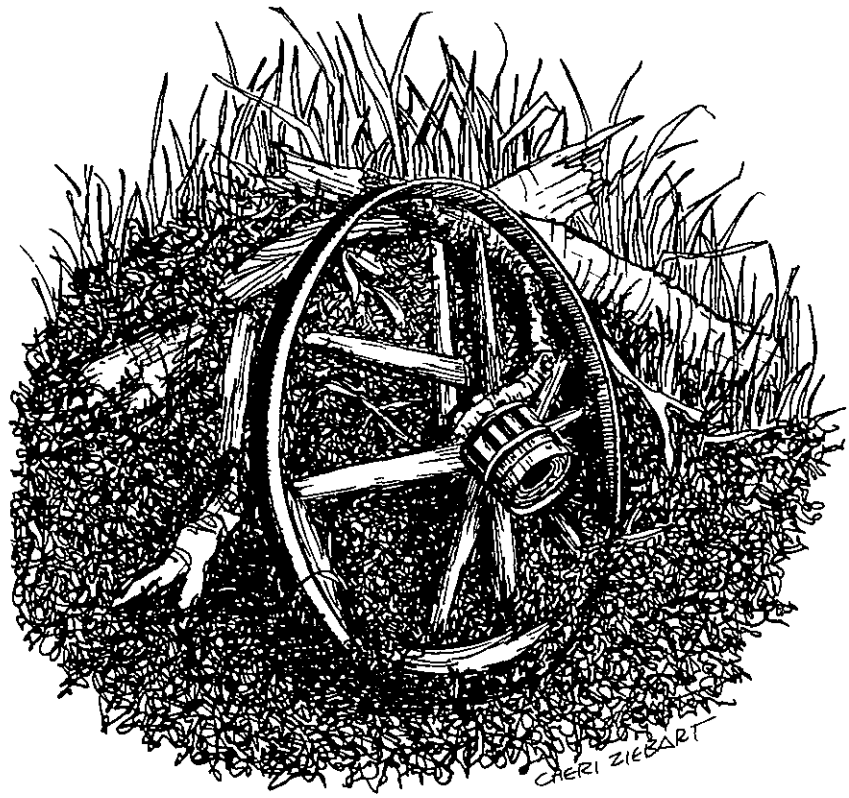
5. Decisions on the maintenance level for eligible historic structures will be based on an analysis of utility, interpretive value, public interest, existing site or area allocation, funding sources, and existing agreements.

6. Wildfire suppression plans and prescribed burning prescriptions to be applied in areas of known or potential cultural resource properties shall comply with 36 CFR 800. A cultural resource inventory and consultation with the State Historic Preservation Officer may be required.

Enhancement

1. The Forest shall foster active programs of research through permits to, and cooperative agreements with, qualified institutions, organizations, and individuals; and by identifying opportunities for research. Such research should meet Forest Service, State, and/or scientific needs.

2. In preparing cultural resource management plans (Evaluation # 3 above), consider the interpretation of properties for the recreational use and educational benefit of the general public. The measure of suitability should be based on accessibility to the public, feasibility for protection, condition of the property, compatibility with other resource management activities within or adjacent to the area, thematic representation, and value to public groups. Preferred methods include brochures, signs, and self-guided tours.



WILDERNESS

Goal: The goal of wilderness management is to feature naturalness, provide opportunities for solitude, challenge, and inspiration, and within these constraints to allow for recreational, scenic, scientific, educational, conservation, and historical uses. Permitted but non-conforming uses specified in the Wilderness Act will be carried out under restrictions designed to minimize their impact on the wilderness. The criteria used for conflict resolution will be to preserve and protect the wilderness resource.

Wilderness exemplifies freedom, but is defined more by the absence of human impact than by an absence of human control. Management therefore shall seek to minimize the impact of use rather than use per se. A high priority, however, shall be placed on spontaneity of use and as much freedom from regimentation as possible while preserving the naturalness of the wilderness resource and the opportunity for solitude, primitive recreation, scenic, scientific, and historical values.

In carrying out this goal, a policy of nondegradation management shall be followed. The nondegradation policy recognizes that in wilderness one can find a range of natural and social settings from the most pristine to those where naturalness and opportunities for solitude have been diminished by established uses. It is the intent of this policy to assure that appropriate diversity and existing wilderness character are maintained. Further intent is to ensure that all of the most pristine areas will not be reduced to the minimum acceptable standard of naturalness simply to disperse and accommodate more use.

Managers shall administer the wilderness using five wilderness Recreation Spectrum classes: Transition, Trailed, General Trailless, Dedicated Trailless, and Special Areas. This classification is a refinement of the primitive and semi-primitive nonmotorized ROS classes. Within each of these is described the character of activities expected within the class and standards to guide management.

Recreation - To provide a spectrum of opportunities for wilderness recreation featuring a natural environment, solitude, physical and mental challenge, and inspiration consistent with preservation of wilderness values.

Wilderness provides unique and highly favored recreational experiences, however, recreational use of wilderness must be closely managed and monitored to assure that degradation of resource values does not occur. The following standards and guidelines are established to help achieve this end.

1. If monitoring of on-site conditions indicates that wilderness resource values are being degraded or changed to a point that limits of acceptable change are being closely approached, management actions must be implemented to reverse the declining trend. Recreational visitor activities may be regulated, reduced, or excluded from specific sites or areas. Management actions designed to solve user impact problems will generally be fully implemented before entry quota systems are employed.

2. Manage use within the limits of acceptable change for the five Wilderness ROS classes. Set specific site and area carrying capacities for heavy use areas to meet established standards.

3. Regulations limiting the number of visitors to maintain established Limits of Acceptable Change should be put into effect only after other reasonable measures to minimize impacts have been considered. Non-regulatory management measures may include: improve, maintain, or lower standards for access roads, trailhead facilities, and trails; advertise special attributes of selected areas; identify the range of recreation opportunities in surrounding areas; educate users about basic concepts of protecting wilderness ecosystems; advise users of little-used areas and general patterns of use, and etc. Limitations on numbers of users should be applied to particular heavy use locations where carrying capacity levels are exceeded before they are applied to the entire wilderness.

4. If it becomes necessary to establish priorities for wilderness visitation, highest priority should be given uses which (1) least alter the wilderness environment, and (2) are dependent upon the wilderness environment. Other users should be encouraged to visit areas outside the wilderness.

5. Proposed temporary improvements must be necessary for the protection of the wilderness resource and not for the convenience of users. Authorized improvements shall be constructed of natural materials, and designed to harmonize with the environment.

6. Commercial outfitting and guide permits should be allowed where there is a demonstrated management and public need compatible with general public use and limits of acceptable change.

   The number of permits issued and the amount of use allocated to permit holders should be evaluated periodically to assure an appropriate balance is maintained between general public use and outfitter use. Outfitter guides should not be allowed to dominate the use of an area or occupy favored campsites to the point that use by the general public is limited or constrained.

   a. Outfitter-guide camps should be located away from other popular visitor campsites to reduce social resource impacts.

   b. Outfitter-guide permittees should actively assist in the education of wilderness visitors, within the scope of their operations.

   c. Outfitter-guide operations will generally be required to adhere to established party size limitations and use conditions specified for each wilderness. Any deviation from catching or party size limitations must be documented in the annual operating plan and approved by the District Ranger.

7. Recreation visitors should not be permitted to cache or store equipment, personal property, or supplies in wilderness. Caching is defined as leaving equipment unattended for more than 48 hours.

   The following criteria should be used when considering waivers to allow caching of equipment in wilderness for a period longer than 48 hours.

1. Granting of the waiver is part of a managed corrective action aimed at getting control of historical occupancy and use problems.

2. The requested area is not highly controversial with the public.

3. The requested area is not located where there is frequent competition for available sites.

4. The site can accommodate the planned use.

5. The waiver will not exceed a length of stay prohibited by another order, ie: 14 day limit.

6. The site is not located in high visibility areas such as trail foregrounds, Mountain passes, meadows, or lake shores.

7. The waiver can be monitored for compliance.

8. The waiver will facilitate an important wilderness enjoyment purpose, for which reasonable alternatives are lacking.

8. A range of management tools may be used to reduce conflicts and impacts.

Possible Management Actions:

When analysis of visitor use levels and monitoring results indicate management action is necessary to solve resource impact problems, a process will be followed to select the appropriate management actions.

Areas will be field checked when inventory or monitoring data show that resource standards are being approached and the trend is downward toward greater deterioration. The field review will determine if the indicators were properly measured and if the indicators accurately reflect the resource conditions.

Tables 4-17 list a range of potential management action depending on the specific circumstances that may be successful in reversing deteriorating conditions. The actions are listed in order of descending priority.

The emphasis in selecting management actions will focus on choosing actions which will be least intrusive to wilderness visitors, yet effective in resolving problems. In cases where problems are extensive, complex, and very visible, management actions will be required that will have some effect on visitors freedom to use certain areas.

In areas where resource impact has been severe, rehabilitation and restoration work will be accomplished to speed up the natural recovery process.

Should the management actions implemented not result in improving conditions, more restrictive and intensive management actions will be instituted. This progression will continue down through the sequence of management actions until the problems are resolved.

Management actions selected, or the extent to which an action is implemented, should also be in accord with the appropriate WROS Class of the area involved.

Table 4-17
Potential Management Actions to Improve Campsite Conditions
Descending Order of Implementation

1. Education of users outside wilderness
2. Information outside wilderness, at trailheads
3. Contact repeat users such as organized groups, clubs and associations, etc.
4. Wilderness Ranger contacts
5. Reroute trails away from lakes
6. Prohibit stock in campsites
7. Restrict camping near lakes, streams, and meadows
8. Prohibit campfires in specific areas
9. Equipment requirements
10. Install resource protection facilities on durable sites
11. Limit party group size
12. Length of stay limit in problem areas
13. Close campsites to specific users
14. Rehabilitate damaged areas
15. Special law enforcement efforts
16. Campsite closure
17. Campsite permits
18 Entry quota permit system

Reduce Campsite Density

1. Education of users outside wilderness
2. Information outside wilderness, at trailheads
3. Contact repeat users such as organized groups, clubs and associations, etc.
4. Campsite obliteration and rehabilitation
5. Prohibit camping within prescribed distances of trails, lakes, streams, and meadows
6. Make access to problem areas more difficult
7. Campsite closures, may be seasonal
8. Closure of large areas to camping

Reduce Trail and Campsite Encounters

1. Education of users outside wilderness
2. Information outside wilderness, at trailheads
3. Encourage use outside peak periods
4. Limit group size
5. Seasonal campsite closures
6. Restrict camping near trails
7. Close campsites to certain users
8. Close specific areas to camping
9. Change trailhead and access conditions
10. Length of stay limits
11. Allow only one-way travel on some trails
12. Campsite permits
13. Entry quota permit system

Improve Vegetative Conditions Impacted by Recreation Stock/Pack Animal

1. Education of users outside wilderness
2. Information outside wilderness, at trailheads
3. Allow no hay or unprocessed grain
4. Require use of supplemental feed
5. Limit total number of stock per party
6. Limit group size
7. Prohibit stock in specific areas
8. Prohibit stock in campsites
9. Eliminate facilities that are attractions
10. Provide facilities where impacts should be concentrated on durable sites
11. Allow no stock to feed within specified distance of lakes, streams, and wet areas
12. Seasonal closures
13. Close drainages to stock on a rotating basis
14. Length of stay limits
15. Closure of large ares to stock

Wild and Scenic Rivers - Sections of rivers within wilderness are being recommended for designation as Wild Rivers under the Wild and Scenic Rivers Act. The classification of river segments as "Wild" rivers is compatible with wilderness designation. Management decisions regarding land use or appropriate recreation activities will be directed by the act which has the most restrictive language regarding a specific question. For example, impoundment of rivers, which could be approved by the President under the Wilderness Act, Section 4(d)(4), would not be authorized on a river in wilderness designated "Wild" under the Wild and Scenic River Act, Section 7. Recreation use of a designated "Wild" River in wilderness may be regulated, if such use is creating impacts on wilderness resources that is not in keeping with the Wilderness Act. Management activities and recreation use impacts that occur on wild river segments within wilderness will be monitored for compliance with both Acts.

Visual Quality - To develop facilities and conduct management activities to create acceptable visual conditions in keeping with preservation of the wilderness character.

Natural events and processes such as rock slides, avalanches, tree mortality due to insects and disease, or fire, will change the visual conditions present. These natural occurrences will not be considered as detrimental to Visual qualities. Special management actions would not be taken to mitigate or repair visual damage.

Signing - Provide signs only where necessary to protect the wilderness resource and for basic visitor protection and orientation. The objective is to install and maintain the <u>least</u> possible number of signs.

1. Rough cut, chamfered edge, unfinished white oak shall be the standard sign material in the wilderness. Lettering may be routed and lightly scorched. Pacific Crest National Scenic Trail logo will be branded on white oak.

2. To facilitate long-term mounting and to minimize the visual impact, white oak signs should be placed on trees wherever possible. Where posts are necessary, use untreated native materials that will weather over time.

3. All existing signs should be individually evaluated to determine if they meet the sign management objective. Signs that are needed to meet management objective, but are not of the current design, should be replaced when the existing sign is no longer serviceable. The need for signs should be minimized by developing accurate map brochures and other user information systems.

4. Mileages shall not be placed on signs within the wilderness.

5. Signs needed for management and regulation of use (including site restoration areas, trail closures, and directions to toilets) shall be the minimum size possible to be easily seen, and shall be installed to minimize both physical impact upon the wilderness resource and psychological impact on the user. Whenever possible, universal symbols should be used on signs and signs should be worded to have positive psychological tone (i.e., "Please Camp Elsewhere" rather than "No Camping"). Signs shall be removed when their purpose has been accomplished.

6. Signing at wilderness trailheads may consist of trail direction signs, wilderness boundary signs, and essential official information or interpretive displays such as fire prevention, regulations governing use of the wilderness, and suggested wilderness behavior. Trailhead signs may include destination mileages.

7. Provide the minimum number of directional signs possible. These signs should be limited to one directional or destination indicator per leg of the trails at a junction.

8. Signs should not be used for directions to or within "General" or "Dedicated Trailless" areas.

9. Wilderness boundary signs should be placed at sufficient locations and distances so that outside activities will not encroach upon the wilderness. In the case of other management activities, project planning should include boundary posting.

10. Signs should not be provided for on-site interpretation within the Wilderness.

Administration - Preserve the integrity of the wilderness resource; provide uniform and consistent administration by all Ranger Districts; conduct necessary administrative activities most protective of the wilderness resource.

1. Wilderness Management implementation schedules shall be prepared yearly for each individual wilderness. These plans shall state specific local actions (prioritized pending yearly budget allocations). Action plans shall be approved by the District Ranger.

2. Coordination between adjoining National Forest and National Park Service units is expected to insure reasonable uniformity where necessary.

3. All administrative activity shall be conducted to minimize impacts on the social and biological resource. Installation of equipment for monitoring aerosol chemistry, precipitation, etc., necessary to assess air pollution impacts on AQRV's shall only be located inside wilderness areas when no representative locations can be found outside the wilderness. Permanent sample plots will be located away from commonly used areas. Field projects should be closely supervised to insure consistency with the goal and objectives of this plan.

4. Facilities such as cabins, trail shelters, or corrals, shall not be constructed or maintained for administrative purposes. The wildernesses of the Forest are not of sufficient size or of sufficient logistical complexity to warrant these structures in wilderness.

5. Coordination should be maintained with all state, county, and federal agencies as well as private landowners that use, or influence use of the wilderness, to promote understanding of the purposes of wilderness.

6. Entrance self registration or monitoring devices should be operated at wilderness trailheads.

7. Forest management activities outside of wilderness that influence the administration and visitor use of wilderness, shall carefully consider potential negative impacts on wilderness resources in the planning phases.

8. There will be one trained wilderness ranger per 30,000 acres or 20,000 visitor days of use.

Trails and Travel - To provide a range of challenges to wilderness users through a spectrum of access opportunities, including cross-country travel and trails of varying difficulty for horse and foot travel; to minimize physical and visual impacts upon the land, conflicts between users, and concentrations of use harmful to the wilderness resource.

1. Trails shall be designed, built, relocated, reconstructed, and maintained to provide a service appropriate for the planned use (as shown on the Wilderness WROS map). These trails shall comply with objectives of this plan.

2. Trails shall be managed to maintain a balanced spectrum of travel opportunities according to difficulty, mode of travel, distance, and type of destination. Standards for trail encounters within each of the five Wilderness WROS classes shall be adhered to. Segments that currently do not comply with the standards shall be identified. These segments should be listed in order of priority for meeting standards.

3. Trails should be reconstructed, rerouted or eliminated as needed to protect the wilderness resource and meet the objectives of each WROS class. Priorities should be identified in the trail plan and implementation schedule, Appendix E.

4. The practice of placing temporary plastic ribbons, cairns (not including summit carins), or other devices by visitors to mark informal trails shall be discouraged through visitor information. Such markers shall be removed as they are found. Climbing wands (when in use) are an exception. Wands should be removed after use by the climbing party.

5. Where other means are not practical to protect the wilderness, cairns may be located and maintained by the Forest Service.

6. Trail and trailhead construction and maintenance activities shall be accomplished with minimum impact on the wilderness resource and on the experience of wilderness users. Trailhead facilities shall be compatible with use and character of the area served.

7. Stakes and ribbons used to identify trail construction or reconstruction locations or other administrative activity shall be temporary and removed immediately after project completion. Tree blazes may not be used for pre-construction trail location. They shall be avoided to mark existing trail locations except where they are absolutely necessary in difficult to locate situations where other means of marking a trail are not possible.

8. Bridges and footlogs may be provided only when no other route or crossing is reasonably available for essential user safety. Bridges should not be installed for user convenience or installed to extend use season unless necessary to meet wilderness management objectives. Natural materials shall be preferred.

9. Trail locations and relocations should avoid wet areas and meadows. New trail drainage structures should be constructed of natural materials and designed to minimize their visual obtrusiveness. Drainage structures of non-native material will be replaced when trail reconstruction becomes necessary and will be hidden from view until replaced. Natural materials should be used whenever feasible.

10. Existing trails no longer compatible with the objectives of this plan should be abandoned and returned to as near a natural state as possible. Abandoned trails should be monitored periodically.

11. When possible, through-trails should be routed away from areas of concentrated use, such as lakes and popular campsites, to avoid unnecessary visitor contacts and environmental impacts.

Vegetation - Maintain the system of natural processes that governs the distribution of plant communities and ensure that natural biotic communities remain undisturbed except by those natural processes.

1. Non-native plant species should not be introduced. The possibility of accidental introduction through the use of pack and saddle stock should be minimized by prohibiting the use of hay and unprocessed grain as supplemental feed and encouraging the use of processed, weed-free feeds (i.e., pelletized rations).

2. Campfires should be prohibited at heavily used locations if analysis indicates that firewood is being used faster than natural accumulation. The supply of firewood shall be monitored at sites identified in yearly operating plans. If the amount is declining, use should be prohibited altogether.

3. The thrift, density and vigor of natural vegetation shall be monitored to determine the extent of alteration of the natural biotic communities by off site sources of air pollution. If confirmed changes are measured, pollution sources shall be identified and corrective actions initiated through provisions of the Federal Clean Air Act.

Collection of Resource and Use Information - Make collection of data in a non-obtrusive manner consistent with the preservation of the wilderness resource, (a) gain information needed to achieve and monitor the attainment of the objectives of this plan; and (b) acquire baseline knowledge needed to assess long-range natural changes, and direct and indirect human influence on the wilderness ecosystem.

1. The collection of resource and use information should be annually coordinated between Ranger Districts.

2. Site specific information concerning the location and amount of impacts on soil properties, water quality, vegetation, visibility and other physical characteristics of the areas resulting from recreational use or off-site pollution sources should be collected, maintained, and used in making future management decisions. The following are priorities and locations for assembling resource information in descending order of importance.

    a. Vegetation, soil condition, and trend information in heavily used camp areas near trails and at other impact areas, such as stock hitching areas, that appear to be near the limits of acceptable change.

    b. Baseline visibility conditions within those wilderness areas designated as Class I areas.

    c. Baseline conditions of water chemistry, vegetation condition, and aquatic ecosystems within those areas designated as Class I areas.

    d Baseline conditions of visibility, water chemistry, vegetation condition, and aquatic ecosystems within those areas designated as Class II areas.

    e. Vegetation and soil condition information in areas having high potential for resource degradation in the future.

    f. Baseline vegetation and soil information should be collected using permanent transects in camps, trails, and other areas that currently appear to be well within acceptable standards, but have some potential for future degradation.

3. Quantifiable information concerning the amount, season, and pattern of recreation use should be collected and maintained (including information necessary for RIM reporting) for use in making future management decisions. The following are priorities for obtaining use information: overall statistics required for annual RIM reporting; trails accessing the heavily impacted sites; and Transition Class areas.

4. University and other government researchers should be encouraged to conduct studies and collect additional data to assess recreation impacts and aid in establishing and revising carrying capacities.

Scientific Study - To provide for, and encourage scientific study dependent on a natural setting, that seeks to explain wilderness phenomena, and conducted in an unobtrusive manner consistent with preservation of the wilderness resource.

1. Research projects require Chief of the Forest Service or Regional Forester approval. Only those applications for research that are wilderness dependent and compatible with the goals and objectives of this plan shall be recommended for approval. Research activities that adversely affect the wilderness resource, the experience of users, or conflict with other wilderness objectives shall not be recommended.

2. Research that helps resolve wilderness management problems or basic research on wilderness shall be given highest priority, encouragement, and cooperation as administrative time and funding permit.

3. Data collected for management purposes, such as use figures and ecological data, should be made available to scientists for research purposes.

4. All research projects which require public contact, specimen collecting, ground reference marking or exemption from any regulations shall be conducted under a special-use permit.

Public Information - Make information about the wilderness, including management goals and objectives, available to the public to provide for and foster understanding of the natural processes which occur in the wilderness.

Actively attempt to direct use incompatible with wilderness to alternative areas by orienting the public, Forest Service employees, and users to the wilderness philosophy.

Encourage user behavior (No Trace ethic) which minimizes resource impacts and emphasize compliance with requirements or regulations.

1. Wilderness rangers, receptionists, and other Forest Service personnel who have contact with the public concerning the wilderness should be acquainted with wilderness philosophies, management goals, and current conditions within the wilderness. In contacts, they will direct non-wilderness activities to alternative areas, encourage suitable wilderness behavior, and create additional awareness, understanding, and appreciation of wilderness. While visitor contact may range from frequent to rare (depending on WROS class), the effect of contacts on user solitude or adventure should be minor.

2. Printed materials should contain information on wilderness management goals. Publishers and authors of trail, climbing, and other informational books should be encouraged to include minimum impact and other wilderness management messages in publications. Media contacts should be informed of new management goals and decisions as well as wilderness philosophies pertaining to the wilderness.

3. A wilderness map/brochure may be developed as needed. Supplemental publications may be developed and existing publications revised periodically to keep them current with management decisions and conditions.

4. Only trails that appear on the system trail inventory should be shown on Forest Service publications. Publishers of maps and guidebooks should be encouraged to follow a similar policy. All trails on trail inventories do not need to be shown on, or in guidebook publications.

5. Public involvement and user awareness programs should be used in solving management problems and to help gain acceptance of solutions among users, not to promote use per se.

6. Schools, colleges, and organized groups should continue to be involved in volunteer programs. Cooperating volunteers should be encouraged to assist managers in monitoring use, collecting and evaluating data, educating visitors and performing trail or revegetation projects.

Archaeological and Historical Properties - To recognize that cultural resources within and relating to the wilderness are a valuable, nonrenewable resource. To identify, evaluate, preserve, protect, and enhance these resources in compliance with federal and state laws and Forest Service policy.

1. All structures shall be evaluated for their historical significance, in accordance with 36 CFR 60.

2. Decisions to maintain, abandon, or remove structures which meet the criteria for the National Register shall be made in consultation with the State Historic Preservation Office, Advisory Council on Historic Preservation and other interested parties as outlined in 36 CFR 800. Abandoned structures should be allowed to deteriorate naturally. Retained or maintained structure shall be managed to have a minimum impact on the wilderness resource.

3. Decisions to remove structures shall be documented in an Environmental Assessment. Removal shall be by a practical method compatible with the goals of this plan and the site shall be restored to as natural a condition as is practical.

Fish and Wildlife - To provide habitat most conducive to a natural distribution and abundance of native species of fish and wildlife by allowing natural processes to shape habitat and interactions among species, and to encourage hunting and fishing practices in a manner consistent with the preservation of wilderness values under the Wilderness Act [Section 4(d8)].

1. The Forest Service should continue to work closely with the Washington Departments of Wildlife and Fisheries in all aspects of fish and wildlife management. Ranger District action plans shall address any specific coordination needs. Forest recommendations will be predicated on need for protection and maintenance of the wilderness resource, including fish and wildlife and their respective habitats. Hunting, fishing, and trapping shall be permitted in accordance with State Law under the same restrictions as other recreation use of the wilderness.

2. Manage to allow natural ecological succession, including natural infestations of insects, to operate freely in so far as they do not endanger significant resources outside of the wilderness.

3. Native species shall be maintained, with special emphasis on the preservation of threatened or endangered species, plus designated management indicator species and their habitats. Fish or wildlife indigenous to an area, may be re-established if previously eliminated by the influence of man.

4. Discarding of food or garbage that tends to alter the natural feeding behavior of wildlife should be discouraged through visitor education or regulation.

5. Fish stocking shall be allowed to continue where it is an established practice , however fish stocking may be reduced or stopped as one of a series of management steps designed to bring use within limits of acceptable change. Stocking should emphasize native species. Those water bodies that are naturally fish free, and where fish stocking is not an established practice, shall not be stocked.

6. Fish stocking of individual water bodies shall be limited to those methods used prior to establishment of the wilderness. Aerial stocking may be by fixed wing or helicopters. A record of fish stocking shall be developed and maintained, including an inventory of stocking dates, species and methods used.

7. Native species of fish should be favored in waters with a history of supporting such species. Waters known to contain native species should be identified in a stocking inventory.

8. Fire shall be allowed to play a more natural role in maintaining habitat diversity to insure a natural abundance and distribution of native wildlife species.

9. Improvements including habitat manipulation necessary for fish/wildlife management and in existence prior to designation are permitted, provided work is performed in a manner exerting the minimum impact on wilderness naturalness and solitude. Chief's approval is necessary.

10. Trails and camping areas shall avoid known habitat components including escape and thermal cover, goat kidding areas, travel corridors, mineral licks and others where human activities have been identified as disrupting use of the habitat. Existing trails and camps should be relocated to avoid harassment in these areas.

Livestock Use - To allow utilization of forage by recreation pack and saddle stock to the extent it does not jeopardize wilderness values.

1. Livestock use shall be managed so that native plant species will be maintained with special emphasis on the preservation of threatened or endangered species.

2. Available forage shall be used according to the following order of priority: wildlife, administrative livestock, recreation livestock, commercial packers, and commercial grazing allotments.

3. Pack and saddle stock shall be required to rely on processed hay or grain, or livestock feed (certified weed free).

4. Recreational livestock use on trails shall be limited to those identified as open and maintained for livestock use. The public should be made clearly aware of trails open and closed to livestock use. Information shall be available from administrative offices, trailheads, information brochures and all maps. Llama's will be considered as stock or pack animals, although requiring different management than horses.

5. Permanent corrals shall not be permitted for either public or commercial livestock. Hitch rails, ropes, and hobbles are the recommended methods.

6. Develop setback standards from lakes for grazing, hitching, tethering or hobbling of any pack or saddle stock.

Commercial Use - To allow utilization of forage for commercial allotments to the extent it does not jeopardize resource values and is in accordance with existing rights.

1. Because of vegetative changes, grazing allotments shall be evaluated to determine if they are capable of being continued as a viable commercial grazing allotment. If they are no longer capable, the allotment shall be terminated when the permittee no longer desires to use the area and/or relinquishes his permit. The available forage shall be allocated to wildlife and recreation livestock needs.

2. With respect to WROS Class, commercial stock should not be permitted to travel through Dedicated Trailless to reach permit areas.

Water - To preserve water bodies and stream courses in a natural state with *minimal modification or human and animal caused contaminants.*

1. Except as provided for in Section 4(d)(4) of the Wilderness Act, watersheds shall not be altered or managed to provide increased water quantity, quality, or timing of discharge.

2. Short-term weather modification activities which will produce only occasional, incidental, temporary, or transitory changes in the weather with carry-over effects on the ground lasting only a few days beyond the actual seeding period may be permitted. Long-term weather modification *programs producing repeated or prolonged changes in the weather during any* part of successive years and having substantial impacts on the wilderness resource shall not be permitted.

   Prior to any weather modification within the wilderness, formal application *must be filed and be approved by the Chief of the Forest Service.* The proponents must, through an environmental analysis accompanying their application, provide reasonable, scientifically supportable assurance that their activities will not produce permanent or substantial changes in natural conditions, nor will they include any feature that might reasonably be expected to produce conditions incompatible in appearance with the environment or reduce the values for which the wilderness was created.

3. Water yield measurements (including snow survey) shall continue to be read from the air or from the ground by primitive means, except as provided in for in the FSM.

4. Livestock and human use shall be regulated to maintain existing water quality levels equal to or exceeding Washington State Class AA and lake water quality standards. Any water body found to be below standard should be restored to the prescribed quality. See WAC 173-201-045 for standards.

5. Human activity should not influence the natural quality of any waters within wilderness beyond temporary changes that return to normal when activity ceases.

6. Constructed facilities such as trails or high-use campsites have high potential to result in accelerated erosion rates that are detrimental to water quality. Areas used by recreation visitors will be closely observed for evidence of accelerated erosion. Water sources and water bodies near campsites should be observed for evidence of soap, other chemicals, and biological contaminants that may be introduced by human activity.

7. Wilderness Action Plans will identify management actions to be implemented to correct water quality problems. Methods will be developed in the future to monitor physical, chemical, and biological changes in water quality.

Soils - To ensure that the physical properties of the soils and rate of erosion will not noticeably be altered from conditions naturally occurring and to allow processes of soil formation to operate unaltered by human activity.

Air - Maintain aerosol concentrations and particulate levels over the wilderness areas at levels that do not adversely effect identified Air Quality Related Values for each area.

1. Maintain an active role in the review of Prevention of Significant Deterioration Permit applications that have potential to impact wilderness areas.

2. Impacts on visibility and other AQRV's will be considered as a prescription perimeter when permitting natural ignitions to be used to accomplish prescribed fire objectives.

3. For further direction see the Air Resource section on page 4-XXX .

Mining and Minerals - To assure the rights of mineral claimants as specified in the Wilderness Act, while insuring that their activities create the least possible impact upon the wilderness resource.

When proposed mineral-related activities require the use of mechanized or motorized equipment or will cause impacts to the wilderness characteristics, a plan of operation must be submitted, processed and approved. During the evaluation of such a proposal not only will the environmental consequences be assessed and valid existing rights to conduct such activity confirmed prior to approval, but a determination will be made as whether the use of such equipment is reasonably necessary for and incidental to the level of exploration or development activity being proposed.

Management objectives for the administration of mineral activity in wilderness are as follows:

1. Mineral-related activities will be administered in compliance with all appropriate laws, regulations and Forest Service policy concerning wilderness management and the mining and mineral leasing laws.

2. Those conducting mineral related activities will be required to meet all Federal and State water quality standards, and will be required to reasonably minimize any adverse impacts to wildlife habitat and the wilderness characteristics of the area.

3. In keeping with any valid existing rights to operate mining claims or mineral leases, administrative efforts will be made to minimize any conflict between the mineral and the recreation users of wilderness areas.

4. When mineral-related valid existing rights have been confirmed, they will be recognized; and our policy will be to encourage and facilitate those activities while ensuring any adverse impacts to wilderness are minimized. In meeting this objective the technological feasibility and the cost of implementing any enforceable controls will be considered and kept to a reasonable level.

5. As-time permits or as wilderness-impacting activities are proposed, valid existing rights on all unpatented mining claims located within wilderness areas will be evaluated. As part of the validity determination process, mining claimants will be contacted and given an opportunity to participate in that process.

6. Rockhounding shall be treated as are other recreational activities within wilderness, and be regulated or restricted should damage to wilderness values occur.

Land Occupancy and Structures - Maintain the wilderness free from facilities and structures, except those necessary to protect the wilderness resource. Management objectives set forth in this plan and those exceptions permitted by Section 4(d) of the Wilderness Act shall be met.

1. All drift fences should be removed and less obtrusive methods for constraining livestock, including hitch rails, hitch ropes, or picketing methods used.

2. No roads, powerlines, telephone lines, water flow maintenance structures, reservoirs, or other improvements shall be permitted; except as authorized under Section 4(d) and 5(a) of the Wilderness Act.

3. Current water diversions should not be expanded. They should continue to be maintained by primitive means, unless NEPA analysis indicates that the work would cause unacceptable resource damage.

4. Occupancy, structures and use of motorized or mechanized equipment related to legitimate mining prospects shall be permitted to the extent allowed by law and regulations. Every reasonable effort should be made through the operating plan to minimize their effect on the wilderness resource.

5. Lands classified in ownership Group 1 should be retained or acquired as directed.

Wilderness
Forest-wide S&G

Fire Management - To permit natural fires to exert their effects on the vegetative patterns within the wilderness without endangering public safety or values outside the wilderness; to use suppression techniques which result in the least possible evidence of human activity; and to provide for a fire protection strategy which achieves the resource management objectives at least cost.

1. Naturally occurring fires shall be permitted to burn in specific areas, if they meet the prescription parameters for the zone. All naturally occurring ignitions are considered prescribed until declared wildfire.

2. A suppression decision matrix shall be used to determine appropriate suppression actions on fires. These decisions should be documented when the fire starts and should be reviewed by the District Ranger periodically throughout the duration of the fire. The most cost-efficient tactics within the goals and objectives of this plan should be utilized.

3. A prevention program, consisting of education and enforcement activities, shall be directed at maintaining a level of accidental fire occurrence not to exceed the current level of fires per year measured by a 10 year mean.

4. A public education program should be undertaken to explain the natural role of the fire in the wilderness ecosystems. The program should be undertaken before any prescribed fire is allowed within the wilderness.

5. Retardant may be used to contain any fire which exceeds the prescribed intensity levels and threatens acreage limitations or adjacent management areas.

6. Retardants with "fugative" color are preferred when available. These products begin with an orange-brown color and then become colorless in three to five days.

Aircraft

1. Private and commercial aircraft shall be discouraged below 2,000 feet above ground level.

2. Military aircraft shall be discouraged from overflight training missions.

3. The landing of aircraft within the wilderness is prohibited. Air dropping supplies is also prohibited. Exceptions may be granted for emergencies, significant administrative purposes, and fish stocking.

Search and Rescue - Search and rescue activities on National Forest Lands come under the jurisdiction of the County Sheriff in the county where an incident has occurred. The role of the Forest Service is to provide assistance, when requested, within the scope of the 1962 Memorandum of Understanding between the Forest Service and the Washington State Sheriff's Association. A supplement to this agreement applies to winter search and rescue situations at Stevens and Snoqualmie Passes. Specific District procedures should be included in Annual Wilderness Action Plans.

Requests for use of motorized equipment or helicopters in search and rescue activities in wilderness, must be approved by the Forest Supervisor.

SOIL, AIR, WATER, AND RIPARIAN AREAS

Soil Resource

Goal: Maintain or enhance soil and land productivity.

1. Plan and conduct land management activities so that reductions of soil productivity potentially caused by detrimental compaction, displacement, puddling, and severe burning are minimized. Nutrient capital on forest and rangelands is to be maintained at acceptable levels as determined by state of the art technology.

2. Plan and conduct land management activities so that soil loss from surface erosion and mass wasting, caused by these activities, will not result in an unacceptable reduction in soil productivity and water quality (as stated in FSM 2500 R-6 Supp. 45 or as revised).

3. No more than 20% of an activity area may be severely burned, compacted, puddled, or displaced as a result of the activity. Only permanent features of the transportation system will remain in a detrimentally compacted, puddled, and/or displaced condition.

4. Surface erosion will be minimized by maintaining effective ground cover after cessation of any soil disturbing activity:

Erosion Hazard Class	Minimum Percent Effective Ground Cover 1st Year	2nd Year
Low	20 - 30	30 - 40
Medium	30 - 45	40 - 60
Severe	45 - 60	60 - 75
Very severe	60 - 75	75 - 90

5. Plan and accomplish rehabilitation projects as necessary to meet soil and water objectives and standards.

6. Areas classified as irreversible soils (S-8) will generally be considered as unavailable for road construction and timber harvest.

7. An area approximately 1/8 mile wide surrounding a confirmed S-8 classification should be evaluated during project planning to determine if special management considerations may be required due to unstable soils and/or possible adverse effects caused to adjacent S-8 soils. These special considerations might include practices such as: avoidance by roads, reduced unit size, scheduling to reduce frequency of harvest, and use of suspension. Refer to Forest Supervisor's 2550 memos of June 10, 1988, and January 2, 1990.

8. Other soils that are known to be unstable, but which are not sufficiently unstable to be classified as S-8, will require special transportation planning, design, layout, preconstruction, construction, and maintenance techniques. Refer to Forest Supervisor's 2550 memos of June 10, 1988, and January 2, 1990.

9. Utilize soil surveys and/or soil scientists in project planning work that involves activities that affect or are affected by the soil resource.

Air Resource

Goal: Protect Air Quality Related Values of the forest to the extent necessary to achieve Plan goals and to execute management activities within the constraints of existing air quality laws and regulations.

1. New Source Review procedures of the Prevention of Significant Deterioration provisions of the Clean Air Act requires the Forest Service, as a Federal Land Manager, review the impacts of all proposals to construct or modify pollutant emitting facilities that may impact federal lands. Federal Land Manager acknowledgement of acceptable impacts is required before permit issuance by the Department of Ecology. The forest will maintain a line of communication with the Department of Ecology and other regulatory agencies to insure that permit reviews are accomplished.

2. All wildfires or prescribed fires that exceed applicable air quality regulatory standards will receive appropriate suppression action to minimize the impact to air quality.

3. The Forest Service will comply with all applicable air quality laws and regulations, and coordinate with appropriate air quality regulatory agencies.

4. The Forest must demonstrate reasonable progress in reducing Total Suspended Particulates (TSP) from prescribed burning activities. The State of Washington has defined "reasonable further progress" as a 35% reduction in the emission of TSP from prescribed burning by 1990 in western Washington.

5. The Forest air resource shall be protected against pollution sources outside Forest boundaries through application of the Prevention of Significant Deteriorations (PSD) regulations contained in the Clean Air Act. Special protection shall be afforded Air Quality Related Values (AQRV's) found in Class I wilderness. Information on both PSD's and AQRV's is available in the Air Resource Management Handbook.

Water Resources and Riparian Areas

Goal: Maintain or enhance water quality and riparian areas.

1. Limit acres of final harvest to meet the water quality and riparian management requirement. The management requirement, expressed as the maximum number of final harvest acres per FORPLAN Allocation Zone (watershed) per decade, is shown in Table 4-18.

2. Meet or exceed Water Quality Regulations for waters of the State (Washington Administrative Code, Chapter 173-201) through application of Best Management Practices (see Glossary). The key beneficial uses which BMP's are designed to protect are fish and water for domestic use.

3. Use the existing process to implement the State Water Quality Management Plan on lands administered by the USFS as described in a Memorandum of Understanding (MOU) between the Washington State Department of Ecology and U.S. Department of Agriculture, Forest Service (7/79), and "Attachment A" referred to in this MOU (Implementation Plan for Water Quality Planning on National Forest Lands in the Pacific Northwest 12/78).

4. Geographical boundaries of riparian areas will be determined by on-site characteristics. They are lands adjacent to perennial and intermittent streams, lakes, wetlands, ponds, springs (seeps), floodplains, or other wet areas.

5. Maintain the bank, flood plain, and shore stability of all wetlands, streams, lakes, and other bodies of water. (This standard applies above the high waterline on reservoirs.) Implicit in this standard are actions to prevent all forms of accelerated soil erosion and soil compaction, and the retention of the live root mat to the maximum practicable extent.

6. Riparian areas should be maintained in accordance with FSM 2526 MBS Supp. 01/81 or as revised.

7. Large woody material (plus trees) needed to meet the desired future condition shall be maintained and managed to: (1) maintain water quality in streamside management units of all streams at existing levels, and (2) maintain fish habitat at existing levels.

8. Maintain in-channel and streambank stability maintained for upper and lower channels in the Forest watersheds in order to provide stable, high-quality habitat for salmon and trout, and provide high quality water for other in-stream beneficial uses.

9. Maintain pool conditions in both upper and lower channels in the Forest watersheds to: (1) provide high quality habitat for salmon and trout, and (2) provide in-stream flow regulation.

10. Along perennial streams and fish bearing intermittent streams, vegetation should be maintained to provide cover and/or root strength so as to maintain streambank stability and fish habitat capability at existing levels.

11. Highly incised Class III streams shall be evaluated during the project planning process to determine if special measures may be required to protect significant riparian and/or associated riparian values.

    a. The evaluation should include an analysis of such factors as: soil stability, stream size and gradient, steepness and height of the inner gorge, and vegetative types. Depending upon these factors, special measures may be required which would include one or more of the following; stream clean out, intermediate tree marking, topping, directional falling away from the stream, yarding away from both sides, and full suspension across the stream. In all cases existing non-merchantable riparian vegetation should be maintained to the extent practicable.

b. In some cases, the lightly incised Class III streams have existing fish usage (anadromous and/or resident) that make potential fish habitat enhancement investments worthwhile. In the original stream classification done on the Forest, this potential was not known or recognized. For these Class III streams, fish habitat enhancement intensities from Management Prescription 13 may be applied.

c. As new information or additional data become known on a Forest stream (e.g. stream surveys, habitat improvement project data, other agency data), stream classification status may or may not require reclassification.

12. For class I, II, and fish bearing class III streams, the maximum daily temperature shall not exceed 65^{0} F. and the average 7 day maximum temperature shall not exceed 60^{0} F.. Exceptions must be based on scientific rationale, and must maintain the existing level of beneficial uses of the water, and be approved through NEPA analysis and documentation.

13. The Forest shall inventory and map riparian areas during project design and enter information and data into Forest-wide data base.

14. Consult with a hydrologist if the activity being planned involves riparian areas, wet lands, flood plains, or probable cumulative impacts on water resources.

15. Instream flow on National Forest System Lands should be protected through critical analysis (via NEPA) of proposed water uses, diversions, and transmission applications and renewal of permits. Protection of instream flow needs may be achieved through filing protests with States where applications are made that adversely affect National Forest resources, asserting claims for this water under Federal or State laws where applicable, inserting protection measures into special use permits, or reaching formal agreements over use. Purchase of water rights and impoundments are other means for reducing these impacts.

Table 4-18
Maximum Number of Acres that can be Final Harvested
by Allocation Zone (Watershed) by Decade

ALLOCATION ZONE No.	Name	DECADE 1	DECADE 2
Mt. Baker Ranger District			
2	ILLABOT CK	425	425
3	CHILLMUNRD	250	250
4	CANYON CK	100	200
5	LRNOFKNOOK	400	400
6	GLAMFNOOKN	280	280
8	MDFKNOOKUR	250	250
9	URNOFKNOOK	980	980
10	MDFKNOOKSO	200	200
11	SOFORKNOOK	325	325
14	SWIFT-PARK	250	250
15	BAKER	650	1025
16	BKLKUNRD	350	350
17	LKSHANNON	300	300
18	LKSHANUNRD	200	300
20	JACKCRMUR	200	325
22	MRSKRVMR	625	625
23	URSKAGITRV	330	330
26	CASCADE RV	1100	1100
27	LRSKAGITRV	75	75
28	LRSKRVMUR	550	550
29	DEER CK NW	100	200
30	FINNEY CR	100	100
31	DEER CR SE	0	0
32	DEERCRUNRD	110	110
38	SAUK RV NE	100	100
North Bend Ranger District			
70	TLTRVMUMUR	250	250
71	NFKSNQALMU	700	700
72	TAYLORALMR	250	250
73	MFKSNQALMU	350	350
74	URMFKSNQMU	800	800
75	PRATT-ALMU	650	650
77	SFKSNOQMU	200	200
81	URGREENRV	500	500
82	GREENRVNO	300	300
83	GREENRVSO	1000	1500
Darrington Ranger District			
34	MRNOFKSTNO	200	200
35	MRNOFKSTSO	500	500
37	URNOFKSTIL	1000	1000
39	SAUK RV SE	1700	2500
40	SUIATTLERV	2500	1700
41	SU-RVMUNRD	750	350
42	WHITECHUCK	650	650
44	CANYON CR	250	250
45	SAUDRVUNRD	450	450
46	LRSOFKSTLL	350	350
48	URSOFKSTLL	500	500
49	SAUKRVFORK	250	250
Skykomish Ranger District			
47	SULRVUNRDN	200	200
51	SULRVURSE	300	300
52	SULTAN RV	100	100
53	NFSKYURSO	650	650
54	NFKSKYURNO	500	500
55	NOFKSKYRV	1060	1060
56	NFKSKYURW	310	310
57	SKYRVMUNRD	350	350
59	TYE RIVER	100	150
60	BECK-RAPID	3600	4000
61	SOFKSKYUR	240	240
62	SOFKSKYRV	270	270
63	SKY-TOLT	300	200
65	SFKSKYALMR	430	430
67	TY-BEC-MU	700	1000
68	FOSSRVALMU	500	500
69	MILLERALMU	200	200
White River Ranger District			
84	GREENWATER	650	880
85	LRWHITERV	250	250
86	CLEARWATER	407	407
90	HUCKLBRYCK	1300	1300
91	WFWHITERV	2000	2000
93	CARB-PUYAL	1150	1150

DIVERSITY AND LONG-TERM PRODUCTIVITY

Goal: Maintain native and desirable non-native plant and animal species and communities. Provide for all seral stages of terrestrial and aquatic plant associations in a distribution and abundance to maintain the productivity of these biological communities.

General

1. Maintain or enhance plant and animal diversity by providing or developing an ecologically sound distribution and abundance of plant and animal communities and species at the forest stand, sub-drainage, and Forest level. This distribution must contribute to the goal of maintaining or enhancing all native and desirable introduced species and communities. Management Standards and Guidelines for all resources serve as a foundation for this distribution.

2. In addition, evaluate opportunities to maintain or enhance stand, sub-drainage, and Forest level components of biological diversity on an area-by-area basis as commensurate with management area direction. Specific opportunities include the following:

    a. Retain contiguous forest stands of later seral stages within drainages. Link patches of later seral stages with corridors of mid to late seral stages, such as riparian or visual corridors.

    b. Identify sub-drainage specific management objectives for fish and wildlife habitat and plants. These sub-drainage objectives should maintain or develop the habitat sizes, patterns, and spacing essential for allowing genetic interchange and movement of species.

    c. Where mature and old-growth forest stands are managed for wildlife habitat, select and manage for stand size, characteristics and spatial locations that will help support all plant and animal species closely associated with those habitats.

3. During project planning, develop site-specific management prescriptions that meet objectives for biological diversity and ecosystem function. In addition to other management direction, consider the following guidelines for maintenance of species diversity through commercial forest management:

    a. Conserve or enhance long-term site productivity, including wildlife habitat productivity, by maintaining, throughout the rotation, levels of large woody, as well as small fine materials, on the ground which are similar to those typically encountered in natural ecosystems of the appropriate type.

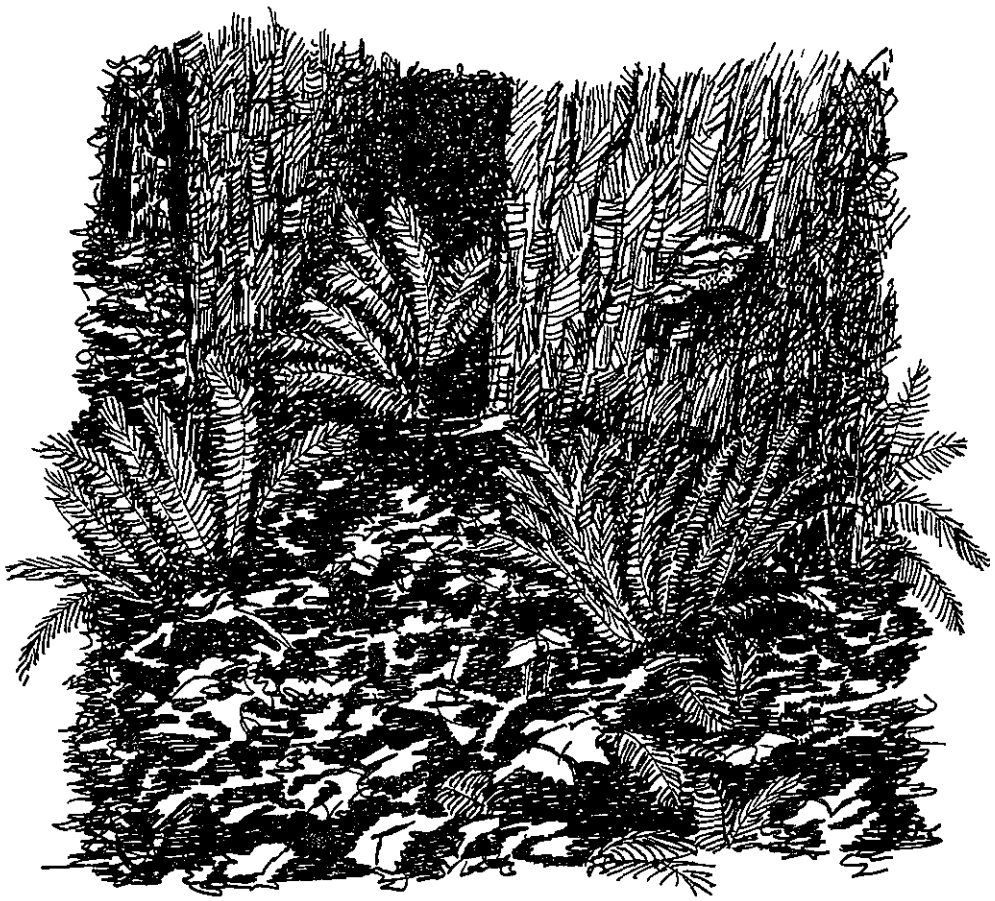
    b. Retain standing dead and standing green trees sufficient to maintain cavity nester habitat at or above 40% of minimum potential population levels, throughout the managed forest (80% in riparian areas). Retention trees and snags should be of the largest size class available in the stand, and should be selected considering safety regulations. Minimum numbers of desired species of retention trees should be determined by modeling the stand through its rotation, and

should be designed to meet current and future habitat needs. Where possible, leave wildlife trees at levels which will be similar to those typically found in natural ecosystems of the appropriate type.

c. Tree species used in planting harvest units should be based on the potential of the site as indicated by plant associations. Consideration should be given to regenerating and maintaining a mixture of species, where appropriate for the site.

d. Guidelines for commercial and noncommercial thinning should retain a diversity of species based on site potential.

e. Vegetation management should allow for all natural species to function. None should be eliminated from the site.



WILDLIFE HABITAT MANAGEMENT

Goal: Maintain a viable population of all native and desired non-native vertebrate species and maintain, protect, and improve habitat of management indicator species. The indicator species for this Forest are the American peregrine falcon, bald eagle, grizzly bear, northern spotted owl, pileated woodpecker, pine marten, mountain goat, and primary cavity excavators.

Management

1. As a minimum, provide sufficient numbers and sizes of live and dead trees throughout the Forest to maintain primary cavity excavators at the 40% population level using guides from Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington (Brown, 1985).

2. In addition to snags, large dead and down logs will be left. The number of logs and size specifications will be determined on a case-by-case basis using guides from Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington (Brown, 1985).

3. Nest sites actively being used by raptors or other bird species of special concern (ie; great blue heron) will be protected from human disturbance until nesting and fledging is completed. Protection of nest sites or areas will be sufficient for species involved. In project design, roost areas will be evaluated for the need for additional protection. Determination of protection area and seasons should involve consultation with a Wildlife Biologist.

4. Cliffs, talus, and caves are recognized as relatively unique habitats of the Forest and all potentially disturbing or altering management activities shall be carefully evaluated on the ground during the planning process to insure their protection and/or proper management.

5. Programmed activities in calving, fawning, and kidding areas should be discouraged. They shall be timed to minimize disturbance to the animals. This may require restricting access and operations during certain times of the year.

6. Provide a sufficient amount of available forage and optimal thermal cover to maintain viable populations of mountain goat.

7. Maintain a mix and distribution of successional stages that will support maintaining or enhancing diversity.

8. Provide highest levels of deer and elk habitat capability possible while still meeting other primary resource objectives.

9. Introduction of fish and wildlife species shall be carefully coordinated with the various State and Federal wildlife agencies and considered on a case-by-case basis through NEPA analysis.

10. During project design, surveys shall be made to determine the presence of or absence of mountain goat winter range. When identified, the area shall be maintained until an analysis can be completed and the need for a Plan amendment determined. Once the amendment is completed, the standards and guidelines for MA 15 shall apply.

11. Activities that adversely affect mountain goats on their spring and summer range shall be identified and mitigated.

12. Pileated woodpecker foraging areas shall be maintained by providing a sustained minimum average of two hard snags per acre $\geq$ 10 inches d.b.h. on an additional 300 acres around each pileated woodpecker habitat management area.

13. Seed areas in identified winter range with big game preferred seed.

14. Maintain areas which serve as connecting habitat or travel corridors for indicator species. Future timber management of connecting habitat is not precluded as long as there are blocks of similar quality and age stands serving as connecting habitat in the adjacent area. These areas will be provided at intervals of 1/2 to 3 miles along a drainage, depending on the land forms, forest structure, and wildlife use of the area. Connecting habitat is defined as areas which serve as travel corridors or habitat connections, provide for the dispersal and interaction of indicator species, and avoid the isolation of habitat into geographic islands. These areas provide species access across drainages and elevation gradients (ridgeline to valley floor.)

    Connecting habitat can be provided by:

    a. Utilizing natural land forms when possible, such as riparian areas along creek drainages, or the areas adjacent to avalanche chutes.

    b. Maintaining areas in blocks of land that are generally one or more logical harvest units in size. This will provide the option of rotating the designation of connecting habitat to adjacent areas, as the adjacent harvested areas mature and develop the desired habitat structure.

15. For spotted owl pairs occupying non-network sites, protect the nest tree and an area around it. Disturbance will be minimized or eliminated adjacent to the nest during the nesting period. Seek technical assistance of the U.S. Fish and Wildlife Service and Washington Department of Wildlife in developing management strategies for these sites.

16. Areas proposed for timber harvest which contain habitat suitable for spotted owls will be surveyed according to standard inventory procedure. Maintain survey results in the Ranger District office and forward to the Forest Coordinator periodically.

FISH HABITAT MANAGEMENT

Goal: Provide a diversity of terrestrial and aquatic communities while maintaining water quality. This goal applies to all areas dominated by riparian vegetation, including areas containing anadromous and resident fish habitat, perennial and intermittent stream courses, lakes, wet lands, and flood plains.

Note: the Forest-wide Standards and Guidelines for Water and Riparian Areas also apply.

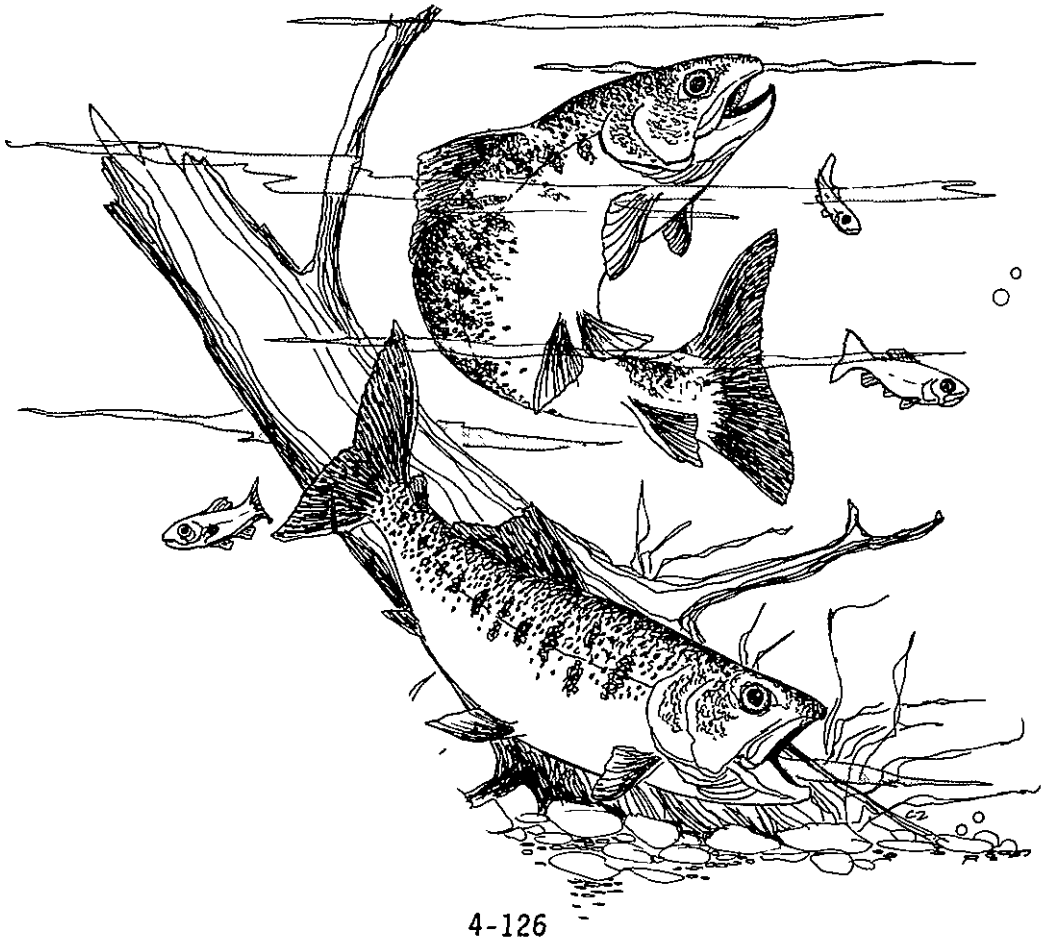
Management

1. Water quality shall be maintained or enhanced through application of Best Management Practices. This meets the requirements of the Clean Water Act and State Water Quality Standards (includes temperature, turbidity, and sediment).

2. Develop fish habitat restoration projects to rehabilitate lost or deteriorated habitat.

3. Cooperate with Washington Department of Fisheries and Department of Wildlife in providing a fish stocking program on the Forest (anadromous and resident fish).

4. All forest management activities should provide for unobstructed fish passage to historically accessible fish habitat.



THREATENED, ENDANGERED, AND SENSITIVE SPECIES

Goal: Maintain or improve habitat for all threatened or endangered (T&E) plant and animal species on the Forest, and manage habitats for all sensitive (S) species to prevent their becoming threatened or endangered. Management of threatened, endangered, and sensitive species habitats is addressed below and under Management Area 16, Threatened and Endangered Species. These Forest-wide standards and guidelines describe typical management practices in T&E habitats. The Forest will consult with the USDI Fish and Wildlife Service in determining protection, enhancement, and mitigation measures for specific T&E habitat areas.

Overall Management

1. All proposed management actions which have the potential to affect habitat of endangered, threatened, or sensitive species will be evaluated to determine if any of these species are present.

   Biological evaluations will be completed for all proposed management activities which could affect T & E species. Management actions that may affect T&E habitat in any Management Area shall be guided by a Recovery Plan if one exists, and may only proceed after consultation with the USDI Fish and Wildlife Service as outlined in Section 7 of the Endangered Species Act (ESA). Biological evaluations, when necessary, shall be prepared as described in Forest Service Manual 2670.

   When sensitive species are present, a Biological Evaluation shall be completed as described in Forest Service Manual 2670. Habitat for sensitive plants and animals shall be managed to ensure that management activities do not contribute to these species becoming threatened or endangered.

2. The Forest will initiate, support and cooperate with State and Federal fish and wildlife agencies in developing recovery plans for Federally listed threatened or endangered species. Where such plans conflict with other Management Area direction, the recovery plans will take precedence.

3. The Forest and Districts will cooperate in conducting inventories and keeping records of essential and/or critical habitat and its distribution for all T&E and sensitive species. Occupied habitats of threatened, endangered, and sensitive species will be monitored on a regular basis.

4. Collection of Federally listed threatened and endangered and R-6 listed sensitive plant species should only be allowed under permit. The issuance of permits must be preceded by the same degree of assessment required for other projects.

5. Before project decisions are made, consult with Federal, State, other agencies, groups, and individuals concerned with the management of T&E and sensitive species. In the design of projects for implementation where such species, areas, or habitats are known to occur, insure that appropriate action is taken to protect these species, areas, and habitats.

USDI Fish and Wildlife Service will be consulted for technical information and ESA Section 7 consultation when a management activity may affect a threatened or endangered species.

The Washington Department of Wildlife will be consulted for technical information in development of species management guides, and in determinations of viable population levels of sensitive species. The Washington Natural Heritage Program will be consulted for technical information regarding sensitive plant species or unique plant communities.

6. The Forest shall develop site specific management plans for threatened and endangered species in accordance with recovery plans.

   Species management guides shall be developed for each sensitive species. These plans should be developed on a regular basis and in order of highest priority so that all guides are completed by the end of the tenth year after approval of the Forest Plan. Following the development of a management guide for a sensitive species, projects will follow the objectives of the management guide.

7. Known bald eagle nests and roost sites are managed under standards and guidelines in Management Area 16A, Bald Eagle. Additional bald eagle nests or roost sites identified in the future will also be managed under that prescription.

   If habitats for peregrine falcons, resident gray wolves or grizzly bear are identified in the future, the standards and guidelines for these species in Management Area 16, Threatened and Endangered Species, will supersede the existing management prescription for these habitat areas.

8. The following standards and guidelines apply to bald eagle feeding areas. They indicate the typical management practices for these areas and typical sizes for the management areas. However, protection and mitigation needs will vary depending on the individual habitat site and will be determined in each case in consultation with the USDI Fish and Wildlife Service.

   a. The Forest will determine whether human activities are adversely affecting bald eagle use of feeding areas. Where these adverse effects are occurring, protection or mitigation measures will be identified and implemented. These may include restrictions or controls on human uses of these habitat areas at certain times.

   b. Existing developed sites will not be expanded and increased human use will be discouraged when monitoring identifies a potential conflict with bald eagle use of feeding areas.

   c. Roads shall not be planned within 1/4 mile of known feeding areas. Reconstruction activities will be prohibited when feeding areas are in use.

   d. Construction of development projects near feeding areas should not be conducted during the time of bald eagle use.

e. Development of new commercial or private homesites is prohibited within 1/4 mile of shorelines used as part of feeding areas.

f. Require air space restrictions for low level aircraft in the vicinity of feeding areas during the season of habitat use.

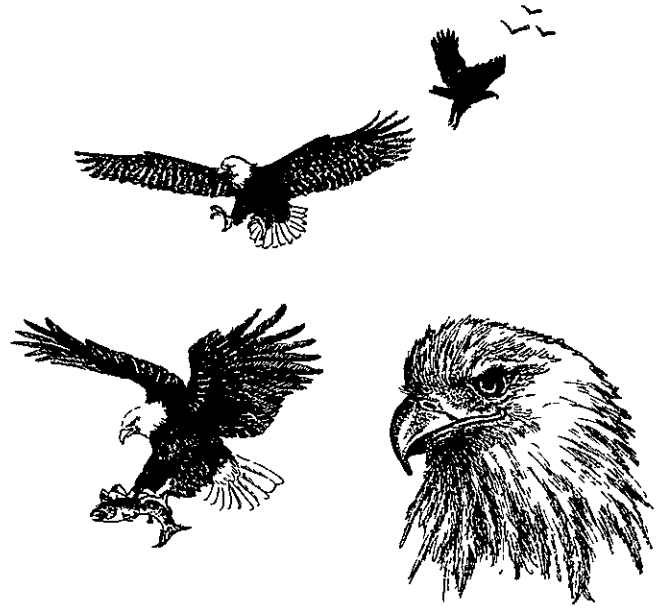
g. Timber management activities should be restricted within 1/4 mile of feeding areas during their season of use. There should be no treatment of fuels in feeding areas when in use.

h. Mineral activity shall be prohibited within 1/4 mile of shorelines used for bald eagle feeding.

i. In known feeding areas, perch trees within 200 feet of shorelines should be preserved.

9. Threatened, Endangered and Sensitive species of plants and animals are identified as important Air Quality Related Values. All permit applications to the Department of Ecology under the requirements of the Prevention of Significant Deterioration provisions of the Clean Air Act for modification or construction of pollution emitting facilities will be evaluated by the Forest for their potential impacts on AQRV's. Mitigating and monitoring requirements necessary for protection will be recommended for inclusion in any permits issued by the Department of Ecology.

10. All habitat improvement projects for Threatened, Endangered, or Sensitive species will be small-scale and experimental in nature until such time as species responses are better understood. When species response to a specific improvement project can be predicted, projects can be larger in scale and practical in nature.



TIMBER MANAGEMENT

Goal: Provide for the production of timber on lands classified as suitable for timber production consistent with various resource objectives, environmental constraints, and considering cost efficiency.

Suitable Forest Lands - Allowable sale quantity shall be programmed and harvested only on those lands classified as suitable for timber production.

Non-Declining Flow - The harvest schedule for any decade will be equal to or greater than the planned sale and harvest for the preceding decade of the planning period provided that the planned harvest is not greater than the long-term sustained-yield capacity consistent with the management objectives of the alternative (36 CFR 219.16(a)(2)(iv)).

Management Practices, Intensities, and Utilization Standards - The management intensities and utilization standards used in determining harvest levels are as follows:

1. Management Practices. Management intensities will vary with site productivity, timber species, other resource management objectives, and timing of implementation. Each of the following timber management practices may be used singly or in combination to determine the appropriate management intensity.

   a. Site preparation - chemical, mechanical, and prescribed fire.
   b. Genetic Tree Improvement.
   c. Reforestation by planting, seeding, or natural.
   d. Growing stock protection from animals, insects, and diseases.
   e. Release and weeding - chemical, mechanical, and prescribed fire.
   f. Precommercial thinning.
   g. Commercial thinning.
   h. Salvage harvest.
   i. Final harvest.
   j. Fertilization

2. Utilization Standards. Separate utilization standards are to be used in determining harvest levels for the first decade and future decades to the planning horizon. The standards displayed in the table below shall apply on the Forest, except where individual market areas or specific products present opportunities for standards specifying utilization of a higher proportion of the tree resource.

Table 4-19
Timber Utilization Standards

	Minimum DBH (Inches)	Minimum Top DIB (Inches)
Existing Timber Stands		
Final Harvest Size	9	6
Commercial Thinning Size	7	4
Regenerated Future Timber Stands	7	4

Culmination of Mean Annual Increment - Minimum rotation lengths will be based upon the length of time required to achieve volume production equivalent to at least 95 percent of culmination of mean annual increment. Exceptions are permitted for the use of sound silvicultural practices, for salvage or sanitation harvesting, or for the removal of a particular species of trees after considering the multiple objectives of the area.

Regeneration Assurance - When trees are cut to achieve timber production objectives, the cutting will be made so as to assure that lands can be adequately restocked within 5 years after final harvest [36 CFR 219.27(c)(3)]. Research and experience indicate that the harvest and regeneration practices planned can be expected to result in adequate restocking.

Adequate restocking for the Mt. Baker-Snoqualmie will meet the minimum stocking level for regeneration, as defined by a site-specific silvicultural prescription. Minimum stocking levels will generally be no lower than 190, well distributed established trees per acre. Five years after final harvest is defined as: 5 years after clearcutting, 5 years after final overstory removal in shelterwood cutting, 5 years after the seed tree removal harvest in seed tree cutting, or 5 years after selection cutting.

Created Openings

1. Forest openings created by the application of even-aged harvest cutting methods shall be limited to a maximum size of 60 acres in the Douglas-fir type of the coastal Douglas-fir zone, and to a maximum size of 40 acres for all other forest types in the Pacific Northwest Region. Exceptions are permitted for natural catastrophic events (such as fires, windstorms, or insect and disease attacks) or on an individual basis after a 60-day public notice period and review by the Regional Forester. In addition, the limits may be exceeded by as much as 50 percent without necessitating review by the Regional Forester, or 60 days public notice, when exceeding the limit will produce a more desirable combination of net public benefits.

   Created openings will be prescribed by the Silviculturist based on site objectives, site indicators and other site factors.

   These size restrictions may be increased 50 percent if any one of the following four criteria are met:

a. When a larger created opening will enable the use of an economically feasible logging system that will lessen the disturbance to soil, water, fish riparian resources, or residual vegetation. Such lessening is to be achieved by reducing landing or road construction, by enabling such construction away from unstable soil, or by reducing soil and vegetation disturbance caused by dragging logs.

b. When created openings cannot be centered around groups of trees infected with dwarf mistletoe or root rot and therefore need to be expanded to include these trees in order to avoid infection of susceptible adjacent conifers.

c. When visual quality objectives require openings to be shaped and blended to fit the landform.

d. Where larger openings are needed to achieve regeneration objectives in harvest areas being cut by the shelterwood method, and where destruction of the newly created stand would occur as a result of delayed removal of shelter trees. This exception applies only to existing shelterwood units and to shelterwood units under contract prior to approval of the Forest Plan.

2. A harvested area of commercial forest land will no longer be considered a created opening for silvicultural purposes when stocking surveys, carried out in accordance with Regional instructions, indicate prescribed tree stocking that is at least 4-1/2 feet high and free to grow (USDA, 1984b). When other resource management considerations (such as wildlife habitat, watershed needs, or visual requirements) prevail, a created opening will no longer be considered an opening when the vegetation in it meets a particular management objective stated in the Forest Plan.

3. Created openings will be separated by blocks of land that generally are not classed as created openings and that contain one or more logical harvest units. These areas shall be large enough and contain a stand structure appropriate to meet resource requirements of the Forest Plan. Resource requirements may include wildlife habitat, watershed, landscape management, and others. Contiguous harvest units (cornering or otherwise touching) are not precluded, but must be considered as a single opening which must be created within requirements for size, exception procedures, and justification.

   The total area of created openings contiguous to 30-acre or larger natural openings should normally not exceed one-third the size of the natural opening and not occupy more than one-third of the natural opening perimeter. Openings should not be created adjacent to any natural openings (regardless of size) unless adequate vegetation along the edge can be developed or retained in sufficient density to protect wildlife and visual management objectives. The determination of adequate vegetation will be made by an appropriate interdisciplinary team.

Silvicultural System - Even-aged silvicultural management has been determined, by experience and research, to be the optimum system for timber production on the Mt. Baker-Snoqualmie National Forest. (Refer to Appendix F in the FEIS.) Uneven-aged silvicultural system may be used, if necessary, to meet established requirements of other resources. Selection of a silvicultural system will be made with a site-specific analysis. Selection of the appropriate silvicultural systems will be guided by the following criteria and the land management allocation.

1. The selected silvicultural system must permit the production of sufficient volume of marketable trees to permit utilization of all trees which meet utilization standards and are designated for harvest.

2. The selected silvicultural system must permit the use of an available and acceptable logging method that has the capability to remove logs and other products without excessive damage to the identified desirable residual vegetation.

3. The selected silvicultural system must be capable of providing special conditions, such as a continuous canopy or continuous high density live root mats when required by critical soil conditions or needed to achieve management objectives such as streamside protection, wildlife needs, and visual resources.

4. The selected silvicultural system must permit control of existing or potential vegetation to a degree that establishment of number of trees, other desirable vegetation, and rates of growth as identified in site specific silviculture prescriptions for harvest areas can be achieved.

5. The silvicultural system selected must promote stand structure and species composition which avoids serious risk of damage from mammals, insects, disease, or wildfire and will allow treatment of existing insect, disease, or fuel conditions. Monoculture is to be avoided.

6. The silvicultural system selected must meet resource allocation and vegetation management objectives identified in the Forest Plan. Silvicultural systems for specific areas may be identified during the NEPA process.

7. Salvage harvest practices may be employed on suitable lands unless stated otherwise in a strategy.

Vegetative Manipulation Activities - All vegetative manipulation activities related to timber management will be prescribed for or approved by a certified silviculturist.

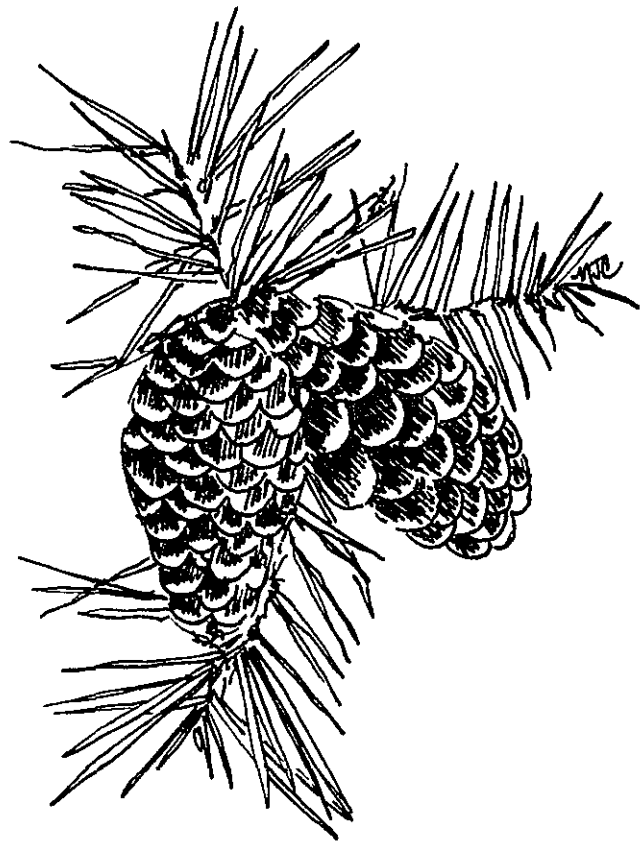
Timber Volume Chargeable to Allowable Sale Quantity (ASQ) - The timber sale preparation final package must state the volume of timber in MMCF that is chargeable to the ASQ. All volume included in the growth and yield projections to calculate the ASQ is net live timber volume meeting Forest Utilization Standards, and is chargeable to the ASQ. All other timber not meeting these Standards, including most dead and down, shall be nonchargeable.

Timber
Forest-wide S&G

Catastrophically killed stands of timber which were included in ASQ calculations would normally be sold as chargeable.

Western redcedar

Favor the regeneration and management of Western redcedar on those sites where it now occurs and on sites where environmental conditions are such that successful establishment and management would occur.

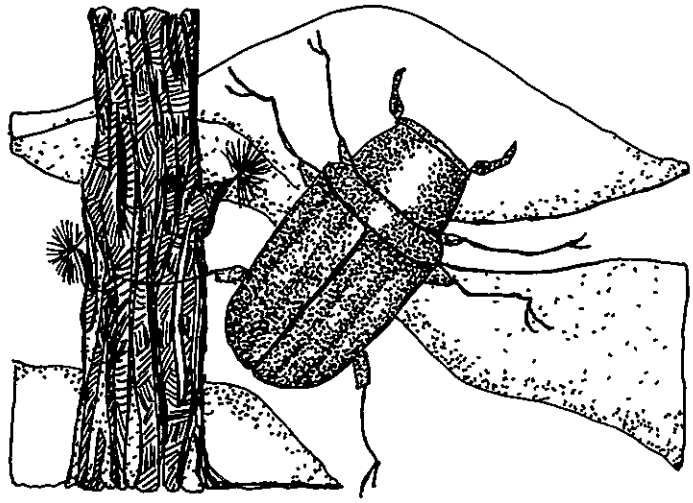


VEGETATION MANAGEMENT

Goal: Vegetation management and/or manipulation to meet objectives of the management areas.

1. Vegetation management and/or manipulation will follow the Record of Decision, Managing Competing and Unwanted Vegetation, Final EIS, Pacific Northwest Region, December 1988 (or as amended), the Mediated Agreement, and implementation direction.

2. Control noxious weeds to the extent practical. The following methods for control shall be used: mechanical, biological, access restrictions to prevent spread, seeding disturbed soils and use of herbicides. Small infestations of new noxious weeds (e.g. tansy ragwort should be eradicated as quickly as possible.



Minerals
Forest-wide S&G
MINERALS AND ENERGY

Goal: Provide for exploration, development, and production of mineral and energy resources while minimizing effects on the surface resources.

Management

1. An appropriate environmental analysis and documentation will be used as a basis for making recommendations in leasing or licensing and in determining necessary stipulations for the protection of other resources.

2. Processing and administration of all mineral, oil and gas and geothermal leases, exploration proposals, and development proposals will be in accordance with State and Federal rules, regulations, and standards.

3. Mineral exploration and mineral removal are permitted throughout the Forest, except withdrawn areas.

4. All activities which involve significant disturbance of the surface resources require a notice of intent and/or an operating plan be submitted and processed in accordance with 36 CFR 228.

5. Reclamation standards will be developed to insure land restoration to a productive condition to the extent practicable. Opportunities to enhance other resources will be considered. Concurrent reclamation will be required and bonded.

6. Withdrawal of lands from appropriation or entry under the mining or mineral leasing laws will be in accordance with Section 204 of the Federal Land Policy and Management Act of 1976 (FLPMA). Areas with mineral potential will be recommended for withdrawal from mineral entry when mitigation measures would not adequately protect other resource values which are of greater public benefit. Review of existing withdrawals will be made by 1991 as required by FLPMA.

7. For mineral lease applications submitted by USDI Bureau of Land Management, appropriate stipulations will be required for leases as necessary to achieve Management Area prescriptions. "No surface occupancy" stipulations will be incorporated in lease recommendations when: (a) surface occupancy would cause significant resource disturbance which cannot be mitigated by other means; (b) where resource impacts would be irreversible or irretrievable; or (c) the activity proposed is incompatible with the surface management prescription.

8. Common variety materials (including gravel pit sources) will be managed by lease, sale, or permit in accordance with the following criteria:

    a. Priority will be given to utilization of existing sources over development of new sources.

    b. Use will not be authorized where removal will conflict or interfere with prior authorization or Management Area prescriptions.

    c. Requests for use of common variety minerals will be processed as stipulated in 36 CFR 228, Subpart C.

    d. A development plan and appropriate NEPA documentation will be prepared prior to development of new common variety mineral sources.

LAND USES

Goal: To be responsive in the consideration of the use and occupancy of the Forest by private individuals, Federal, State, and local governments when such use is consistent with Forest management objectives, is in the public interest, and cannot be reasonably served by development on private land.

General

1. Special use evaluation, permit issuance, fees and administration will be in accordance with Forest Service Manual 2700 or as revised, and 36 CFR 251.

2. In considering special use applications, the needs of the general public will be given priority over the applicant.

3. Land to be used will be suitable for the proposed use and kept as small as is consistent with the intended use. National Forest land will not be made available for private development when suitable private land is available to support needs.

4. Provisions will be made to protect land and resources of the National Forest. Forest Service will approve location of all developments, designs, and plans for construction of facilities.

5. Applicants should be required to furnish necessary environmental analysis, other required studies, plats, etc., and provide funds for administration of the permit.

6. New resort activities, plus recreation and concession proposals will be selected through a competitive process if interest is shown by several parties.

7. Applicants for sites and facilities will be directed toward use of sites in the following order:

   a. Utilizing capacity of existing approved sites.

   b. Utilizing new sites through and following an environmental analysis. Site plans should be prepared prior to installing facilities.

Right-of-Way Grants and Acquisition

1. Grant needed easements to State and local governments for existing and relocated roads and highways. Follow 36 CFR 212.8, 9, 10, and 11 in granting and acquiring access across lands and easements administered by the Forest Service.

2. Acquire road and trail rights-of-way across non-National Forest land to implement and support resource management activities. Coordinate with intermingled and adjacent landowners, plus State and local government in developing roads or road systems that serve the needs of all parties.

3. Where appropriate, the Forest will enter into and continue existing cost share agreements. The Forest Cost Share program will be managed according to principles established in FSM 5467 and the deeds.

4. Grant access to private property in accordance with Federal rules, regulations and standards.

Landlines - Survey and mark boundaries to accomplish the following priorities: (1) protect present corners or references when the possibility of disturbance exists, (2) resolve or prevent encroachment, (3) assist forest users in identifying public lands, and (4) to help assure full utilization of National Forest resources.

Utility and Transportation Corridors

1. Future memoranda of understandings, project maintenance and construction plan will meet Forest Standards and Guidelines and Management Area 25 management direction.

2. When applications for rights-of-way for utilities and highways are received, the Forests' first priority will be to utilize residual capacity (within or contiguous) in existing corridors. The corridors will be planned and located to minimize ground and air disturbance.

3. The Forest will consider only that area between Pyramid Peak and Tacoma Pass as a potential new major cross Cascade utility corridor. This corridor will only be considered after the existing corridors have been utilized to their maximum.

4. Potential utility and transportation rights-of-way will be examined in relation to issues and concerns and resource management objectives.

5. Routes through wilderness are excluded from consideration as utility or transportation corridors. Routes through Management Areas 1A, 1B, 1C, 3A, 3C, 3D, 4, 5A, 5B, 5C, 7, 11, 12, 13D, 15, and 18 shall be avoided during consideration of utility or transportation corridors.

Other Uses - Applications for licenses or grants associated with dams and reservoirs shall be recommended for approval when they are consistent with the Management Area goals and objectives.

LAND ADJUSTMENTS

Goal: To provide an optimum pattern of landownership within the Mt. Baker-Snoqualmie National Forest considering resource goals and efficiency of managing the Forest.

Landownership Classification

1. All National Forest land and land in other ownerships within the forest boundary will be classified into one of five landownership classification groups. This classification system identifies opportunities to acquire, retain, exchange, or relinquish lands to facilitate administration of the Forest.

   Group Definitions.

   a. Group I - This group includes those lands where Congress has either directly or indirectly instructed the Forest Service to retain ownership and acquire non-Federal lands for a designated purpose.

   b. Group II - Landownership direction for Group II lands is to retain National Forest ownership and acquire private land as the opportunity and/or need occurs.

   c. Group III - These lands will be available for land adjustment and usually will provide most of the land considered in exchange projects.

   d. Group IV - Lands in this group are normally made available to acquire private land in Groups I, II, or III areas.

   e. Group V - This group includes situations where it is determined that a more intensive study and planning are necessary before landownership decisions are made.

FACILITIES

Goal: Provide and manage roads, facilities, and utility systems required to protect and manage the Mt. Baker-Snoqualmie National Forest.

Roads

1. Planning.

   a. The Forest Transportation System will be planned to serve long-term multiple resource needs as provided in Management Area direction.

   b. Maintain the Forest Road Management Plan.

2. Construction. Roads will be designed, constructed, and/or reconstructed according to standards appropriate to planned uses, activities, safety, economics, and impacts on lands and resources using criteria in FSM 7700 and 7720 or as revised.

3. Operations and Maintenance.

   a. Operate, maintain, and/or close roads to meet established road management objectives and safety.

   b. Where appropriate, the Forest will enter into and continue existing cost share agreements.

   c. Close and return to the planned resource use all roads not on the Forest Development System or authorized by permit, lease, or easement. Measures will be taken to prevent excessive resource damage.

   d. Develop and implement projects to correct road related water quality, anadromous fish habitat, and other resource problems.

Facilities

1. Facilities will be managed to support Forest Management Objectives.

2. Barrier free access will be provided in facilities when mandated by Washington State Law or by Forest Service policy.

3. Facility alterations will be accomplished in conformance with the cultural management requirements of the site.

4. All new facilities on the Forest should employ the Cascadian architectural style. The Cascadian style is a variety of rustic architecture. It's character-defining elements are described in Appendix A of the Internal Management Guidelines for Depression-Era Buildings.

   a. Design shall borrow from, but not duplicate, the elements of Cascadian design.

   b. Design shall emphasize the use of wood and other Forest resources.

c. Use wood frame designs in administrative sites, except in the immediate vicinity of existing log buildings.

d. Use contemporary wood products in public interior spaces where they will be dominant and seen.

e. Vary interior and exterior textures. Shake roofs, alternation of direction and pattern of siding, rough-sawn wood textures and occasional stone treatments on prominent walls will create visual interest.

f. Use heavy posts of wood or stone for porticos and interior columns.

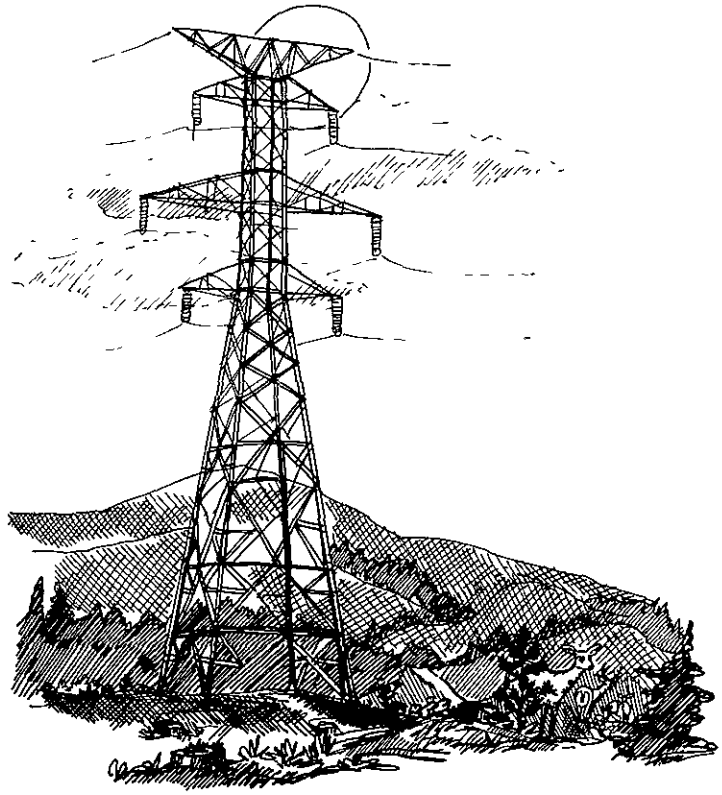
g. Windows can be aluminum, but should be darkly anodized. Consider using snap-in mullions.

h. Establish an integrated paint scheme for building groups. Use earth tones. All buildings on a site need not be the same color (for example, office, residential and service buildings might each have a distinct color treatment, within an integrated scheme).

i. Design steep roof pitches of gable and hipped gable structure.

j. Proportion and align floors, windows, eaves, roof heights, building setbacks and building axes to adjoining buildings.

k. Match the scale of adjoining buildings.



PROTECTION

Pest Management

Goal: Protect forest and range resources from unacceptable losses due to destructive forest pests.

1. Develop and practice the use of Integrated Pest Management (IPM) prevention and suppression strategies. Methods may include management practices (cultural or silvicultural), biological, mechanical, manual, prescribed fire and/or chemical treatments, and regulatory measures. Prevention and suppression methods will be based on environmental analysis.

Fire

Goal: Provide and execute a fire protection and fire use program that is cost efficient and responsive to land and resource management goals and objectives.

1. All wildfire will receive an appropriate suppression response utilizing a strategy of confine, contain, or control.

2. Wildfires that threaten life, property, public safety, improvements, or investments will receive aggressive suppression action using a control strategy.

3. Prescribed fire will be considered for use in meeting management objectives in areas where ecological studies show that fire has played a significant role in ecosystem development.

4. Prescribed fire will be utilized only when careful analysis indicates that it will be cost effective and practical. This analysis will include consideration of measures to mitigate impacts on air quality, such as increased removal of slash from the site, reduction of acres to be burned for hazard reduction, and ignition and burning techniques that reduce fuel consumption.

5. Maintenance of air quality will be a key factor in planning prescribed fire use. Consideration will be given to mitigation measures, such as burning during a longer season to spread emissions throughout the year, avoidance of burning near recreational units during times of peak use, and coordination with State smoke management plans.

Fire Management Direction

Fire Protection: GROUP A Area: 315,000 acres

Applicable Management Areas: 2A,2B,3A,3B,3C,3D,7,8,11,12,16A,23A,25A,25B

Recommended Fire Prevention Intensity: Moderate

Recommended Fire Suppression Strategy: Control

Fire Suppression Direction:

Appropriate suppression action will be taken on all wildfires within the area these allocations apply. A contain or control strategy will be utilized on human caused fires and other wildfires which threaten cultural resources, capital investments, or other areas where preservation of existing vegetation is desired.

Prescribed Fire Direction:

Prescribed fire may be used to accomplish specific resource management objectives if it is the most cost effective method to use. All projects will recognize air quality and smoke management constraints. Unplanned ignitions may be used if they occur when prescription parameters needed to accomplish the prescribed fire objectives for the area can be met.

Operational Constraints:

Economic efficiency, guided by the maximum fire size constraint, will control the intensity of fire suppression efforts. The full range of suppression tactics and tools are available, although those with the least impact on the ground are preferred. Control or contain actions will be taken on any fire which has the potential to exceed the maximum fire size constraint for these allocations. Mop-up actions will be consistent with and insure the success of the suppression actions taken.

Fuel Management Objectives:

Activity fuels will be treated to the level necessary to achieve the expected resource objectives of the area. Normally this will be to return the area to as near natural appearance as possible. Natural fuels will not be treated except where necessary to meet specific resource or activity objectives.

Fire Management Direction

Fire Protection: GROUP B Area: 730,000 acres

Applicable Management Areas: 4,10A,10B,10C,10D,10E

Recommended Fire Prevention Intensity: Low

Recommended Fire Suppression Strategy: Confine Natural Ignition. Contain or Control Human Caused Ignitions

Fire Suppression Direction:

All wildfires will receive appropriate suppression action. Contain or control strategies will be used when wildfires threaten identified cultural sites or improvements or has the potential to leave the wilderness area and result in unacceptable damages. A confine strategy will be used elsewhere.

Prescribed Fire Direction:

Natural ignitions occurring under conditions that satisfy specific prescription parameters for the area may be used to accomplish wilderness objectives that are achievable through prescribed fire. Accidental human caused fires will not be used to accomplish prescribed fire objectives and will be suppressed. Planned ignitions may be used where necessary to meet wilderness management objectives.

Operational Constraints:

Containment or control actions will be in accordance with wilderness suppression guidelines (FSM.) Indirect attack utilizing natural barriers and changes in vegetation and topography will be utilized whenever possible. All actions will minimize disturbance to vegetation and soil. Helicopters may be utilized if they are the most cost efficient method of accomplishing the job. Natural openings will be utilized as helispots whenever possible. Clearing will be held to a minimum. Power saws and other mechanized equipment will be used only after Forest Supervisor approval. Air tankers will be used only on wildfires which threaten non-wilderness values. Mop-up will be limited to that necessary to maintain the integrity of contain or control objectives when applied.

Fuel Management Objectives:

Treatment of activity fuels will be consistent with wilderness management objectives.
As with other activities, the method least impacting on the land and vegetation will be the preferred method if disposal is necessary.

Fire Management Direction

Fire Protection: GROUP C Area: 288,000 acres

Applicable Management Areas: 1A, 1B, 1C, 1D

Recommended Fire Prevention Intensity: Low

Recommended Fire Suppression Strategy: Confine, Contain, or Control

Fire Suppression Direction:

Appropriate suppression action will be taken on all wildfires within the area this allocation applies. The contain or control strategies will be utilized when wildfires threaten cultural resources, capital investments or other areas with more constrained fire management direction.

Prescribed Fire Direction:

Prescribed fire may be utilized to accomplish specific resource management objectives if it is the most cost efficient method. All projects will recognize air quality and smoke management constraints. Unplanned ignitions may be used if they occur when prescription perimeters needed to accomplish the prescribed fire objectives for the area can be met.

Operational Constraints:

Economic efficiency rather than a specified acreage constraint will control the intensity of fire suppression efforts. The full range of suppression tactics and tools are available, though those with the least impact on the ground are preferred. Contain or control actions will be taken on any fire which has the potential to exceed the annual maximum allowable burned acreage for this allocation. Mop-up actions will be consistent with insuring success of contain or control actions where deployed.

Fuel Management Objectives:

Activity fuels will be treated to the level necessary to achieve the expected resource objectives of the area. Normally this will be to return the area to as near natural appearance as possible. Natural fuels will not be treated except where necessary to meet a specific resource or activity objective.

Fire Management Direction

Fire Protection: GROUP D Area: 68,000 acres

Applicable Management Areas: 5A,5B,5C,6,13

Recommended Fire Prevention Intensity: Low

Recommended Fire Suppression Strategy: Control

Fire Suppression Direction:

Control all wildfires at 5 acres or less.

Prescribed Fire Direction:

Prescribed fire has limited application in this allocation. Maintenance of total vegetation cover is critical to meeting resource objectives. Some burning of piled debris may be utilized.

Operational Constraints:

Avoid the use of ground disturbing equipment within 100 ft of water courses. Avoid the use of retardant within 200 ft of water courses. Firelines should be located away from stream courses. If possible maintain at least 50 ft between the stream course and firelines. Tactics which maintain the greatest proportion of riparian vegetation are preferred. Mop-up should be aggressive and directed at retaining as much riparian vegetation as possible.

Fuel Management Objectives:

Natural fuels shall be left in place for soil stability. Activity fuels shall be treated to (1) a level that results in a fire intensity of no more than Class 3 (Flame Length 4 to 6 Ft) when measured 3 years from creation under median summertime weather conditions or (2) meet specific resource need, whichever is lower.

Fire Management Direction

Fire Protection: GROUP E (1) Area: 143,000 acres

Applicable Management Areas: 14,15A,17,19,21

Recommended Fire Prevention Intensity: Low

Recommended Fire Suppression Strategy: Control or Contain

Fire Suppression Direction:

Suppress all wildfires at 50 acres or less using the most cost efficient suppression tactics. An exception to this would be in those areas where this allocation abuts one with a more stringent objective or when private land boundaries are threatened. In these situations a 10 acre control objective is appropriate.

Prescribed Fire Direction:

Prescribed fire may be utilized to accomplish specific resource management objectives. Plans must be accompanied by an evaluation which indicates it to be the most environmentally and cost effective method to meet the objectives. Only planned ignitions will be utilized. All projects will be executed in accordance with air quality and smoke management guidelines.

Operational Constraints:

Direct attack will normally be used under Fire Intensity Level (FIL) 1 and 2 conditions and indirect attack methods used under FIL 3+.
Mop-up will be of sufficient intensity to maintain the control integrity.
The full range of suppression techniques is available.

Fuel Management Objectives:

Natural fuels will be treated only when necessary to meet a specific resource or activity objective.
Treatment of activity fuels to meet specific resource or activity objectives will in most cases achieve residue loadings compatible with protection needs of this area. Except where environmental constraints prohibit it, the projected fire intensity caused by the presence of activity fuels should not exceed FIL 3 when evaluated at a point in time three years after creation under median weather conditions for the area.

Fire Management Direction

Fire Protection: GROUP E (2) Area: 103,000 acres

Applicable Management Areas: 17,21,22

Recommended Fire Prevention Intensity: High

Recommended Fire Suppression Strategy: Control or Contain

Fire Suppression Direction:

Suppress all wildfires at 25 acres or less using the most cost efficient suppression tactics. An exception to this would be in those areas where this allocation abuts one with a more stringent objective or when private land boundaries are threatened. In these situations a 10 acre control objective is appropriate.

Prescribed Fire Direction:

Prescribed fire may be utilized to accomplish specific resource management objectives. Plans must be accompanied by an evaluation which indicates it to be the most environmentally and cost effective method to meet the objectives. Only planned ignitions will be utilized. All projects will be executed in accordance with air quality and smoke management guidelines.

Operational Constraints:

Direct attack will normally be used under Fire Intensity Level (FIL) 1 and 2 conditions and indirect attack methods used under FIL 3+.
Mop-up will be of sufficient intensity to maintain the control integrity.
A full range of suppression techniques are available.

Fuel Management Objectives:

Natural fuels will be treated only when necessary to meet a specific resource or activity objective such as wildlife habitat, site prep, etc. Treatment of activity fuels to meet specific resource or activity objectives will in most cases achieve residue loadings compatible with protection needs of this area. Except where environmental constraints prohibit it, the projected fire intensity caused by the presence of activity fuels should not exceed FIL 3 when evaluated at a point in time three years after creation under median weather conditions for the area.

Fire Management Direction

Fire Protection: GROUP E (3) Area: 37,000 acres

Applicable Management Areas: 17,21,

Recommended Fire Prevention Intensity: High

Recommended Fire Suppression Strategy: Control or Contain

Fire Suppression Direction:

Contain all wildfires to essentially the cutover area within which they start except those fires which threaten private property or equipment will be controlled at the least practical acreage, usually 10 acres or less.

Prescribed Fire Direction:

Prescribed fire may be utilized to accomplish specific resource management objectives. Plans must be accompanied by an evaluation which indicates it to be the most environmentally and cost effective method to meet the objectives. Only planned ignitions will be utilized. All projects will be executed in accordance with air quality and smoke management guidelines.

Operational Constraints:

Indirect attack utilizing vegetation type changes, i.e. leave strips or mature timber, should be used whenever practical.
Mop-up will be of sufficient intensity to maintain the contain integrity.
A full range of suppression techniques are available except that air tankers will normally only be used along unit boundaries except where private land or equipment is involved.

Fuel Management Objectives:

Natural fuels will be treated only when necessary to meet a specific resource or activity objective such as wildlife habitat, site prep, etc. Treatment of activity fuels to meet specific resource or activity objectives will, in most cases, achieve residue loadings compatible with the protection needs of these areas.

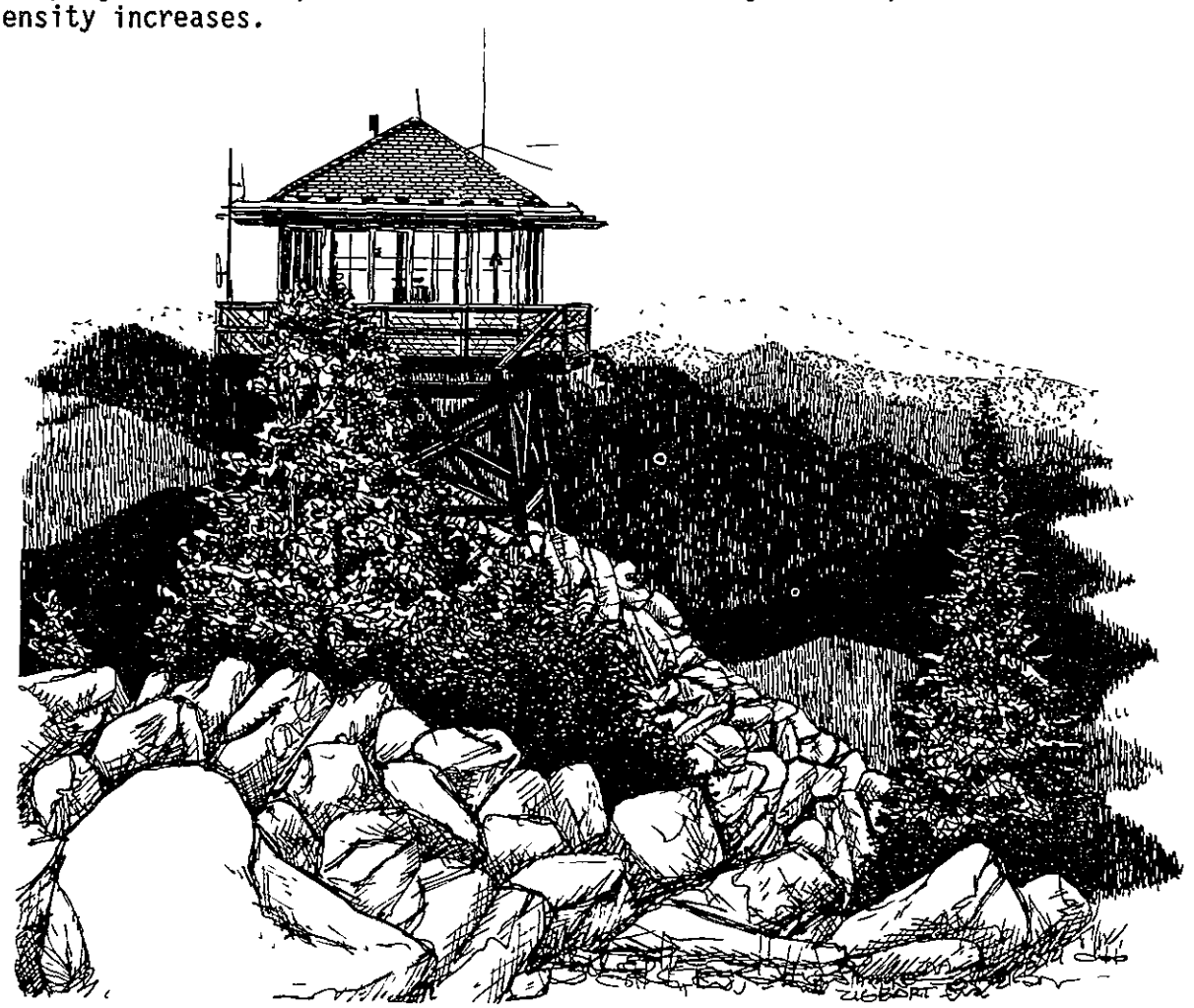
Except where environmental constraints prohibit achievement, the projected fire intensity caused by the presence of activity fuels should not exceed FIL 3 when evaluated at a point in time three years after creation under median weather conditions for the area.

Fire Prevention Plan

The achievement of the expected outputs from the various prescription and land allocations is affected by many variables. Maintaining losses from wildfire at or below the levels for each allocation is one of these. The protection objectives anticipated are met through a combination of prevention, detection, presuppression, preparedness, fuels management, and fire suppression activities. This plan details the prevention actions proposed as part of the total protection program needed to meet the land management objectives.

The various land management prescriptions and allocations have different risks of human-caused fires associated with them. They also have different constraints to the extent that wildfire can be tolerated without adversely impacting the expected outputs. In order to recognize these differences and to maintain a cost effective program, we have developed a graduated program which varies the level of prevention emphasis with the need to insure that expected outputs are met.

Three levels of prevention emphasis have been developed. Each prescription and/or land allocation has one of the three prevention levels associated with it. The individual levels contain specific direction relative to personal contacts, regulation of uses, signing, inspections and law enforcement and mass media programs. The specific action under each vary as the prevention intensity increases.



Prevention Levels

METHOD	I LOW	II MODERATE	III HIGH
Public Contacts	1. Incidental-done as a part of other contacts. Message content designed to maintain general fire awareness. 2. Fewer than 10% of the users will have direct contact during the fire season.	1. Contacts are secondary to other purposes but have a specifically designed message and target. 2. Message should emphasize the damaging effects of wildfires. 3. Fewer than 25% of the users should be contacted during the fire season.	1. Contacts are specifically for conveying fire prevention messages or the enforcement of regulations. 2. Messages should emphasize the costs of wildfires as well as the damaging effects. 3. Individual messages should be targeted to specific problems, areas, or users. 4. A minimum of 50% of the industrial users should be contacted during the fire season, and 20% of the non-industrial users.
Regulation of Fire Use	1. Normal CFR's, state laws and contracts or permit provisions are sufficient to control starts. 2. Restriction on specific uses or activity will be limited to periods of critical fire risk.	1. Normal CFR's. 2. Restrictions on specific uses may be initiated during portions of the fire season.	1. Specific restrictions on use of fire and spark omitting equipment may be initiated during the fire season. 2. Restrictions will be designed to address specific groups of users or types of activities.

Prevention Levels, continued

METHOD	I LOW	II MODERATE	III HIGH
Signing	1. Conducted as part of the general information signing for the area.	1. A limited amount of general information and motivational signing should occur.	1. The actions in Level 1 and II should occur.
	2. Prevention messages should be both general and positive. Main theme should be motivational in nature.	2. Special prevention messages posted along travel routes and at destinations.	2. Additional signing should include fire restriction emphasis.
		3. Messages should be informational in nature but directed to specifically identified problems.	3. Emphasis should be made at high use/ high risk areas.
Inspection and Law Enforcement	1. Done as part of the regular monitoring job.	1. Done as part of user contact programs.	1. Specific inspection contacts will be made in heavy use areas during the fire season.
	2. Flagrant violations will be processed as they are discovered.	2. Emphasis will be correction of violations.	2. Violations will be processed as discovered.
	3. Emphasis will be educational.	3. Flagrant violations will be processed as discovered.	3. Media program will emphasize violations or convictions.
Mass Media Programs (Radio/TV)	1. No specific programs.	1. Message will be directed to specific problem or groups.	1. Messages will be targeted to specific problems or groups.
	2. Any message will be general and incidental to principle messages being conveyed.	2. Messages will usually be combined with other subject matter.	2. Messages will be single purpose.

E. MANAGEMENT AREA PRESCRIPTIONS

Each acre of National Forest land within the Mt. Baker-Snoqualmie has been assigned to one of the following management areas. This section of Chapter 4 shows the individual management area prescriptions which apply to projects, activities, and uses on the Forest. **The standards and guidelines for each management area must be used in conjunction with the Forest-wide Standards and Guidelines.**

Refer to Table 4-20 for the acres allocated to each MA in this Forest Plan. The Alternative J (Preferred) maps accompanying this document show the on-the-ground location of all the management areas. A Forest Plan control map will be developed; it will be the authoritative reference for interpreting and implementing the spatially-related direction in this Forest Plan. A master copy of the Forest Plan Control map, updated to reflect any amendments or revisions, will be maintained in the Forest Supervisor's Office.

Table 4-20
Management Area Acreages

Management Area	J (Preferred)
Lands Suitable for Timber Production	346,411
1 Dispersed Recreation	
1A Primitive	45,278
1B Semi-Primitive Nonmotorized	225,104
1C Semi-Primitive Motorized	2,981
1D Roaded Natural Recreation	14,926
1E General Dispersed Recreation	0
1F 1926 Mt. Baker Recreation	0
Subtotal	288,289
2 Scenic Viewshed	
2A Foreground	23,406
2B Middleground	95,795
Subtotal	119,201
3 Developed Recreation	
3A Public Sector Sites	1,819
3B Potential Recreation Sites	0
3C Winter Sports Resorts	6,041
3D Private Sector Sites	558
Subtotal	8,418
4 Mt. Baker National Recreation Area	8,740
5 Potential Wild & Scenic River	20,865
6 Skagit Wild & Scenic River	17,037
7 Amer Indian Religious/Cultural Use 4/	0
8 Special Areas 5/	6,321
10 Wilderness	
10A Transition	15,078
10B Trailed	49,015
10C General Trailless	457,000
10D Dedicated Trailless	191,606
10E Special Area	9,017
Subtotal	721,716
11 Old Growth Habitat	54,191
12 Mature & Old Growth Habitat	19,282
13 Watershed, Wildlife and Fisheries Emphasis in Riparian Areas 6/	
13D Level III Anadromous, Potential Resident Fish Habitat Capability	47,048
14 Deer and Elk Winter Range	33,587
15 Mountain Goat Habitat	
15A Management Requirements	17,110
15B Habitat Improvement	0
Subtotal	17,110
16 Threatened & Endangered Species	
16A Northern Bald Eagle	2,808

Table 4-20 Page 2 of 2
Management Area Acreages

Management Area	J (Preferred)
17 Timber Management Emphasis	166,611
18 Research Natural Areas 8/	5,233
19 Mtn Hemlock Zone	31,965
20 Cedar River Municipal Watershed	
20A Current Direction, Exchange NF Lands to City	0
20B Exchange NF Lands, City Maintains Old Growth	0
20C Retain NF Land, Maintain Old Growth Habitat	0
20D Negotiate new Cooperative Agreement	11,724
21 Green River Municipal Watershed	
21A Current Direction, Timber Harvest, Disp Rec. OK	24,935
21B Timber Harvest OK, Most Public Rec. Prohibited	0
22 Sultan River Municipal Water	
22A Closed Except Protect Watershed & Hydropower Production, Exchange NF Lands	0
22B Current Situation, Exchange NF Lands, Moderate Timber Harvest, Restricted Recreation	8,399
22C Retain NF Lands, Full Multiple Use	0
23 Other Municipal Watersheds	
23A Timber Harvest, Moderate Recreation	13,138
23B No Harvest, Limited Recreation	0
25 Special Uses - Utilities	
25A Utility Corridors 9/	[1500]
25B Electronic Sites	1,014
26 Administrative Sites	143
27 Alpine Lakes Mgt. Area 10/	95,305

1/ Total acres in each alt. vary due to rounding. MA 9 not used, MA 24 Min. Mgt. not assigned in any alternative.
2/ Applies only to Alt. A; includes mostly unroaded, but some roaded recreation, from exisitng Multiple Use Plans.
3/ Parcels of the 1926 area that remain outside of wilderness and the Mt. Baker NRA are included here.
4/ Acres are protected, at varying levels, in the alternatives, but not shown to protect confidential nature.
5/ Includes: Cultural-Historic, Geologic, Biologic, Botanic, and Scenic Special Areas.
6/ Many acres of riparian zone fall within other MA's and are protected through those management prescritptions.
7/ Management Areas 16B Grizzly Bear, 16C American Peregrin Falcon, and 16D Gray Wolf have no acres assigned at this time, because no specific habitat has been identified or evaluated.
8/ Acres of existing or proposed RNA located within wilderness are included in MA 10, not here.
9/ These acres overlap other MA's.
10/ Includes acres within the congressionally designated Alpine Lakes Management Unit that are not otherwise assigned to other, compatible management areas. (Compatible MA's include: 5, 11, 12, 14, 15, and 16.)

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iA

1 DISPERSED RECREATION

Goal: To provide for a spectrum of dispersed recreation opportunities in a predominately natural or naturally appearing environment through the management of user activities and natural resource settings.

Description of Lands Where Prescription Applicable This prescription is applied to selected acres throughout the forest. It does not occur in wilderness or existing developed recreation sites.

Desired Future Condition: Varies by Intensity.

Intensities In Management Area 1:

1A Primitive
1B Semi-Primitive Nonmotorized
1C Semi-Primitive Motorized
1D Roaded Natural

INTENSITY 1A: PRIMITIVE

Desired Future Condition: Unmodified natural environment has been maintained with a high probability of isolation. Evidence of human activities would be unnoticed by most users. Primitive recreation opportunities are available with a high degree of risk and challenge On-site controls, facilities, or modifications are unlikely and would be provided only for resource protection and users safety. Timber harvest is not appropriate and is not scheduled. Because of the distances involved, most use is overnight in character. Concentration of users is very low, generally under 0.1 RVD's/acre/year. Roads will be generally three miles from these zones and normally one would expect to hike one to three hours to access these areas.

Program Element	Standards and Guidelines
A. Recreation	
1. Trail Planning	a. Trails should be located to take advantage of viewing opportunities in high Visual Absorption Capability terrain, and to enhance primitive opportunities.
	b. Trails will generally be constructed and managed to a standard of "more difficult" and "most difficult."
2. Visual Quality	a. Visual Quality Objective of preservation should be maintained, lower standards are acceptable in the event of unregulated harvest necessary for catastrophic events. Practices should be employed in a manner that best achieves the objectives of primitive intensity
3. American Indian Religious and Cultural Use	a Meet Forest-wide Standards and Guidelines.

4 Facility and Site Management	a.	None provided, except at sites where needed to respond to primitive recreation need. Existing sites not needed, will be removed following cultural resource evaluation
	b.	On-site signs will be permitted
5. Use Administration	a.	Issue entry permits or group size limitations where necessary to meet goals for area management or resource protection.
	b.	Dispersed campsites should not have user-built improvements such as, shelters, drainage controls, drift fences, etc
	c.	Manage according to Primitive ROS goals and standards.
	d.	Campfires may be limited to designated sites, or prohibited, as needed for resource protection
	e.	Recreational stock should be held overnight outside of the foreground areas of lakes, streams, camp areas and trailsides.
	f.	Dispersed camp areas located to take advantage of topographic and vegetative screening.
	g.	Area is closed to motorized ORV use
	h.	Use of power tools allowed.
	i.	Multiple trails at focal points should be discouraged with management practices aimed at halting the spread of these trails. Generally trails will be constructed and maintained to standards of "most difficult."
B. Wilderness	a.	Not applicable.
C. Wildlife and Fish		
1. Planning	a.	Trails and camping areas should avoid known essential habitat components including escape and thermal cover, goat kidding areas, travel corridors, mineral licks and raptor nest sites where user activity may be expected to disturb or jeopardize these areas.
2. Non-Structural Habitat Improvement	a.	Fish stocking is allowed to improve or re-establish anadromous or resident species
	b.	Vegetative manipulation to enhance wildlife habitat is allowed within the constraints of a Primitive setting.

	3. Structural Habitat Improvement	a.	Habitat improvement projects are generally acceptable, but they shall be unnoticed and blend into the natural landscape.
D.	Range	a.	Meet Forest-wide Standards and Guidelines
E.	Timber		
	1 Timber Management Planning	a	No scheduled harvest. Harvest may take place in the event of a catastrophic event such as fire, insects, disease, or blowdown The intent of such harvest is limited to preventing further losses or protecting other resources or adjacent lands,and not for recovery of merchantable timber. Preference given to those systems having the least effect on primitive values.
		b	Replant in native species.
F.	Water, Soil, and Air	a.	Meet Forest-wide Standards and Guidelines; where applicable use endemic or native species for erosion control.
G.	Minerals and Geology	a.	Meet Forest-wide Standards and Guidelines
H.	Rural Community and Human Resources	a	Volunteers and other human resource programs will be used to augment site and facility maintenance work where applicable.
J.	*Lands*		
	1. Special Use Management	a	Do not locate utility corridors, dams and diversions in these areas.
	2 FERC License and Permits	a.	Recommend against FERC license or permits
	3. Land Ownership Planning	b	Place all these lands in Group II - retain or acquire when possible
	4 Rights of Way Cost Share	a	Do not share cost on roads accessing private inholdings.
L.	Facilities		
	1. Transportation System Planning	a	Road development is not permitted, except where access to manage catastrophic timber loss is not practicable by aerial means. In such cases roads will be temporary and returned to a near natural condition when harvest project is complete.
		b.	Any existing roads are closed to motorized use and access, such primitive roads will be allowed to naturally revegetate.
P.	Protection		
	1. Fire Management Planning	a.	Forest-wide Fire Protection Group C applies
	2. Forest Pest Management	a.	Meet Forest-wide Standards and Guidelines.

INTENSITY 1B: SEMI-PRIMITIVE NONMOTORIZED

Desired Future Condition· Areas are characterized by a predominately natural or naturally appearing environment generally free from evidence of sights and sounds of human activities. Opportunity exists for isolation. Recreational experiences carry a moderate degree of risk and challenge Concentration of users is low, generally under 0 6 RVD's/acre/yr. Timber harvest is not appropriate and is not scheduled. Roads will generally be a quarter mile to three miles from these areas.

Program Element		Standards and Guidelines
A	Recreation	
	1. Trail Planning	a Trails located to take advantage of viewing opportunities located in high Visual Absorption Capability terrain, and serve to disperse users.
		b Generally trails will be constructed and managed to the standard no higher than "more difficult." If, however the demand exists for a particular recreation opportunity a higher standard trail may be constructed.
	2. Visual Quality	a. Visual quality objective of retention should be maintained.
	3 American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines.
	4. Facility and Site Management	a. Limited facilities allowed to achieve signing, sanitary, safety needs, resource protection, and recreation enhancement.
		b Facilities allowed for resource protection and enhancement, and for the purposes of health and safety. Should use rustic materials, maintaining a natural appearance
		c Signs may be provided at all major trail junctions and trailheads indicating routes, distances, and destinations. Additional signing may be provided for user safety and resource protection.
		d Experience level 2 campgrounds may be constructed for nonmotorized uses.
		e Some interpretation through self-discovery or on-site interpretation
	5. Use Administration	a. Group size restriction may be employed where needed for resource protection.
		b. Issue entry permits if necessary to meet goals for area management or resource protection.

		c. Campsites are typically informal, fire rings and user built improvements are allowed.
		d. In overused areas, campsites may be designated and open fires restricted.
		e. Manage according to Semi-Primitive Nonmotorized ROS goals and standards.
		f Recreational stock should be held overnight outside of the foreground areas of lakes, streams, camp areas, trailsides.
		g. Dispersed camp areas located to take advantage of topographic and vegetative screening.
		h. Area is closed to ORV use, snowmobile use is allowed, except where posted as closed.
		i. Use of power tools allowed.
		j. User built trails are allowed, within the constraints of protecting resources from damage.
B. Wilderness		a. Not applicable.
C. Wildlife and Fish		
1. Planning		a. Trails and camping areas should avoid known essential habitat components including escape and thermal cover, goat kidding areas, travel corridors, mineral licks and others where user activity may be expected to disturb or jeopardize these areas.
2 Non-Structural Habitat Improvement		a. Fish stocking allowed to improve or or resident species.
		b Vegetative manipulation to enhance wildlife habitat is allowed within the constraints of a Semi-Primitive Nonmotorized setting
3 Structural Habitat Improvement		a. Habitat improvement projects acceptable if they meet foreground retention visuals and other standards of the Semi-Primitive Nonmotorized ROS class
D. Range		a Meet Forest-wide Standards and Guidelines

E.	Timber		
	1. Timber Management Planning	a.	No scheduled harvest. Harvest may take place in the event of a catastrophic event such as fire, insects, disease, or blowdown. The intent of such harvest is to prevent further losses or protect other resources or adjacent lands and not for recovery of merchantable timber. Preference given to those systems having the least effect on Semi-Primitive values.
		b	Replant in native species.
F.	Water, Soil, and Air	a.	Meet Forest-wide Standards and Guidelines.
G.	Minerals and Geology	a.	Meet Forest-wide Standards and Guidelines.
H.	Rural Community and Human Resources	a.	Volunteers and other human resource programs will be used to augment site and facility maintenance work where applicable.
J.	Lands		
	1 Special Use Management	a.	Avoid locating utility corridors in these areas.
		b.	Avoid locating special uses in this area which are incompatible with the management prescription and desired future condition.
	2. Land Ownership Planning	a.	Place all these lands in Group II - retain or acquire when possible.
	3. Rights of Way Cost Share	a.	Do not share cost on roads accessing private inholdings.
L.	Facilities		
	1. Transportation System Planning	a.	Road development should not be permitted, except where access to managed catastrophic timber loss is not practicable by aerial means. In such cases roads will be temporary and returned to a near natural condition when harvest project is complete.
		b.	Any existing roads are closed to motorized use and access, such primitive roads will be allowed to naturally revegetate, and return to a naturally appearing condition
P.	Protection		
	1. Fire Management Planning	a	Forest-wide Fire Protection Group C applies.
	2. Forest Pest Management	a.	Meet Forest-wide Standards and Guidelines

INTENSITY 1C SEMI-PRIMITIVE MOTORIZED

Desired Future Condition: This is an area where alterations to the natural landscape may be moderately dominant and may exist, but not draw the attention of motorized users within the area. Offers the opportunity to experience a moderate degree of isolation from the sights and sounds of human activity, allows one to establish some sense of independence and closeness to nature. Develops a moderate feeling of self-reliance through the use of outdoor skills. Area is managed to minimize the presence of on-site controls and use restrictions. There will often be the evidence of other users, but the concentration of these users is low, generally under 3.5 RVD's/acre/year. Motorized use is allowed, but may be seasonal in nature in some areas. Timber harvest is not appropriate.

Program Element		Standards and Guidelines
A.	Recreation	
	1 Trail Planning	a. Trails located to take advantage of viewing opportunities, high Visual Absorption Capability (V.A.C.) terrain, travel loops and motorized recreation challenge. Generally trails will be designed and maintained to the standard of "more and most difficult."
	2. Visual Quality	a. A range of Visual Quality Objective from retention to partial retention should be maintained.
	3. American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines.
	4. Facility and Site Management	a. Limit facilities to tables, fire places, sanitary and safety needs; built in rustic materials (level 2 scale of development).
		b Signs provided at all major trail junctions and trailheads, indicating routes, distances, and destinations. Additional signing may be provided for user safety and resource protection
		c. On-site interpretation may be present.
	5. Use Administration	a. Issue entry permits or group size limitations if necessary to meet goals for area management and resource protection
		b. Recreational stock and ORV's should be held overnight outside of the foreground areas of lakes, streams, camp areas, trailsides
		c. Campsites are typically informal, user built improvements are allowed.
		d. In overused areas, campsites may be designated and open fires restricted.

		e. Manage according to Semi-Primitive Motorized ROS class.
		f. Dispersed camp areas are located to take advantage of topographic and vegetative screening.
		g. General area is open to ORV use, although some closures may be used to respond to wildlife and/or resource management concerns.
	6. Use Administration	a. Motorized use should be routed away from essential forage production and wildlife protection areas through trail relocation.
B. Wilderness		a. Not applicable.
C. Wildlife and Fish		
	1. Planning	a. Trails and camping areas shall avoid known critical habitat components including escape and thermal cover, goat kidding areas, travel corridors, mineral licks and others where user activity may be expected to disturb or jeopardize these areas.
		b. Prevent wildlife harassment in calving, fawning, and nesting areas. Close roads and trails to motorized use from March 15 - July 15 (or as necessary) when identified disturbance occurs.
		c. Prevent wildlife harassment in Goat Winter Range by seasonally closing roads and trails to motorized use from November 15 to May 15 (or as necessary).
	2. Non-Structural Habitat Improvement	a. Fish stocking is allowed to improve or re-establish anadromous or resident species.
		b. Vegetative manipulation to enhance wildlife habitat is allowed within the constraints of the Semi-Primitive motorized intensity
	3. Structural Habitat Improvement	a Habitat improvement projects should be designed to meet Visual Quality Objectives.
D. Range		a. Meet Forest-wide Standards and Guidelines
E. Timber		
	1. Silvicultural Examination	a. No scheduled harvest. Harvest may take place in the event of a catastrophic event such as fire, insects, disease, or blowdown. The intent of such harvest is to prevent further losses or protecting other resources or adjacent lands, and not for recovery of merchantable timber Preference given to those systems having the least effect on Semi-Primitive values.

		b.	Replant in native species.
F.	Water, Soil, and Air	a.	Meet Forest-wide Standards and Guidelines.
G.	Minerals and Geology	a.	Meet Forest-wide Standards and Guidelines.
H.	Rural Community and Human Resources	a.	Volunteers and other human resource programs will be used to augment site and facility maintenance work where applicable.
J.	Lands		
	1 Special Use Management	a.	Avoid locating utility corridors in these areas.
		b.	Avoid locating special uses in this area that are incompatible with the management prescription and desired future condition.
	2. Land Ownership Planning	b.	Place all these lands in Group II - retain or acquire when possible.
	3. Rights of Way Cost Share	a	Do not share cost on roads accessing private inholdings.
L.	Facilities		
	1. Transportation System Planning	a	Road development should not be permitted, except where access to managed catastrophic timber loss is not practical by aerial means. In such cases roads will be temporary and returned to a near natural condition when harvest project is complete.
P.	Protection		
	1 Fire Management Planning	a.	Forest-wide Fire Protection Group C applies
	2. Forest Pest Management	a.	Meet Forest-wide Standards and Guidelines.

INTENSITY 1D ROADED NATURAL

Desired Future Condition: Provides the users an equal opportunity to experience recreational contact with other user groups or isolation from the sights and sounds of human activity. Allows users to establish an interest in the natural environment and to develop and test outdoor skills associated with either motorized or non-motorized recreation use with little challenge or risk. The setting for this class of recreation is characterized by an environment where modifications of the natural landscape range from being easily noticed to obviously dominant to users. However, from sensitive travel routes and use areas, these alterations will appear subordinate to the surrounding areas Timber harvest is permitted

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Program Element		Standards and Guidelines
A. Recreation		
1. Recreation Planning	a	Emphasis will be given to day use recreation and facilities.

	2. Visual Quality	a.	Visual quality objectives in the area are partial retention along sensitive travel routes; elsewhere, may range from partial retention to modification
	3. American Indian Religious and Cultural Use	a	Meet Forest-wide Standards and Guidelines.
	4. Facility and Site Management	a.	Development level 2 and 3 sites are permitted.
		b	Wayside exhibits for interpretation may be used
	5 Use Administration	a	Manage according to Roaded Natural ROS standards.
		b	Campfires may be limited to designated sites.
		c.	Recreational stock shall be held outside of the foreground areas of lakes, streams, camp areas and trail sides.
		d	Closures may be used to respond to wildlife and/or resource management concerns.
		e	Camping located to take advantage of topographic and vegetative screening.
	6 Trail Planning	a.	Trails located to take advantage of viewing opportunities, terrain, destination points, and challenge.
	7. Use Administration	a	Meet Forest-wide Standards and Guidelines
B	Wilderness	a.	Not applicable.
C.	Wildlife and Fish		
	1 Planning	a.	Trails and camping areas should avoid known essential habitat components including escape and thermal cover, goat kidding areas, travel corridors, mineral licks and others where user activity may be expected to disturb or jeopardize these areas.
		b	Prevent wildlife harassment in calving, fawning, and nesting areas. Close roads and trails to motorized use from March 15 - July 15 (or as necessary) when identified disturbance occurs.
		c	Prevent wildlife harassment in Goat Winter Range by seasonally closing roads and trails to motorized use from November 15 to May 15 (or as necessary).

d. When inventoried deer and elk winter range occurs within this management area, the following standards will be incorporated

(1) Diversity and juxtaposition of habitat shall consist of forage, hiding/thermal cover and optimal cover (OC) See glossary for definition of habitat types

(2) Range of habitat types is as follows

Seral Stage	% of Range
1-20 years	10-15% forage
21-90 years	40-45% Thermal/hiding cover
90+ years	37-45% Optimal Cover

(3) As a general rule, maintain above range of habitat types for every 2,000 acres (approx) of contiguous winter range

(4) Methods such as sequential, adjacent harvest entries with small unit sizes to achieve larger OC area size requirements in the long term could be used, and would meet scenic objectives as well

(5) Average open-road density per square mile for a contiguous piece of winter range shall be 2 miles/square mile.

2 Habitat Improvement

a. Improvement will be emphasized such as desirable forage species planting, fertilization, thinning, and slash disposal

D. Range

a. Meet Forest-wide Standards and Guidelines

E. Timber

1 Timber Management Planning

a A full range of silviculture practices shall be allowed. USDA Forest Service, Agriculture Handbook No. 559 should be used to design harvest units

b The standards and guidelines for the management prescription, 17 shall apply to this management prescription

c Stands will be managed for a minimum 125 year rotation to meet visual objectives cited in A-2a.

F. Water, Soil, and Air

a Meet Forest-wide Standards and Guidelines

G. Minerals and Geology

a Meet Forest-wide Standards and Guidelines.

H. Rural Community and Human Resources

a. Volunteers and other human resource programs will be used to augment site and facility maintenance work where applicable

J	Lands		
	1. Land Ownership Planning	a.	Place all these lands in Group III - Available for land exchange
L	Facilities		
	1. Transportation System Planning	a	Generally, easy access is provided to highway vehicles on single or double dirt or gravel lane roads built to accommodate dispersed recreationists. Roads may be built for the purpose of providing expanded recreational opportunities in this ROS class
	2 Developed Site Construction/ Reconstruction	a	Moderate amount and complexity of facilities for comfort and convenience of users. May include trail shelters, boat ramps, sanitary facilities, picnic tables, cook fire enclosures Facilities should blend in with the natural landscape and character.
P.	Protection		
	1. Fire Management Planning	a	Forest-wide Fire Protection Group C applies.
	2. Forest Pest Management	a	Meet Forest-wide Standards and Guidelines.

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2 SCENIC VIEWSHED — Goal: Provide a visually appealing landscape as viewed from major travel corridors and use areas

Description of Lands Where Prescription Applicable: This prescription is applied to selected, sensitive corridors and viewsheds throughout the Forest (see figure 4-1a and 4-1b). Several of these because of their combined scenic, cultural, and recreational values have been designated as National Forest Scenic Byways

Desired Future Condition Common to all Intensities.

Scenic viewsheds accommodate a variety of activities which, to the casual observer, are either not evident or are visually subordinate to the natural landscape. Activities borrow from or repeat form, line, color, and texture elements which are frequently found in the natural landscape Vegetation is diverse and includes a wide variety of tree species and sizes, both living and dead

Intensities in this Management Prescription.

2A. Foreground
2B Middleground

INTENSITY 2A FOREGROUND

Program Element		Standards and Guidelines
A. Recreation		
1 Recreation Planning	a	Developed sites may be allowed. Plan for roaded natural and rural ROS class standards.

A

b. The applicable standards and guidelines for developed recreation are in Management Area 3A, program element A.

2. Visual Quality

a. Projects shall meet Visual Quality Objectives of Retention from primary road corridors and Partial Retention from secondary road corridors (figures 4-1a and 4-1b). Trails crossing 2A have a VQO of Retention.

3. American Indian Religious and Cultural Use

a. Meet Forest-wide Standards and Guidelines.

4. Facility and Site Management

a. All signs and facilities blend with surrounding landscape. On site interpretation may be present.

5. Use Administration

a ORV use allowed in designated areas only.

6. Trails Construction, Reconstruction, Operation

a Trails are located and maintained to blend with topography and surrounding landscape.

b. Trails are located to take advantage of viewing opportunities

B. Wilderness

a Not applicable.

C. Wildlife and Fish

1 Planning

a. Meet Forest-wide Standards and Guidelines.

b. When inventoried deer and elk winter range occurs within this management area, the following standards will be incorporated.

(1) Diversity and juxtaposition of habitat shall consist of forage, hiding/thermal cover, and optimal cover (OC) See glossary for definition of habitat types

(2) Range of habitat types is as follows:

Seral Stage	% of Range
1-20 years	10-15% forage
21-90 years	40-45% thermal/hiding cover
90+ years	37-45% OC

(3) As a general rule, maintain above range of habitat types for every 2,000 acres (approx) of contiguous winter range.

(4) Methods such as sequential, adjacent harvest entries with small unit sizes to achieve larger OC area size requirements in the long term could be used, and would meet scenic objectives as well.

		(5) Average open-road density per square mile for a contiguous piece of winter range shall be 2 miles/square mile
2. Habitat Improvement	a.	Improvement will be emphasized such as desirable forage species planting, fertilization, thinning, and slash disposal.
D. Range	a.	Not applicable.
E. Timber		
1. Timber Management Planning	a.	A full range of silvicultural practices should be allowed. USDA Forest Service, Agriculture Handbook No. 559 should be used to design harvest units.
	b.	Stands will be managed on an extended rotation to meet visual objectives cited in A-2a.
2. Timber Sale Preparation and Timber Sale Administration	a.	At least ten percent of timber stands in foreground and areas shall contain large character trees (30" to 36" DBH) in sensitivity level 1 and 24" to 30" DBH in sensitivity level 2
	b.	Diversity in undergrowth should be retained by minimizing ground disturbance.
	c	Created openings shall no longer be considered openings in sensitivity level 1 areas when trees reach 20 feet in height.
	d	Created openings shall no longer be considered openings in sensitivity level 2 areas when trees reach 15 feet in height.
	e.	Areas of ground disturbance should be rehabilitated to natural appearance. Exposed areas should be revegetated within one year of disturbance.
	f	Diversity of species and age classes should be maintained through harvest scheduling
	g.	Landing should be located outside of seen areas or rehabilitated within one year of operation if they must be located in seen areas
	h.	Logging systems should be used that meet the minimum objectives of timber harvest and cause the least ground disturbance.
	i.	Stumps should be cut to a height necessary to meet Visual Quality Objectives.
3. Genetic Forest Tree Improvement	a	Genetic tree material (cones, scions, etc) may be collected and marked.

F.	Water, Soil, and Air	a.	Meet Forest-wide Standards and Guidelines.
G.	Minerals and Geology	a.	Meet Forest-wide Standards and Guidelines.
H	Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J.	Lands		
	1. Special Use Management	a.	Transmission towers should be designed to blend with the surrounding landscape.
	2. Right-of-Way Grants	a.	Right-of-Way corridors should be designed and located to blend with the surrounding landscape.
	3. Land Ownership Planning	a	Group III - available for land exchange.
L.	Facilities		
	1 Transportation System Planning	a	Roads in the seen or potentially seen area should blend with natural form, line, color, and texture.
	2 Road Construction and Reconstruction	a	Cut and fill slopes should be revegetated within one year of construction.
		b.	Rockpits and stockpile sites should be located outside seen areas whenever possible and rehabilitated when located within seen areas
	3 FA&O Construction/ Reconstruction and Facility Maintenance	a.	Buildings and other facilities should be designed and located to blend with the surrounding landscape.
P.	Protection		
	1. Fire Management Planning	a.	Forest-wide Fire Protection Group A applies.
	2. Forest Pest Management	a.	Meet Forest-wide Standards and Guidelines.

INTENSITY 2B· MIDDLEGROUND

Program Element		Standards and Guidelines
A.	Recreation	
	1. Recreation Planning	a. Developed sites may be allowed. Plan for semi-primitive motorized, roaded natural and roaded modified ROS class standards.
		b. The applicable standards and guidelines for Developed Recreation are found in Management Area 3A, program element A (recreation).

2. Visual Quality	a.	Projects shall meet Visual Quality Objectives of Partial Retention in the middleground of primary road corridors (see figure 4-1a and 4-1b). Foregrounds of secondary roads or of trails which overlap the middleground seen area also have a VQO of Partial Retention.
3 American Indian Religious and Cultural Use	a.	Meet Forest-wide Standards and Guidelines.
4. Facility and Site Management	a.	All signs and facilities blend with surrounding landscape. On site interpretation may be present
5. Use Administration	a.	ORV use allowed in designated areas only.
6. Trails Construction, Reconstruction, Operation	a.	Trails are located and maintained to blend with topography and surrounding landscape.
	b.	Trails are located to take advantage of viewing opportunities.
B. Wilderness	a.	Not applicable.
C Wildlife and Fish		
1 Planning	a.	Meet Forest-wide Standards and Guidelines.
	b.	When inventoried deer and elk winter range occurs within this management area, the following standards will be incorporated:

(1) Diversity and juxtaposition of habitat shall consist of forage, hiding/thermal cover, and optimal cover (OC) See glossary for definition of habitat types.

(2) Range of habitat types is as follows:

Seral Stage	% of Range
1-20 years	10-15% forage
21-90 years	40-45% thermal/hiding cover
90+ years	37-45% OC

(3) As a general rule, maintain above range of habitat types for every 2,000 acres (approx.) of contiguous winter range.

(4) Methods such as sequential, adjacent harvest entries with small unit sizes to achieve larger OC area size requirements in the long term could be used, and would meet scenic objectives as well.

(5) Average open-road density per square mile for a contiguous piece of winter range shall be 2 miles/square mile.

	2. Habitat Improvement	a.	Improvement will be emphasized such as desirable forage species planting, fertilization, thinning, and slash disposal.
D.	Range	a.	Not applicable.
E.	Timber		
	1 Timber Management Planning	a.	A full range of silvicultural practices should be allowed. USDA Forest Service; Agriculture Handbook No. 559 should be used to design harvest units.
		b.	The Standards and Guidelines for the timber production, Management Prescription 17 shall apply to this Management Prescription.
		c.	Visual quality objective of partial retention should be maintained.
	2. Timber Sale Preparation and Timber Harvest Administration	a.	Areas of ground disturbance should be rehabilitated to natural appearance. Exposed areas should be revegetated within one year of disturbance.
		b.	Diversity of species and age classes should be maintained through harvest scheduling.
		c.	Landing should be located outside of seen areas or rehabilitated within one year of operation if they must be located in seen areas.
		d.	Logging systems should be used that meet the minimum objectives of timber harvest and cause the least ground disturbance.
	3. Genetic Forest Tree Improvement	a.	Genetic tree material (cones, scions, etc) may be collected and marked
F.	Water, Soil, and Air	a.	Meet Forest-wide Standards and Guidelines.
G.	Minerals and Geology	a	Meet Forest-wide Standards and Guidelines
H	Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J.	Lands		
	1 Special Use Management	a.	Transmission towers should be designed to blend with the surrounding landscape.
	2. Right-of-Way Grants	a	Right-of-Way corridors should be designed and located to blend with the surrounding landscape.
	3. Land Ownership Planning	a.	Group III - available for land exchange.

L	Facilities		
	1. Transportation System Planning	a	Roads in the seen or potentially seen area should blend with natural form, line, color, and texture.
	2. Road Construction and Reconstruction	a.	Cut and fill slopes should be revegetated within one year of construction.
		b	Rockpits and stockpile sites should be located outside seen areas whenever possible and rehabilitated when located within seen areas
	3. FA&O Construction/ Reconstruction and Facility Maintenance	a	Buildings and other facilities should be designed and located to blend with the surrounding landscape.
P.	Protection		
	1 Fire Management Planning	a.	Forest-wide Fire Protection Group A applies.
	2. Forest Pest Management	a	Meet Forest-wide Standards and Guidelines.

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3 DEVELOPED RECREATION — Goal: Provide a wide variety of year-round recreation experiences and facilities at developed sites.

Description of Lands Where Prescription Applicable: Developed recreation sites are usually located close to water bodies, or other areas of scenic or special interest. Developed recreation sites include existing and potential campgrounds, major trailheads, boating and swimming sites, picnic areas, alpine ski areas, and associated facilities, organization camps, recreation residences, and others Facilities will be provided at mostly recreation development scale 2 (semi-primitive) with little site modification, to scale 4 (rural) with the site heavily modified. The areas allocated to developed recreation include the specific site on which existing or potential development takes place and a surrounding visual and noise screen Soils and vegetation should be able to absorb heavy use. Except for winter recreation areas, developed recreation sites are usually located on land with slopes of 10 percent or less.

Desired Future Condition Common to all Intensities.

Developed recreation sites may appear mostly natural to rural in setting. Physical facilities may be evident, design and construction will repeat the color, shapes, and lines of the surrounding environment. Site controls and user interaction will vary with the setting. There is no scheduled timber harvest and any vegetative management is done for the purposes of maintaining a safe, functional, and attractive site. Openings exist to accommodate facilities and provide scenic views. Vegetation will vary widely in type, size, and age. Access is by road.

Intensities in this Management Prescription

3A Public Sector Developed Sites
3C. Winter Sports Resorts
3D. Private Sector S tes

:A

This intensity is applied to a full range of public developed and managed recreation sites including campgrounds, trailheads, boating and swimming sites, picnic areas and interpretation sites. Facilities shall be provided at the full range of development scale including fee sites. These existing developed sites should be maintained long-term as developed sites, but will be closed periodically due to decrease in program capability.

INTENSITY 3A PUBLIC SECTOR DEVELOPED SITES

Program Element	Standards and Guidelines
A. Recreation	
1. Recreation Facilities Planning	a. Constructed structures should be architecturally compatible with the established landscape.
	b. Sites may be modified to accommodate recreational facilities and uses.
	c. Buildings should present naturally harmonious colors
	d. Sites will be developed that are appropriate to the forest environment, and will be maintained to provide only facilities for forest-type recreation such as camping, picnicking, hiking, canoeing, etc.
	e Where the need exists, facilities in existing developed sites should be modified to make them usable by the handicapped Future developments will be planned and designed to make facilities accessible to the handicapped.
	f The developed site usually encompasses an area larger than just the ground on which facilities are located These peripheral areas should be managed as a roaded natural setting in which trails may be developed to provide dispersed recreation opportunities. These areas should also provide a visual retention screen of at least 300-500 feet between the developed site and other resource development areas
	g Sites shall be designed to ensure that the People At One Time (PAOT) capacity of the site is in proper relationship to the desired ROS class and the ability of the site to withstand use
	h. Overcrowding and loss of privacy will be prevented by strategically locating improvements, limiting their number, or designing facilities so as to limit the number of persons who can physically use or occupy them at one time.

		i. Consider potential to incorporate cultural resource protection and interpretation in facility development plans.
2.	Visual Quality	a A Visual Quality Objective (VQO) of retention is prescribed for 1) all fee campgrounds and 2) day use sites in primary viewsheds. Other developed sites have a VQO of partial retention.
		b. A visual analysis should be completed in order to blend activities with the naturally established landscape
		c Rehabilitation measures should be applied to the landscape where needed to improve the visual setting.
3.	American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines.
4.	Facility and Site Construction and Reconstruction	a. A comprehensive and detailed site plan shall be developed prior to site construction or expansion.
		b. Site plans should show the specific location and design of all facilities and will provide for proper utilization of the site, control of traffic, public safety, sanitation, site protection, grading, landscape planting, and use distribution
		c Site designs should be based upon the ROS class and development scale concept.
		d The site shall be constructed or expanded to conform with an approved site plan
		e. Soil compaction should not exceed established limits except as necessary to accommodate development.
		f. Priority for site development will generally follow
		(i) Expand existing high-use fee sites.
		(ii) Convert non-fee to fee sites.
		(iii) Develop new sites to fill a recognized need.
5.	Recreation Facilities and Site Management	a Occupancy and use of recreation sites shall be regulated to the extent necessary to protect the resources and to ensure safe, enjoyable recreation experiences

-A

b. Utilize regulations contained in 36 CFR 261 (Prohibitions) as necessary to ensure full public enjoyment of recreation sites.

c. Off-road vehicles use should be limited to ingress and egress.

d. Information and other on-site interpretation should be designed and used to the extent necessary to inform visitors of current conditions and regulations.

e. An operation and maintenance plan shall be prepared and updated annually. Ensure that personnel who perform operation and maintenance (O&M) functions are familiar with O&M plans. (See most current USDA Handbook "Cleaning Recreation Sites.")

f A vegetative management prescription and plan of management should be prepared and implemented for each site or group of sites, prior to vegetative manipulation.

g Each site should be analyzed periodically to determine whether its intended function is being served and if it requires alteration, replacement, closure, or elimination.

h. Provide periodic patrols and site supervision utilizing volunteer hosts where appropriate.

i Collect fees for those sites that meet Land and Water Conservation Fund Act fee site designation criteria.

j. Cleaning and policing should be performed regularly to ensure that sites are clean and sanitary, free of litter, and neat in appearance as described in the most current USDA Handbook "Cleaning Recreation Sites."

k. Each site shall be inspected annually and all known safety hazards must be eliminated to the extent practical

l. Potable water sources shall be operated and maintained in accord with FSM 7420, Federal, and State regulations.

m. Vaults, septic tanks, and wastewater systems shall be inspected at regular intervals to ensure appropriate operation.

		n. Garbage disposal should be accomplished at intervals sufficient to minimize odors, prevent pollution of water supplies, and avoid attracting disease spreading insects and rodents
		o. Priority for work on developed sites is:
		(i) Work needed to ensure public health and safety
		(ii) Protection of the site's physical resources.
		(iii) Care and policing, maintenance of existing improvements, supervision of occupancy and use, and interpretive services.
		(iv) Expansion of existing developments or construction of new sites, as needed.
		p. Soil compaction should not exceed established limits except as necessary to accommodate development of sites.
	6. Trail Planning	a. Trails should be located to take advantage of viewing opportunities.
	7. Trail Reconstruction and Construction	a. Trails will be located to minimize resource impacts.
	8 Trail System Maintenance and Operation	a. Maintenance of trails within the developed site should be at a priority 3 level, providing resource protection, investment preservation, and visitor convenience.
B.	Wilderness	a Not applicable.
C	Wildlife and Fish	
	1. Planning	a Improvement of wildlife and fisheries habitat is permitted.
	2. Habitat Improvement	a Improvements are appropriate as long as visitor conflict is minimized.
		b. Structures should blend in with the naturally established landscape.
		c. Seasonal visitor use and wildlife use should be coordinated to minimize conflicts.
		d Watchable wildlife projects are encouraged.
	Range	a Not applicable

E. Timber

1. Timber Management Planning

a. Timber shall be managed on a non-scheduled basis, to meet recreation objectives, and to reduce the risk of public injury from hazardous trees.

b. Improvement cutting shall be in accordance with the vegetation management prescription for the site.

c. Logging practices shall be selected that provide the least impact to the site.

d. Any logging shall be scheduled for off-season periods or while in a closed condition.

2. Silvicultural Examination and Prescription

a. This prescription should :

(i) Create and/or maintain a regenerating natural environment.

(ii) Create an environment that is, in visual aspects, pleasing and which resembles a natural setting.

(iii) Provide herbs, grasses, and other ground-cover plants as components of the site.

(iv) Create a more durable area, less prone to damage by human or pest impact.

(v) Create diversity of tree size, age, and species, ultimately reducing the need to remove hazard trees by emergency treatment, short of a catastrophe

(vi) Develop healthy soil conditions conducive to plant growth

(vii) Create or perpetuate plant screening between occupancy units as appropriate to the planned experience level.

(viii) Provide shade, wind protection, and sunshine diversity as appropriate to the climate.

3. Reforestation - Site Preparation for Planting and Seeding

a. Unwanted vegetation, slash, stumps or roots should be removed, as well as having the ground surface shaped before planting or seeding to retain the determined vegetation conditions for the site as outlined in the vegetation management prescription.

F Water, Soil, and Air		
1. Planning	a	Meet Forest-wide Standards and Guidelines.
2. Improvements	a.	Improvements are appropriate as long as visitor conflict is minimized
	b	Improvements or rehabilitation should blend in with the naturally established landscape.
G. Minerals and Geology	a.	Identify and determine validity of existing claims prior to development of a new site.
	b	Removal of common variety minerals should not be permitted.
	c.	Require a no surface occupancy stipulation for mineral leases.
	d.	Sites not previously withdrawn shall be studied to determine where a withdrawal from mineral entry is appropriate Where appropriate, withdrawal action will be initiated.
	e.	No on-site occupancy.
	f.	Lease application recommendations will include stipulations to protect existing and/or future uses.
H. Rural Community and Human Resources	a.	Human Resource and Volunteer Programs will be aggressively used to supplement the recreation program.
	b.	Campground Hosts, preseason cleanup days, and adopted campgrounds are methods to be used to supplement services at developed sites.
J. Lands		
1. Special Use Management	a.	Developed sites are not available for other non-recreation uses provided by special use permits, if such uses are determined to conflict with the intended use of the developed site.
2. Right-of-Way Grants	a.	Provide appropriate access to inholders under the existing guidelines
	b.	Strive to minimize the impact on the character of the site.
3 FERC License and Permits	a	Recommend only compatible uses which do not impair recreational use of the area.
4. Withdrawals, Modifications and Revocations	a.	Use withdrawals where necessary to protect on site values.

	5.	Property Boundary Location and Corner Maintenance	a. Aggressively survey, mark, and post National Forest property lines and maintain to a high level.
	6.	Land Ownership Planning	a. Group II Generally retain or acquire, but the NEPA analysis may allow disposal (Group III).
L	Facilities		
	1.	Road Construction and Reconstruction	a. Roads should be provided that are compatible with development scale.
			b Roads and other facilities inconsistent with developed recreation should be located away from the primary use area, closed or removed.
			c. Design roads with proper width and surfacing for experiences desired. Access roads should be managed to permit passenger car traffic.
	2.	Road Operation	a. Roads should be managed to proper experience level desired for safety, resource protection, and convenience.
P	Protection		
	1	Fire Management Planning	a. Forest-wide Fire Protection Group A applies
	2	Law Enforcement	a It is preferable to obtain compliance with rules and regulations through closely supervised use as opposed to heavy law enforcement action.
			b Law enforcement shall stress education and being good hosts.
			c. Agreements shall be made wherever possible with counties to provide cooperative law enforcement support.
	3	Forest Pest Management	a Only biological, chemical, or silvicultural methods consistent with the management goals for the area will be used for pest management.

INTENSITY 3C: WINTER SPORTS RESORTS

Alpine skiing and related activities such as Nordic skiing, snow play, tobogganing, horseback riding, tennis, and other winter and summer activities at resorts established for those purposes These areas will be managed to provide, through private sector concession operations, a diversity of winter and summer recreation activities that emphasize the Forest Setting.

Program Element		Standards and Guidelines
A. Recreation		
1. Visual Quality	a	Meet Visual Quality Objectives of foreground retention, middleground partial retention for the recreation setting. Development in the base area will be designed to remain subordinate to the landscape. This may require special measures to blend ski runs, ski lifts, and buildings into the natural environment.
2. American Indian Religious and Cultural Use	a.	Meet Forest-wide Standards and Guidelines.
3 Use Administration	a.	Administration will be on a monitoring basis. Improvement projects (buildings, chairlifts) may be administered at the expense of the proponent.
B. Wilderness	a	During summer activities, winter sports resorts will be discouraged from significantly impacting wilderness resources.
C Wildlife and Fish	a	Enhancement of habitat may be permitted provided that recreation use is not impaired.
	b	Recreation and wildlife use shall be coordinated to minimize conflict.
D. Range	a.	Not applicable.
E. Timber		
1. Timber Management Planning	a	No scheduled harvest Harvesting allowed to maintain an attractive, safe setting or to clear new ski runs
F Water, Soil, and Air	a.	Meet Forest-wide Standards and Guidelines. Give extra attention to erosion prevention and control on areas cleared for ski runs.
G. Minerals and Geology	a	Sites not previously withdrawn shall be studied to determine whether a withdrawal from mineral entry is appropriate. Where appropriate, withdrawal action will be initiated.
H. Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J. Lands		
1. Special Uses Management	a.	Do not issue permits for activities which are not compatible with recreation use.
2. Land Ownership Planning	a	Group III - Acquire, retain, or dispose

L Facilities

1	Transportation System Planning	a	Roads and trails shall be planned and developed according to an approved area site development plan. Other objectives may be met if recreation use is not impaired

P. Protection

1	Fire Management Planning	a.	Forest-wide Fire Protection Group A applies.
2	Forest Pest Management	a	Meet Forest-wide Standards and Guidelines

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INTENSITY 3D: PRIVATE SECTOR SITES

Organization Camps, Ski Clubs, Concession sites, and Recreation Residences are facilities operated by the private sector on National Forest land under a Special Use Permit Authorization

a. Organization Camp Sites are designated for organized group recreation use. These privately operated facilities provide lodging, meals social and educational opportunities of recreation in a forest environment.

b Ski Clubs are facilities or structures authorized to occupy National Forest land to serve groups that have organized as a registered club and are available to the public only through club membership or as invited guests

c A Concession is a commercial public service enterprise such as a ski or lake resort, campground, or groomed cross-country ski trail, operating on National Forest land under permit for the purpose of providing goods and services to the general public

d Recreation Residence is a privately built and owned structure, authorized on National Forest land under a term Special Use Authorization

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Program Element		Standards and Guidelines
A. Recreation		
1.	Planning, Facility and Site Management	a. Plan new areas only for Organization Camps or Concessions and then, only where the public need can be clearly demonstrated Administer existing areas to provide suitable, safe and attractive sites under Special Use Authorization Administer permits to meet National Forest recreation direction, and Forest-wide Standards and Guidelines.
2.	Visual Quality	a. Visual Quality Objective should be retention for the recreation setting. Development of facilities will modify the site but will be designed to be subordinate to the natural landscape
3.	American Indian Religious and Cultural Use	a Meet Forest-wide Standards and Guidelines.

4 Use Administration	a.	Organization Camp Sites. Manage for Organization site only when private land is not available, and land is not needed for higher use, and a public need is clearly demonstrated
	b	Ski Clubs Do future use determinations on all permits. Where it cannot be demonstrated that the club is the best use of the forest land it occupies, proceed with termination of the permit or conversion to a use that better serves the public or forest resources
	c	Concession Sites Management objective is to provide a suitable site for commercial development when determination is made by the Forest Service that commercial services are needed for public use and convenience. Encourage private sector to provide needed services under Special Use Authorization. Re-evaluate need for Concession operation each time the term permit comes up for renewal.
	d.	Recreation Residence. Manage in tracts and in time reduce the number of isolated occupancies Do not create any additional tracts
B Wilderness	a.	Not applicable.
C. Wildlife and Fish	a	Improvement of habitat may be permitted provided it is compatible with the recreation use permit.
D. Range	a	Not applicable
E Timber		
1. Timber Management Planning	a	Timber shall be managed on a non-scheduled basis to meet recreation objectives and to reduce the risk of public injury. Vegetative management prescriptions should be prepared to maintain desired vegetation conditions for each site.
F. Water, Soil, and Air	a	Meet Forest-wide Standards and Guidelines.
G. Mineral and Geology	a.	Removal of common variety minerals should not be permitted.
	b.	Recommend a no surface occupancy stipulation for mineral leases
	c	Sites not previously withdrawn shall be studied to determine whether a withdrawal from mineral entry is appropriate. Where appropriate, withdrawal action will be initiated.

		d.	Applications will include stipulations to protect existing and/or future uses.
H.	Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J.	Lands		
	1. *Special Uses Management*	a.	*Do not issue permits for activities which* are not compatible with recreation use.
	2. Land Ownership Planning	a.	Group III - Retain, acquire, or dispose.
L.	Facilities		
	1. Transportation System Planning	a.	Roads and trails shall be planned and developed according to an approved area site development plan. Other objectives may be met if recreation use is not impaired.
P.	Protection		
	1. Fire Management Planning	a.	Forest-wide Fire Protection Group A applies
	2. Forest Pest Management	a.	Meet Forest-wide Standards and Guidelines

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4 MT. BAKER NATIONAL RECREATION AREA

Goal Provide for: Public recreation, including but not limited to snowmobile use; the conservation of scenic, natural, historic, and other values contributing to public enjoyment; and manage, dispose of, and utilize other natural resources which are compatible with and which do not significantly impair the purposes for which the area is established.

Description of Lands Where Prescription Applicable A 8,600 acre parcel of land on the south side of Mt. Baker established by Congress in the 1984 Washington Wilderness Act. (PL 98-339, 98 STAT. 299)

Desired Future Condition:

A natural or natural appearing environment has been maintained A variety of recreation opportunities are available in a primitive, semi-primitive nonmotorized, semi-primitive motorized or roaded natural setting. On site controls, facilities or modifications exist as appropriate to each ROS class. Timber harvest or other resource utilization is compatible at levels which do not dominate the landscape or significantly impair the purposes of the area as described by Congress.

Intensities in this Management Prescription: None

Program Element		Standards and Guidelines
A. Recreation		
1. Planning and Use Administration	a.	Summer Use. Planned summer recreation facilities shall support nonmotorized use of NRA, such as heavy public use of the climbing route up Mt. Baker and of the crevasse fields on Easton Glacier for mountaineering training. Visual Quality Objective should be partial retention when more than 1/4 mile from existing roads and trails, and retention within 1/4 mile. Planned recreation use should emphasize the high elevation dispersed type opportunities available on the side of Mt. Baker. Planned recreation improvements such as trailhead & interpretive facilities should support this use These may include hardened sites and toilet facilities to prevent resource damage. Use of vehicles off the road is prohibited Monitor area to detect resource damage caused by human impact Set standards and institute management controls if damage exceeds standards
	b.	Winter Use. Snowmobile use will be permitted within the National Recreation Area whenever the snow depth is 24 inches or deeper at the Schriber's Meadow area. Provide for snowmobile use of road to Schriber's Meadow (#13) and into upper Rocky Creek and upper Sulphur Creek, the upper Railroad Grade, Metcalfe Moraine, and lower Easton Glacier Work with Washington State Sno-Park program and user groups to manage winter use of this area.
2. Visual Quality	a.	From recreation roads and trails, a Visual Quality Objective of retention should be maintained in the foreground, and partial retention in the middleground.
3. American Indian Religious and Cultural Use	a.	Meet Forest-wide Standards and Guidelines.
4. Trail System	a.	During the summer, motorized use is prohibited. Provide loop trails out of trailhead for one and two day trips into alpine areas as shown on the trail plan. Permit horse use on the western edge of the NRA.

B.	Wilderness	a.	Not applicable.
C.	Wildlife and fish	a	Habitat improvement projects are acceptable provided they meet the visual quality objective of retention.
D	Range	a.	Not applicable.
E.	Timber		
	1. Timber Management Planning	a.	Scheduled harvest at Timber Intensities A, C, D
		b.	Permit limited regeneration and sanitation salvage cutting to maintain healthy, and attractive forest.
		c.	Logging to be permitted during periods of low public use.
		d	Give special attention to the preservation of the unique stand of subalpine fir above road #12.
F.	Water, Soil, & Air	a	Meet Forest-wide Standards and Guidelines.
G	Minerals & Geology	a.	For locatable minerals follow 36 CFR 228 and Forest-wide Standards and Guidelines.
		b	Do not issue any "common variety" mineral materials permits.
		c	NRA is withdrawn from geothermal entry by law (Pl 91-581; Sec. 15(c)).
		d.	*Do not allow winter operations which would* significantly interfere with recreation use.
H.	Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J.	Lands		
	1. Special Uses Management	a.	Issue only permits which contribute toward goal of NRA Grant permits as required in 1984 establishment act for studies of Mt Baker.
		b	Do not issue permits for projects which will significantly interfere with winter recreation use
	2. FERC License & Permits	a	Recommend only when VQO of Retention can be met in the foreground Applies to all facilities including access roads and power transmission.
	3. Land Ownership Planning	a.	Group II, retain or acquire.

L. Facilities

1. Transportation System Planning	a.	No new permanent roads permitted for timber management activities.
	b.	Construct trailhead facilities as needed to meet goals of NRA.
	c.	Develop roadhead facilities to enhance snowmobile use. If roads are to be plowed in winter require alternative roadhead facilities.
	d.	Consider alternate snowmobile and X-C skier access to Schriber's Meadow and to the alpine areas rather than the existing road. Attempt to separate snowmobile and X-C ski traffic where possible.

P. Protection

1. Fire Management Planning	a.	Forest-wide Fire Protection Group B applies.
2. Forest Pest Management	a.	Only biological, chemical, or silvicultural methods consistent with the management goals for the area will be used for pest management.

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5 RECOMMENDED WILD AND SCENIC RIVERS — Goal: Protect from degradation the outstanding remarkable values and wild, scenic, and recreation characteristics of recommended rivers and their environment, pending a decision on inclusion into the National Wild and Scenic River System.

Description of Lands Where Prescription Applicable: This prescription is generally applied to National Forest lands 1/4 mile either side of the main channel of each river that has been recommended for inclusion into the system; however, boundaries may include additional adjacent areas needed to protect the resources or facilitate management of the river corridor. The Forest Service has no authority for management or river protection outside National Forest lands until the river has been designated by Congress.

Desired Future Condition: Varies by Intensity.

Intensities in this Management Prescription:

5A Recommended Recreation River
5B. Recommended Scenic River
5C. Recommended Wild River

INTENSITY 5A: RECOMMENDED RECREATION RIVERS

Desired Future Condition Evidence of a full range of management activities may exist, including existence of low dams, diversions, residential development, and forestry uses (past and present timber harvest). The rivers readily accessible by railroad, and bridge crossing. Streamside bank is generally natural condition. Water quality is such that waters are fishable and swimmable, or a water improvement plan exists or is under development in compliance with Federal and State laws.

Program Element		Standards and Guidelines
A. Recreation		
1. Recreation Planning	a	Proposed recreational activities shall be compatible with river values. Development Scale should not exceed Level 4. Attempt to locate major facilities outside of riverine area.
	b	The applicable Standards and Guidelines for Developed Recreation are in Management Prescription 3A , program element A.
	c.	Trails may be constructed
	d.	Recreation special use may be permitted for the purpose of providing river-oriented recreation.
2. Visual Quality	a	See Forest-wide Standards and Guidelines for Visual Resource Management.
3. Use Administration	a	Manage according to ROS class standards of surrounding area. Controls on motorized use will be similar to those on surrounding lands.
B. Wilderness	a	Not applicable.
C. Wildlife and Fish		
1. Planning	a	When inventoried deer and elk winter range occurs within this management area, the following standards will be incorporated

(1) Diversity and juxtaposition of habitat shall consist of forage, hiding/thermal cover, and optimal cover (OC). See glossary for definition of habitat types

(2) Range of habitat types is as follows

Seral Stage	% of Range
1-20 years	10-15% forage
21-90 years	40-45% thermal/hiding cover
90+ years	37-45% Optimal Cover

(3) As a general rule, maintain above range of habitat types for every 2,000 acres (approx) of contiguous winter range

(4) Methods such as sequential, adjacent harvest entries with small unit size requirements in the long term could be used, and would meet scenic objectives as well.

			(5) Average open-road density per square mile for a contiguous piece of winter range shall be 2 miles/square mile
	2	Habitat Improvement	a. Improvement will be emphasized such as desirable forage species planting, fertilization, thinning, and slash disposal.
D.	Range		a. Not applicable.
E.	Timber		
	1.	Timber Management Planning	a. The Standards and Guidelines for Management Prescription 17, program element E, in the Forest Plan shall apply to this Management Prescription.
F.	Water, Soil, Air		a. Meet Forest-wide Standards and Guidelines.
G.	Minerals and Geology		a. Operation plans will include provisions to maintain streamside banks in a natural condition.
			b Common variety mineral should not be removed.
H.	Rural Community and Human Resources		a Meet Forest-wide Standards and Guidelines.
J.	Lands		
	1	Special Use Management	a Applications for new permits will be reviewed to assure no degradation of river character or values, and for compliance with ROS classification.
	2.	FERC License and Permits	a FERC application proposals shall not be supported if degradation to values and characteristics necessary for classification is likely to occur
	3.	Land Ownership Planning	a. Group II - Retain national forest land and acquire other ownership as opportunity or need occurs
L.	Facilities		a Meet Forest-wide Standards and Guidelines.
P	Protection		
	1.	Fire Management Planning	a. Forest-wide Fire Protection Group D applies.
	2.	Forest Pest Management	a. Meet Forest-wide Standards and Guidelines.

INTENSITY 5B: RECOMMENDED SCENIC RIVERS

Desired Future Condition: Rivers are free flowing. No substantial evidence of human activity. A few small community buildings or structures may be present and visible from the river. Evidence of timber harvest is not noticeable from this river, and lands appear natural when viewed from riverbanks The river is accessible by roads which may occasionally bridge the river area Short stretches of conspicuous or longer stretches of inconspicuous and well screened roads or railroads paralleling the river area may be permitted Water quality is such that waters are fishable and swimmable, or a water improvement plan exists or is under development in compliance with Federal and State laws.

Program Element		Standards and Guidelines
A. Recreation		
	1. Recreation Planning	a Proposed recreational activities shall be in keeping with river values, Development Scale should not exceed Level 3. Recreational sites and facilities to be located, designed, and constructed to be unobtrusive from river and riverbank.
		b. The applicable Standards and Guidelines for Developed Recreation are in Management Prescription 3, Intensity A, program element A
		c. Trails may be constructed, but located and constructed to be generally unobtrusive from river and riverbank
		d Recreation special use may be permitted for the purpose of providing river-oriented recreation.
	2. Visual Quality	a. See Forest-wide Standard and Guidelines for Visual Resource Management.
	3 American Indian Religious and Cultural Use	a Meet Forest-wide Standards and Guidelines.
B. Wilderness		a. Not applicable
C. Wildlife and Fish		
	1. Planning	a When inventoried deer and elk winter range occurs within this management area, the following standards will be incorporated. (1) Diversity and juxtaposition of habitat shall consist of forage, hiding/thermal cover, and optimal cover (OC). See glossary for definition of habitat types. (2) Range of habitat types is as follows: Seral Stage % of Range

			1-20 years 8-12% forage 21-90 years 40-45% thermal/hiding cover 90+ years 37-45% Optimal Cover (3) As a general rule, maintain above range of habitat types for every 2,000 acres (approx.) of contiguous winter range. (4) Methods such as sequential, adjacent harvest entries with small unit sizes to achieve larger OC area size requirements in the long term could be used, and would meet scenic objectives as well. (5) Average open-road density per square mile for a contiguous piece of winter range shall be 2 miles/square mile
	2. Habitat Improvement	a	Improvements will be emphasized such as desirable forage species planting, fertilization, thinning, and slash disposal
D.	Range	a	Not applicable.
E.	Timber		
	1. Timber Management Planning	a.	The Standards and Guidelines for Management Prescription 17, program element E, shall apply to this Management Prescription.
F.	Water, Soil, Air	a.	Meet Forest-wide Standards and Guidelines
G	Minerals and Geology	a	Operation plans will include provisions to maintain streamside bank in natural condition.
		b.	Common variety minerals should not be removed
H	Rural Community and Human Resources	a	Meet Forest-wide Standards and Guidelines.
J.	Lands		
	1 Special Use Management	a.	Applications for new permits will be reviewed to assure no degradation of river character or values, and for compliance with ROS classification.
	2. FERC License and Permits	a	FERC application proposals shall not be recommended for approval.
	3. Land Ownership Planning	a.	Group II - Retain National Forest land and acquire other ownership as opportunity or need occurs
L.	Facilities 1. Transportation Planning	a.	Roads may occasionally bridge the river. Short stretches of conspicuous or long stretches of inconspicuous and well-screened roads could be allowed

B
C

P Protection		
1 Fire Management Planning	a	Forest-wide Fire Protection Group D applies.
2. Forest Pest Management	a.	Meet Forest-wide Standards and Guidelines.

INTENSITY 5C RECOMMENDED WILD RIVER

Desired Future Condition Wild rivers are generally inaccessable by road, but can be reached by trail or water. Vegetation is varied in size, species, and age and is predominately the product of natural succession. Vegetation may vary from natural openings to stands of mature and old-growth timber. The opportunity to interact within a natural environment away from the sights and sounds of man, is available A high degree of challenge is offered.

Program Element		Standards and Guidelines
A. Recreation		
1 Recreation Planning	a.	Proposed recreation activities shall be compatible with Wild River values and recreation sites should be limited to simple comfort and convenience facilities and be located away from river shorelines. Such facilities will be of design and location which harmonize with the surroundings
	b	Powerboats and off-road vehicles shall not be permitted in wild river corridors.
	c.	As a minimum direction covering the semi-primitive non-motorized class of the *Recreation Opportunity Spectrum (ROS) shall be* met
	d.	Trails may be developed but must be located and constructed to be unobtrusive from the river or riverbank Unobtrusive trail bridges could be allowed.
	e.	Recreation special uses may be permitted for the purpose of providing river oriented recreation provided they are in keeping with the semi-primitive non-motorized ROS description
2 Visual Quality	a	See Forest-wide Standards and Guidelines for Visual Resource Management.
3 American Indian Religious and Cultural uses	a	Meet Forest-wide Standards and Guidelines.
B. Wilderness	a.	Not applicable.

C. Wildlife and Fish		
1. Habitat Improvement	a.	Structural habitat improvements allow utilizing native or natural appearing materials provided retention VQO can be met
D. Range	a.	Not applicable.
E. Timber		
1. Timber Management Planning	a.	No scheduled harvest. Harvest may take place in the event of a catastrophic event such as fire, insects, disease, or blowdown. The intent of such harvest is limited to preventing further losses or protecting other resources or adjacent lands, and not for recovery of merchantable timber. Preference given to those systems having the least effect on primitive values.
	b.	Firewood cutting for commercial or domestic use should not be permitted.
F. Water, Soil, Air	a	Meet Forest-wide Standards and Guidelines.
G. Minerals and Geology	a.	Operating plans shall be developed for proposed projects and shall include provisions to maintain streamside banks in their natural condition.
	b.	Common variety mineral materials sources shall not be developed.
	c.	Wild River corridors shall be studied to determine whether a mineral withdrawal is appropriate. Where appropriate initiate withdrawal action
H. —Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J. Lands		
1. Special Use Management	a	Applications for new permits will be reviewed to assure no degradation of river corridors or values, and for compliance with ROS classification.
	b	New utility corridors shall not be permitted within or traversing river corridors.
2. FERC License and Permits	a.	FERC application proposals shall not be recommended for approval
3. Land Ownership Planning	a.	Group II - retain National Forest land and acquire other ownerships as opportunity or need occurs.

L. Facilities

1. Transportation Planning	a.	No roads shall be permitted in Wild River Corridors.
2. Structures	a.	All water supply dams and major diversions are prohibited.
	b	No flood control levees, dams, or other works are allowed in river channel or river corridor.
	c	A few minor existing structures could be allowed assuming such structures are not incompatible with the existing primitive and natural values of the river corridor. New structures not allowed except in rare instances to achieve recreation management objectives

P. Protection

1. Fire Management Planning	a.	Forest-wide Fire Protection Group D applies.
2. Forest Pest Management	a	Meet Forest-Wide Standards and Guidelines.

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6 SKAGIT WILD AND SCENIC RIVER

Goal: Manage the designated portions of the Skagit, Cascade, Sauk, and Suiattle Rivers as the Skagit Wild and Scenic River in *accordance with the Skagit River Final* Management Plan (Volume II) (1984).

Description of Lands Where Strategy Applicable: This strategy is applied to the Skagit Wild and Scenic River, including 158.5 miles of designated river and 38,939 total acres.

Desired Future Condition: Refer to the management goals and specific management direction of the 1984 River Management Analysis and Plan.

Intensities in this Management Strategy None

Management Direction as included in the River Management Plan - Skagit River Record of Decision August 8, 1984.

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7 AMERICAN INDIAN RELIGIOUS AND CULTURAL USE AREAS

Goal: Allow for access to and protection of environmental conditions and values of sites and areas important to religious and ceremonial use by recognized American Indian tribes within the planning area.

Description of Lands Where Prescription Applicable The prescription is applied to all Cemeteries, and selected Spirit Quest sites and legend sites, Cedar areas, Ceremonial Flora and Plant areas identified in the 1981 "Inventory of Native American Religious Use, Practices, Localities and Resources." Sites and areas may be less than one acre or over 3,000 acres and are found throughout the Forest. Religious use areas are not shown on maps to protect their confidential nature Use areas may occur in wilderness, dispersed recreation, wildlife habitat allocations, and most other allocations.

Desired Future Condition: Areas vary from natural or naturally appearing to highly modified. The degree and nature of activity, and time of year during which activities may take place varies by the nature of the religious or ceremonial activity.

Intensities in this Management Prescription. None

Program Element		Standards and Guidelines
		For all activities under all Program Element, consultation with appropriate American Indian tribe is required. (See Forest-wide Standards and Guidelines.)
A. Recreation		
1 Trail Planning	a.	No new trails shall be located which lead directly to or cross these sites unless in consultation with the affected tribe(s) it is shown that such a location would not affect the quality and integrity of the site.
2. Visual Quality	a.	Meet the Visual Quality Objective of the Management Area as shown on the Forest Plan Map.
3 American Indian Religious and Cultural Use	a.	Meet Forest-wide Standards and Guidelines.
4 Facility and Site Construction	a	New campgrounds or recreational developments within the area shall be discouraged.
5. Facility and Site Management	a.	Existing facilities within the use area may remain. Consultation shall be undertaken to find means of mitigating existing adverse effects.

6. Trail Construction	a.	Trail Reconstruction in the area shall be timed to avoid conflict with known use periods of the sites
7. Trail Systems Operation	a.	Motorized recreation within the area shall be discouraged unless consultation with the affected tribe shows such use would not affect the quality and integrity of the site.
B. Wilderness		
1. Wilderness Use Administration	a	Camping, stock grazing, and other activities that concentrate wilderness users shall be discouraged.
C. Wildlife and Fish		
1. Non-Structural Habitat Improvement	a.	Any activity which may affect (even temporarily) stream quality, clarity, and stream flow in sensitive areas, or upstream from them, shall require consultation with the appropriate tribes to develop appropriate mitigation measures.
2. Structural Habitat Improvement	a.	Habitat improvement projects should not impair the religious or ceremonial use as determined by consultation with the affected tribe(s).
D. Range	a.	Not applicable.
E. Timber		
1. Timber Management Planning	a.	The Standards and Guidelines for the Management Areas as shown on the Forest Plan map shall apply.
	b.	Proposed timber management activities which may adversely affect the nature of the religious or ceremonial activity, even temporarily will require consultation to develop appropriate or mitigation measures.
2. Timber Harvest Administration	a.	Timber harvest activities should be scheduled for periods of non-use.
F. Water, Soil, and Air	a	Meet Forest-wide Standards and Guidelines. Include consultation with affected tribe(s) for activities that impact use areas.
G Minerals & Geology	a.	Meet Forest-wide Standards and Guidelines. Include consultation with affected tribe(s) for activities that impact use areas.
H. Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J. Lands		
1. Special Use Management	a.	Avoid locating transportation and utility corridors in these areas.

2 FERC License and Permits	a.	Hydropower development projects upstream, or within the use area, which may adversely affect the nature of the religious or ceremonial activity, even temporarily will require consultation to determine appropriate avoidance of mitigation measures.
3 Land Ownership Planning	a.	Place all these lands in Group II - retain as National Forest.
L Facilities		
1. Road Construction	a	Construction of new roads within the zone of influence of sites shall be avoided unless such roads are determined, through consultation, not to adversely impact the value of the site for religious use.
P Protection	a	Meet Forest-wide Standards and Guidelines.

8A Mather Memorial Parkway

Goal: Manage the area to maintain and enhance its outstanding scenic and recreation qualities.

Description The Parkway is classified by executive order It encompasses a zone 1/2 mile either side of U S. Highway 410 and is managed primarily for scenic and recreational purposes

Desired Future Condition· The Mather Memorial Parkway will provide a Roaded Natural Recreation opportunity. The forest will be managed for its intrinsic values, emphasizing the old growth conifer stands. Developed recreation sites will be improved for customer satisfaction Interpretive overlooks, and trails will enhance visitors understanding of natural and cultural resources, forest management and local recreation opportunities. Timber management practices may take place to enhance the overall objectives for the Parkway. These entries will be necessary to preserve species composition, primarily the Douglas-fir component The objectives will to maintain a range of tree sizes with a continuum of large size trees

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Program Element		Standards and Guidelines
A Recreation		
1. Recreation Planning	a	Developed facilities will be improved to provide customer satisfaction where opportunities and interest warrant The applicable standards and guidelines for developed recreation are in Management Area 3, program element A.
	b.	Interpretive overlooks and trails will be added to enhance the visitors understanding of the forest and its opportunities.

		c. Trailheads will be constructed to support the trail system for improved convenience and safety of users. Additional trails will be constructed where opportunities and interest warrant.
		d. Facilities will be planned for the roaded natural and rural Recreation Opportunity Spectrum.
	2. Visual Quality	a. Projects shall meet a Visual Quality Objective of Retention
	3. American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines.
	4. Facility and Site Management	a. Signs and facilities are designed to complement the natural forest setting
	5. Use Administration	a. ORV use allowed in designated areas only
	6. Trails Construction, Reconstruction, Operation	a. Trails are located and maintained to blend with topography and surrounding landscape
		b. Trails are located to take advantage of viewing opportunities
B	Wilderness	a. Not applicable
C.	Wildlife and Fish	
	1. Planning	a Improvement of wildlife and fisheries habitat may be permitted.
	2. Habitat Improvement	a. Improvements are appropriate as long as visitor conflict is minimized.
		b. Structures should blend in with the naturally established landscape
		c. Seasonal visitor use and wildlife use should be coordinated to minimize conflicts.
D.	Range	a. Not applicable
E.	Timber	
	1. Timber Management Planning	a. Timber shall be managed on a non-scheduled basis, to meet recreation and visual objectives, and to reduce the risk of public injury from hazardous trees
		b. All timber management intensities may be utilized to meet vegetation management prescription for the site.
		c. Logging practices shall be selected that provide the least impact to the site.

	2 Silvicultural Examination and Prescription	a	Objectives of the prescription should be to:
			(i) Create and/or maintain a regenerating natural environment that is, in visual aspects, pleasing and which resembles a natural setting.
			(ii) Maintain the characteristic old growth forest with its natural diversity of tree size, age, and species.
			(iii) Provide shade, wind protection, sunshine and views to complement the recreation environment.
	3 Reforestation - Site Preparation for Planting and Seeding	a.	Unwanted vegetation, slash, stumps or roots should be removed, as well as having the ground surface shaped before planting or *seeding to retain the determined vegetation* conditions for the site as outlined in the vegetation management prescription.
F	Water, Soil, and Air	a	Meet Forest-wide Standards and Guidelines.
G.	Minerals and Geology	a	Inventory and/or validate existing mining claims and initiate title clearance on sites planned for development.
		b	Removal of common variety minerals should not be permitted
		c	Recommend denial for application for leasable minerals.
		d	Sites not previously withdrawn shall be recommended for withdrawal from mineral entry.
		e	Developed sites shall be protected by standard and special stipulations in any leasing actions.
		f	No on-site occupancy.
		g.	Applications will include stipulations to protect existing and/or future uses.
H	Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J.	Lands		
	1. Special Use Management	a	Transmission towers should be designed to blend with the surrounding landscape
	2. Right-of-Way Grants	a.	Right-of-Way corridors should be designed and located to blend with the surrounding landscape.
	3. Land Ownership Planning	a.	Group III - Retain, acquire, or dispose.

L.	Facilities		
	1 Transportation System Planning	a.	Roads in the seen or potentially seen area should blend with natural form, line, color, and texture
	2. Road Construction and Reconstruction	a	Cut and fill slopes should be revegetated within one year of construction
		b	Rockpits and stockpile sites should be located outside seen areas whenever possible and rehabilitated when located within seen areas
	3. FA&O Construction/ Reconstruction and Facility Maintenance	a	Buildings and other facilities should be designed and located to blend with the surrounding landscape.
		b	A Cascadian architectural theme will be used to complement the CCC era architecture of the area
P	Protection		
	1 Fire Management Planning	a	Forest-wide Fire Protection Group A applies
	2 Forest Pest Management	a	Meet Forest-wide Standards and Guidelines

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8B HEATHER MEADOWS — Goal: Manage the area to maintain outstanding scenic quality and enhanced day-use recreation opportunities

Description of Lands Where Prescription Applicable: Heather Meadows is located within the original Mt Baker Recreation Area designated in 1926 by the Secretary of Agriculture Boundaries have since been modified by creation of the Mt. Baker Wilderness The remaining area is a developed day-use area in the summer and part of the Mt. Baker Ski Area in the winter (winter sports use is addressed in management area 3C) Recreation facilities are designed to enhance the viewing and interpretation of natural and cultural resources for the general public at the "easiest" access level feasible.

Desired Future Condition: The outstanding scenery which draws people to this location is maintained in a natural condition Physical facilities may be evident, design and construction will repeat color, shapes and lines compatible with the natural environment Structures will have a "Cascadian" architectural theme inspired by the CCC architectural style Access is by paved road with the system essentially in place. Trails provide hiking opportunities outside the wilderness and an "easiest" level is encouraged Historic recreation and structures are restored and/or interpreted for the public Encounters with other users are frequent. Vegetative management is for accomplishing recreational objectives, there is no scheduled harvest, and revegetation uses locally native species.

Program Element		Standards and Guidelines
A. Recreation		
	1. Recreation Planning	a. Developed sites are designed for day use recreation such as hiking, picnicking, viewing scenery, visitor information and interpretive naturalist programs.
		b. The trail system is expanded to provide hiking opportunities outside of wilderness for the general public. An "easiest" standard will be used where terrain permits.
		c. Interpretive facilities and programs will provide information on cultural and natural history and management.
	2. Visual Quality	a. A Visual Quality Objective of Retention is maintained with deviations for developed facilities which are designed to blend into the natural environment.
	3. *American Indian Religious and* Cultural Use	*a Meet Forest-wide Standards and Guidelines.*
	4. Facility and Site Management	a. Developed recreation facilities are designed for rural and urban recreation opportunity spectrum Refer to 3A, PUBLIC SECTOR DEVELOPED SITES for facility development standards and guidelines.
		b A "Cascadian" architectural theme will be used to complement existing CCC era buildings.
	5. Recreation Facilities and Site Management	a. Standards and Guidelines are the same as 3A Public Sector Developed Sites.
	6. Use Administration	a. Maintenance of trails within developed sites should be at a priority level 3, providing resource protection, and visitor convenience
B. Wilderness		a. Not applicable.
C. Wildlife and Fish		
	1 Planning	a Improvement of wildlife and fisheries habitats may be permitted.
	2. Habitat Improvement	a Improvements are appropriate as long as visitor conflict is minimized and VQO's are met.
		b. *Seasonal visitor use and wildlife use should* be coordinated to minimize conflicts.

	3. Structural Habitat Improvement	a.	Habitat improvement projects are generally acceptable, but they shall be unnoticed and/or blend into the natural landscape.
D.	Range	a.	Not applicable.
E.	Timber		
	1. Timber Management Planning	a.	Timber shall be managed on a non-scheduled basis, to meet recreation objectives, and to reduce the risk of public injury from hazardous trees.
		b.	Replant in native species.
F.	Water, Soil, and Air	a.	Improvements are appropriate as long as visitor conflict is minimized.
		b.	Improvements or rehabilitation should blend with the natural landscape. Use endemic or native species for erosion control.
G.	Minerals and Geology	a	High value recreation sites not previously withdrawn shall be recommended for withdrawal from mineral entry.
H.	Rural Community and Human Resources	a	Meet Forest-wide Standards and Guidelines
J.	Lands		
	1. Special Use Management	a.	Do not issue permits which are not compatible with the goals of this prescription.
	2. Land Ownership Planning	a.	Group III - Retain, acquire, or dispose.
L.	Facilities		
	1. Transportation System Planning	a	Roads in the seen or potentially seen area should blend with natural form, line, color, and texture.
	2. Road Construction and Reconstruction	a.	Cut and fill slopes should be revegetated within one year of construction.
		b	Rockpits and stockpile sites should be located outside seen areas whenever possible and rehabilitated when located within seen areas.
	3. FA&O Construction/ Reconstruction and Facility Maintenance	a	Buildings and other facilities should be designed and located to blend with the surrounding landscape.
		b.	A Cascadian architectural theme will be used to complement the CCC era architecture of the area
P.	Protection		
	1. Fire Management Planning	a.	Forest-wide Fire Protection Group A applies.
	2. Forest Pest Management	a.	Meet Forest-wide Standards and Guidelines.

8C SULPHUR CREEK BOTANICAL AREA

Goal: Protect unique low elevation silver fir stand for special botanical interest, research and education.

Description of Lands Where Applicable: An approximately 570 acre parcel of land located in Sulphur Creek on the south side of Mt. Baker. The area is a unique vegetative community for the elevation The principal features include low elevation silver fir and associated species. The vegetation species are found on a lava flow which is influenced by cold air draining from the glaciers on Mt Baker Several species of vegetation are usually found only at more northern latitudes.

Desired Future Condition: Protection of natural plant communities/associations for educational and scientific values.

Program Element		Standards and Guidelines
A. Recreation		
1 Recreation Planning	a	Developed facilities are for the purpose of education, and would be limited to trails and roadside turnouts
	b	Dispersed recreation use should not be encouraged.
2. Visual Quality	a	Projects shall meet a Visual Quality Objective of Retention in the foreground and Partial Retention in the middleground.
3. American Indian Religious and Cultural Use	a	Meet Forest-wide Standards and Guidelines.
4. Facility and Site Management	a	All signs and facilities blend with surrounding landscape. On-site interpretation may be present.
B. Wilderness	a.	Not applicable.
C. Wildlife and Fish		
1 Planning	a.	Control of excessive animal populations may take place where such populations threaten desired plants.
D. Range	a.	Not applicable.
E. Timber		
1. Timber Management Planning	a.	Timber harvest, including salvage, shall not be scheduled.
	b.	Hazard tree removal may only be permitted along roads or trails when required for safety.
F. Water, Soil, and Air	a.	Meet Forest-wide Standards and Guidelines.

G. Minerals and Geology	a.	Removal of common variety minerals shall not be permitted when the removal of vegetation is required. However, existing borrow sites may be utilized if the use does not require the removal of native vegetation.
	b.	Recommend denial of application for leasable minerals.
	c.	Sites not previously withdrawn shall be recommended for withdrawal from mineral entry.
H. Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J. Lands		
1 Special Uses Management	a.	Do not issue permits which are not compatible with the goals of this prescription.
2. Land Ownership Planning	a	Place all these lands in Group II - retain or acquire when possible.
3. FERC License and Permits	a.	Recommend only compatible uses (existing licenses and permits will be allowed).
L. Facilities		
1. Transportation System Planning	a.	Transportation system and utility corridors generally should not be allowed. If allowed, developments must be consistent with the goals of this prescription. (Existing facilities will be allowed and maintained.)
2 FA&O Construction/ Reconstruction and Facility Maintenance	a.	Structures should not be permitted unless botanical area characteristics can be maintained.
P. Protection		
1. Fire Management Planning	a	Natural-occurring and human-caused fires shall be controlled at the minimum acreage.
2 Forest Pest Management	a.	No action should be taken against insects and diseases unless an outbreak threatens the plants being protected or is inconsistent with management goals for adjacent areas
3 Vegetation	a.	Competing vegetation may be removed in order to preserve the continued existence of plant species of special interest.
4. Collection Permits	a.	Collection permits shall be required for the collection of any botanical specimens.

10 WILDERNESS	Goal	Preserve and protect the wilderness character. Allow for naturalness and provide opportunities for solitude, challenge, and inspiration Within these constraints, and following a policy of non-degradation management, provide for recreational, scenic, educational, scientific, and historical uses.

Description of Lands Where Prescription Applicable This prescription is applied to those acres classified as Wilderness, including: Glacier Peak, Mt. Baker, Noisy-Diobsud, Boulder River, Henry M Jackson, Clearwater, and Norse Peak Refer to the Alpine Lakes Management Plan for management direction for the Alpine Lakes Wilderness (See Management Prescription 27).

Desired Future Condition: Common to all 10A, 10B, 10C, 10D, 10E.

The ROS concept emphasizes that quality in outdoor recreation can best be achieved by providing a diversity of opportunities consistent with resource limitations to satisfy varying preferences of users. This concept is combined with factors for efficient management and adapted to wilderness in this plan. Wilderness ROS and their standards apply to all designated wilderness on the Forest (for specific direction regarding Alpine Lakes, consult the Alpine Lakes Area Land Management Plan)

Within each WROS Class there are Limits of Acceptable Change (LAC) which presuppose that certain areas (transition for example) of the wilderness will be allowed to receive relatively higher levels of use than other areas (trailless), and thus will receive higher levels of resource change or impact Decisions about management of WROS Classes are aimed at making a conscious choice about the changes that will be allowed to occur LAC should not be confused with a management objective that one is attempting to achieve LAC is a maximum limit of change allowed Managers try to achieve the best conditions possible rather than allowing conditions to deteriorate until this threshold is reached

Wilderness must be managed to prevent degradation. The nondegradation principle directs that each Wilderness must essentially be as wild as it was at the time of classification, or if conditions are not known and cannot be reconstructed for the time of classification, the first Wilderness condition inventory should be used as the benchmark for maintaining Wilderness conditions. Nondegradation applies to all values of Wilderness social, physical, and biological factor Additionally, conditions shall be improved in situations where natural processes are not operating freely, and where the values for which a Wilderness was created are impaired.

The standards listed below and summarized at the end of this Management Prescription were derived from field study and professional judgement

Carrying Capacity - Carrying capacities have been developed to estimate the amount of recreation visitor use that a wilderness or portion of wilderness, could support without degradation of resource values Carrying capacity is commonly expressed in Recreation Visitor Days (RVD's) per year or people-at-one-time (PAOT).

In the Recreation Opportunity Spectrum system, coefficients have been developed that help in the estimation of carrying capacity These coefficients are the estimated RVD's per average acre per year, that a WROS class can support Different coefficients are identified for each class and are theoretical estimation of capacity based on average conditions.

For the Land and Resource Management Plan for the Mt Baker-Snoqualmie National Forest, the following carrying capacity coefficients were developed in coordination with adjacent Forests sharing management of the Washington State Cascade Range Wilderness:

Zone	RVD/Acre/Year	RVD/Sq. Mile/Year
Transition	15 000	9600
Trailed	3.750	2400
General Trailless	25	160
Dedicated Trailless	.078	50
Special Area	To be established after study	

Limits of Acceptable Change - Recreation visitor use of wilderness cannot occur without some degree of impact on wilderness resources Impact occurs on the physical and biological features of wilderness as the quality of the recreation experience of other visitors There is a point at which increasing impact of visitor use will result in unacceptable degradation outside the intent and direction of the Wilderness Act. The Regional Nondegradation Policy is described in FSM 2322 03.

The limits of acceptable change concept is a system to establish limits on the change that can be permitted within the nondegradation policy, before management actions must be taken to reverse trends of change These actions can be either directed to improve the knowledge and abilities of the users or to reduce the numbers of visitors in impacted areas during critical time periods, or both

The system has incorporated limits or maximum levels for which key indicator resource values can change before management actions are implemented The system assumes that the condition of key indicators which are easily quantifiable and measurable reflect the general condition of resource values which are not easily measured. the impact of human-caused noise and human disturbance of wildlife are examples of impacts not easily measured.

The limits of acceptable change levels or standards are different for each Wilderness Recreation Opportunity Spectrum Class. The standards for the Dedicated Trailless tolerate the least impact in order to achieve the most pristine wilderness conditions and the least evidence of man's activity The Transition Class standards are more tolerant reflecting management of the area for a semi-primitive recreation experience and physical evidence of man's activity

The table following the standards and guidelines summarizes the key indicators that will be measured in monitoring the physical, biological, and social conditions and the standards for each Wilderness Recreation Opportunity Spectrum Class.

When monitoring results indicate that the condition of one or more of the key indicators is approaching the standard, or limit of acceptable change, a trend analysis will be done this analysis will assess the changing conditions and identify all factors of visitor use contributing to the change Cost effectiveness of possible management actions and recreation opportunity tradeoffs will be considered in the analysis. The analysis will identify alternative courses of action and a most suitable alternative will be chosen and implemented. Actions appropriate to resolve impact problems are shown in the wilderness Forest-wide Standards and Guidelines

There is a high probability that initial monitoring results in some areas will indicate impact conditions in excess of standards established for particular WROS Classes. In this event, monitoring efforts will need to be intensified to establish the current trends. The objectives in these situations will be to institute management actions to achieve an improving trend. Downgrading the Wilderness Recreation Opportunity Class to a class more tolerant of impact will not be an option.

Over the long term, wilderness management activities should lead to an improving trend in the effects of man's activity on wilderness resources in all WROS classes.

Intensities in this Management Prescription:

10A. Transition
10B. Trailed
10C General Trailless
10D. Dedicated Trailless
10E. Special Areas

INTENSITY 10A: TRANSITION

This trailed class includes system trails and may include user-made trails that have a travelway worn to mineral soil over long distances, and is characterized by having a large proportion of day-users who are often mixed in with overnight and long distance travelers This area is usually adjacent to trailheads and extends into the wilderness a distance that is typically traveled in one day by a hiker. This class includes areas accessed by trail, around lakes or other attractions used by people, or pack stock within the day-use influence area The class extends at least 500 feet on either side of a trail, but this may be wider around lakes or heavily used areas. The length of this trail class will be established for each trail depending on ease of travel, distance from trailhead outside wilderness, and destination attractions inside wilderness. This generally will be 3 to 5 miles inside the wilderness boundary. If the day-use activity occurs entirely outside wilderness, the trail will have no Transition Class.

Opportunities for exploring and experiencing isolation contrast with adjacent more developed areas outside the Wilderness, though the visitor can expect the greatest number of people compared to other wilderness classes This class introduces users to the Wilderness setting. This area normally provides relatively low challenge or risk in using outdoor skills compared to other classes. The managed trail system may include trails classified as "easiest," "more difficult," or "most difficult," and they shall receive maintenance activities as appropriate for the primary objective and difficulty level. Users may encounter improvements where the frequency and magnitude of use dictates the need for such improvement to protect the wilderness resource

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Program Element		Standards and Guidelines
A. Recreation		
1	American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines.
B Wilderness		
1	Wilderness Use Administration	a Capacity coefficient is 15 RVD's per acre per year.
		b. *Vegetative loss at campsites shall not exceed* 1,000 square feet, or cumulatively, 3% from any acre.
		c. Mineral soil exposed shall not exceed 200 square feet at campsites

OA
OB

		d. Trees felled or with scarring shall not exceed 10 trees, or 50 percent of trees on site, whichever is smaller.
		e. Average number of parties encountered per day when traveling during snow-free season shall not exceed 8.
		f. Maximum encounters with other groups on any one day shall not exceed 30.
		g. Unit size (people and stock) shall not exceed 12 unless otherwise authorized under Special Use Permit
		h. The number of "campsites" per 160 acre area shall not exceed 20.
		i. Occupied campsites visible shall not exceed 4.
C.	Wildlife and Fish	a. Displacement of wildlife due to visitor use can be significant and should be an overriding concern in wilderness where the primary objective is to maintain a natural ecosystem. Since only a small amount is managed in this class, evaluation of visitor use effects on habitat effectiveness should include adjacent areas Visitor use must not decrease habitat effectiveness in each wilderness (average of all WROS classes) for any species by more than 20%
D	Range	a Meet Forest-wide Standards and Guidelines.
E.	Timber	a. Not applicable
F	Water, Soil, and Air	a. Meet Forest-wide Standards and Guidelines.
G	Minerals & Geology	a. Meet Forest-wide Standards and Guidelines.
H.	Rural Community & Human Resources	a. Meet Forest-wide Standards and Guidelines.
J	Lands	a. Meet Forest-wide Standards and Guidelines.
L.	Facilities	a. Meet Forest-wide Standards and Guidelines
P	Protection	
	1. Fire Management Planning	a. Forest-wide Fire Protection Group B applies

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INTENSITY 10B: TRAILED

This class includes all managed system trails extending beyond the Transition Class. This class extends at least 500 feet on either side of the trail but may be wider around lakes or heavily used areas.

A moderate to high degree of opportunity exists for exploring and experiencing isolation (from the sights and sounds of civilization), independence, closeness to nature, tranquility and self-reliance through the application of no trace skills in a natural environment that offers a moderate to high degree of challenge and risk as one travels further from trailheads. The managed trail system may include trails classified as "more difficult," or "most difficult" and they shall receive maintenance activities as appropriate for the primary objective and difficulty levels. Visitors must be prepared for overnight camping, outdoor living, and changes in weather. A variety of user restrictions may be implemented to control use impacts as the need arises.

Program Element	Standards and Guidelines
A, D-P	a. Same as 10A.
B. Wilderness	
1. Wilderness Use Administration	a Capacity coefficient is 3 75 RVD's per acre per year.
	b. Vegetative loss at campsites shall not exceed 1,000 square feet, or 3 percent from any acre.
	c. Mineral soil exposed shall not exceed 200 square feet.
	d Trees felled or with scarring shall not exceed 6 trees, or 25 percent of the trees on site whichever is smaller.
	e. Average number of parties encountered when traveling per day per snow-free season shall not exceed 5
	f Maximum encounters with other groups on any one day shall not exceed 10
	g Unit size (people and stock) shall not exceed 12 unless otherwise authorized under Special Use Permit.
	h. The number of "campsites" per 160 acre area shall not exceed 10.
	i Occupied campsites visible shall not exceed 3.
C. Wildlife and Fish	a Displacement of wildlife due to visitor use can be significant and should be an overriding concern in wilderness where the primary objective is to maintain a natural ecosystem. Since only a small amount is managed in this class, evaluation of visitor use effects on habitat effectiveness should include adjacent areas Visitor use must not decrease habitat effectiveness in each wilderness (average of all WROS classes) for any species by more than 20%.

OC

INTENSITY 10C GENERAL TRAILLESS

This class is characterized by area not falling into the other classes. It generally attracts lower use because of the lack of constructed trails and a relative lack of attractions The area is unmodified and user-made trails are not encouraged, but they may exist. If obvious user-made trails become well established, or are causing resource damage, consideration will be given to restricting use or reconstructing these trails in order to protect the wilderness resource from further damage. Reclassification from general trailless to trailed requires a supplement of the Forest Plan, which shall include full public involvement. This class is available for new trail construction only to protect resources or meet management objectives by dispersing use If this should occur, the trail will be constructed to no higher than "more difficult" or "most difficult" standards.

This class provides an outstanding opportunity for isolation and solitude, mostly free from evidence of human activities and with very infrequent encounters with others. The user has outstanding opportunities to travel cross-country utilizing a maximum degree of outdoor skills, often in an environment that offers a very high degree of challenge and risk. No-trace camping skills are strongly encouraged and any user built "improvement" is undesirable and shall be removed.

Program Element		Standards and Guidelines
A, D-P	a	Same as 10A.
B. Wilderness		
1 Wilderness Use Administration	a	Capacity coefficient is 0 25 RVD's per acre per year
	b	Vegetative loss at campsites shall not exceed 500 square feet.
	c.	Mineral soil exposed shall not exceed 100 square feet
	d.	Trees felled or with scarring shall not exceed 4 trees, or 25 percent of trees on site, whichever is smaller.
	e.	Average number of parties encountered when traveling during snow-free season shall not exceed 2 per day
	f.	Maximum encounters with other groups on any one day shall not exceed 4.
	g	Unit size (people and stock) shall not exceed 12 unless otherwise authorized under Special Use Permit
	h.	The number of "campsites" per 160 acre area shall not exceed 5.
	h	Occupied campsites visible shall not exceed 2.

C. Wildlife and Fish	a. Displacement of wildlife due to visitor use can be significant and should be an overriding concern in wilderness where the primary objective is to maintain a natural ecosystem. Since only a small amount is managed in this class, evaluation of visitor use effects on habitat effectiveness should include adjacent areas. Visitor use must not decrease habitat effectiveness in each wilderness (average of all WROS classes) for any species by more than 10%

INTENSITY 10D: DEDICATED TRAILLESS

This class is managed forever trailless; obvious user-made travel ways are not permitted. Class may include way trails and routes not discernible as human related, the condition to be avoided is vegetation and soil loss along a continuous tread. The class may include popular attractions accessed only by cross-country travel Human impact and influence is, by design, minimal therefore user restrictions may be necessary to insure that trailless experiences remain. Areas chosen for Dedicated Trailless should be of a size that will allow for a meaningful experience and can be reasonably protected for the experiences and remoteness identified. Generally the class is at least 2,000 - 3,000 acres in size and contain whole drainages or basins out of sight and sound of trails, or areas outside the wilderness.

This class provides an outstanding opportunity for isolation and solitude, free from evidence of human activities and with very infrequent encounters with users. The user has outstanding opportunities to travel cross-country utilizing a maximum degree of outdoor skills, often in an environment that offers a very high degree of challenge and risk.

Program Element	Standards and Guidelines
A, D-P	a. Same as 10A
B Wilderness	
1. Wilderness Use Administration	a Capacity coefficient is .078 RVD's per acre per year.
	b. Vegetative loss at campsites shall not exceed 0 square feet
	c Mineral soil exposed shall not exceed 0 square feet.
	d. There shall be no trees felled or scarred at the sight.
	e. Average number of parties encountered when traveling during snow-free season shall not exceed 1 per day.
	f Maximum encounters with other groups on any one day shall not exceed 1.

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g Unit size (people and stock) shall not exceed 12, but strongly encourage 6 people and 0 stock, unless otherwise authorized under Special Use Authorization

h. The number of "campsites" per 160 acre area shall not exceed 2.

i. Occupied campsites visible shall be 0.

C. Wildlife and Fish

a Displacement of wildlife due to visitor use can be significant and should be an overriding concern in wilderness where the primary objective is to maintain a natural ecosystem. Since only a small amount is managed in this class, evaluation of visitor use effects on habitat effectiveness should include adjacent areas. Visitor use must not decrease habitat effectiveness in each wilderness (average of all WROS classes) for any species by more than 10%.

INTENSITY 10E: SPECIAL AREAS

The intent of this class is to provide for changes in standards or other management guidelines for unique areas Situations that qualify for Special Area designation include congressionally acknowledged areas, areas of significant cultural or historic value, areas with special wildlife considerations and areas that have limited management options to deal with unique situations. Areas do not qualify for this class for administrative convenience in dealing with overuse. This class is rare and will not exist in many wildernesses

Experience opportunities vary widely depending upon the special feature and its location A high number of other visitors may or may not be encountered. Rules and regulations to protect resources or preserve visitor experience can be expected. The following have been identified as Special Areas

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Special Area Name	Significance	Standards and Guidelines
A, D-P a	Same as 10A	
B. Wilderness		
Coleman Glacier Climbing Route- Mt Baker Wilderness	Second most popular climbing route in State	a Capacity coefficient will be in RVD's per acre per year. Coefficient to be developed thru ID Team analysis b. Same as 10A.

		c Same as 10A
		d Same as 10A
		e Average Number of parties encountered per day when traveling shall not exceed 16
		f. Campsites visible shall not exceed 10.
		g. Same as 10A.
		h Same as 10A
Winchester Mountain Lookout-Mt Baker Wilderness	Lookout addressed in Committee Reports of enabling legislation for 1984 Wilderness bill	a Accept non-conforming use, Standards and Guidelines same as 10A.
Three Fingers Lookout Boulder River Wilderness	Lookout addressed in Committee Reports of enabling legislation for 1984 Wilderness bill.	a Accept non-conforming use, Standards and Guidelines same as 10B
Miners Ridge Lookout Glacier Peak Wilderness	Lookout addressed in Committee Reports of enabling legislation for 1984 Wilderness bill.	a Accept non-conforming use, Standards and Guidelines same as 10B.
Green Mountain Lookout Glacier Peak Wilderness	Lookout addressed in Committee Reports of enabling legislation for 1984 Wilderness bill	a. Accept non-conforming use, Standards and Guidelines same as 10B.
Park Butte Lookout Mt Baker Wilderness	Lookout addressed in Committee Reports of enabling legislation for 1984 Wilderness bill.	a. Accept non-conforming use, Standards and Guidelines same as 10A
Cascade Glacier U.S.G S Facility Glacier Peak Wilderness	Glacial Research Station Maintained by Geological Survey	a. Accept non-conforming use, periodically review Special Use Permit, and manage same as 10C
Green Mtn Research Natural Area (Proposed) Glacier Peak Wilderness	Dual designation with Wilderness	a. Follow Wilderness or RNA Standards and Guidelines, whichever is more restrictive
Lily Lake Research Natural Area (Proposed) Clearwater Wilderness	Dual designation with Wilderness	a Follow Wilderness or RNA Standards and Guidelines, whichever is more restrictive
North Fork Nooksack Research Natural Area Mt Baker Wilderness	Dual designation with Wilderness	a. Follow Wilderness or RNA Standards and Guidelines, whichever is more restrictive.

North Fork Nooksack Research Natural Area (Proposed expansion) Mt. Baker Wilderness	Dual designation with Wilderness	a. Follow Wilderness or RNA Standards and Guidelines, whichever is more restrictive.
Chowder Ridge Research Natural Area (Proposed) Mt. Baker Wilderness	Dual designation with Wilderness	a. Follow Wilderness or RNA Standards and Guidelines, whichever is more restrictive.
Long Creek Research Natural Area Boulder River Wilderness	Dual designation with Wilderness	a. Follow Wilderness or RNA Standards and Guidelines, whichever is more restrictive.
C. Wildlife and Fish		a. Displacement of wildlife due to visitor use can be significant and should be an overriding concern in wilderness where the primary objective is to maintain a natural ecosystem. Since only a small amount is managed in this class, evaluation of visitor use effects on habitat effectiveness should include adjacent areas. Visitor use must not decrease habitat effectiveness in each wilderness (average of all WROS classes) for any species by more than 20%.

Summary of Management Intensities Standards and Guidelines for Wilderness 1/

Standard	Intensities				Coleman Glacier
	Transition	Trailed	General Trailless	Dedicated Trailless	Special Area
Capacity coefficient RVD's/acre/year	15.000	3.750	0.25	0.078	To be Determined
Veg. Loss at Campsite (square feet) 2/	1,000 (or 3% from any acre)	1,000	500	0	1,000
Mineral Soil Exposed (square feet)	200	200	100	0	200
Trees Scarred or Felled or Percent of Trees on a Site Scarred or Felled 3/	15 (50)	15 (50)	7 (25)	0 (0)	15 (50)
Average number parties encountered when traveling day/snow-free season 4/	8	5	2	1	16
Maximum Encounters on Any Day 5/	30	10	4	1	To be Determined
Unit size limit (people and stock together) unless otherwise authorized under Special Use Permit 6/	12	12	12	12 (strongly encourage 6 people, 0 stock)	12
Number of Campsites per 160 Acre Area 7/	20	10	5	2	To be Determined
Occupied campsites visible from other campsites 8/	4	3	2	0	10

1/ A standard may be made more restrictive on site-specific areas at the discretion of the District Ranger, if resource damage is occurring. These areas will be identified by name and the lower LAC documented.

2/ Vegetation Loss at Campsites

This indicator, measured in square feet using a transect method, was determined in U.S.F.S. Research Paper INT-284 (1982) as being an excellent indicator of soil changes and as a good measure of areal extent of site impacts

Both visual impacts and physical/ecological impacts of campsite use are reflected in this indicator, which can be measured fairly accurately using methodology developed in the mid-1970's by Schreiner, Moorehead, Koch and others.

3/ Trees Scarred or Felled

This indicator is one of the easiest to measure and is the only LAC proposed which deals with the effects of firewood gathering, and general site vandalism. Although some tree damage is inevitable, the cumulative effects over time can become critical, and therefore monitoring the trends of this indicator is essential, given the near impossibility of restoration.

4/ Average Encounters

Although maximum encounters is one way of monitoring social impacts, it is also desirable to monitor average number of parties encountered when travelling per day during the snow-free season as well. Due to the limits of personnel and funds, constant patrol is not possible in many areas and a maximum level of encounters could be difficult to monitor in these places Also, average encounters is more a measure of the day-to-day situation which the majority of visitors will be subject to Again, this indicator may be measured by patrols, encounters, or permits.

5/ Maximum Encounters

This indicator is an upper threshold LAC for social impact, indicating a level of use where the WROS class no longer retains its character. Although this may not be easily monitored in all areas, it is a necessary limit tied to definition of the WROS opportunity for solitude. Maximum encounters per day can be variously monitored by counters, observation, or permits

6/ Special Use Permit may be denied if other standards are being exceeded or resource damage is expected. Permit must specify route of travel, camp locations, dates, and other conditions necessary to meet management objectives Llamas are considered stock and are counted the same as horses and people

7/ Number of Sites Per Any 160 Acre Area

This indicator, as suggested by Stankey et al, is an indicator of campsite density and an indirect measure of aggregate site impacts. In many areas individual campsites might have acceptable levels of impact, yet the total number of sites far exceeds need In such instances, unnecessary physical and social impacts occur due to the haphazard location and selection of sites. This LAC indicator is easily measured from a Code-A-Site or similar site inventories and is based on 160 acres (1/4 section) since most destination spots will fall within this area.

8/ Campsites Visible From Each Site

Campsites visible is largely an indicator of social impacts, and is our only measure of in-camp social impact. Campsites visible is a measure which can be attained from a Code-A-Site or similar inventories, and is fairly easily and accurately measured.

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11 OLD-GROWTH HABITAT (SPOTTED OWL) — Goal: Provide and maintain the mature and old growth forest ecosystem as habitat for species that depend upon or utilize old growth for a significant portion of their habitat.

Description of Lands Where Prescription Applicable: Old growth habitat is distributed throughout the forest and exhibits the following characteristics: stand overstory dominated by live mature and old growth trees; canopy structure is multi-layered with trees of varying age classes; large numbers of standing dead trees or snags in a variety of decomposition stages, downed logs and woody material on the forest floor, located generally below 4,000 feet in elevation. The management indicator species for this habitat is the northern spotted owl. Management Area 11 consists of a network of Spotted Owl Habitat Areas (SOHA's). Generally, each SOHA has a 300 acre core and a total of 2,200 acres of suitable habitat within a 2.1 mile radius circle Some exceptions occur due to availability of habitat, and differing levels of information about specific areas.

Desired Future Condition: Evidence of human activity may be present but it does not dominate the environmental setting or significantly alter the old growth characteristics. Timber harvest is not permitted in these old growth areas with some exceptions. Construction of new access routes - roads or trails - is limited and may be affected by season and species involved. Old growth areas are protected from fire. Isolated disease and insect outbreaks are natural occurrences in an old growth ecosystem Controls will be implemented if significant damage or alteration to the ecosystem and surrounding forest land is anticipated.

Intensities in this Management Prescription: None

Program Element	Standards and Guidelines
A. Recreation	
1 Recreation Planning	a. Developed sites will be allowed in SOHA's outside of core areas, the applicable Standards and Guidelines are found in Management Prescription 3A, program element A.
	b Expansion of existing developed sites should be carefully evaluated to insure that habitat values are not detrimentally impacted Construction of new facilities will not be allowed in SOHA core areas.
	c. Existing nonmotorized trails and trail use will be permitted in SOHA, including core area.
	d. New non-motorized trail construction may be permitted in these areas including SOHA core areas, provided: 1) core area has been determined using Regional standards, and 2) biologist has been consulted to determine trail will not impact these areas.

		e. On and off-trail motorized vehicle use is prohibited in core areas, however, may be permitted in other portions of SOHA on designated trails. Management and recreation activities will be scheduled to minimize disturbance between February 15 and August 15.
		f. Trail construction and reconstruction activity should be restricted in SOHA's during the breeding period from February 15 - August 15 within the core area Management activities will be scheduled to minimize disturbances between February 15 and August 15 throughout the SOHA, unless it can be determined that owls are not actively using the area while construction/reconstruction is scheduled.
	2. Visual Quality	a. A Visual Quality Objective of retention should be met from primary viewsheds (see figure 4-1a & 4-1b) and trails within the designation.
	3. American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines
B.	Wilderness	a. Not applicable.
C.	Wildlife and Fish	
	1. Planning	a. Core areas that are immediately adjacent to a SOHA boundary shall be verified prior to timber harvest to ensure protection of the nest
		b. Cooperate and coordinate on any research studies of old growth management
		c. Conduct monitoring necessary to determine effectiveness and condition of existing inventory of habitat improvements.
		d. Management activities shall be scheduled to minimize disturbances between February 15 and August 15
		e. Conduct inventory and monitoring of suitable habitat and owl occurrences within SOHA's
	2. Habitat Improvement	a. Habitat improvement may be done to correct resource damage, if compatible with SOHA objectives
D.	Range	a. Not applicable

E. Timber		
1. Timber Management Planning	a.	Timber management activities, including salvage of blowdown, and dead, or down material shall not normally be conducted. Exceptions are permitted where a portion of one of these areas is lost to blowdown or other catastrophic event that significantly changes the old growth stand structure to the point it is no longer suitable habitat, and salvage operations will not further adversely impact habitat requirements. When this situation occurs, and prior to beginning salvage operations, the oldest adjacent stands will be identified and managed so as to replace portion lost.
2. Timber Sale Preparation	a	Trees within these areas may be used as tailholds and/or rigging provided the tree shall not be felled.
	b	Management activities will be scheduled to minimize disturbances throughout the SOHA between February 15 and August 15.
F. Water, Soil, and Air		
1. Planning	a.	Meet Forest-wide Standards and Guidelines.
2. Improvement	a.	Watershed restoration projects may be done to correct resource damage, if the project does not conflict with spotted owl habitat values.
	b.	Management activities will be scheduled to minimize disturbances throughout the SOHA between February 15 and August 15
G. Minerals and Geology	a.	These areas may be withdrawn from mineral entry following NEPA analysis and Bureau of Land Management concurrence. Appropriate protection clauses will be inserted in mineral leases.
	b	If activities that do not involve removal of timber are approved, no activities shall be permitted between February 15 - August 15.
	c.	Activities that reduce habitat in areas outside of the core shall require replacement of that habitat to maintain at least 2,200 acres.
H. Rural Community and Human Resources	a	Meet Forest-wide Standards and Guidelines.

J.	Lands		
	1. Land Ownership Planning	a.	Old growth habitat lands considered critical to old growth species viability or necessary to insure distribution criteria will be placed in Group III, available for land exchange, as long as proponent's lands contain equal habitat and meet distribution requirements Otherwise such lands shall remain in Group II.
L.	Facilities		
	1 Transportation System Planning	a.	Avoid locating roads in SOHA's outside of core areas. Those proposed road locations that involve these areas will be analyzed to assure the objectives of managing these habitats is maintained and acreage of habitat lost is replaced.
	2. Road Construction and Reconstruction	a	Prior to construction or reconstruction, SOHA core area must be verified.
		b.	No new road construction shall be permitted in SOHA core area.
	3. Road Operation	a.	In SOHA core areas, existing roads shall be permitted provided that local roads that the Forest Service has existing, valid rights be closed at the end of each activity period.
		b.	When feasible, restrict permitted activity in a SOHA core during the period of February 15 - August 15
P.	Protection		
	1 Fire Management Planning	a.	Forest-wide Fire Protection Group A applies.
	2. Forest Pest Management	a.	Integrated pest management concepts are permitted only when spotted owl habitat values can be maintained

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12 MATURE AND OLD GROWTH WILDLIFE HABITAT (PINE MARTEN, PILEATED WOODPECKER)

Goal. Provide and maintain mature and/or old growth forest as habitat for those species that can utilize either for their primary habitat needs.

Description of Lands Where Prescription Applicable Mature and/or old growth habitat is distributed throughout the Forest and exhibits the following characteristics. Mature stands generally have large diameter (21" dbh) standing trees, a multi-layer canopy component: moderate numbers of standing dead trees or snags in a variety of decomposition stages, including down logs and woody material on the forest floor. Old growth overstory is dominated by large diameter trees generally 21" plus, a multi-layered (usually 4) stand, and large numbers of standing dead trees or snags in a variety of decomposition stages, including down logs and woody material on the forest floor. The management indicator species that are dependent on mature plant communities and also use old growth are the pine marten and pileated woodpecker.

Desired Future Condition Evidence of human activity may be present but it does not dominate the environmental setting or significantly alter the mature or old growth characteristics. Dedicated habitat will be maintained as either old growth or mature stands of timber with the characteristics of each described above. There will be opportunities for visitors to interact with a natural environment to view and/or hunt wildlife.

Intensities in this Management Prescription: None

Program Element		Standards and Guidelines
A.	Recreation	
	1. Recreation Planning	a. The applicable Standards and Guidelines for Developed Recreation are found in Management Prescription 3A, program element A.
		b. Expansion of existing developed sites or construction of new sites will not be allowed.
		c Existing nonmotorized trails and trail use will be permitted in these areas.
		d. New non-motorized trail construction may be permitted in these areas provided: 1) the area has been determined using Regional standards, 2) biologist has been consulted to determine trail will not impact these areas.
		e. Existing motorized vehicle use may be permitted on designated trails Management and recreation activities may be scheduled to minimize disturbance between April 1 - June 15.
	2 Visual Quality	a A Visual Quality Objective of retention should be met from primary viewsheds (See Figure 4-1A & 4-1B) and trails within the designation.
	3. American Indian Religious and Cultural Use	a Meet Forest-wide Standards and Guidelines.
B.	Wilderness	a Not applicable
C	Wildlife and Fish	
	1 Planning	a Cooperate and coordinate on any research studies on pileated woodpecker or pine marten.
		b Snag habitat will be maintained or created to at least meet minimum requirements for cavity-nesters as stated in Forest-wide Standards and Guidelines.

		c	Down log component for all species represented by this habitat management prescription will follow density, decay class, size class, and distribution characteristic to the pine marten.
		d.	Conduct monitoring necessary to determine effectiveness and condition of existing inventory of habitat improvements.
		e.	Conduct inventory and monitoring of Management Area to determine habitat suitability and occupancy
	2. Habitat Improvement	a	Habitat improvement may be done to maintain or enhance the areas.
D.	Range	a.	Not applicable
E.	Timber		
	1. Timber Management Planning	a	Timber management activities, including salvage of blowdown, dead, or down material shall not normally be conducted. Exceptions are permitted where a portion of one of these areas is lost to blowdown or other catastrophic event that significantly changes the old-growth stand structure to the point it is no longer suitable habitat, and salvage operations will not further adversely impact habitat requirements. When this situation occurs, and prior to beginning salvage operations, the oldest adjacent stands will be identified to replace portion lost.
	2 Timber Sale Preparation	a.	Trees within these areas may be used as tailholds and/or rigging provided the tree shall not be felled.
F	Water, Soil, and Air		
	1. Planning	a	Meet Forest-wide Standards and Guidelines
	2 Improvement	a.	Meet Forest-wide Standards and Guidelines
G.	Minerals and Geology	a.	These areas may be withdrawn from mineral entry and appropriate protection clauses will be inserted in mineral leases
		b.	Activities that reduce habitat shall require replacement of that habitat to maintain at least that amount recommended in the Regional Guide.
H.	Rural Community and Human Resources	a	Meet Forest-wide Standards and Guidelines

J.	Lands		
	1. Land Ownership Planning	a	Old growth and mature forest habitat lands considered critical to old growth and mature forest species viability or necessary to insure distribution criteria will be placed in Group III, available for land exchange as long as proponent's lands contain equal habitat and meet distribution requirements, otherwise, such lands shall remain in Group II.
L.	Facilities		
	1. Transportation System Planning	a	Avoid locating roads in these areas. If a proposed road location involves crossing through these areas, an analysis will be made to assure the objectives for managing these areas is maintained
	2. Road Operation	a	In these areas, existing roads shall be permitted provided that local roads that the Forest Service has existing valid rights shall be closed at the end of each activity period.
P	Protection		
	1. Fire Management Planning	a.	Forest-wide Fire Protection Group A is applicable except
	2. Forest Pest Management	a.	Integrated pest management concepts are permitted, except where use of pesticides conflicts with old growth habitat management.

13 WATERSHED, WILDLIFE, and FISHERIES EMPHASIS IN RIPARIAN AREAS	Goal	To maintain or improve water quality and to produce various levels of potential habitat capability for various species of fish within designated riparian areas. Also maintain or enhance habitat for riparian associated wildlife species.

Descriptions of Lands Where Prescription Applicable: This prescription is applicable to those lands adjacent to perennial and intermittent streams - Class I, II, and deeply incised Class III streams - lakes, wetlands, ponds, seeps, floodplains, and it includes the aquatic and the riparian ecosystems. These lands also support a diversity of plant species, being dominated by species preferring or tolerating wet or moist site conditions

Riparian areas contain a variety of resource values (water quality, fish and wildlife habitat, and soil productivity). This strategy is designed to maintain and/or improve these resource values, with special emphasis on water quality and fish and wildlife habitat Actual area and boundaries of these riparian areas will be determined at the project level of planning.

Desired Future Condition Meet or exceed State/Federal water quality standards. Maintain current (existing) levels of habitat capability of all fish species. Fish habitat capability is measured by the following four in-channel features channel stability, streambank stability, condition of pools, and the presence or absence of large woody debris. In some areas increase habitat capability for targeted fish species (habitat restoration or enhancement). Maintain, and in some cases, improve riparian vegetation diversity. Maintain, and in some areas improve, existing levels of habitat capability of all riparian dependent wildlife species through restoration and/or enhancement A variety of plant and animal species are present, hardwood tree species are more common here than elsewhere. A variety of dead trees standing and downed, are common Created openings are small and widely distributed. The riparian area will include mature trees that may be managed on a normal rotation, as well as larger older trees to be managed on an extended rotation (160 + years). Some trees are not planned to be harvested, as they are needed for slope stability or future large woody debris in the stream systems.

INTENSITY 13D LEVEL III ANADROMOUS, POTENTIAL RESIDENT FISH HABITAT CAPABILITY

Program Element		Standards and Guidelines
A. Recreation		
1 Recreation Planning	a	When planning any new development and a conflict exists that conflict will be resolved in favor of the dependent riparian resources and values (soil, water, fish, and wildlife.)
	b.	ROS settings can range from primitive to roaded natural
2 Recreation Use	a	No ground or water channel disturbance from any ORV use.
3. Visual Quality	a	Visual Quality Objectives of retention to modification consistent with adjacent management areas
4. American Indian Religious and Cultural Use	a.	Meet Forest-wide Standards and Guidelines

5. Trail Planning	a.	Nonmotorized trail facilities are permitted. Existing ORV use will be permitted on roads or trails designated for that use.
	b.	New ORV trail construction/reconstruction activities will be permitted in designated riparian areas only when stated riparian objectives can be accomplished. If ORV activities are allowed, they should be restricted to timing and/or access due to fish migration and/or spawning.
B. Wilderness	a	Not applicable.
C. Wildlife and Fish		
1. Planning	a.	Emphasize maintenance and protection of fish habitat capability and water quality. Maintain or protect existing stream channel and bank stability, pool condition, and the presence of large woody debris in all stream channels. Where necessary, restore or rehabilitate channels to improve channel and bank stability, pool conditions, and large woody debris
	b	Retain instream woody material plus standing (live and dead) adjacent to the stream, needed for future debris recruitment, bank and channel stability, and wildlife habitat.
	c	Emphasize planning at a watershed level for habitat and watershed restoration and improvement activities.
	d	Maintain streamside vegetation so that at least 80% of the fish habitat stream surface has shade during the summer low flows. Maintain or restore 75% of other small woody and herbaceous vegetation.
	e	Primary excavator habitat will be managed to 80% of potential population levels. All large dead and down logs will be left except for logs to be used as instream structures for fish habitat or channel stability.
	f.	For T & E species, follow Forest-wide Standards and Guidelines and Management Prescription 16 Standards and Guidelines. Manage wetlands to protect all bogs, swamps, and beaver ponds.
	g	Manage wetlands to protect all bogs, swamps, and beaver ponds.
	h	Consult with local state biologists to assure fish management objectives are compatible with state management objectives.

2. Habitat Improvement	a	Emphasize restoring, rehabilitating and improving degraded or lost spawning and/or rearing habitat for native anadromous and resident trout species. Habitat work in upper channel includes: installation of log-check dams and/or rock dams as energy dissipaters and sediment collectors Streambank areas will be planted and seeded to help stabilize eroded sections The objective is to maintain and increase sufficient amounts of structure components to provide channel and bank stability.
	b	Habitat work in lower channel areas includes installation of large structures (wood, native rock, or concrete) in the channels to restore or improve spawning and/or rearing habitat quality and quantity. The objective is to re-create pools, or to improve on pool quality, and to increase stream channel and bank stability. Other habitat work in the lower channel areas can include improving or enhancing off-channel juvenile salmon and trout habitat by constructing either rearing channels or rearing ponds.
	c.	Emphasize measures to improve wildlife habitat diversity and integrity
	d.	Stocking of anadromous fish (adults or juveniles) permitted to help meet production level III requirements Must be part of the overall restoration plan Stocking of resident fish is permitted to meet potential capability level for resident fish Stocking activities must be part of overall project work plans.
D. Range	a	Not applicable
E Timber		
1. Timber Management Planning	a	A range of silvicultural treatments will be permitted only when riparian objectives can be accomplished Timber management intensity H (extended rotation) best meets the riparian values; other timber management intensities A-G which also meet the riparian values may also be considered
2. Timber Sale Preparation	a	Yarding and skidding that maintains soil disturbance and vegetation standards are acceptable (see F2 on following page)
	b.	Less than 10% of the area should be damaged. A damaged area exists when there is an increase in soil bulk density of 15% or more over the undisturbed level, a macropore space reduction of 50% or more, and/or a reduction below the 15% level as measured by an air permeameter.

F	Water, Soil, and Air		
	1. Planning	a.	Meet Forestwide Standards and Guidelines
	2. Improvements	a	Watershed improvements and maintenance are permitted. Use vegetative restoration methods to restore live root mat and reduce risk of slope failure along stream channels as well as upper slope areas outside the riparian area.
	3. Soil Resource Monitoring	a.	Ground disturbing activities will result in no more than 10% mineral soil exposed within a project area. Disturbance should be widely distributed over the area.
		b.	Small woody and herbaceous vegetation disturbance limited to 25% and widely distributed over the project area.
G	Minerals and Geology	a.	Extraction of common variety minerals may be conducted provided riparian values can be protected.
H.	Rural Community and Human Resources	a.	Encourage use of various human resource programs to be used in accomplishing pre-selected water quality or fish habitat restoration/rehabilitation projects
J.	Lands		
	1 Special Use Management	a.	Activity to be analyzed through NEPA process to determine its effect on riparian habitat. Only permitted if riparian habitat diversity and integrity is maintained.
	2. Rights-of-Way Grants	a	Meet Forest-wide Standards and Guidelines.
	3. FERC License and Permits	a	Assure consideration and establishment of minimum flows.
	4. Land Ownership Planning	a.	Lands critical to riparian management should be placed in a Group III. Federal and non-federal lands involved in land exchanges shall contain equal amounts of mature riparian habitat.
L.	Facilities		
	1 Transportation System Planning	a	Roads should avoid riparian areas when possible. Locating roads in a riparian area can only be done if riparian values are protected.
		b.	Necessary crossings should use methods that minimize adverse impacts to water and fisheries resources.
	2. Road Construction, Reconstruction and Operation	a.	Road construction/reconstruction activities will be permitted in designated riparian areas only when stated riparian area objectives can be accomplished. Such activities may be restricted to timing and/or access due to fish migration and/or spawning.

		b. Slopes adjacent to or within riparian areas will be protected with erosion and/or sediment control Before the first wet season, vegetation or slope protection will be completed. Prior to the end of the normal operating season, final stabilization practices should include vegetation as well as structural.
		c Water quality and/or fisheries habitat problems caused by road construction/reconstruction shall be fully mitigated in kind, on site.
		d All roads not receiving annual maintenance shall have measures to control road surface and ditch water.
P. Protection		
1 Fire Management Planning		a. Forest-wide Fire Protection Group D applies.
2 Forest Pest Management		a. Integrated pest management is permitted except where use of pesticides conflicts with riparian values

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14 DEER AND ELK WINTER RANGE — Goal Manage winter range to specifically benefit deer and elk in terms of vegetational habitat.

Description of Lands Where Prescription Applicable· This prescription is applied to acres throughout the Forest that are inventoried as deer and elk winter range Winter range is generally located below 2,200 feet in elevation and contains a mix of successional stages to meet the forage and cover requirements for deer and elk. Optimum habitat is mature and old growth forest. The canopy cover and litter and understory vegetation of an old growth forest provides both the optimal thermal cover plus forage needs for wintering deer and elk. Second growth stands may also provide habitat These acres include timber stands with a 70 percent or greater canopy closure and provide adequate thermal cover Forage, however, is limited. Clearcut acres may also provide some food for the needs of deer and elk winter range; forage is available but cover is limited.

Desired Future Condition

To achieve proper forage/cover ratios, timber harvest patterns and unit size will be designed for optimum proportion and arrangement of different successional forest stages, including old growth, second growth stands, and clearcuts and plantations. Management activities will be scheduled to minimize disturbances between December 1 and April 1 Road closures may be implemented to reduce wildlife harassment from recreation or management activities

Intensities in this Management Prescription: None

Program Element	Standards and Guidelines
A. Recreation	
1. Recreation Planning	a. Concentrated recreational activities are permitted except where direct conflicts with winter range occurs.
	b Specialized habitats include, but are not limited to, calving and fawning areas, elk wallows, mineral licks, concentration areas, and travel corridors. Existing concentrated recreational activities within these areas should be moved to other areas when they conflict with winter range objectives.
	c. Conflicts between ORV and big game use between the dates of December 1 - April 15 shall be resolved in favor of the latter.
2. Visual Quality	a Meet a Visual Quality Objective of foreground retention and middleground partial retention in primary viewsheds (See Figure 4-1A & 4-1B). Meet a Visual Quality Objective of partial retention in secondary viewshed foregrounds, and modification in secondary viewshed middleground.
3 American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines
B. Wilderness	a Not applicable
C. Wildlife and Fish	
1 Planning	a. Average open-road density per square mile for a contiguous piece of winter range shall be no more than 2 miles/square mile
	b. Diversity and juxtaposition of habitat shall consist of forage hiding/thermal cover, and optimal cover (OC) See glossary for definition of habitat types.
	c Range of habitat types is as follows.

Seral Stage	% of Range
1-20 years	10-15% forage
21-80/90 years	40-45% Thermal/hiding cover
90+ years	37-45% Optimal cover

	d. As a general rule, maintain above range of habitat types for every 2,000 acres (approx.) of contiguous winter range, but not to exclude areas smaller than 2000 acres

	2. Habitat Improvement	a. Improvement will be emphasized such as desirable forage species planting, fertilization, thinning, and slash disposal.
D.	Range	a. Not applicable
E.	Timber	
	1. Timber Management Planning	a. Timber harvest will be scheduled and units designed to provide habitat diversity and integrity for deer and elk.
		b. The following priorities for scheduling shall be applied: (1) In scheduling timber management activities, first consideration shall be to meet optimal thermal cover acreage requirements. (2) If optimal cover acreage requirements are met, then schedule to meet forage requirements. (3) If optimal cover acreage requirements cannot be met, hold the oldest available stands to meet future optimal thermal cover requirements, then schedule to meet forage requirements.
		c Any timber management intensity may be applied to meet the optimal cover acreage and forage requirement.
	2. Timber Sale Preparation	a Forage units shall be designed to meet future optimal cover requirements To achieve this unit design should assure no point is further than 600 feet from cover.
F.	Water, Soil, and Air	a. Meet Forest-wide Standards and Guidelines.
G	Minerals and Geology	a Mineral exploration and extraction will include requirements and mitigation measures needed to protect habitat and winter range objectives.
		b Activities that adversely affect wildlife shall be identified and mitigated.
H	Rural Community and Human Resources	a Meet Forest-wide Standards and Guidelines
J.	Lands	
	1. Special Use Management	a. Construction, maintenance, and operation are permitted, provided it does not adversely affect special habitat and/or winter range.
	2. FERC License and Permits	a. Same as J-1a above.

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3. Land Ownership Planning	a.	Winter habitat will be placed in Group III classification for acquisition or disposal as needed
L. Facilities		
1. Transportation System Planning	a.	Location of new roads shall not adversely impact special habitat areas, including winter range. Road design should be coordinated with a biologist to determine and reduce impacts.
	b.	See C-1a on prior page for open road densities.
2. Road Construction and Reconstruction	a.	Road construction and reconstruction shall not be permitted between December 1 - April 15 in identified winter range.
	b.	Road construction and reconstruction shall be timed to reduce harassment in special habitat areas, including winter range Some exceptions for emergency flood repair
3. Road Operation	a.	See above for timing restrictions for maintenance operations. Some exceptions for emergency flood repair.
	b	Local and collector roads may be closed seasonally or indefinitely, in order to allow an open road density that maintains habitat effectiveness Unneeded roads will be obliterated or inactivated.
P. Protection		
1 Fire Management Planning	a	Forest-wide Fire Protection Group E3 applies.
2 Forest Pest Management	a	Utilize integrated pest management techniques except when use of chemical pesticides conflicts with objectives of managing winter range and specialized habitats.

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15 MOUNTAIN GOAT HABITAT

Goal Protect and manage habitat to maintain or increase mountain goat populations.

Description of Lands Where Prescription Applicable This prescription is applied to selected acres of current and historical mountain goat habitat. These areas characteristically contain diverse vegetation including mature and old growth stands, steep rocky cliffs, projecting pinnacles, ledges, and talus slides Winter range is generally at lower elevations (tree-line and below) than summer habitat.

Desired Future Condition

Current and historically used mountain goat range is in the process of being identified and verified. The winter range is maintained as a natural environment with little evidence of human activity.

No new roads will be constructed to access winter range; existing roads and trails that would permit human encroachment and subsequent harassment to mountain goats on the winter or summer range will have use restricted. No scheduled timber harvest. If timber management activities are conducted, practices shall be for purpose of maintaining mountain goat habitat.

Intensities in this Management Prescription

15A Management Requirement

INTENSITY 15A: MANAGEMENT REQUIREMENT

Program Element		Standards and Guidelines
A. Recreation		
	1. Facilities Construction and Reconstruction	a. Facilities that maintain the integrity of mountain goat habitat may be allowed.
		b. Use of existing trails and campsites should be discouraged within 1,500 feet of known key habitat features. Key habitat features are defined in the "Description of Lands" for this prescription
	2. Visual Quality	a. Visual Quality Objectives consistent with adjacent management areas The site itself will be managed to show little to no evidence of human impact
	3. American Indian Religious and Cultural Use	a Meet Forest-wide Standards and Guidelines.
	4. Use Administration	a Existing roads that directly access winter range shall be restricted where harassment to mountain goats has been identified.
		b. Motorized use shall not be allowed on winter range from October 31 - June 15
B. Wilderness		a. Not applicable.
C. Wildlife & Fish		
	1 Planning	a Cooperate with the Washington Department of Wildlife in mountain goat census and refinement of winter range boundaries.
		b Continue surveys and inventory of known and suspected mountain goat winter range to document critical habitat for protection.
		c Monitoring shall examine habitat components and use to insure Forest Planning objectives are being met
D. Range		a. Not applicable.

E.	*Timber*		
	1. Timber Management Planning	a.	No harvest scheduled. If timber management activities are conducted, practices applied shall be for the primary purpose of maintaining mountain goat winter habitat.
	2 Reforestation and Timber Stand Improvement	a	Reforestation and TSI plans should be designed for improving forage to meet management objectives for mountain goats
	3. Timber Sale Preparation and Harvest Administration	a.	Any limited harvest activity should have restrictions, similar to A-4b on previous page.
		b	*Timber management activities adjacent to avalanche chutes shall be maintained to meet optimal cover needs in those areas*
F.	Water, Soil, and Air	a.	Meet Forest-wide Standards and Guidelines.
G.	Minerals and Geology	a	Mineral exploration and extraction, including common variety minerals will include requirements and mitigation measures needed to protect habitat and winter range objectives.
		b.	Activities that adversely effect goats on the winter range shall be identified and mitigated.
H.	Rural Community and Human Resources	a	Meet Forest-wide Standards and Guidelines.
J	Land		
	1. FERC Licenses and Permits	a	Construction, maintenance, and operation is permitted, provided it does not alter or adversely impact mountain goat habitat or it's effectiveness.
	2. Land Ownership Planning	a.	Identified critical habitat within forest boundary will be placed in Group II
L.	Facilities		
	1 Transportation System Planning	a	No new roads permitted which access mountain goat winter habitat.
		b.	Existing open-road density should average no more than approximately 2 miles per square mile of contiguous winter range habitat.
	2. Road Construction and Reconstruction	a.	Reconstruction activities shall be timed to avoid conflict with mountain goat winter habitat use. Activities shall be restricted *between December 1 - May 15 (south) and* December 1 - June 15 (north).

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3 Road Operation	a.	Manage traffic to minimize impact on mountain goat winter range Consider road closures when conflict or goat harassment has been identified. Use of existing facilities should be discouraged within 1500' of key habitat features.

P. Protection

1. Fire Management Planning	a.	Forest-wide Fire Protection Group E1 applies.
2 Forest Pest Management	a	Utilize integrated pest management techniques except where use of chemical pesticides conflicts with objectives of managing winter range

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16 THREATENED AND ENDANGERED SPECIES — Goal: Manage existing habitat to provide for the long-term needs of Threatened and Endangered species. In addition, identify potential habitat and management to enhance long-term viability of these species Management is consistent with recovery plan objectives.

Description of Lands Where Prescription Applicable This prescription is applied to identified and designated sites and areas to meet recovery needs, and those that may be identified in future through more intensive surveys

Desired Future Condition: Common to all Intensities

Existing habitat is managed to provide for the for the long-term needs of the species concerned Management may include vegetative alterations to enhance habitat, depending on species Potential habitat is identified and managed to enhance the long-term viability of the species consistent with species recovery objectives and eventual delisting

Intensities in this Management Prescription

16A Northern Bald Eagle
16B Grizzly Bear
16C American Peregrine Falcon
16D Gray Wolf

The standards and guidelines in this prescription identify typical management practices in T & E habitat areas. However, the Forest will consult with USDI Fish and Wildlife Service regarding management activities which may affect a federally listed species' habitat and will develop protection, mitigation and enhancement measures specific to that habitat area Recovery plans will be implemented and used to guide management activities within Threatened and Endangered species habitat

INTENSITY 16A: NORTHERN BALD EAGLE

Included as dedicated habitat are one existing and two potential nest sites, as identified in the Bald Eagle Working Team Implementation Plan (1989), and six communal roost sites. These sites are not shown on the maps distributed to the public. There are additional acres of existing and potential feeding habitat that are managed for the eagle, but assigned to the Management Areas addressing the Skagit Wild and Scenic River, Riparian and Fisheries Habitat and other MA's with compatible management direction. There is no scheduled timber harvest in the dedicated areas. Some activities are prohibited, others are restricted, either by season or by distance from the nesting or roosting areas

Program Element		Standards and Guidelines
A. Recreation		
1 Trail Planning	a	New trails will not be located within 1/4 mile of known nest trees or roost areas.
2. Visual Quality	a.	Meet a VQO of retention foreground and partial retention middleground from primary viewsheds Meets a VQO of foreground partial retention and middleground modification from secondary viewsheds.
3. American Indian Religious and Cultural Use	a	Meet Forest-wide Standards and Guidelines.
4. Facility and Site Construction and Reconstruction	a.	New facilities shall be located at least 1/4 mile from known nests and roosts, except that development of new recreation sites is permitted if recreational use does not occur during the season of bald eagle use.
	b	Existing developed sites will not be expanded and increased human use will be discouraged when monitoring identifies a potential conflict with bald eagle use.
	c.	Restrict any recreation reconstruction activity within 1/4 mile of a known nest from January 1 - August 31, or roost areas from November 15 - April 1.
	d	Construction or development projects or reconstruction near the winter use areas should not be conducted between November 15 - April 1.
5 Use Administration	a	Dispersed use, such as an occasional solitary hiker, is not a significant conflict. However, more use than the occasional intrusion within 1/4 mile of a nest should be restricted between January 1 - August 31, The same restriction applies to known communal night roosts , and feeding areas, but for the period November 15 - April 1.

6. Trail Construction	a	Locate new trails and recreation facilities further than 1/4 mile from known nest trees and night roosts.
7. Trail Reconstruction	a.	Relocate existing trails within 660 feet of known nests to 1/4 mile or more from the nest. If relocation is not possible, restrict trail reconstruction activity from January 1 to August 31.
B. Wilderness	a.	Not applicable.
C. Wildlife and Fish		
1 Threatened, Endangered and Sensitive Species Recovery Effort	a	There will be no public disclosure of locations of known nest and roost sites
2. Habitat Improvement	a	Habitat improvement within 1/4 mile of nest sites will be restricted between January 1 - August 31, and between November 15 - April 1 for roost sites, if it conflicts with eagle use of the area.
D. Range	a.	Not applicable.
E. Timber		
1. Timber Management Planning	a.	There will be no scheduled harvest within 1/4 mile radius, as a minimum, of any known or potential nest site, roosting or staging area. Timber harvest and related activities will be restricted to occurring outside of the habitat use period.
	b	To maintain nesting and winter roost and perch habitat, and to lessen susceptibility to disease, competing vegetation may be controlled or eliminated from immediately around these habitats using biological or silvicultural methods.
F Water, Soil, and Air	a.	Meet Forest-wide Standards and Guidelines.
	b.	If conflict occurs, require air space restrictions for low level aircraft from January 1 to August 31 in the vicinity of nest sites and feeding areas when in use.
G Minerals and Geology	a	No surface mining within a minimum of 1/4 mile of known nests, and no mining activity within 1/4 mile of a nest during season of use No mining activity within 1/4 mile of shorelines used for feeding areas, or within 1/4 mile of known roosting sites, during seasons of bald eagle use

		b	Mineral activity within 1/4 mile radius from known roosting or nest sites will require protection measures, such as timing restrictions
H	Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J	Lands		
	1. Special Use Management	a.	No development of commercial sites or private homesites, hydroelectric facilities, and powerlines within 1/4 mile of known nests or roosting areas.
	2 FERC License and Permits	a	Activities within 1/4 mile of a nest site or roost area may occur only outside the season of habitat use (January 1-August 31 for nest sites, and November 15-April 1 for roost areas)
	3 Land Ownership Planning	a	Group II - parcels of Forest land containing existing or potential bald eagle habitat will be retained.
L.	Facilities		
	1 Road Construction and Reconstruction	a	Reconstruction and maintenance of existing roads within 1/4 mile of a nest tree or roost area will be restricted between January 1 - August 31 for nest areas, and November 15 - April 1 for roost areas, or when these areas are in use. Where possible, relocate existing roads 1/4 mile from nest and roost areas.
		b	No road construction within 1/4 mile of known nests, feeding areas, and core roosting areas.
	3. Road Operation	a	Roads within 1/4 mile of nests, in feeding and/or roost areas will have time-of-year restriction on maintenance and use.
P.	Protection		
	1. Fire Management Planning	a.	Protection of bald eagle nesting and roosting habitat from wildfire will be a high priority in determination of appropriate suppression response.
		b.	Forest-wide Fire Protection Group A applies.
	2 Treatment of Activity Fuels	a	No fuels treatment within 1/4 mile of known nests between January 1 - August 31 or within 1/4 mile of roost sites between November 15 - April 1.
	3. Forest Pest Management	a	Integrated pest management concepts are permitted only when bald eagle habitat values can be maintained

INTENSITY 16B: GRIZZLY BEAR

Although sightings of grizzly bears have been reported, no occurrences have been documented by the Washington Department of Wildlife in the on-going Grizzly Bear Population and Occurrence Study. Any grizzly bears found on the Forest will receive full protection under the Endangered Species Act. If the North Cascades Ecosystem is selected as a grizzly recovery area, a recovery plan will be developed which will guide grizzly bear management on the Forest. At the present time, the following standards and guidelines apply:

Program Element		Standards and Guidelines
A. Recreation		
	1. Recreation Planning	a. Planning will assure that potential developed or dispersed use will not degrade or compromise important potential grizzly use areas (forage sites, denning areas, or travel routes).
		b The applicable Standards and Guidelines for Developed Recreation are found in Management Prescription 3A, program element A
	2. Visual Quality	a. Meet Forest-wide Standards and Guidelines.
	3. American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines.
B. Wilderness		
	1. Wilderness Use Administration	a. Assure administration of wilderness use will not degrade or compromise important potential grizzly use areas.
C. Wildlife and Fish		
	1. Threatened and Endangered Sensitive Species Recovery Effort	a. Conduct an inventory of the condition of grizzly bear habitat.
		b. Send reports of sightings to coordinator.
D. Range		a Not applicable.
E. Timber		
	1. Timber Management Planning	a Assure any proposed activity in or near potential grizzly habitat is evaluated for its effect through NEPA analysis.
F. Water, Soil, and Air		a. Same as timber E-1a above
G. Minerals and Geology		a. Same as timber E-1a above
H. Rural Community and Human Resources		a. Meet Forest-wide Standards and Guidelines.
J. Lands		
	1. Special Use Management	a. Same as timber E-1a above.

2. Land Ownership Planning	a.	Group II- retain or acquire.
L. Facilities		
1. Transportation System Planning	a.	Same as timber E-1a above.
P Protection		
1. Fire Management Planning	a.	If habitat quality is substantiated, managed burning may be appropriate.
	b.	Forest-wide Fire Protection Group D applies.
2. Forest Pest Management	a.	Not applicable.

INTENSITY 16C. AMERICAN PEREGRINE FALCON

There are no specific standards or guidelines for this species because no use or recovery plan sites have been identified. Habitat for peregrine falcon will be inventoried. Suitable standards and guidelines will be developed and implemented if use areas are identified

Meet Forest-wide Standards and Guidelines, Section VI Threatened, Endangered, and Sensitive Species for general direction if American peregrine falcon nesting and use is discovered.

INTENSITY 16D: GRAY WOLF

There are no specific standards or guidelines for this species because no use or recovery plan sites have been identified.

Meet Forest-wide Standards and Guidelines, Threatened, Endangered, and Sensitive Species direction if gray wolf use is discovered.

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17 TIMBER MANAGEMENT EMPHASIS Goal: Provide for the production of timber.

Description of Lands Where Prescription Applicable: This prescription may be applied to any suitable forest acres. Approximate acres suitable for timber production in each timber productivity type are: Principal Douglas-fir North 271,575 acres; Principal Douglas-fir South 128,900 acres, Upper True fir North 92,515, and Upper True fir South 111,810 acres. Timber productivity for these types as expressed by the average King site index at age 50 years (King 1966) are 95, 79, 73 and 70 respectively. The intensity selected for any suitable acre will be determined at the project-level environmental (NEPA) analysis.

Desired Future Condition: Common to all Intensities.

Areas allocated to this strategy will take on the appearance of intensively managed timber lands, typified by even ages of stands, relatively even spacing of trees, well developed crown ratios, and low levels of mortality. Clearcuts are common; they may borrow form, line, and texture from the characteristics of the surrounding landscape, but management activities will generally be dominant Access will generally be by road.

Intensities in this Management Prescription.

17A **Natural Regeneration - Final Harvest** Natural reforestation is supplemented by planting to meet Forest minimum stocking standards. This is a minimum investment intensity.

17B **Natural Regeneration - Precommercial Thinning - Final Harvest**· Reforestation is natural, supplemented by planting to meet Forest minimum stocking standards. Precommercial thinning is planned. Release, growing stock protection measures, and fertilization may be prescribed. This intensity may be applied to existing reforestation condition classes There are no location or species constraints

17C **Plant - Final Harvest:** Reforestation is by planting. Release and growing stock protective practices may be prescribed

17D. **Plant - Final Harvest - Genetic Stock:** Reforestation is by planting, using genetically improved stock when available Release and growing stock protective practices may be prescribed.

17E **Plant - Commercial Thin (1) - Final Harvest - Genetic Stock** Reforestation is by planting, using genetically improved stock when available. Release, growing stock protection measures, and fertilization may be prescribed Commercial thinning harvest is planned 10 to 20 years before regeneration (final) harvest MA 17E may be applied to stands that have not been precommercially thinned. Commercial thinning permitted in timber stands accessible by road, in which 50% of the trees are Douglas-fir.

17F **Plant - Precommercial Thin - Final Harvest - Genetic Stock** Reforestation is by planting using genetically improved stock when available. Precommercial thinning planned Release, growing stock protection measures, and fertilization may be prescribed. This intensity may be applied to existing reforestation condition classes There are no location or species constraints

17G. **Plant -Precommercial Thin - Commercial Thin (1) - Final Harvest - Genetic Stock:** *This intensity is designed to obtain the maximum timber production possible while* meeting the Forest-wide and Management Area Standards and Guidelines. Every applicable approved practice should be used to increase production Reforestation is by planting, using genetically improved stock when available. Precommercial thinning is planned; commercial thinning is permitted, as in 17E. This intensity may be applied to existing reforestation condition classes. Maximum rotation length is at the age volume production is equivalent to 100% culmination of mean annual increment (see Glossary)

17H. **Plant - Precommercial Thin - Commercial Thin (3) - Final Harvest - Genetic Stock - Extended Rotation** This intensity is designed to produce and maintain a portion of managed stands with a good range of large to very large trees, to meet visual quality requirements or other resource objectives. The basic rotation length is 200 years, with three intermediate thinning harvests; however, different rotation lengths may be prescribed. Reforestation is by planting. Precommercial and commercial thinning at 30 year intervals are planned. Release, growing stock protection practices, fertilization, or planting genetic stock may be prescribed. This intensity may be applied to existing reforestation condition classes.

The first two intensities (A, B) are applicable only to the upper slope type of true fir-western hemlock while intensities C through H are available to the principal forest type where Douglas-fir is the preferred tree species. Intensity C is applicable to the mixed conifer hardwood types where hardwood species will be planted.

Timber management intensities A through H have the same Standards and Guidelines for each program element except where noted.

Program Element	Intensity		Standards and Guidelines
A. Recreation			
1. Visual Quality	All	a.	Unit design will meet at least the Visual Quality Objective of Maximum Modification while still meeting the objective of this Management Prescription.
	All	b.	Within a trail foreground, manage to meet a Visual Quality Objective of at least modification.
2. American Indian Religious and Cultural Use	All	a.	Meet Forest-wide Standards and Guidelines
3 Facility Site Planning	All	a.	Developed recreation sites will be allocated to, and managed under direction contained in Management Area 3A.
4. Use Administration	All	a.	Recreation opportunities will generally be in Roaded Natural and Roaded *Modified ROS classes.*
	All	b.	ORV use as provided in Forest-Wide Standards and Guidelines.

		All	c.	Roaded and non-roaded dispersed recreation are permitted.
	5. Trails	All	a.	Trails interrupted by logging or road construction shall be restored, or substitute trails provided so that the mileage of trails in the same general location is not diminished. Trails will be kept open, and clear directions for users provided during interrupting activities
		All	b	New trail location shall be permitted provided that it does not conflict with the long-term timber objectives.
B	Wilderness	All	a.	Not applicable.
C	Wildlife and Fish			
	1. Planning	All	a.	Meet Forest-wide Standards and Guidelines for maintenance of wildlife habitat.
	2. Habitat Improvement	All	a.	Enhancement of habitat may be permitted provided that full timber management objectives are met
	3. Threatened, Endangered, and Sensitive Species	All	a	Meet Forest-wide Standards and Guidelines.
D.	Range	All	a.	Range use may be permitted to accomplish specific silvicultural objectives.
		All	b.	Other range use may be permitted provided that timber production is not impaired.
E.	Timber			
	1 Timber Management Planning and Inventories	All	a.	The full range of activities are included which are necessary to develop and prepare the timber resource portion of the forest land and resource management plan, (including inventory, data analysis, rotation determination, harvest schedule development, EIS preparation, etc.) plus maintenance of the completed plan and control records.
	2. Regeneration Harvest	All	a.	Final harvest method determined as stipulated in E. 6a below.
	3. Intermediate Harvest	A-D,F	a.	Sanitation (salvage) cuts are permitted.
		E,G,H	a	Thinning and sanitation (salvage) cuts are permitted.

4. Commercial Thinning Harvest	E,G,H	a.	Candidate stand should not be past Culmination of Mean Annual Increment (CMAI).
	E,G,H	b.	Individual trees will have crown ratios meeting or exceeding those prescribed in FSH 2409 26d (Silvicultural Examination and Prescription Handbook) for a commercial thin before management activity may occur.
	E,G,H	c.	Stand is expected to show a growth response to treatment.
	E,G,H	d.	Management activity should lessen susceptibility to infectious disease, e.g. stem and/or root rots.
	E,G,H		1. Harvest activities will be such as to limit damage to residual stands.
	E,G,H		2. Treat freshly cut whitewood stumps, above ten inches in diameter, with disease retarding agents. e.g Borax.
	E,G,H	e.	In whitewood (True firs and hemlock) stands give priority to wetter plant associations for commercial thinnings.
	E,G,H	f.	Economic efficiency analysis shall be completed before the decision is made to use Commercial Thinning
5. Salvage Harvest	All	a.	Permitted.
6. Silvicultural Examination and Prescription	All	a.	Prior to any silvicultural activity, a silvicultural examination and prescription will be made.
7. Post Treatment Examination and Validation	All	a.	A post-treatment examination and validation of the prescribed treatment will be made to insure that minimum prescribed standards are met.
8. Activity Review and Evaluation	All	a.	Reviews of silvicultural activities that are "in progress" or "recently completed" will be conducted to provide feedback to silviculturalists for the purpose of improving the quality of prescriptions.
9. Reforestation	A,B	a.	Residual seedlings and natural seeding will be utilized. Planting may be used to insure adequate reforestation. Genetically improved stock will not normally be planted.

	C-F,H	a.	Residual seedlings and natural seeding will be utilized. Planting may be used to insure adequate reforestation Genetically improved stock will be planted when available.
	G	a.	Residual seedlings may be utilized and natural seedling may also occur. Planting may be used to insure adequate reforestation. Genetically improved stock will be planted when available.
10. Site Preparation for Planting and for Natural Regeneration	All	a.	Removal and utilization will be the preferred method for treating residual material for site preparation and hazard reduction. The NEPA analysis for a planned regeneration harvest should address both utilization standards and length/diameter specifications for "Piling of Unutilized Material" to provide for maximum removal under the sale contract.
	All	b.	Utilize as many viable residual seedlings as practical in the Pacific silver fir zone. Viable naturals retained should be undamaged, be of the prescribed species and size, and have a crown ratio of at least 0.3.
	All	c.	All site preparation methods that do not cause degradation of water and soil productivity are permitted. The selected method shall be based on a site-specific analysis.
11. Planting and Replanting	All	a.	A "pre-planting" survey will be conducted to determine site preparation needs as well as recording stockability relative to the prescription Planting will follow prescriptions and Sale Area Improvement (SAI) Plans.
	All	b.	A minimum stocking of 190 well-spaced seedlings per acre should be alive and growing during the first growing season following reforestation. A post-treatment examination will be made at the end of the first growing season
12. Certification of Planted, Seeded Natural Regeneration	All	a.	Before an area of deforested land may be certified as satisfactorily stocked, the reestablished tree seedlings must have survived and be thriving after three or more full growing seasons.

13. Animal Control for Reforestation and Timber Stand Improvement	All	a.	Conduct activities necessary to maintain the stocking level prescribed for the site. Coordinate method selection and activity with appropriate State and Federal agencies, and adjacent land owners.
14. Timber Stand Improvement	All	a.	Permitted activities should provide for salvage rights of wood residue in service contracts.
15. Release and weeding	B,F-H	a.	Use of mechanical, chemical, or manual methods to maintain the stocking level of desirable trees are permitted.
16. Precommercial Thinning	B,F-H	a.	Either killing or felling of excess trees are permitted. Salvage of this excess growing stock is encouraged whenever a market exists and damage to the remaining trees would not be significant.
17. Fertilization	B,F-H	a.	Fertilization may be prescribed for stands composed of 70% or more Douglas -fir growing on previously identified soil types, (Snoqualmie SRI 10, 12, & 13 and Mt. Baker SRI 12, 13, 24, 25, & 26) or other soil types which show positive response to fertilization. Potential fertilization gains are based on Nitrogen Fertilization Trials on Mt. Baker-Snoqualmie National Forest. (PNW Cooperative Research Project.)
	B,F-H	b.	May be prescribed for stands of different species composition in different soils if found responsive through research studies.
18. Certification of Timber Stand Improvement	All	a.	Examine completed treatment and prepare written certification that the treatment meets prescription objectives.
	All	b.	Take appropriate follow-up action if treatment does not meet the prescription
19 Timber Sale Preparation	All	a.	Activities necessary for the preparation of sawtimber, roundwood, and miscellaneous forest product sales (except firewood) are included.
		b.	Begin NEPA analysis, start scoping.

20. Position Statement Development	All	a.	Staff specialists conduct an extensive review to obtain information for decision on whether to prepare a sale. A positive decision adds a sale project to the Forest Timber Sale Program. The statement documents the scoping process and includes a work plan scheduling specific activities.
	All	b.	Development of Position Statements is a continuing activity as sales must be planned several years ahead of projected sale date.
21. Sale Area Design	All	a.	Conduct an intensive interdisciplinary field investigation within and adjacent to the sale project area.
	All	b.	Complete NEPA analysis.
22. Sale Plan Implementation	All	a.	Implement all phases of the sale plan and prepare the timber sale report, incorporating the direction of the NEPA decision document.
23. Final Sale Package Preparation Appraisal and Offering, Bid Opening, and Sale Award	All	a.	Follow current Forest Service Manual directions to prepare the final sale package, offer, accept bids, and award sale.
24. Timber Harvest Administration	All	a.	Administer timber harvest for compliance with the provisions of timber sale contracts or permits
25. Post Sale Measurements	All	a.	Conduct all activities necessary including check scaling, log/load accountability, and utilization scales to insure accuracy of timber volume/quantity and value for payment purposes.
26 Financial Management	All	a.	Perform all project work involved with timber sale financial requirements.
27 Sale Area Administration	All	a.	Day-to-day, on-the-ground inspections will preferably be conducted by Certified Sale Administrators Specific Standards and Guidelines are found in FSH 2409.23 - Timber Sale Administration Handbook
28 Non-recurring Contractual Work	All	a.	Take timely appropriate action to complete unscheduled project work associated with timber sale contract administration such as contract modifications, contract term extensions, breach, unauthorized cutting, etc.

29. Administration, Execution and Supervision of Cooperative Work	All	a.	Require the purchaser to perform all possible work which is involved with his timber sale contract. Entering a cooperative agreement to perform the purchaser's work should be avoided for most projects. Cooperative road maintenance is often an exception
	All	b.	Conduct all project work involved with purchaser cooperative agreements. Knudsen-Vandenberg (KV) and BD accounts are excluded
30. Export and Substitution Control	All	a.	Administer export and substitution control regulations. Make timely and appropriate reports on violations.
31. Cost Collection	All	a.	Participate in data collection, mill studies, to update Appraisal Handbook. Specific needs are coordinated by the Regional Director of Timber Management.
32. Commercial Fuelwood Sale Preparation/Administration and Personal Use Fuelwood Sale/ Administration	All	a.	Wherever feasible prepare, offer, sell, and administer the sale of unutilized wood created from regeneration and thinning harvest units. Refer to Standards and Guidelines 20 and 25 for general guidance in this process
	All	b.	Encourage relogging of regeneration harvest units if adequate volume of unutilized wood is present and reforestation requirements and other resource protection can be maintained.
	All	c.	Consider hauling PUM (Piling of Unutilized Material) to locations that will facilitate better utilization. Also seek prospective purchasers who could chip PUM at the sale site
	All	d.	Maintain roads, weather conditions permitting, to allow access to unutilized wood residue concentrations for fuelwood or fiber sales.
33. Free Convertible Products Preparation and Administration	All	a.	Consult current budget appropriation direction and Forest Service Manual for specific Standards and Guidelines in issuing free use permits. Generally, convertible wood products, except fuelwood in some cases, are sold by commercial sale because of the value and demand.

34. Nonconvertible Products Free & For Sale Preparation and Administration		All	a.	Follow current FS Manual on free use and sale of non-convertible products.
35. Nursery Management		All	a.	Not applicable.
36. Cone Collection		All	a.	Follow the Forest's Ten Year Seed Collection Plan for cone quantities by elevation, seed zone, and species for family selection.
37. Seed Extraction		All	a	Not applicable.
38. Seed Certification & Storage		All	a	All seed collected will be certified to minimum standards of SIA.
39. Genetic Forest Tree Improvement Program				
	(1) Tree Selection and Maintenance	All	a.	Tree Selection based on superior growth, form and disease resistance.
	(2) Seed Collection from Selected Trees	All	a	Collect seed from selected trees to use in reforestation and seed orchard establishment.
	(3) Genetic Evaluation Plantations	All	a	Establish test plantations with seedlings from selected trees in order to evaluate parents by comparing the performance of their offspring For Douglas-fir and noble fir only.
	(4) Seed Orchards	All	a.	Establish seed orchards using scion or seed collected from selected trees to produce seed for reforestation.
F. Water, Soil, and Air				
1. Planning		All	a.	Meet Forest-wide Standards and Guidelines.
2 Soil Resource Inventory Updating		All	a	Continue to update, monitor and record status of unsuitable forest lands classified S-8 soils.
G Minerals & Geology		All	a	Meet Forest-wide Standards and Guidelines
H. Rural Community and Human Resources		All	a.	Meet Forest-wide Standards and Guidelines
J. Lands				
1. Special Use Management		All	a.	Discourage permits which would reduce timber production.
2. Rights-of-way Grants		All	a.	Meet Forest-wide Standards and Guidelines.
3. Land Ownership Planning		A-F	a.	Group III, available for land exchange.

	G,H	a.	Group III, available for land exchange provided approximately equal acreage of like lands are acquired.
L. Facilities			
1 Transportation System Planning and Road Precon-struction, Construction	All	a.	Meet Forest-wide Standards and Guidelines
Reconstruction and Operations	H	b.	Location of roads should minimize impacts on dedicated or sensitive lands where practicable; i.e , wilderness, NRA's, RNA's, semi-primitive dispersed recreation.
P. Protection			
1 Fire Management Planning	All	a.	Fire Management Direction Old Growth Stands - Group E (1); Second Growth Stands - Group E (2); Harvest Areas, Pre-reforestation Certification - Group E (3)
2 Treatment of Activity Fuels Also termed Slash disposal Fire hazard reduction Wood residue treatment	All	a.	Permitted methods are burning, rearrangement, and removal Removal by utilization is the preferred treatment, and should be used wherever feasible. Utilization must be considered as a post-activity treatment option.
3. Disposal of Activity Fuels by Burning	All	a.	Broadcast burning, piling and burning, or burning landing concentrations may be prescribed.
4. Rearrangement of Activity Fuels	All	a	Any rearrangement to meet prescribed standards of fire hazard reduction may be used. Two such methods of treatment are chipping and PUM (Piling of unutilized material).
5. Removal of Activity Fuels	All	a.	Hauling activity fuels to good locations for subsequent utilization is permitted. PUM and hauled activity fuels should be utilized by commercial wood fiber, commercial fuelwood, or personal use fuelwood sales whenever feasible.
	All	b.	Maintain roads to allow access to wood residue concentrations for fuelwood or fiber sales, weather conditions permitting.
	All	c.	Encourage relogging of regeneration harvest units if adequate volume of fiber is present and reforestation requirements and other resource protection can be maintained.

	B,F G,H	d.	Include a provision for wood residue salvage rights for all trees cut in pre-commercial thinning contracts.
6. Forest Pest Management	All	a	Meet Forest-wide Standards and Guidelines.

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18 RESEARCH NATURAL AREAS — Goal: Preservation of naturally occurring physical and biological units where natural conditions are maintained insofar as possible for the purpose of: 1) comparison with those lands altered by management; 2) education and research on plant and animal communities; and 3) preservation of gene pools for typical as well as threatened and endangered plants and animals

Description of Lands Where Prescription Applicable: Existing RNA - North Fork Nooksack River - 1,407 acres established in 1934. Principal features include Douglas-fir and western hemlock forests. Lake Twenty-two - 790 acres established in 1947. Principal features include north slope western redcedar and western hemlock forests and a subalpine lake Long Creek - 640 acres established in 1947. Principal feature includes a south-slope western hemlock forest and climax red alder forest. Potential RNA - Perry Creek - Approximately 2,000 acres Principal features include a unique assemblage of rare fern species and Alaska cedar in a stand with mountain hemlock and subalpine fir, and a heather-huckleberry community. Green Mountain - Approximately 2,000 acres. Principal features include a subalpine parklike mosaic, heather-huckleberry communities, and subalpine lush herbaceous communities Chowder Ridge - Approximately 1,900 acres. Principal features include an alpine community mosaic with Krummholz tree groups North Fork Nooksack Addition - Approximately 2,500 acres Principal features include a 75 year old burn in Douglas-fir along with a wide array of subalpine meadow communities. Lily Lake - Approximately 800 acres. Principal features include high elevation mountain hemlock - Pacific silver fir forest. Lake is typical of mid to high elevation subalpine lakes.

Desired Future Condition: Preservation of naturally occurring physical and biological processes without undue human intervention, as a source for gene pools and for education and research on plant and animal communities.

Intensities in this Management Prescription None

Program Element		Standards and Guidelines
A. Recreation		
1 Use and Administration	a.	Recreation activities and use within RNA's shall not be encouraged. If necessary to prevent damage, permits or closures may be instituted.
	b.	Overnight camping and the use of fires shall be discouraged. Such use may be prohibited where it interferes with the preservation of naturally occurring biological or physical conditions.

		c. Discourage all recreation use within 200 feet of streams, lakes and ponds except for use on system trails.
		d. Prohibit all recreation pack and saddle stock.
		e. All recreation summer and winter ORV use is prohibited.
		f. Hunting and trapping shall not be encouraged.
2.	Visual Quality	a. Visual Quality Objective of preservation shall be maintained.
3.	Archaeological and Historical Properties	a. Meet Forest-wide Standards and Guidelines.
4.	American Indian Religious and Cultural Use	a Manage identified and potential cultural resource sites to protect sites and preserve values.
		b. Prohibit interpretation rehabilitation or restoration of historical or archaeological sites within RNA. Relocate if possible to rehabilitate or interpret Relocation shall include a restoration plan for the RNA
		c Stabilize and preserve Green Mountain Lookout. Accept non-conforming structures.
5.	Interpretive and Public Use Administration	a. Education will generally be directed toward the graduate level, but may be approved for advanced undergraduate or interested groups.
		b. Prohibit on-site interpretation or demonstrative facilities.
		c. Criteria for education use shall be: 1) minimum influence on natural character of RNA, 2) minimum influence on existing research activities, 3) size, frequency, and intensity of group use, and 4) provisions for supervising and controlling group activities.
		d. Publicity that would attract the general public to the area shall be avoided.
		e. Information on location and resources of the RNA shall be made available to responsible scientific and educational parties.
		f. Signs or references on maps should be discouraged except to protect the RNA.
		g. Discourage publicity of special features within RNA's.

	5. Trail System Maintenance and Operation	a. Existing trails will be allowed to remain. Minor rerouting or upgrading shall be allowed provided it does not compromise the purpose of the RNA.
		b. New trails will not normally be constructed unless it is needed for research purposes or can be shown to conform to the purpose of the RNA and compliment its management objectives.
B.	Wilderness	
	1. Wilderness Use Administration	a. For those RNA's, or portions thereof, that fall within designated Wilderness areas, no mechanized equipment will be allowed
C.	Wildlife and Fish	
	1. Planning	a. Prohibit introduction of exotic plant and animal species.
		b. Reintroduction of former native species may be permitted with Regional Forester approval and with concurrence of PNW Station Director.
		c Species of special interest may be managed within RNA according to standards and guidelines for those species except that management shall not violate the integrity of the RNA
		d. Control of excessive animal populations may be considered where such populations threaten the RNA integrity Control measures are subject to Regional Forester and PNW Station Director approval.
		e. Habitat improvement is prohibited.
		f Fish stocking shall be prohibited, except as provided under C1b above
D	Range	a Grazing of domestic livestock is prohibited.
E.	Timber	
	1 Timber Management Planning	a Scheduled timber harvest is prohibited.
		b Logging may be permitted following fire, windthrow, insect attack, or disease which may threaten the RNA or threaten values adjacent to the RNA. This is subject to approval of the Regional Forester and PNW Station Director.
	2 Reforestation	a. Natural regeneration following fire, windthrow, insect attack, or disease is the preferred reforestation method.
		b. Prohibit firewood cutting

	3. Timber Management Research	a	All research proposals shall be subject to approval by the PNW Station Director and any applicable permits obtained from the appropriate National Forest System line officer.
		b	Research should be limited to non-consumptive, non-destructive, and essentially observational activities. Some collecting of soil, plants, or animal specimens may be permitted on a case-by-case basis.
		c	Research will be conducted only by qualified individuals or groups.
F.	Water, Soil, and Air	a	Meet Forest-wide Standards and Guidelines.
G.	Minerals and Geology	a.	RNA's shall be recommended for withdrawal from mineral entry.
H	Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines
J.	Lands		
	1. Special Use Management	a	Minimal, temporary or semi-permanent research facilities and installations may be approved under permit. Approval is required through the PNW Station Director and coordinated with the Forest Supervisor.
	2. Rights-of-way Grants	a.	Rights-of-way easements including utility corridors existing before RNA establishment shall be honored, but upgrading of existing ones shall be discouraged.
		b	No longer needed rights-of-way shall be restored to their natural surrounding conditions
		c	Proposals for new rights-of-way shall require Regional Forester recommendation and Chief of Forest Service approval.
		d.	Roads shall be discouraged as RNA boundaries
	3. FERC License and Permits	a	Recommend against FERC licenses or permits.
	4. Land Ownership Planning	a	All lands will be placed in Group II - retain or acquire.
L	Facilities		
	1. Transportation System Planning	a.	New trail or road construction or reconstruction should not normally take place unless it is aimed at preserving or enhancing RNA values.

		b. Hazard tree felling is permitted along boundary trails or roads for safety. Felled trees shall remain in place unless lying across trail or road. Trees should not normally be hauled out or used for trail improvements
	2. FA&O Facility Maintenance and Reconstruction	a. Prohibit buildings or other facilities. Allow existing facilities to deteriorate without replacement.
P	Protection	
	1. Fire Management Planning	a. Managed fire may be considered to perpetuate the sere and thus the cell that the RNA is meant to represent.
		b. If fire is used to manage a sere, it should mimic a natural fire, but with prudent measures to avoid catastrophe.
		c. Prescribed burn plans shall be subject to approval by the PNW Station Director and Regional Forester.
		d. Naturally occurring or accidental human-caused fire shall be extinguished at the smallest practical acreages unless it meets strict guidelines of a management prescription to maintain the RNA objectives.
		e. Ground disturbing activity to suppress fire such as fire breaks with bulldozers shall be avoided if possible.
		f. Fire retardants shall be avoided if possible
	2. Fuel Management Inventory	a. Fuels normally should be allowed to accumulate at natural rates unless they threaten adjacent values or the existence of the RNA.
	3. Forest Pest Management	a. No action will be taken against insects or diseases unless the outbreak threatens adjacent resources or would drastically alter the natural ecological processes within the RNA. If action is proposed, it shall be subject to approval of the PNW Station Director and Regional Forester.

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19 MOUNTAIN HEMLOCK ZONE

Goal: Determine what portion of the mountain hemlock plant associations are tentatively suitable forest land.

Description of Lands Where Prescription Applicable: These lands are located on the Skykomish, Darrington, and Mt. Baker Ranger Districts and are identified as Mtn. Hemlock plant associations, described in "Preliminary Plant Associations and Habitat Types for the Mt. Baker-Snoqualmie National Forest" by Henderson and Peter (1983, 1984, 1985) The delineation of these habitat types on maps were drawn for modeling purposes. Actual on-the-ground verification will be made by a certified silviculturist as part of project environmental analysis in adjacent management areas.

These lands are normally characterized by heavy snowfall accumulations and a very short growing season. These forest lands have been classified as "not suited" for timber production because existing knowledge, research, and experience does not provide reasonable assurance of reforestation success within 5 years after final harvest (36 CFR 219 14(c) (3))

Desired Future Condition This prescription is included so that a study plan may be implemented to test various silvicultural practices which will address the reforestation question. The study plan is "A Study Plan for the Determination of Suitability for the Mountain Hemlock Zone on the Mt. Baker-Snoqualmie National Forest." The implementation of the Study Plan will require various types of timber removal. These activities will give the appearance of intensively managed lands, typified by even ages of stands. They may or may not reflect relatively even spacing of trees and well developed crown ratios. Silvicultural treatments may borrow form, line, and texture from the characteristics of the surrounding landscape, but Study activities may be dominant. For this study, up to approximately 250 acres may be harvested, in 25 plots of approximately equal size These cut areas will represent a structured "study" design and will be distributed on the three districts mentioned.

Intensities In Management Area 19: None

Program Element		Standards and Guidelines
A. Recreation		
	1. Visual Quality	a. Visual Quality Objective ranges from retention to modification.
	2. American Indian Religious and Cultural Use	a Meet Forest-wide Standards and Guidelines.
	3. Facility and Site Management	a No developed recreation sites permitted in Study plots.
	4. Use Administration	a. No ORV use is permitted in the Study plots. Study plots will be located to avoid known ORV travelways.
		b. A full range of recreation activities is permitted if use does not interfere with the prescription goal.
	5. Trail System Maintenance and Operation Reconstruction	a. Maintain existing trails. Replace or relocate trails disrupted by roads or study plan activities.

		b. New trail location may be permitted, provided it does not conflict with long-term study objectives.
B. Wilderness		a. Not applicable.
C. Wildlife and Fish		
	1. Habitat Improvement	a. Improvement of habitat may be permitted if consistent with the Study Plan.
	2. Threatened, Endangered, and Sensitive Plants	a. Meet Forest-wide Standards and Guidelines.
D. Range		a. No domestic livestock grazing in Study Plots.
E. Timber		
	1. Timber Management Planning	a. Limit timber management activities to those needed to carry out the Study Plan. Volume harvested in this Study will not contribute to ASQ.
		b. Varying combinations of silvicultural regeneration systems may be used, such as: - Harvest, clearcut even-aged regeneration method; - Strip clearcut/strip shelterwood even-aged regeneration method; - Shelterwood even-aged regeneration method.
	2. Silvicultural Examinations and Prescriptions	a. Guided by the Study Plan, specialists will select probable Study unit locations. As part of the Study unit selection process, and prior to any silvicultural activity, an intensive silvicultural stand examination will be made in probable Study unit locations. Analysis of stand examinations will aid in selecting planned Study units.
		b. A silvicultural prescription for each Study unit will be approved by a certified silviculturist
		c. Other management practices **NOT** to be applied under this Study are: - Broadcast burning; - Genetic tree improvement; - Precommercial thinning; - Salvage harvest, - Fertilization.
	3. Post Treatment Examination and Validation	a. A minimum of three post-treatment examinations will be made at first, third, and fifth year intervals.

	4. Timber Sale Preparation and Timber Harvest Administration	a.	Each of the 25 units will have regeneration cut.
		b.	Unit design, location, etc. will follow the Study Plan.
		c.	Additional standards and guidelines for timber sale preparation and administration are located under Management Prescription 17.
	5 Reforestation	a	Each unit will be reforested by either natural or artificial means as indicated in the Study Plan.
F.	Water, Soil, and Air		
	1 Planning	a.	Meet Forest-wide Standards and Guidelines.
	2 Soil Resource Inventory *Updating*	a.	Continue to update, monitor, and record S-8 *soils*
G	Minerals & Geology	a.	Meet Forest-wide Standards and Guidelines.
H.	Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J	Lands		
	1. Special Uses Management	a.	Discourage permits which would interfere with Study plots
	2. Rights-of-Way Grants	a.	Meet Forest-wide Standards and Guidelines.
	3. Land Ownership Planning	a.	Group III, available for land exchange, except Study plots, which are Group II.
L	Facilities		
	1. Transportation Planning	a.	Meet Forest-wide Standards and Guidelines.
	2. Road Preconstruction, Arterial, Collector, Local Bridge & Culvert, Timber Purchaser	a.	Meet Forest-wide Standards and Guidelines.
	3. Construction Engineering, Arterial, Collector, Local Bridge & Culvert, Timber Purchaser	a.	Meet Forest-wide Standards and Guidelines.
	4. Road Reconstruction, Arterial, Collector, Local, Bridge & Culvert, Timber Purchaser	a.	Meet Forest-wide Standards and Guidelines.
	5. Road Construction, Arterial, Collector, Local, Bridge & Culvert, Timber Purchaser	a.	No system roads will be constructed. Temporary roads are permissible to meet Study Plan objectives or to access adjacent management areas
	6. Road Operation	a.	Meet Forest-wide Standards and Objectives.

P.	Protection		
	1. Fire Management Planning	a.	Forest-wide Fire Protection Group E (1) will apply with the exception of the use of prescribed fire.
	2. Treatment of Activity Fuels	a.	Emphasize residue utilization for hazard reduction.
		b.	Treatment of fuels by prescribed burning is not permitted
	3 Forest Pest Management	a.	Meet Forest-wide Standards and Guidelines.

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20 CEDAR RIVER MUNICIPAL WATERSHED (CITY OF SEATTLE)

Goal: Provide raw water at a level of quality and quantity, with treatment by the purveyor, which will result in a satisfactory and safe water supply Production of timber products is allowed to the extent that the water quality goal is met. There is varying emphasis on other uses.

Description of Lands Where Prescription Applicable: The Watershed is comprised of private, municipal and National Forest lands totaling 90,495 acres in King County. This strategy applies to National Forest lands within the watershed not allocated to other Management Areas. National Forest lands are intermingled with City of Seattle and private lands in a checkerboard ownership pattern in the eastern portion of the watershed

City of Seattle and private lands within the watershed are closed to the public. All National Forest lands in the watershed are open to public use. However, because the Forest Service does not own public rights on the roads, the public has no road access to interior National Forest parcels.

A spotted owl habitat area has been provided for in the eastern portion of the watershed. Management Area 11 standards and guidelines will apply to these lands.

Intensities in this Management Prescription:

20D. Negotiate a new Cooperative Agreement.

Desired Future Condition.

The desired future condition for the watershed has been based on the 1962 Cooperative Agreement between the City of Seattle and the Forest Service. The management goals of that agreement for City owned lands have recently been modified by the City of Seattle's Secondary Use Policies. As new findings on wildlife protection needs become known, changes in the management direction for National Forest lands in the watershed are likely to occur as well.

The Forest Service will initiate negotiations on a new Cooperative Agreement between the City of Seattle and the Forest to reestablish goals and objectives for management of the watershed. Until a new agreement is negotiated, the Forest Service will not enter into new land exchanges affecting National Forest lands within the watershed. Pending a new agreement, the 1962 Cooperative Agreement will remain in effect. When a new agreement is reached, the Forest Plan will be amended to incorporate its goals and direction.

Program Element		Standards and Guidelines	
A.	Recreation		
	1. Visual Quality	a.	Visual Quality Objective is maximum modification except for areas seen from the Pacific Crest National Scenic Trail where the standard will be retention foreground.
	2 American Indian Religious and Cultural Use	a.	Meet Forest-wide Standards and Guidelines.
	3. Facility Construction, Reconstruction, and Management	a.	No existing or planned developed recreation sites.
	4. Use Administration	a.	Dispersed use is permitted unless otherwise restricted, but is not encouraged.
	5. Trails Planning	a.	Use of the Pacific Crest National Scenic Trail (PCNST) in the far eastern part of the watershed will be allowed to continue. No relocation is planned.
		b	No new trails are planned.
B.	Wilderness	a.	Not applicable.
C.	Wildlife and Fish		
	1. Planning	a.	A spotted owl habitat area is designated in the watershed to fit into the Forest-wide network. MA 11 standards and guidelines will be applied in these areas.
	2. Threatened and Endangered Species	a.	Meet Forest-wide Standards and Guidelines.
D.	Range	a	Not applicable.
E.	Timber		
	1. Timber Management Planning	a.	Timber Management Prescription 17, program element E is applicable, Intensities A, C, D are applicable.
F.	Water, Soil, and Air		
	1. Soil Resource Inventory	a.	Continue to update, monitor and record S-8 classified soils. Maintain inventory of areas in the TRI/GIS system.
	2. Planning	a.	Use soil information when locating roads and harvest units.
	3. Improvement	a	Emphasize maintenance and improvement of water quality over other resources.

4. Administration/Management	a.	Operations are conducted in compliance with the 1962 Coop Agreement (subject to amendment) with the City of Seattle which includes prohibition of manufacturing, use of uniform road construction standards, and compliance with sanitary regulations. No overnight camping is allowed (applies only to Industrial Operations) Industrial operations must provide chemical toilets.
	b.	Prescribed slash burning is discouraged to protect residual seedlings, soil water and air quality
	c.	Roads will not be constructed across S-8 classified soils, and timber harvest will not be done on S-8 or J-8 lands
5. Soil Resource Monitoring	a.	Timber harvest activities will result in no more than 10 percent of the project area having mineral soils exposed within the riparian zone, or 15 percent outside the riparian zone.
G. Minerals and Geology	a.	National Forest lands were withdrawn from locatable mineral and mineral leasing activities (which includes minerals, oil and gas, and geothermal) by Public Law 97-350, 96 Stat 1661 dated October 18, 1982. Extraction of common variety rock for road development needs is acceptable where water quality is not degraded.
H. Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J. Lands		
1 Special Use Management	a	Approval will be recommended for only those special use authorizations compatible with over all management goals and direction for this area.
2 Rights-of-Way Grants	a	Rights-of-Way and easements will be given or obtained as outlined in the 1962 Cooperative Agreement
3 Land Ownership Planning	a.	Maintain the options of maintaining National Forest land ownership in the watershed and the option of disposal of lands and/or timber to the City of Seattle National Forest lands within the watershed fall into land classification Group V, more intensive study and planning necessary before landownership decisions are made
	b.	Retain right-of-way on Pacific Crest National Scenic Trail

L	Facilities		
	1 Transportation System Planning	a	Road locations are jointly planned and reviewed in accordance with the 1962 Coop Agreement in order to minimize the miles of road constructed.
	2. Road Construction and Reconstruction	a.	Road construction standards are used as jointly agreed, in accordance with the 1962 Coop Agreement
	3 Road Operation	a.	Road maintenance operations, schedules, and standards are agreed to annually through cooperative meetings between Forest Service, municipal owner, and private owners.
		b.	Road maintenance is financed through cooperative maintenance agreements under Forest Service timber sale contracts, cost-share agreements, and haul permit charges.
		c.	Locked gates and gate watchmen services at main entries are provided to control access by road.
P	Protection		
	1. Fire Management Planning	a.	All operations are subjected to fire regulations mutually developed by the City of Seattle and the Forest Service as provided by the 1962 Coop Agreement
		b.	Suppress all fires utilizing suppression strategies and resources compatible with fire intensity conditions and values.
		c.	Prescribed fire has limited application. Maintenance of vegetative cover is important to meeting resource objectives. Some burning of piled debris may be done.
		d.	Avoid the use of ground disturbing equipment within 100 feet of water courses Avoid the use of retardant within 200 feet of water courses Firelines should be located away from streams, maintaining at least 50 feet between the stream course and fire lines if possible.
		e.	Natural fuels shall normally be left in place for soil stability Activity fuels shall normally be treated by utilization.
	2. Forest Pest Management	a.	Integrated pest management permitted except where use of pesticides conflicts with water quality objectives.

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21 GREEN RIVER MUNICIPAL WATERSHED (CITY OF TACOMA)

Goal: Provide for the production of water at a level of quality which, with adequate treatment by the purveyor, will result in a satisfactory and safe water supply. Timber production is emphasized to the extent that the water quality goal is met. There is varying emphasis on other uses.

Description of Lands Where Prescription Applicable: This prescription is applied to the approximately 36,000 acres of National Forest land within the Green River Watershed. Such lands are located in an intermingled pattern in the eastern part of the Green River drainage. About 9,000 acres of National Forest Land are currently being considered under the existing Memorandum of Understanding for land exchange.

Intensities in this Management Prescription:

21A Current Direction, Timber Harvest and Dispersed Recreation Permitted.

Desired Future Condition:

Complete land exchanges as described in the 1984 joint Memorandum of Understanding with the City of Tacoma. As exchanges are completed, relinquish public use rights on those roads no longer needed to access National Forest land. All other use rights may be retained as needed.

Timber production with dispersed recreation in a primarily roaded modified setting will be emphasized. Special constraints will help protect water quality. Emphasis on public firewood cutting will be continued. Forest Service roads with public use rights, which provide access to National Forest lands, will remain open for dispersed recreation including deer and elk hunting

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Program Element		Standards and Guidelines
A. Recreation		
1 Visual Quality	a.	Manage to a maximum modification visual quality standard except in areas seen from the Pacific Crest National Scenic Trail where the standard will be foreground retention.
2 American Indian Religious and Cultural Use	a.	Meet Forest-wide Standards and Guidelines.
3. Facility Construction, Reconstruction	a	No developed recreation sites exist. Construct no new sites unless it is concluded after consultation with the City of Tacoma and the Washington State Department of Social and Health Services that such facilities can be installed and utilized while safeguarding water quality
4. Use Administration	a	Emphasize dispersed recreation. Overnight camping will be allowed.

		b. Discourage camping within 200 feet of perennial streams Physically block access spurs to campsites within 200 feet of streams where necessary to discourage use.
		c. Discourage issuance of Recreation Special Use Permits such as concerts, religious gatherings, group parties or recreation vehicle clubs.
B. Wilderness		a Not applicable
C. Wildlife and Fish		
	1. Planning	a. Meet Forest-wide Standards and Guidelines.
		b. Cooperate with the Washington State Department of Fisheries and Department of Wildlife in restoration and enhancement of fisheries habitat and the stocking of resident and anadromous fish within the area
		c. Habitat improvements are encouraged.
D Range		a. Not applicable.
E. Timber		
	1. *Timber Management Planning*	a. *Program Element E from Timber Management* Prescription 17, Investment Levels A through G are available. Silvicultural prescription and economic analysis at the time an activity is planned shall determine the appropriate investment level.
F. Water, Soil, and Air		
	1. Soil Resource Inventory	a. Continue to update, monitor, and record S-8 classified soils Maintain inventory of areas in TRI/GIS system.
	2. Planning	a Use soil information when locating roads and harvest units.
	3. Improvement	a. Emphasize maintenance and improvement of water quality over other resources. Bank stabilization and erosion control is encouraged to reduce turbidity, bedload and sedimentation.
	4. Administration/Management	a. Industrial operations must provide a means of disposing of human wastes and litter and restoration of the site upon removal of overnight facilities.
		b. Cooperate with the Washington State Department of Social and Health Services and the City of Tacoma in providing data that would be helpful in the study of the watershed and water quality.

		c. Prescribed slash burning is discouraged to protect residual seedlings, soil, water and air quality.
		d. Roads will not be constructed across S-8 classified soils and timber harvest will not be done on S-8 or J-8 lands.
		e. Timber harvest activities will result in no more than 10 percent of the project area having mineral soils exposed within the riparian zone, or 15 percent outside the riparian zone.
		f. Meet at least annually with the City of Tacoma to review work plans, anticipated contractor or permittee work within the drainage, informational or educational materials referencing activities within the drainage, and other issues of mutual interest.
G.	Minerals and Geology	a. National Forest lands were withdrawn from locatable mineral and mineral leasing activities (which includes minerals, oil and gas, and geothermal) by Public Law 97-350, 96 Stat 1661 dated October 18, 1982. Extraction of common variety rock for road development needs is acceptable where water quality is not degraded.
H.	Rural Community and Human Resources	a. Meet Forest-wide Standards and Guidelines.
J.	Lands	
	1 Special Use Management	a. Approval will be recommended only for those special uses compatible with overall management goals and direction for this area.
	2. Land Ownership Planning	a Applicable details are found in the Memorandum of Understanding between the Forest Service and the City of Tacoma, dated August 29, 1984, F.S. Control #84-06-58-5.
		b. National Forest lands are in Group III and IV. (Group III - available for land exchange and Group IV - available for disposal through land exchange)
L.	Facilities	
	1 Transportation System Planning	a. Meet Forest-wide Standards and Guidelines.
	2. Road Construction and Reconstruction	a. Perform and administer road construction/reconstruction activities to stay within the water quality goal for this area.

3 Road Operation	a	Road maintenance is financed through cooperative maintenance agreements under Forest Service timber sale contracts, cost share agreements, haul permit charges and appropriated funding
	b	Refer to Forest Service-Corps of Engineers joint Memorandum of Understanding No. DA(S) 45-108-CIVENG-60-10 which describes administration and maintenance agreements on Road 54 from the west watershed entry to the end of the Corps of Engineers' ownership
P. Protection		
1. Fire Management Planning	a.	Forest-wide Fire Protection Group E applies
2. Forest Pest Management	a	Integrated pest management is permitted except where the use of pesticides conflicts with water quality objectives.

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22 SULTAN RIVER MUNICIPAL WATERSHED (CITY OF EVERETT)

Goal: Provide water at a level of quality and quantity which, with treatment by the purveyor, will result in satisfactory and safe water supply. There is emphasis on providing for other uses.

Description of Lands Where Prescription Applicable: This prescription is applied to approximately 16,800 acres of National Forest land within the Sultan River watershed. It excludes the private and municipal ownership in the watershed.

Intensities in this Management Prescription

22B. Current Situation Restricted watershed, recreation use only in developed sites. Provide for timber production, protect watershed values beyond legal requirements, maintain fish and wildlife. The watershed will be managed under the 1963 Memorandum of Understanding between the Forest Service, the City of Everett, and the Snohomish County Public Utility District.

Desired Future Condition:

The National Forest land will be owned and managed by another party either private, State or municipal The Forest Service will relinquish all rights except those necessary for the Federal Power Withdrawal (FERC Project No. 2157). While still in the National Forest system, lands will be managed for developed recreation use, timber production, protection of watershed values, and maintenance of fish and wildlife habitat Emphasis is on maintaining current high quality water production, and for producing moderate levels of fish/wildlife habitat, recreation, and timber outputs

Program Element		Standards and Guidelines	
A.	Recreation		
	1. Recreation Planning	a.	Developed sites permitted. Planning limited to developed sites for picnicking, camping, boating and lake fishing. Water contact sport (swimming) prohibited. Dispersed use (ORV, hunting, driving for pleasure, hiking, etc.) is discouraged, but not prohibited.
	2 Visual Quality	a	Meet Forest-wide Standards and Guidelines.
	3. American Indian Religious and Cultural Use	a.	Meet Forest-wide Standards and Guidelines.
	4. Facility and Site Reconstruction, Construction and Management	a.	Site development (boat access, picnic, camping and interpretative sites) along Spada Lake is emphasized. Access to the lake should be distributed to allow access to the entire lake.
		b.	Interpretation of the hydroelectric projects are permitted
		c	Gas-powered boats are not permitted on the lake.
		d.	The applicable Standards and Guidelines for Developed Recreation are found in Management Prescription 3A, program element A.
	5. Trail Planning	a.	Trails to access the lake and around the lake *permitted to manage user developed* travelways. Sanitation facilities provided at the lake and the trailhead when on National Forest land.
B.	Wilderness	a.	Not applicable
C.	Wildlife and Fish		
	1. Planning	a.	Emphasis is on maintaining 20% of the National Forest commercial timber land in "old growth"
		b.	Maintain resident fisheries. Maintenance could involve some habitat improvement in the riparian area.
D	Range	a.	Not applicable.
E.	Timber		
	1. Timber Management Planning	a.	The Standards and Guidelines for the Timber Management, MA 17, intensities C and D, program element E, shall apply to this management prescription.

22B
23A

F. Water, Soil, and Air		
1. Improvement	a.	Meet Forest-wide Standards and Guidelines. Emphasize maintenance and improvement of water quality. Bank stabilization and erosion control is encouraged to reduce turbidity, bed load and sedimentation.
G. Minerals and Geology	a.	Meet Forest-wide Standards and Guidelines.
H. Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J. Lands		
1. Special Use Management	a	Administer special use permit for FERC license.
2. Right-of-Way Grants	a.	Meet Forest-wide Standards and Guidelines.
3. Land Ownership Planning	a.	Group IV - available for disposal through land exchange.
L. Facilities	a.	Meet Forest-wide Standards and Guidelines. Roads accessing developed sites maintained for public use All other roads maintained as per the Forest Service-Department of Natural Resources Agreement for the Sultan Basin
P. Protection		
1. Fire Management Planning	a.	Forest-wide Fire Protection Group E (2) applies.
2. Forest Pest Management	a.	Integrated pest management permitted except where the use of pesticides conflict with water quality objectives.

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23 OTHER MUNICIPAL WATERSHEDS

Goal: Provide water at a level of quality and quantity which, with treatment by the purveyor, will result in satisfactory and safe water supply with varying emphasis on timber production, recreation, and other uses.

Description of Lands Where Prescription Applicable: This prescription is applied to the small municipal watersheds of the Forest not covered in Management Prescriptions 20, 21, and 22. Watersheds are found throughout the Forest and at varying elevations. Most are forested old growth, second growth, and plantations - and access is generally by road.

Desired Future Condition: Common to all Intensities.

A varying mix of timber, recreation, wildlife, and other resource use will occur but the primary emphasis will be to meet the above stated goal for a municipal watershed.

Intensities in this Management Prescription:

23A Timber Harvest, Moderate Recreation Opportunities.

Program Element		Standards and Guidelines
A. Recreation		
1. Recreation Planning	a	Recreation opportunities in SPNM, SPM, RN, and RM may occur.
	b	Day use shall be permitted. Overnight use may occur at designated sites
	c.	The applicable Standards and Guidelines for Developed Recreation are found in management prescription 3A, program element A
2. Visual Quality	a.	Meet a Visual Quality Objective of foreground retention and middleground partial retention in primary viewsheds Meet a VQO of Partial Retention in secondary viewsheds foreground and modification in secondary viewsheds middleground.
3. American Indian Religious and Cultural Use	a	Meet Forest-wide Standards and Guidelines.
4. Recreation Use Administration	a	ORV use may be controlled by closures on certain travelways.
5. Trail Construction, Reconstruction, and Maintenance	a	Trail development may occur and will be located and constructed to minimize adverse effects on water quality.
B. Wilderness	a.	Not applicable.
C Wildlife and Fish	a.	Meet Forest-wide Standards and Guidelines.
D. Range	a	Not applicable.
E. Timber		
1. Timber Management Planning	a	The Standards and Guidelines for the Timber Management Prescription Intensity 17B, program element E, shall apply to this management prescription.
F. Water, Soil, and Air		
1. Planning	a.	Meet Forest-wide Standards and Guidelines.
2. Improvement	a.	Watershed improvement and maintenance activities are permitted. Use vegetative restoration methods to restore live root mat and reduce risk of slope failure
3. Soil Resource Monitoring	a.	Meet Forest-wide Standards and Guidelines
	b	Ground-disturbing activities will result in no more than 15 percent mineral soil exposed within the project area after the first year, excluding roads.

G.	Minerals and Geology	a	Additional mitigation and rehabilitation measures may be required to protect water quality. These measures will be determined through NEPA analysis.
H.	Rural Community and Human Resources	a	Meet Forest-wide Standards and Guidelines.
J.	Lands		
	1. Special Use Management	a	Permit special use compatible with this intensity.
	2. Rights-of-way Grants	a.	Meet Forest-wide Standards and Guidelines.
	3. FERC License and Permits	a	Activity to be reviewed through NEPA analysis to determine its effect on water quality. Only permitted if water quality and minimum flows are maintained.
	4 Land Ownership Planning	a.	Acquire and/or dispose of land as needed. Lands are in Group III.
L.	Facilities		
	1. Transportation System Planning	a.	Roads must be located to meet water quality objectives
	2. Road Construction and Reconstruction	a.	Only those construction/reconstruction practices that meet water quality objectives will be allowed. Water quality and/or fish habitat problems caused by construction should be given a high priority for corrective action.
		b	Road cut-and-fill slopes that may adversely effect water quality will be protected with erosion and/or sediment control Final stabilization practices should include vegetation as well as structures.
	3. Road Operation	a	See Item L-2a above. Apply for maintenance.
		b.	See Item L-2b above. Apply for maintenance
		c.	All roads not receiving annual maintenance should have measures to control road surface and ditch water
		d.	Temporary structures installed to impound water for road maintenance will be removed upon completion of use.
P.	Protection		
	1 Fire Management Planning	a.	Forest-wide Fire Protection Group A applies.
		b.	Temporary structures installed to impound pumper chance water sources will be removed immediately upon completion of use.

		c. Rehabilitation needs should be evaluated for all sizes of fires.
2.	Treatment of Activity Fuels	a. No more than 20% of the activity area may be exposed to mineral soil and at least 80% of the streams surface within the area should be shaded
3.	Forest Pest Management	a Integrated pest management is permitted except where use of pesticides conflicts with water quality objectives.

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25 SPECIAL USES

Goal: Provide and manage for effective and economical transmission facilities with least impact on the natural resources involved.

Description of Lands Where Prescription Applicable: The prescription applies to existing and potential sites and corridors for such purposes as communication, signal relay, other electronic sites, canals, penstocks, pipelines, and power transmission lines. It includes the land directly under and adjacent to the corridor (clearing limits). Compatible facilities are combined within the same corridor when possible.

Desired Future Condition: Common to all Intensities.

Signs of human activities are dominant. Buildings, antennas, pipelines, high voltage powerlines, and similar structures will be visible. There are few, if any, large trees at sites or in the corridors; ground cover is in small conifers, shrubs and forbs. Vegetation partially screens smaller sites from distant view and provides edge habitat for wildlife. Recreational opportunities may be available for operating off-road vehicles, viewing distant scenery, gathering miscellaneous Forest products, and hunting.

Intensities in this Management Prescription

25A Utility Corridors
25B Electronic Sites

INTENSITY 25A Utility Corridors

Program Element		Standards and Guidelines
A.	Recreation	a Meet Forest-wide Standards and Guidelines.
1.	Visual Quality	a Meet a Visual Quality Objective of foreground retention and middleground partial retention in primary viewsheds. Meet a VQO of Partial Retention in secondary viewsheds foreground and modification in secondary viewsheds middleground.
2.	American Indian Religious and Cultural Use	a. Meet Forest-wide Standards and Guidelines.
B.	Wilderness	a. Not applicable.
C.	Wildlife and Fish	a. Meet Forest-wide Standards and Guidelines.

D. Range	a.	Not applicable
E. Timber		
1. Timber Management Planning	a.	No scheduled timber harvest activities. Commercial products, eg. Christmas trees, may be grown within a utility corridor as long as the prescriptions contained in the corridor management plan are met.
	b.	Vegetation maintenance salvage activities will be encouraged for safety purposes.
	c.	Brush control within corridors shall be accomplished by manual or mechanical methods unless specific approval is obtained for the use of herbicides
F. Water, Soil, and Air	a.	Meet Forest-wide Standards and Guidelines.
G. Minerals and Geology	a.	Operating plans must include appropriate measures for protecting the existing facilities.
H. Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J. Lands		
1. Special Use Management	a	Other linear rights-of-way within the corridors will be encouraged Special use permits for uses other than the preceding will be discouraged.
2. Rights-of-Way Grants	a.	Meet Forest-wide Standards and Guidelines
3. FERC License and Permits	a.	New development will be encouraged within existing utility corridors when activities are compatible.
4. Land Ownership Planning	a.	Group III - Retain, Acquire, or Dispose.
L. Facilities	a.	Meet Forest-wide Standards and Guidelines.
P. Protection		
1. Fire Management Planning	a	Forest-wide Fire Protection Group A applies.
2. Forest Pest Management	a.	Meet Forest-wide Standards and Guidelines

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INTENSITY 25B: Electronic Sites

Program Element		Standards and Guidelines
A. Recreation		
1. Recreation Planning	a.	Recreation use is not encouraged.
2. Visual Quality	a	Meet Forest-wide Standards and Guidelines.

	3. American Indian Religious and Cultural Use	a	Meet Forest-wide Standards and Guidelines.
	4. Trail Planning	a	Discourage new public access trail development
		b	No active maintenance of public access trails that may exist in the area.
B.	Wilderness	a	Not applicable.
C	Wildlife and Fish		
	1. Planning	a	Meet Forest-wide Standards and Guidelines for threatened and endangered species. Habitat improvement projects may be implemented if compatible with electronic site uses.
D	Range	a.	Not applicable
E.	Timber		
	1 Timber Management Planning	a.	No scheduled timber harvest activities.
		b	Vegetation maintenance salvage activities compatible with site-specific plans will be encouraged for safety purposes.
F	Water, Soil, and Air	a.	Meet Forest-wide Standards and Guidelines.
G.	Minerals and Geology	a	Operating plans must include appropriate measures for protecting the existing facilities
H	Rural Community and Human Resources	a	Meet Forest-wide Standards and Guidelines.
J	Lands		
	1 Special Use Management	a.	Administration shall meet FS Policy direction Other types of special uses will be discouraged
	2. Rights-of-Way Grants	a	Meet Forest-wide Standards and Guidelines
	3 Land Ownership Planning	a.	Group III - Retain, Acquire, or Dispose
L.	Facilities	a	Meet Forest-wide Standards and Guidelines.
P.	Protection		
	1 Fire Management Planning	a	Forest-wide Fire Protection Group A applies
	2. Forest Pest Management	a	Meet Forest-wide Standards and Guidelines.

26 ADMINISTRATIVE SITES

Goal Provide appropriate sites and facilities to administer the Mt Baker-Snoqualmie National Forest.

Description of Lands Where Prescription Application This strategy is applied to ranger stations, public service centers, engineering zone compounds, road maintenance compounds, seed orchard sites, seed production sites, scale stations guard stations, and lookouts where permanent facilities and utility systems are constructed in order to administer National Forest.

Desired Future Condition. Appropriately located and adequately sized administrative sites with well maintained, legal and functional offices, warehouses, residences, quarters, and utility systems Older buildings will be renovated or replaced to maintain their functionality as they age. Improvements will be thoughtfully integrated into the already existing facilities to form a consistent whole Administrative sites no longer needed may be declared excess or placed under permit if that represents the best use of those real property improvements.

Intensities in this Management Prescription None

Program Element		Standards and Guidelines	
A	Recreation	a	Provide recreation information, displays, brochures, and services at appropriate major administrative sites.
	1. Visual Quality	a.	No active visual management Visual Quality Level of site-specific plans will be met.
	2. American Indian Religious and Cultural Use	a	Meet Forest-wide Standards and Guidelines.
	3 Archaeological and Historic Properties	a	Meet Forest-wide Standards and Guidelines.
		b	Follow provisions of current Programmatic MOA for Management of Depression-Era Structures.
B	Wilderness	a.	Not applicable.
C	Wildlife and Fish	a.	Improvement projects may be implemented when they are compatible with other administrative site uses
D	Range	a.	Not applicable.
E	Timber		
	1. Timber Management Planning	a	Hazard tree removal and salvage sales are permitted to properly maintain facilities and meet safety requirements. Timber stand improvement is the primary goal at seed tree orchards and seed production areas.

	2. Genetic Forest Tree Improvement	a.	Some forest lands are allocated to the culture of genetically improved seed. The "Tree Improvement Plan - Mt. Baker-Snoqualmie National Forest, 1982-1992" is the primary source of information and guidelines on the genetic tree improvement program.
	3. Seed Production Areas	a.	At present, there are only 2 seed production areas located on the Forest. These are the Sun Top and Mule Creek noble fir seed production areas on the White River Ranger District. These sites will be managed as interim sources of seed until such time as seed is available from the McCullough Seed Orchard. Additional information is contained in the "Tree Improvement Plan," previously referenced
		b.	Any additional seed production areas must be recommended by the Forest Geneticist.
	4. Seed Orchards	a.	The Darrington and McCullough Seed Orchards are established to ultimately produce genetically improved seed for the production of seedlings to be used in reforesting deforested National Forest lands. The "Tree Improvement Plan," previously referenced, is the primary guide for the management of these sites. Additional guidance will be provided by the Forest Geneticist.
F.	Water, Soil, and Air	a	Meet Forest-wide Standards and Guidelines.
G.	Minerals and Geology	a.	Not applicable
H	Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J.	Land Ownership Planning	a	Group III, Retain, Acquire, or Dispose
L.	Facilities	a.	Meet Forest-wide Standards and Guidelines
P	Protection	a	Forest-wide Fire Protection Group A applies.

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27 ALPINE LAKES MANAGEMENT AREA

Goal: Manage Alpine Lakes Wilderness and management area in accordance with the Record of Decision, Selected Alternative, Alpine Lakes Area Land Management Plan Final Environmental Impact Statement, November 2, 1981.

Description of Lands Where Prescription Applicable: This prescription is applied to the Alpine Lakes Wilderness and Management Area.

Desired Future Condition: Refer to Alpine Lakes Area Land Management Plan and FEIS.

Intensities in this Management Prescription:

D	Developed Site (as per Alpine Lakes Area Management Plan)
DR	Dispersed Recreation (as per Alpine Lakes Area Management Plan)
GF	General Forest (as per Alpine Lakes Area Management Plan)
SA	Special Area (as per Alpine Lakes Area Management Plan)
SF	Scenic Forest (as per Alpine Lakes Area Management Plan

Management Direction as included in the Alpine Lakes Area Management Plan, Final Environmental Impact Statement and Record of Decision November 2, 1981.

As provided for in the Alpine Lakes Area Management Plan, Management in the following areas will be as stipulated in the following Management Prescriptions

5 - Potential Wild and Scenic River
11 - Old Growth Habitat
12 - Mature and Old Growth Wildlife Habitat
14 - Deer and Elk and Winter Range
15 - Mountain Goat Habitat
16 - Threatened and Endangered Species

Brief descriptions:

D Developed Site: Areas are substantially modified for campgrounds, boating, ski areas, summer home tracts, administrative sites, etc. Sights and sounds of people are evident; concentration of users is often high. Roads, trails, and parking are managed to provide access to the site, with emphasis on nonmotorized activity on the site. No scheduled timber harvest. Vegetative manipulation only for the enhancement or protection of the area.

DR Dispersed Recreation: Managed primarily in an unroaded condition with emphasis on dispersed recreation, scenic, wildlife or other amenity values. No new roads construction. ORV used permitted, depending on the ROS class. No scheduled timber harvest. The only exception is salvage harvest of catastrophic forest loss for the purpose of limiting damage on adjacent lands. Visual Quality Objective is Retention and Partial Retention. Concentration of recreation users is low; relatively minimal contact with other users. If no alternative road access available for intermingled lands, access may be granted for a non-public minimum standard road.

GF General Forest: Timber harvest occurs, with a full range of silvicultural prescriptions used on suitable lands. The visual quality objective ranges from Retention to Modification. Dispersed recreation sites are common; encounters between recreationists may be numerous. Motorized activities are common. Rustic facilities may be provided. Land in this allocation is generally accessible by road. Road and trail standards range from optimum, for high-volume mixed traffic, to closed after project completion.

SA Special Area: Areas protected for their uniqueness and natural conditions, and, where appropriate, to foster public use, enjoyment, or study. Each Special Area has a specific management direction. Refer to FEIS, Alpine Lakes, 1981. No scheduled timber harvest. Roads, facilities (such as parking, picnic areas, and interpretive sites, etc.) will enhance and protect the area. Other resource manipulation, including removal of trees, will occur only for the enhancement or protection of the area.

SF Scenic Forest: The objective is to retain or enhance viewing and recreation experiences. Developments and use in the seen area from recreation sites, roads, and trails within Scenic Forest will meet visual quality objectives. Use will be integrated with the natural landscape. Timber harvest permitted; a full range of silvicultural prescriptions will be used to meet the visual and recreational objectives.

CHAPTER 5 - IMPLEMENTATION OF THE FOREST PLAN

INTRODUCTION

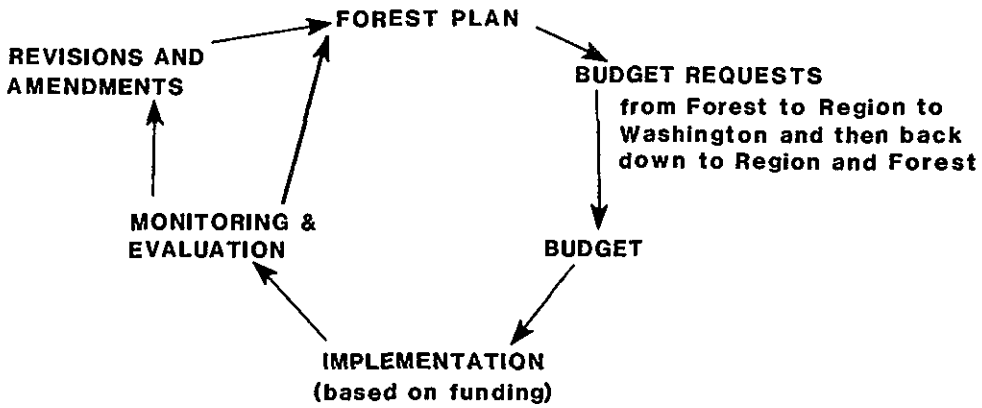
This chapter explains how management of the Mt. Baker-Snoqualmie National Forest Plan will be guided by the implementation of this integrated resource plan, instead of by functional plans. Implementation requires moving from an existing management program, with a budget and "targets" for accomplishment, to a new management program - one with a budget, goals, objectives, and standards and guidelines, that were developed with extensive public involvement and are responsive to issues and concerns.

This Forest Plan, used in conjunction with Forest Service Manuals and the Pacific Northwest Regional Guide, establishes the direction for the Mt. Baker-Snoqualmie National Forest for the next 10 to 15 years.

The remainder of this chapter explains how management of the Mt. Baker-Snoqualmie National Forest moves from the existing management situation (described in the DEIS) to this integrated plan. Chapter sections describe: aspects of the implementation that are influenced by previous management activities and objectives; the relationship between project planning and this Forest Plan; monitoring and evaluation; and the circumstances which could require amendments and revisions to the Plan.

Figure 5-1 displays the Forest Plan implementation process:

Figure 5-1
Implementation Process



B. IMPLEMENTATION DIRECTION

Implementation of the Forest Plan occurs through identification, selection scheduling of projects, and execution of management practices to meet the management direction provided in the Plan. Implementation may also involve responding to proposals by others for use and/or occupancy of National Forest system lands.

Chapter 5
Project Planning

The Forest Plan serves as the single land management plan for the Mt. Baker-Snoqualmie National Forest; all other management plans are replaced or incorporated into this direction. A number of other plans have been (or will be) developed to give additional, more specific guidance to management activities. These are developed within the direction that is established in this Plan. They are needed for site-specific information or to carry out direction in this Plan. Some examples of these plans include:

- Wild and Scenic River Management Plans
- Wilderness Action Plans
- Land Adjustment Plans
- Viewshed Corridor Plans
- Scenic Byway Plans
- Area Transportation Plans
- Cultural Resource Management Plans
- Species Management Guides
- T & E Recovery Plans

The management direction provided by this Forest Plan comprises the framework within which project planning and activities take place. It defines management area goals and management standards that guide project activities toward achieving a desired future condition for the Management Area and, collectively, for the Forest. It specifies a schedule for project activities. It provides guidance concerning potential land and resource management.

Within this guidance, projects are developed o most efficiently and effectively accomplish management goals and objectives. Project environmental analysis provides an essential source of information for Forest Plan monitoring. First, as project analyses are completed, new or emerging public issues or management concerns may be identified. Second, the management direction designed to facilitate achievement of the Management Area goals are validated by the project analyses. Third, the site-specific data collected for project environmental analyses serve as a check on the appropriateness of the land allocation. The information included in the project environmental analyses is used as part of the monitoring process to determine when changes should be made in the Forest Plan.

Project Scheduling

The schedule of proposed and possible projects for the first decade is contained in Appendices A through K of this document. These activity schedules represent a pool of possible projects from which implementation schedules (specific, funded projects) are developed in conjunction with funding approvals. Lists of possible projects to meet or accelerate the 10-year management practice schedule are maintained by the unit managers. These lists will routinely change as projects are implemented or are removed from the lists (for various reasons) and replaced with new projects. Projects are scheduled in response to the management direction in the Plan, planned outputs of goods and services, near-term management needs and opportunities, and the annual budgeting process. If there is a conflict between standards and guidelines and program outputs, projects will be in full compliance with standards and guidelines set forth in this Forest Plan. (WO 1920 February 23, 1990)

Consistency With Other Instruments

This Forest Plan serves as the single land management plan for the Mt. Baker-Snoqualmie National Forest. All other land management plans are replaced by the direction in this Plan, with the exception of the Alpine Lakes Area Land Management Plan and the Skagit Wild and Scenic River Management Plan. These two plans are incorporated into this Forest Plan. The existing management plans that are superseded are:

Ranger District Multiple Use Plans
Land Adjustment Plan, Snoqualmie National Forest
Land Adjustment Plan, Mt. Baker National Forest

Also superseded are the **portions of the Timber Management Plans** for the Mt. Baker N.F. and Snoqualmie N.F. administered by the Mt. Baker-Snoqualmie National Forest.

All outstanding and future permits, contracts, cooperative agreements, and other instruments for occupancy and use of lands included in this Forest Plan will be brought into agreement with this Plan, subject to the valid existing rights of the parties involved. This will be done as soon as practicable, and generally within three years of the date of this Plan.

Budget Proposals

The scheduled projects and monitoring activities in the Plan are translated into multi-year, program budget proposals that identify needed expenditures. The schedule is used for requesting and allocating the funds needed to carry out the planned management direction. The Forest's current year tentative annual program of work will be derived from this process. Upon approval of a final budget for the Forest, the annual program of work is finalized and carried out. Accomplishment of the annual program is the incremental implementation of the management direction of the Forest Plan. Depending on final budgets, outputs and activities in individual years may be significantly different from those shown in Chapter 4 and 5, depending on final budgets.

Environmental Analysis

Projects and activities permitted through this Forest Plan are subject to analysis under the NEPA process, as they are planned for implementation. Analysis will follow the requirements of 40 CFR 1502.20, FSM 1950, and FSH 1909.15 in determining subsequent environmental analysis and documentation. Appropriate public involvement will be a part of the analysis process. Regardless of the form of NEPA documentation (environmental impact statement, environmental assessment, or categorically excluded/decision memo), an analysis file will be maintained and available for public review.

C. MONITORING AND EVALUATION PROGRAM

The Monitoring and Evaluation Program is the management control system governing implementation of the Forest Plan. At established intervals (once per year), the Interdisciplinary Planning Team shall evaluate implementation to

verify compliance with the Standards and Guidelines established in Chapter 4 of this Plan, and to determine the effectiveness of those Standards and Guidelines in meeting Land and Resource Management Plan objectives. Based upon this evaluation, the Interdisciplinary Team shall recommend to the Forest Supervisor such changes in management direction, revisions, or amendments to the Forest Plan as deemed necessary.

Monitoring involves a periodic comparison between the end results that are realized and those projected in the Forest Plan. Costs, outputs, and environmental effects, both experienced and projected, will be compared to gauge the overall progress in implementing the Forest Plan, as well as to determine whether the overall relationships on which the Forest Plan is based continue to be accurate. When differences occur, they will be evaluated as to their significance, and appropriate amendments or revisions will be considered and installed in compliance with NEPA and Forest Service processes.

The Monitoring Plan, Table 5-1, identifies the key activities and outputs to be monitored during implementation of this plan. This table is based on detailed information found in Forest Plan Monitoring Worksheets; these are located in the planning records at the Mt. Baker-Snoqualmie's Supervisors Office.

Table 5-1 is not intended to spell out all monitoring that is occurring or may occur on the Forest in the future. Currently, many activities are being monitored to comply with administrative and legal responsibilities. However, this monitoring is not essential for the purposes mentioned above. Only those items that are essential and sensitive enough for the purposes of this plan will be addressed in the monitoring plan.

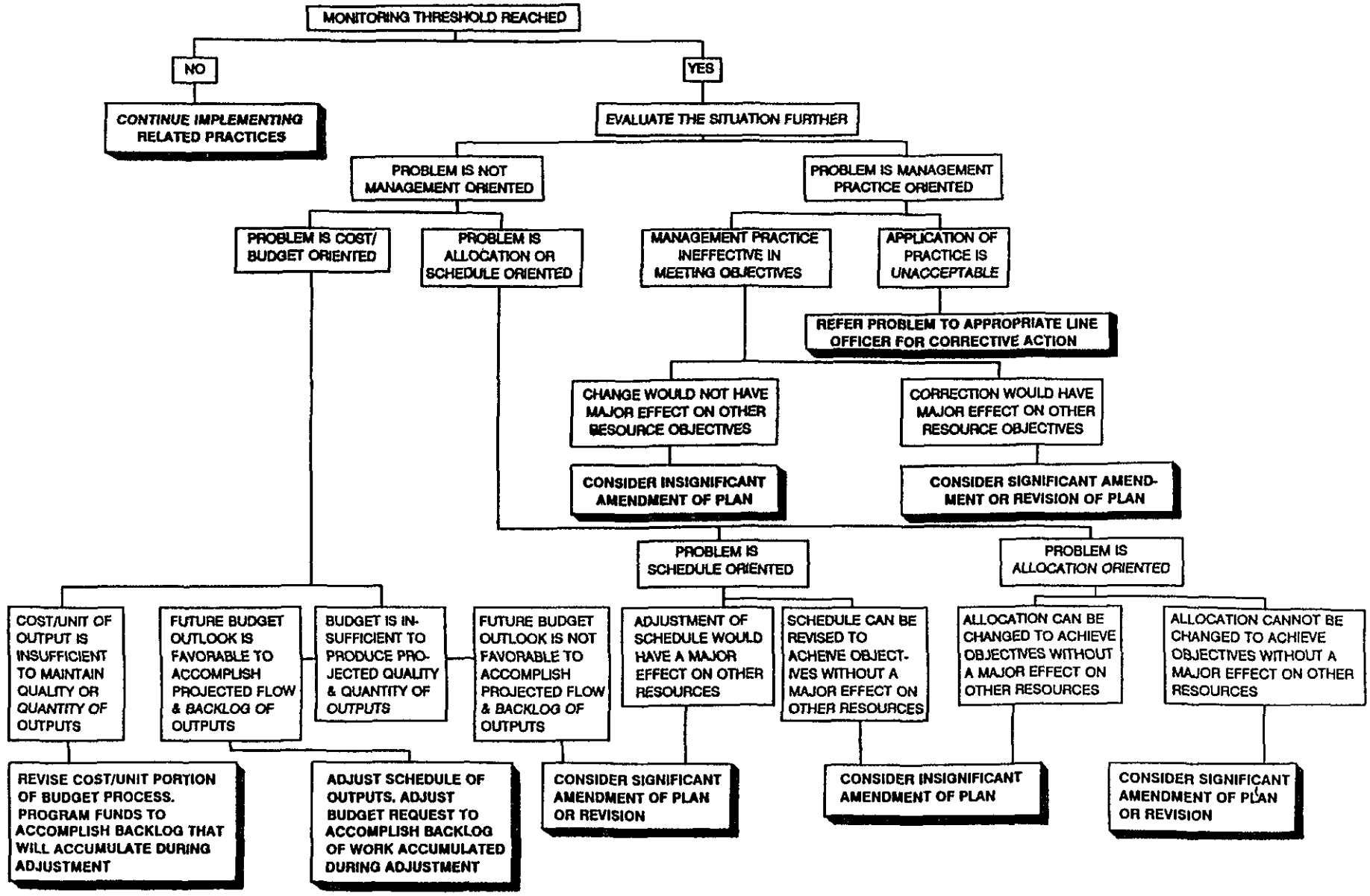
The objectives of monitoring are to determine:

- if management area direction is being applied as directed;
- if standards are being followed;
- if the forest is achieving the objectives of the Plan;
- if application of management area direction is achieving desired conditions;
- if the effects of implementing the Plan are occurring as predicted;
- if the costs of implementing the Plan are as predicted;
- if management practices on adjacent or intermingled non-National Forest lands are affecting the Forest Plan goals and objectives;
- if implementation of the Forest Plan is keeping other agencies from reaching their stated objectives.

Monitoring and evaluation each have a distinctly different purpose and scope. In general, monitoring is designed to gather the data necessary for evaluation. During evaluation, data provided through monitoring are analyzed and interpreted. Evaluation of the results of the site-specific monitoring program will be documented in the **annual monitoring and evaluation report**- The significance of the results of the monitoring program will be analyzed and evaluated by the Forest Interdisciplinary Team.

The data collected during monitoring will be evaluated using the Decision Flow Diagram shown in Figure 5-2. Based on this evaluation, any need for further action will be recommended to the Forest Supervisor. The action prescribed by

DECISION FLOW DIAGRAM FOR EVALUATION



the Forest Supervisor will depend on the significance of the results of monitoring. The magnitude of the change from predicted conditions is an important factor, as is the risk associated with the change. For example, in terms of risk, a finding of somewhat more or less recreation visits than predicted has considerably less significance than a finding of reduced water quality. Procedures prescribed by the National Environmental Policy Act will be followed as the Forest Supervisor determines the appropriate action.

Actions directed by the Forest Supervisor could include one or several of the following:

1. A determination that no action is needed, that monitoring indicates goals, objectives, and standards are being achieved.

2. District Ranger(s) may be directed to improve application of management area direction as projects are implemented. Normally, this would involve a change in proposed project design or a site-specific interpretation of management area direction. In some instances, additional information or study may be required due to an inconclusive evaluation.

3. Management area direction may be modified as a Plan amendment. This would normally involve a question of the applicability of the direction to a specific geographic area, rather than to the entire Forest.

4. The assignment of acres to a particular management prescription may be modified as a Plan amendment.

5. The projected schedule of outputs may be amended.

6. The needed action may singly or cumulatively be so significant as to cause the Forest Supervisor to initiate revision of the Plan.

A file will be maintained in the office of the Forest Supervisor which documents all decisions resulting from monitoring and evaluation.

The document resulting from the use of the Decision Flow Diagram constitutes the evaluation report. As applicable, the following will be included in each evaluation report:

1. A quantitative estimate of performance comparing outputs and services with those projected by the Forest Plan;

2. Documentation of measured effects, including any changes in productivity of the land;

3. Unit costs associated with carrying out the planned activities as compared with unit costs estimated during Forest Plan development;

4. Recommendations for changes;

5. A list of needs for evaluation of management systems and for alternative methods of management;

6. A list of additional research needed to support the management of the Forest;

7. Identification of additional monitoring needs to facilitate achievement of the monitoring goals.

The Monitoring Plan

The monitoring plan follows, in Table 5-1. Several of the variables across the top of this table merit special discussion.

Precision is a subjective descriptor to measure the expected accuracy with which data is collected. Precision, in Table 5-1, is qualitatively rated as high, moderate, or low.

Reliability is a measure of how accurately the method used to monitor reflects the situation. A qualitative rating system of high, moderate or low is utilized.

Table 5-1
Monitoring Plan

RESOURCE AREA	ACTION/EFFORT MONITORED	OBJECTIVE OF MONITORING	METHOD OF MONITORING	UNIT OF MEASURE	FREQUENCY
SOIL PRODUCTIVITY	Maintain soil productivity by insuring that the effects of displacement, compaction and erosion within harvest units when added to the lands dedicated to systems roads and landings do not ex- 20% of the area	Maintain soil resource so that land productivity is not impaired	1) Follow Regional Guide "Guidelines for Sampling Some Physical Conditions at Surface Soils" by Howes, Hazard and Geist - other State of Art Technology	% area affected	One project in a watershed annually
			2) End product review	Visual observation of condition	25% to 40% of major issue projects
MASS WASTING	Determine if management activities are affecting the frequency and amount of mass wasting	To maintain productivity of land and provide water quality meets the needs of the beneficial user	Visual observations & photo points to determine rate & kind of accelerated movement	Area disturbance, landslide numbers, tons/acre	2 projects per year in area selected to monitor
WATERSHED REHABILITATION	Determine if rehabilitation prescriptions and methodology being used for watershed rehabilitation are achieving expected results	To maintain or improve conditions of Forest watershed to assure land productivity and acceptable water quality	Visual observations and transects in project area	% vegetative cover and project improvement effectiveness	Annually for each project for first three years Every five years after
WATERSHED S&G'S AND PRESCRIPTION	Determine if the S & G's are effective in protecting the watershed resource	To protect and maintain conditions of Forest watersheds to assure land productivity and acceptable water quality	Visual observations , sampling of one or more key water parameters, and photos	Temperature, area of disturbance, etc	One area or watershed per year
TIMBER	Reforestation	Determine if NFMA requirement and Forest Plan assumptions are met	Plantation survival examinations TRI/GIS data base Attainment reports (Annual)	Acre	1,3 and 5 years
	Timberland Suitability	Determine Change in acres of timber base	Formal and informal management reviews Project planning (on going, Vegetation resource inventory (as scheduled) and at least every 10 years)	Acre	5 years

RESOURCE AREA	REPORT PERIOD	PRECISION	RELIABILITY	DATA STORAGE	RESPONSIBILITIES	THRESHOLD OF VARIABILITY
SOIL PRODUCTIVITY	Annually	H	H	-Project DR file -TRI/GIS	Forest Staff and District Ranger	10% deviation from regional guidelines (FSM 2500 R-6 supp 45)
MASS WASTING	Annually	M	M	-Project DR file -TRI/GIS	District Ranger	10% increase in rates of mass wasting established for previously managed areas
WATERSHED REHABILITATION	Annually	H	H	-Project DR file -TRI/GIS	District Ranger	20% less cover than stated in project objectives No more 20% failure rate of structures
WATERSHED S&G's	Annually	H	H	-Project DR file -TRI/GIS	District Ranger & Forest Staff	Within 10% of that defined for each S & G
TIMBER	3 years	H	H	TRI GIS TRACS	District Ranger	10% of harvested lands not adequately stocked after 5 years
	5 years	H	H	TRI, GIS	District Ranger Timber Staff Officer	± 5% change in unsuitable acres, ±-10% amend Forest Plan, ± 20% consider revision of Forest Plan

RESOURCE AREA	ACTION/EFFORT MONITORED	OBJECTIVE OF MONITORING	METHOD OF MONITORING	UNIT OF MEASURE	FREQUENCY
TIMBER (cont)	Size of harvest area	Standards for size and dispersion are met and size limitation are appropriate	Ea's and TRI data base Field Reviews	Acre	Annual
	Impacts to growing stock levels -insect & disease hazards -animal damage -air pollution	Determine whether IPM measures were taken and effective	Aerial surveys, field observation & past detection reports Stand exams	Acres and/or infestation centers	Every other year
	Allowable Sale Quantity	Chargeable volume offered is consistent with Plan	TSSA Stars	MMCF	Annual
	Timber Sale Program Quantity	Total chargeable and non-chargeable volume offered is consistent with Plan	TSSA, Stars	MMCF	Annual
	Acres per Management Area of various silivicultural practices	Silvicultural practices are accomplished as planned for each Management Area	Number of acres harvested by silvicultural system or activity by management area	Acres	Annual
	Distribution of timber harvest acres and volume	Harvest activities by mgt area working group, condition class occur as planned	10-year Action Plan, 6 month announcement, SILVA, TRACS, attainment reports (annual) and Stars	Acres and MMCF by condition class working group, management acre	Annual
	Mt Hemlock suitability	Tentatively suitable lands in the Mt Hemlock association	Mt Hemlock study plan	Acres	Annual

RESOURCE AREA	REPORT PERIOD	PRECISION	RELIABILITY	DATA STORAGE	RESPONSIBILITIES	THRESHOLD OF VARIABILITY
TIMBER (cont)	Annually	H	H	TRI, GIS STARS TRACS	District Ranger Timber Staff & Wildlife Staff Officer	+5% over exceptions in Forest Standards and Guidelines
	Every other year	M	M	TRI, GIS	Timber Staff Officer, District Ranger	When unacceptable losses develop (2,000 acres per decade) on the ground
	Annually	H	H	TSSA, Cut and Sold report, Stars	District Ranger, Timber Staff Officer	± 15% annually or the cumulative volume exceeds ± 10% from that predicted for the decade
	Annually	H	H	TSSA, Cut and Sold report, STARS	District Ranger, Timber Staff Officer	± 25 % annually or the cummulative volume exceeds ± 10% predicted for the decade
	Annually	H	H	TRI GIS, Accomplishment reports, TRACS, STARS, TSPIRS	District Ranger Timber Staff Officer	Total acres treated by each practice is plus or minus 10% of planned objective When threshold is exceeded, ASQ should be adjusted based on new FORPLAN runs
	Annually	H	H	TRI, GIS STARS, Accomplishment Reports, TSPIRS	District Ranger, Timber Staff Officer	Total chargable volume (MMCF) and/or harvest type (Acres) are more than ± 10% of the planned objective for the decade
	Annually	H	H	Mt Hemlock Study Plan TRI GIS	District Ranger, Timber Staff Officer	N/A

RESOURCE AREA	ACTION/EFFORT MONITORED	OBJECTIVE OF MONITORING	METHOD OF MONITORING	UNIT OF MEASURE	FREQUENCY
OLD GROWTH	Old Growth Ecosystem	Identify acres and distribution of Old Growth through time	Field reviews GIS, Region Six's old growth inventory mapping project, and TRI	Acres	Annual
WILDLIFE	Population trends and habitat capability for T & E species (bald eagle grizzly bear, American peregrine falcon, gray wolf and plants)	Determine how populations are responding to the available habitat	Utilize bald eagle census in known nest and roost sites Review WDW USFWS, and other T & E census sources and habitat data Survey biannually all assigned T & E habitat for its continuing suitability Gather data on habitat in and adjacent to project areas during post project analysis	Numbers of animals, acres of suitable habitat	Biennial
	Same as above but for old growth and snag dependent species	Same as above	Conduct (or coordinate) monitoring of population levels in SOHAs Survey all MR old growth acres for continued suitability Use post-project analysis or any project adjacent to assigned old growth to establish actual wildlife tree levels Review WDW and other agency data	Number of animals acres of suitable habitat	Biennial
	Same as above but for deer, elk and mountain goat	Same as above	Survey all assigned big game habitat in and adjacent to project areas for *continuing suitability* Use post-project analysis and data from WDW, Univ of Washington, other sources	Number of animals acres of suitable habitat cover/ *forage ratios*	Every 3 years for goats and 5 years for deer and elk
	Habitat improvement	Determine effectiveness of habitat improvement	Field observation of habitat utilization during project analysis	Number of targeted animals	The 1st and 5th year after project completion

RESOURCE AREA	REPORT PERIOD	PRECISION	RELIABILITY	DATA STORAGE	RESPONSIBILITIES	THRESHOLD OF VARIABILITY
OLD GROWTH	5 years	H	H	STARS, GIS, TRI, Region 6 old Growth mapping project, Integrated Resource Inventory	District Ranger, Timber Staff & Wildlife Staff Officers	± 10% variance from assumed in the Forest Plan
WILDLIFE	5 years or upon habitat loss	L	L	TRI/GIS	District Ranger	Decrease in populations and/or suitable habitat below recovery plan objectives
	5 years	L	L	TRI/GIS	District Ranger	Number of animals pairs or habitat areas is 10% less than projected outputs from Forest Plan, decrease in number of wildlife trees needed to meet 40% potential population level
	3 and 5 years	L	L	TRI/GIS	District Ranger	+ or - 10% deviation from projected populations, amounts and condition of habitat are less than prescribed in management direction
	5 years	M	M	TRI/GIS	District Ranger	+ or - 20% from expected improvement as predicted in acre equivalent outputs from Forest Plan

RESOURCE AREA	ACTION/EFFORT MONITORED	OBJECTIVE OF MONITORING	METHOD OF MONITORING	UNIT OF MEASURE	FREQUENCY
FISH S&G AND PRESCRIPTIONS (FISH)	Effectiveness of the S&G and area prescriptions (including BMP's) in protecting desired fish habitat capability objectives and riparian area values	To provide for desired levels of anadromous & resident fish populations through habitat protection, restoration, and improvement	I D Team using FSH 2609 23 and the Hankin-Reeves stream survey methodology along with the Stream Channel Stability Evaluation	Desired Habitat Capability Levels for Anadromous & Resident Fish	Annual
RIPARIAN	Terrestrial (Diversity abundance, and habitat capability of wildlife species)	To determine population responses of various riparian dependent wildlife species in the available Forest riparian habitat	Conduct population transects and measure ground conditions in selected riparian areas	Number of animals by species, % ground cover, stand age number of vegetation species, other habitat components.	Once immediately on project completion and again 5 years after completion for all projects in 10% of established watershed that have incurred activity
WATER QUALITY/ FISH HABITAT CAPABILITY	Effectiveness of BMP's in maintaining, improving or reducing the capability of the aquatic & riparian areas on the Forest to meet objectives for on-off Forest fishery values	To maintain or improve water quality that will meet the requirements of the Clean Water Act state water quality stds , and the desired levels of beneficial uses of the water (fish)	Measure temperature, sediment sediment bedload, turbidity, & pH using methodology defined in FSH 2609 23 Measure stream channel stability evaluation and streambank vegetation measurements	Change in degrees Centigrade, tons of sediment incl bedload, pH, and jackson turbidity units	At low-flow time of year (July-Sept) on a specific project site or on sensitive aquatic system Number of samples is dictated by the method employed
FISH HABITAT RESTORATION/ IMPROVEMENT	Effectiveness of fish habitat restoration and enhancement projects in producing the fish outputs as predicted in the FP	To determine if the habitat treatment results in an increase in habitat quantity and/or quality	Stream channel response to structural or nonstructural treatment (refer to the Fisheries Handbook)	Change in the habitat capability index	Measure habitat change on 10% of the project sites per district
		To determine if the projected increase in fish (pounds) of anadromous fish & sportfish use (WFUD) are being achieved (FP outputs)	Calculate smolt production and convert to harvested adults for estimating pounds on fish harvested Estimate WFUD's derived from anadromous and resident fish sportfishing use from State recreational sportfishing data	Number of smolts produced per site or location Number of increase WFUD from sportfishing use as a result of project	Measure change in fish production on 10% of the project sites per district

RESOURCE AREA	REPORT PERIOD	PRECISION	RELIABILITY	DATA STORAGE	RESPONSIBILITIES	THRESHOLD OF VARIABILITY
FISH S&G AND PRESCRIPTIONS (FISH)	1 Report per year	M	M	TRI/GIS	Forest Fish and Wildlife Staff Officer & District Ranger	No more than 5 % decrease from the desired habitat capability levels for the project area
RIPARIAN	Every 5 years	M	L	TRI/GIS	Forest Fish and Wildlife Staff	Cumulative sample at end of 5 years indicates a 15% loss of previously established riparian habitat Population transects when compared over time indicate a 10% loss of diversity
WATER QUALITY/ FISH HABITAT CAPABILITY	1 Report per year	M	M	TRI/GIS	Forest Fish & Wildlife Staff & District Ranger	Do not exceed water quality standards established in the State Water Quality Plan
FISH HABITAT RESTORATION/ IMPROVEMENT	Annually sample 30% of the Improvement sites	M	M	TRI/GIS	Forest Fish & Wildlife Staff & District Ranger	90% of the improvement sites meet habitat quality and quantity objectives
	Annual (same as above)	M	M	TRI/GIS	Forest Fish & Wildlife Staff & District Ranger	Habitat treatment sites are within 15 % of meeting projected benefits

RESOURCE AREA	ACTION/EFFORT MONITORED	OBJECTIVE OF MONITORING	METHOD OF MONITORING	UNIT OF MEASURE	FREQUENCY
CUMULATIVE EFFECTS- FISH HABITAT CAPABILITY	Determining the cumulative cause/ effect relationships between land disturbing activities such as timber mgt. & associated road construction and fish habitat capability.	To maintain or improve the desired fish habitat capability levels for anadromous and resident fish.	Collect & evaluate fish habitat trend data to determine changes in the existing fish habitat capability using the Hankin-Reeves stream survey methodology & the stream channel stability evaluation.	Percent or degree of change in the Fish Habitat Capability Index for the target species	Annually
CUMULATIVE EFFECTS - WATERSHED CONDITION	Assessment of the In-channel Condition of the Forest's watersheds (acceptibility/unacceptability)	To determine the acceptability or unacceptability of the following 4 conditions: channel stability, pool condition, status of large woody debris,and stream bank stability.	Validate the watershed condition by: narrative update of the management history (acres harvested, road density), amount and type of unstable soils, updated stability rating of the channels, updated evaluation of the fish habitat capability trends, a current assessment on the prevailing climatic conditions, and a current assessment as to potential for off-site downstream impacts.	Acceptable / Unacceptable Watershed Condition	Will be determined as projects are proposed within the respective watersheds.
WATER	Stream Discharge (flow)	To augment information needed for sediment & bedload movement and for the use in the watershed cumulative effects process.	Streamflow gages,staff gages or other suitable techniques	Cubic foot per sec	Over range of discharge events
SOCIAL AND ECONOMIC	Receipts returned to counties	Determine change in county receipts	Revenue and 25% fund records	Dollars/year	Annual

RESOURCE AREA	REPORT PERIOD	PRECISION	RELIABILITY	DATA STORAGE	RESPONSIBILITIES	THRESHOLD OF VARIABILITY
CUMULATIVE EFFECTS - FISH HABITAT CAPABILITY	Annually	L	L	TRI/GIS	Forest Staff, Wildlife Staff Officer and District Ranger	No more than 5 % decrease in the desired fish habitat capability level for each Forest watershed for the target fish species.
CUMULATIVE EFFECTS - WATERSHED CONDITION	Annually	L	L	GIS	Forest Fish and Wildlife Staff & District Ranger	No more than 15% of the Forest's watersheds in an unacceptable condition at any one time.
WATER	Annually	L	L	GIS	District Ranger	A change in base line flow conditions.
SOCIAL AND ECONOMIC	Annually	H	H	6500 file	Planning Staff Officer	Receipts to counties exceeds + or - 25% annually or + or - 15% of 5 years average from those predicted in the Forest Plan.

RESOURCE AREA	ACTION/EFFORT MONITORED	OBJECTIVE OF MONITORING	METHOD OF MONITORING	UNIT OF MEASURE	FREQUENCY
SOCIAL AND ECONOMIC (cont)	Validation of costs & values identified in the Forest Plan	Determine accuracy of assumptions used in model	Timber sale appraisals, PAMARS and contracts	Dollars	Annually
	Changes in local income		U S Census State publications Co & local agency reports etc	Dollars	Annually
	Changes in local population		U S Census, State publications, Co & local agency reports, etc	Thous of persons	Annually
	Changes in local employment patterns		U S Census State publications Co & local agency reports, etc	Thous of persons by industry of occupation	Annually
	Changes in life-styles, attitudes, beliefs or values		Interviews with key publics and opinion leaders in communities, observation etc (See FSH 1909 17)	Various	Biennial
	Changes in Forest contribution to area forest products industries		Tracking of raw material flow to mills Industry mix	MMCP/yr % industry distribution	Annually
AMERICAN INDIAN INTERACTION	Coordination with Tribes	Determine if Forest programs & activities are in compliance with treaties, AIRFA & FLPMA	Meetings, interviews and telephone contacts with American Indian Tribal representatives	Documentation of Contacts	On-going
CULTURAL	Documentation	Assess level of accomplishment of inventoried acres site surveys recordation and evaluations project assessment, mitigation projects, management plans, and the associated costs	Review data components in Cultural Resource Reconnaissance Reports site inventory records, evaluation reports Cultural Resource Management Plans, and cost figures from Field Units	Variable acres, properties, plans, dollars	On-going

RESOURCE AREA	REPORT PERIOD	PRECISION	RELIABILITY	DATA STORAGE	RESPONSIBILITIES	THRESHOLD OF VARIABILITY
SOCIAL AND ECONOMIC (cont)	5 years	H	H	1920 file	Planning Staff Officer	Predicted costs vary + or - 10% from actual costs over a 5-year average
	Annually	H	H	Files	Planning Staff Officer	+/- 15% in 3 years (corrected for inflation)
	Annually	H	H	Files	Planning Staff Officer	+/- 15% in 3 years
	Annually	M	H	Files	Planning Staff Officer	+/- 15% in 3 years
	Quarterly	L	M	Files, newspapers anecdotal data	Planning Staff Officer	Established trend toward Forest-Community conflict or identification of problems
	Annually	M	M	TSA reports Files	Planning Staff Officer	Fails to meet plan Objectives
AMERICAN INDIAN INTERACTION	Annually	L	M	Files 1920 2360	District Ranger	When Administrative appeals and others have been filed
CULTURAL	Annually	H	M	District and S O Cultural Resource Management files Accomplishment Report	Recreation Staff Officer	Failure to meet 20% or more of assigned cultural resource targets

RESOURCE AREA	ACTION/EFFORT MONITORED	OBJECTIVE OF MONITORING	METHOD OF MONITORING	UNIT OF MEASURE	FREQUENCY
CULTURAL (cont)	Protection of historical resources	To determine the protection for historically significant structures & sites from vandalism and natural degradation	Inspection visits to structures and documentation of observations (may include photogrammetric recordation in selected cases)	Properties	Variable Depends on site condition and nature and intensity of threatening agents As a minimum should be done annually on a sampling of properties
SCENERY	Visual Quality Level	Determine whether the condition of the visual resource is meeting the standards set by management standards and guidelines	Monitor visual conditions during programs and activity reviews through use of visual resource photopoints	Acres by VQO	Annually on 10% of viewsheds, vegetative manipulation roads, or major developments
RECREATION	Recreation outputs by ROS Class	Determine whether recreation opportunities are being provided and quality of experience conforms to management standards and guidelines	Monitor recreation use by type of activity & location of activity Measure in terms of M/RVDs or visits Correlate with ROS class	Measure -M RVOS -visits -activities -standards by ROS class -Acres Not Meeting desired attributes	Annually
	Miles of trail in trail inventory	Determine the extent trail mileage is being retained in the system	RIM Trails data base	Miles	Annually
WILDERNESS	Condition of Wilderness resource	Assess the impacts of overuse	Measure visitor registration or permits, Wilderness Ranger surveys and photoelectric counts to measure trail and campsite encounters in transition and trailled zones Sample once a month during high use season	Number of encounters	Annually
			Measure changes in LAC's in Wilderness	Sq feet denuded area	Initially sites recorded on campsite inventory form 5 years or 20% of sites annually

RESOURCE AREA	REPORT PERIOD	PRECISION	RELIABILITY	DATA STORAGE	RESPONSIBILITIES	THRESHOLD OF VARIABILITY
CULTURAL (cont)	Annually	H	H	District and S.O. Cultural Resource Management Files, RIM facility condition report.	Recreation Staff Officer	When individual site condition class drops one level.
SCENERY	Annually	H	H	TRI/GIS	Recreation Staff Officer	10% of acres not meeting VQO.
RECREATION	Every 2 years	M	M	RIM	Recreation Staff Officer	When use varies + or - 25% from projections or quality of experience is below standard on 15% of sites.
	5 years	H	H	RIM Trails	Recreation Staff Officer	Mileage loss exceeds 10% of the base inventory.
WILDERNESS	Annually	M	M	Files (2320), Wilderness Ranger close out reports.	District Ranger	When encounters reach 90% of established LAC for each WROS>
	5th year	H	H	Files, Wilderness Ranger close out reports	District Ranger	When vegetative loss reaches 90% of LAC for each WROS class.

RESOURCE AREA	ACTION/EFFORT MONITORED	OBJECTIVE OF MONITORING	METHOD OF MONITORING	UNIT OF MEASURE	FREQUENCY
WILDERNESS (cont)			Measure changes in water quality bacteriological levels focusing on Fecal Coliform.	Most probable number method.	Once every 5 years at all extra-heavy use lakes.
		To measure change from established base-line for visual range within Class I areas.	Point samples using photopoints.	Miles	Continuous sampling but reviewed annually after year 3.
		To determine the extent that natural ignitions are used to accomplish pre-scribed fire objectives in wilderness areas	Fire reports	Acres burned by FIL	Annually
WILD AND SCENIC RIVERS	Retention of characteristicts of eligible rivers.	Determine effects of act-ivities on attributes for potential class-ification of river segments *eligible* for wild & scenic river *designation.*	Assure that attributes are maintained at current levels through project reviews on all actions involving vege-tative, soil, or scenic alteration manipulation, road or trail construction or reconstruction along eligible rivers.	N/A	Continuing as projects are proposed.
	Skagit River Plan	Assume that plan is being follow-ed or need for *revision.*	Regional and Forest level activity reviews.	N/A	Once every 3 years
RESEARCH NATURAL AREAS	Effectiveness at meeting RNA manage-ment objectives.	Assure the RNA attributes and unmodified con-ditions are maintained.	Visual site inspection, evaluation of impacts from aladjacent activities (recreation, timber harvest, etc.) and b)on-site activities that are detrimental to RNA qualities (recreation); evaluate Forest compliance with Standards and	RNA sites	Annually

RESOURCE AREA	REPORT PERIOD	PRECISION	RELIABILITY	DATA STORAGE	RESPONSIBILITIES	THRESHOLD OF VARIABILITY
WILDERNESS (cont)	5th year	H	H	Files, Wilderness Ranger close out reports	District Ranger	When 10% of established sites fail to meet established drinking standards.
	Annually	H	H	Written reports prepared by contractor.	Fire Staff Officer	When measured values taken after year three of plan implementation indicate a decline in visual range when compared against the information gained during years 1-3 of the decade.
WILD AND SCENIC	Annually	H	H	Fort Collins Fire Occurrence data file.	District Ranger	When the burned acreage in any one year exceeds by 40% the annual expected burned acreage expressed in the Forest Plan or the accumulated acres burned for the decade exceeds the Plan's expected acreage by 20%.
	N/A	M	H	District files (2310, 2360)	District Ranger	When resource condition or level of activities would lower potential classification.
RESEARCH NATURAL AREAS	3rd year	M	H	District files (2310, 2360)	Recreation Staff Officer	On 3 year schedule or if conditions on river change dramatically.
	Annually	M	H	District, S.O., and PNW Research Station.	District Ranger	When standards are not being met or downward trend is indicated.

RESOURCE AREA	ACTION/EFFORT MONITORED	OBJECTIVE OF MONITORING	METHOD OF MONITORING	UNIT OF MEASURE	FREQUENCY
RESEARCH NATURAL AREAS (cont)			Guidelines/coordination with Station Director, evaluate implementation and effectiness of individual RNA management prescriptions		
FIRE	Fire Management program efficiency	Determine if fire program implementation is achieving intended results	Comparison of the expected Fire Management Efficiency from the Plan with the experienced efficiency following plan implementation	Dollars of budget (include FFF) plus resource losses over M Ac protected	Annually after year 3
LANDS	Effects of N F management on lands resources and communities adjacent to National Forest land	Determine if LMP implementation results in positive and/or adverse effects to occur on/in adjacent lands resources and communities	Periodic meetings with cost share co-operators, city, county officials, and staff management review	N/A	Annually
			Special Uses Program review with site inspections (interdisciplinary).	5 sites	Annually
	Adjacent land Management by Other Government Agencies (Federal, State and local)	Determine effects on N F lands resulting from management activities on adjacent lands managed by other governmental organizations (Federal, State and local)	Periodic meetings with Government agencies and staff management reviews	N/A	Annually
	Effects of N F management of utility corridors on transmission needs and other resource values	Determine whether utility corridor mgmt strategy is compatable with land mgmt objectives and energy needs Assure that capacity of existing corridors is utilized prior to initiating new corridor	Review existing capacity and plans for upgrade with utility officials prior to new corridor construction	N/A	As needed
			Management review of effects of implementation on resources, land management and energy needs	N/A	Every 5 years

RESOURCE AREA	REPORT PERIOD	PRECISION	RELIABILITY	DATA STORAGE	RESPONSIBILITIES	*THRESHOLD* OF VARIABILITY
FIRE	Annually	H	L	PAMARS and Fire Occurrence Data Base at FCCC.	Fire Staff Officer	When the efficiency for an individual year exceeds that predicted by 40% or the accumulated efficiency for the decade exceeds the predicted by 20%.
LANDS	5 years	L	L	5400 open files	L & M Staff Officer	Problem areas which will restrict Plan outputs from being accomplished.
	5 years	M	M	2700 open files	L & M Staff Officer	When Forest-wide Standards are not being met or downward trend is indicated.
	5 years	L	L	5400 open files	Forest Supervisor Deputy F.S. and Staff Officers	Problem areas which will restrict Plan outputs from being accomplished.
	5 years	L	L	2700 open files	L & M Staff Officer	Full utilization of existing corridors.
	5 years	L	L	2700 open files	L & M Staff Officer	Full utilization of existing corridors.

RESOURCE AREA	ACTION/EFFORT MONITORED	OBJECTIVE OF MONITORING	METHOD OF MONITORING	UNIT OF MEASURE	FREQUENCY
MINERALS	Effectiveness of meeting Forest goals and outputs	Assess effectiveness of withdrawals in *managing resource values.*	Program Management Review	N/A	Review 20% annually
		Determine if activities are adequately documented and administered.	Program Management Review	N/A	Review 20% annually
		Assure that operating stipulations are achieving resource protection objectives.	Visual site inspections with interdisciplinary team. Evaluate activities for compliance with Standards and Guidelines.	2 sites	Annually
THE BUILT ENVIRONMENT - ROADS	Miles of new road construction	Validate roading coefficients in planning model.	Engineering reports, data base TIS.	Mi/yr	Annually
ALL	Application of Standards and Guidelines	Determine if Standards and Guidelines are being implemented as planned.	Sample review of NEPA documents for proposals on each unit and various management areas.	Documents sampled	Annually
	Results of Standards and Guidelines	Determine if Standards and Guidelines are effective in meeting desired objective.	Sample review of completed practices, covering all units and various management areas. Review by IDT appointed by Forest Supervisor.	Projects reviewed	Annually, beginning with 2nd year
	Acquisition of new information as specified in Information Needs Chapter 2, Forest Plan.	Determine progress being made to be responsive to information needs.	Review data generated in response to Information Needs section.	Documentation of new data	Every other year beginning 1992.

RESOURCE AREA	REPORT PERIOD	PRECISION	RELIABILITY	DATA STORAGE	RESPONSIBILITIES	THRESHOLD OF VARIABILITY
MINERALS	5 years	L	L	2800 open files	L & M Staff Officer	Action will be taken on all unauthorized ground disturbing mineral activities. Additional administrative efforts may be required to control "recreational" Mining in Wilderness or other special interest areas.
	5 years	L	L	2800 open files	L & M Staff Officer	Same as above.
	Annually	M	M	2800 open files	District Ranger	Same as above.
THE BUILT ENVIRONMENT	5 years	H	H	TIS	Forest Engineer	Miles constructed exceeds + or - 25% annually or + or - 15% of 5 years average predicted in the Forest Plan
ALL	2,3,5 and 8th years	H	M	1920 files	Planning Staff Officer	Failure to implement any Standards and Guidelines.
	Annually	M	M	1920 files	Planning Staff Officer	Determination by IDT that Standards and Guidelines are not producing desired results.
	2 years	H	M	1920 files, Summary of new data	Planning Staff Officer	Determination by Line & Staff that opportunities to gather needed info. are being overlooked.

D. AMENDMENT AND REVISION

The Forest Plan incorporates legal mandate, professional judgement and the public's stated concerns into a future vision of the Forest. It charts a path for this future by developing management goals and objectives and translating them into management direction in the form of standards and guidelines for management areas on the Forest.

National Forest planning is a dynamic process, and the products - Forest Plans - are similarly dynamic. Forest Plans can and should be modified if conditions warrant. As management goals are applied on the ground, or as new information is learned about resources, the Plan's goals and objectives, or activities that the goals generate, may no longer be appropriate. In such instances, activities may be tailored to fit the resources, or planning objectives as stated in the Plan may be amended. Plans do not apply direction in site-specific management activities. It would be unrealistic and beyond the scope of this plan to try to identify, analyze, and schedule the myriad projects or activities that occur on a National Forest. Instead, this type of site-specific planning occurs at the project-level planning stage.

The Forest Supervisor may amend the Forest Plan. Based on an analysis of the objectives, standards, and other contents of the Forest Plan, the Forest Supervisor shall determine whether a proposed amendment would result in a significant change in the Plan. If the change resulting from the proposed amendment is determined to be significant, the Forest Supervisor shall follow the same procedure as that required for development and approval of a Forest Plan. If the change resulting from the amendment is determined not to be significant for the purposes of the planning process, the Forest Supervisor may implement the amendment following appropriate public notification and satisfactory completion of NEPA procedures.

Two types of Management Areas (MA's) are identified in this Forest Plan. The first type are Management Areas that are legally established and described, such as wilderness, Mt. Baker National Recreation Area, Skagit Wild and Scenic River, and the Alpine Lakes Area. The boundaries of these MA's are firm.

The second type of Management Areas are aggregations of analysis areas that have been assigned to the same management emphasis. The boundaries of this type of MA are not firm and do not always follow easily identified topographic features, such as ridges or streams. The boundaries represent a transition from one set of opportunities and constraints to another, with management direction established for each. During project design, field verification may indicate that the mapped Management Area boundary should be changed to reflect the environmental conditions the MA was intended to include. Such changes will be evaluated and documented in the environmental assessment, including a determination of significance, as discussed above.

The Forest Plan shall ordinarily be revised on a ten-year cycle or at least every 15 years. It also may be revised whenever the Forest Supervisor determines that conditions or demands in the area covered by the Plan have changed significantly, or when changes in RPA policies, goals, or objectives would have a significant effect on Forest level programs. In the monitoring and evaluation process, the interdisciplinary team may recommend a revision of the Forest Plan at any time. Revisions are not effective until considered and approved in accordance with the requirements for the development and approval of the Forest Plan.

The Forest Supervisor shall review the conditions on the land covered by the Plan at least every five years to determine whether conditions or demands of the public have changed significantly.

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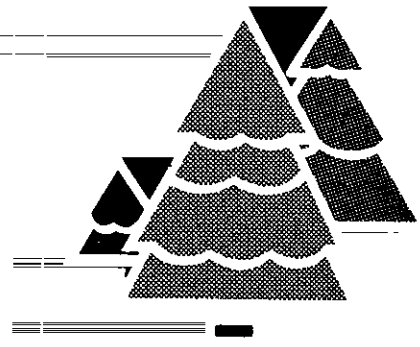
Glossary



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Abbreviations Used In The Documents

AASQ - Average Allowable Sale Quantity

AMS - Analysis of the Management Situation

AQRV - Air Quality Related Value

ASQ - Annual Allowable Sale Quantity

BD - Brush Disposal

BLM - Bureau of Land Management

BMP - Best Management Practices

BSS - Base Sale Schedule

CEQ - Council on Environmental Quality

CF - Cubic Foot

CFL - Commercial Forest Land

CFR - Code of Federal Regulations

CMAI - Culmination of Mean Annual Increment

DBH - Diameter at Breast Height

DEIS - Draft Environmental Impact Statement

DNR - Department of Natural Resources, Washington State

DOE - Department of Ecology, Washington State

EIS - Environmental Impact Statement

EPA - Environmental Protection Agency

EVC - Existing Visual Condition

FEIS - Final Environmental Impact Statement

FERC - Federal Energy Regulatory Commission

FS - Forest Service

FSH - Forest Service Handbook

FSM - Forest Service Manual

FVC - Future Visual Condition

FWS - Fish and Wildlife Service, U.S. Department of the Interior

ICO - Issues, Concerns, Opportunities

ICOR - Interagency Committee for Outdoor Recreation, Washington State

IDT - Interdisciplinary Planning Team

KV - Knutsen-Vandenberg Fund

LAC - Limits of Acceptable Change

LTSYC - Long-Term Sustained Yield Capacity

MAI - Mean Annual Increment

MBNRA - Mt. Baker National Recreation Area

MBS - Mt. Baker-Snoqualmie National Forest

MIS - Management Indicator Species

MBF - Thousand Board Feet

MMBF - Million Board Feet

MCF - Thousand Cubic Feet

MMCF - Million Cubic Feet

MR - Management Requirement

MSF - Mt. Baker-Snoqualmie National Forest

NDY - Non Declining Yield

NEPA - National Environmental Policy Act

NF - National Forest

NFMA - National Forest Management Act

NFS - National Forest System

NPB - Net Public Benefit

PAOT - Persons-At-One-Time

PSD - Prevention of Significant Deterioration

OFM - Office of Financial Management, Washington State

ORV - Off-Road Vehicle

PCT - Precommercial Thin

PNV - Present Net Value

PNW - Pacific Northwest Region, USDA Forest Service

PNW - Present Net Worth

RARE II - Roadless Area Review and Evaluation

RIM - Recreation Information Management

RM - Roaded Modified

RN - Roaded Natural

RNA - Research Natural Area

ROS - Recreation Opportunity Spectrum

RPA - Forest and Rangeland Renewable Resources Planning Act

RVD - Recreation Visitor Day

SCORP - State Comprehensive Outdoor Recreation Plan

SEIS - Draft Supplemental to the Environmental Impact Statement for an Amendment to the Pacific Northwest Regional Guide - Spotted Owl Guidelines, 1986

SMU - Streamside Management Unit

SOHA - Spotted Owl Habitat Area

SPM - Semi-Primitive Motorized

SPNM - Semi-Primitive Nonmotorized

TSPQ - Timber Sale Program Quantity

TRI - Total Resource Inventory

TSE - Timber Stand Examination

TSI - Timber Stand Improvement

USDA - United States Department of Agriculture

USDI - United States Department of Interior

USFWS - United States Fish and Wildlife Service

VAC - Visual Absorbtion Capacity

VQL - Visual Quality Level

VQO - Visual Quality Objective

WFUD - Wildlife Fish User Day

WMU - Wetland Management Unit

WROS - Wilderness Recreation Opportunity Spectrum

Acquired Lands - Lands added to the National Forest system by purchase, transfer, or donation under authority of the Weeks Law or related acts. Also, lands obtained by the Forest Service by exchange for other acquired lands.

Acre Equivalent - Used to adjust actual acres of habitat improvement or improvement structures to reflect overall habitat benefits derived. It reflects the zone of influence of the habitat improvement for the target species. For example, a single water development for upland game birds has an acre equivalent of 160, whereas a single water structure for big game has a value of 640 because it has a larger zone of influence for the more mobile big game animals.

Acre-foot - A measure of water or sediment volume, equal to the amount which would cover an area of one acre to a depth of one foot (i.e., 43,560 cubic feet or 325,851 gallons).

Activity - Actions, measures, or treatments that are undertaken that directly or indirectly produce, enhance, or maintain forest and rangeland outputs or achieve administrative or environmental quality objectives. An activity can generate multiple outputs. Forest Service activity definitions, codes, and units of measure are contained in the Management Information Handbook (FSM 1309.11).

Administrative Unit - An area under the administration of one line officer, such as a District Ranger, Forest Supervisor, or Regional Forester.

Air Quality Related Value (AQRV) - Any physical, chemical, or biological component of an ecosystem that can be affected by changes in air pollutant levels. As an example: visual range as measured from a vista may be shortened by the presence of fine particulates in the air. Similarly a threatened or endangered plant species may be sensitive to sulphur dioxide levels.

Airshed - A geographical area that, because of topography, meteorology, and/or climate, shares the same air.

Age Class - An interval, usually 10 to 20 years, into which the age ranges of vegetation are divided for classification or use.

Allocation Zone - Geographic subdivisions of the Forest delineated for the purpose of controlling land allocations, so the FORPLAN Model could select only from a set of spacially feasible land allocations and harvest schedules. In addition, outputs and costs portrayed by zones would be more meaningful than portrayed by Forest-wide analysis areas.

Allowable Sale Quantity (ASQ) - The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the plan. This quantity is usually expressed on an annual basis as the "Average Annual Allowable Sale Quantity." For timber resource planning purposes, the allowable sale quantity applies to each decade over the planning horizon and includes only chargeable volume. Consistent with the definition of timber production, fuelwood and other non-industrial wood shall not be included in the allowable sale quantity.

Alternative - One of several policies, plans, or projects proposed for decision making.

Amenity - An object, feature, quality, or experience that gives pleasure or is pleasing to the mind or senses. Amenity value is typically used in land use planning to describe those resource properties for which market values (or proxy values) are not or cannot be established (such as clean air and water, scenic quality, etc.).

Anadromous Fish - Those species of fish that mature in the sea and migrate into streams to spawn. Salmon, steelhead, and shad are examples.

Analysis Area - A grouping of homogeneous land areas, formed from the land and resource inventory data comprising the data base. Similarities are in terms of common capabilities to produce resources and susceptibility to impacts. Analysis areas need not be contiguous areas of land.

Analysis of the Management Situation (AMS) - A determination of the ability of the planning area to supply goods and services in response to society's demand for those goods and services.

Animal Unit Month (AUM) - The amount of forage required by one mature (1,000 lb.) cow or the equivalent for 1 month, based on an average of 26 lbs. of dry forage per day.

Aquatic Ecosystems - Stream channels, lakes, marshes or ponds, and the plant and animal communities they support.

Aquifer - An underground geological formation or structure that contains water in sufficient quantity to supply needs for water development.

Arterial Roads - See "Road, Arterial."

Average Annual Allowable Sale Quantity (AAASQ) - See "Allowable Sale Quantity."

Background - The viable terrain beyond the foreground and middleground where individual trees are not visible, but are blended into the total fabric of the stand. Includes the view beyond 3-5 miles from the observer and as far as the eye can see. (See "Foreground" and "Middleground.")

Basal Area - The area of the cross-section of a tree stem near the base, generally at breast height and inclusive of bark.

Base Sale Schedule (BSS) - A timber sale schedule formulated on the basis that the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade, and this planned sale and harvest for any decade is not greater than the long-term sustained yield capacity. This definition expresses the principle of non-declining flow.

Bedload - The sediment that moves by sliding, rolling, or bounding on or very near the streambed; sediment moved mainly by tractive or gravitational forces or both but at velocities less than the surrounding flow.

Benchmark - 1) The analytical basis from which the alternatives were developed. The use of assessed land capability as a basis from which to estimate the effects of alternative patterns of management on the land. 2) Reference points that define the bounds within which feasible management alternatives can be developed. Benchmarks may be defined by resource output or economic measures.
Benefit/Cost Ratio - The ratio obtained by dividing the anticipated benefits of a project by its anticipated costs (or realized benefits by realized costs) to obtain a measure of expected (or realized) benefits per unit of cost--a common exercise in cost-benefit analysis which gives a measure of economic efficiency.

Best Management Practices (BMP's) - A practice or combination of practices that is determined by a State (or designated area-wide planning agency) after problem assessment, examination of alternative practices, and appropriate public participation, to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals (Federal Register, Volume 40, No. 230 dated 11/28/75).

Big Game - Those species of large mammals normally managed for sport hunting.
Big Game Summer Range - A range, usually at higher elevation, used by deer and elk during the summer. Summer ranges are usually much more extensive than winter ranges.

Big Game Winter Range - A range, usually at lower elevation, used by migratory deer and elk during the winter months; usually more clearly defined and smaller than summer ranges.

Biological Growth Potential - The average net growth attainable in a fully stocked natural forest stand.

Biological Potential - The maximum production of a selected organism that can be attained under optimum management.

Biomass - The total quantity at a given time of living organisms of one or more species per unit of space (species biomass), or of all the species in a biotic community.

Board Foot - The amount of timber equivalent to a piece of wood one foot square and one inch thick, being the unit in board foot measure.

Board Foot/Cubic Foot Ratio - A ratio expressing the number of board feet in a cubic foot of timber. Varies with tree species, diameter, height, and form factors

Broadcast Burn - Allowing a prescribed fire to burn over a designated area within well-defined boundaries for reduction of fuel hazard or as a silvicultural treatment, or both.

Browse - Twigs, leaves, and young shoots of trees and shrubs on which animals feed; in particular, those shrubs which are used by big game animals for food.

Brush - A growth of shrubs or small trees, usually of a type undesirable to livestock or timber management.

Brush Disposal (BD) - A term commonly used to refer to disposal of slash. See "Slash," "Broadcast Burn," and "Residue Utilization."

Bureau of Land Management (BLM) - An agency within the Department of the Interior, with land management responsibility for the Public Domain lands.

Canopy - The more-or-less continuous cover of branches and foliage formed collectively by the crown of adjacent trees and other woody growth

Capability - The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at given levels of management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology, as well as on the application of management practices, such as silviculture or protection from fire, insects, and disease.

Capital Investment - An input that increases the value of natural or manmade resources (assets) needed to maintain or increase the flow of outputs in the future. Benefits resulting from capital investments are normally recouped in excess of 1 year.

Carrying Capacity - 1) The number of organisms of a given species and quality that can survive in, without causing deterioration of, a given ecosystem through the least favorable environmental conditions that occur within a stated interval of time 2) In recreation management, the level of recreational use that a site can provide without deterioration of the quality of the recreation experience of the resource

Cavity Excavators - The hollow excavated in trees by birds or other natural phenomena; used for roosting and reproduction by many birds and mammals.

Cedar - Areas that have been sources of various cedar products, or are at least identified as significant stands of cedar. Cedar is used in everything from smokehouse construction to spirit dancer costumes to basketry and other utilitarian items. Of all forest products it may be the most significant to the Indians of today, although it cannot survive without a total appropriate environment, most of which was used by the Indians in the past

Cemetaries & Archaeological Sites - Villages, camps, and burial areas (not in most instances known to be cemetaries). Other sites are ethnographically and/or historically known cemetaries. Some are maintained and still used, others are not

Ceremonial Flora - Locations known to contain certain plants that have ritual or healing properties. Some areas so designated are large and may contain several such plant species, others are small and may possess only a few. Often areas containing specific flora are considered as ceremonially, ritually, and/or religiously powerful.

Channel or Stream Scour - Erosion of the channel bottom caused by high flows of water, loss of channel stability, or debris torrents.

Chargeable Volume - All volume that is included in the growth and yield projections for the selected management prescriptions used to arrive at the allowable sale quantity, based on Regional utilization standards.

CHUNK Study - An economic-efficiency study of the developed campgrounds on the Forest, completed in 1984. Refer to Chapter III, DEIS, Recreation.

Class I Stream - Perennial or intermittent streams (or segments thereof) that have one or more of the following characteristics: provide a direct source of water for domestic use; are used by large numbers of fish for spawning, rearing, and/or migration; and/or are major contributors to the quantity of water in a Class I stream. See "SMU."

Class II Stream - Perennial or intermittent streams (or segments thereof) that have one or more of the following characteristics. are used by moderate though significant numbers of fish for spawning, rearing and/or migration, and/or flow enough water to be moderate or not clearly identifiable contributors to the quantity of water in a Class I stream, or are major contributors to a Class II stream. See "SMU."

Class III Stream - All other perennial streams or segments thereof not meeting higher class criteria. See "SMU."

Deeply Incised - A stream channel with perennial stream flow, steep deep streambanks, and unstable sideslopes that can generate slumps and slides resulting in debris torrents. Class III channels incised more than 10 feet and having one or more unstable soil types qualifies as a deeply incised Class III stream. On this Forest, 70% of the Class III streams are deeply incised; they represent 66% of the total Forest stream miles.

Lightly Incised - Class III channels incised less than 10 feet, and in some cases, possessing unstable soil types, qualifies as a lightly incised Class III stream. For this Forest, 30% of the Class III streams are lightly incised; this represents 27% of the total Forest stream miles.

Class IV Stream - All other intermittent streams not meeting higher class criteria. See "SMU."

Clearcutting - A silvicultural system in which all trees on an area are harvested in one cut for the purpose of regenerating a new, even-aged stand. The area harvested may be a patch, strip, or stand large enough to be mapped or recorded as a separate class in planning for sustained yield.

Climax - The culminating stage in plant succession for a given site where the vegetation has reached a highly stable condition.

Climax Species - Those species that dominate a climax stand in either numbers per unit area or biomass.

Code of Federal Regulations (CFR) - A codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government.

Collector Roads - See "Road, Collector."

Commercial Forest Land (CFL) - See "Timber Resource Land Suitability Classification."

Commercial Thinning - Any type of tree thinning that produces merchantable material at least equal in value to the direct costs of harvesting.

Commodity - A transportable resource product with commercial value; all resource products that are articles of commerce.

Compaction - The packing together of soil particles by forces exerted at the soil surface, resulting in increased soil density.

Concern - A point, matter, or question raised by management and/or the public that must be addressed in the planning process.

Concession - A commercial public service enterprise which operates on National Forest land under a "Special Use Permit" for the purpose of providing goods and services to the public.

Condition Class - A descriptive grouping into 10 classes of the existing forest vegetation based on age, tree size, maturity, species mix, and accessibility by road. Condition class is an important component of the Forest Model structure. See "Forest Model" and Appendix B.

Congressionally Classified and Designated Areas - Areas that require congressional enactment for their establishment, such as National Wilderness Areas, National Wild and Scenic Rivers, and National Recreation Areas.

Connecting Habitat - Areas which serve as travel corridors or habitat connections, provide for the dispersal and interaction of indicator species, and avoid the isolation of habitat into geographic islands. These areas provide species access across and/or along drainages and elevation gradients (ridgeline to valley floor). Connecting habitat can be provided in several ways:

1. Utilize natural land forms, such as riparian areas along creek drainages, or the areas adjacent to avalanche chutes, where possible.

2. Maintain areas in blocks of land that generally are one or more logical harvest units in size. This will provide the option of rotating the designation of connecting habitat to adjacent areas, as the adjacent harvested areas mature or develop the desired habitat structure.

Constraint - A confinement or restriction on the range of permissible choices.

Consumptive Use - A use of resources that permanently reduces the supply, such as mining. (See also Non-consumptive Use.)

Core Area - (As related to a Spotted Owl Habitat Area.) An area encompassing at least 300 contiguous acres of old growth suitable for nesting and reproduction. Centering on a reproductive site or a site of concentrated pair use where such information is available. See "Spotted Owl Habitat Area."

Corridor - A linear strip of land identified for the present or future location of transportation or utility rights-of-way within its boundaries.

Costs:

1. **Direct cost** - a cost that directly contributes to the production of the primary outputs of an activity, project, or program.

2. **Economic cost** - total fixed and variable costs for inputs, including costs incurred by other public parties and, if appropriate, opportunity costs and cost savings.

3. **Fixed cost** - a cost that is committed for the time horizon of planning or the decision being considered. Fixed costs include fixed ownership requirements, fixed protection, short-term maintenance, and long-term planning and inventory costs.

4. **Investment cost** - a cost of creating or enhancing capital assets, including costs of administrative or common-use transport facilities and resource management investments.

5. **Joint cost** - a cost contributing to the production of more than one type of output.

6. **Non-Forest Service cost** - a cost of investment and operating activities paid by cooperators or other non-Forest Service agencies which are part of Forest Service management programs, or which contribute to the outputs included in the analysis.

7. **Opportunity cost** - the value of a resource's foregone net benefits in its most economically efficient alternative use.

8. **Unit cost or cost per unit** - total cost of production divided by the number of units produced.

Cost Efficiency - The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs, including environmental, economic, or social impacts, are not assigned monetary values, but are achieved at specified levels in the least costly manner. Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates-of-return may be appropriate.

Cost Share - A term referring to investment sharing provided under Public Law 88-657 (16 U.S.C 535) whereby forest development roads may be financed cooperatively with public or private agencies or persons. Investment sharing may be accomplished in several ways. Road right-of-way construction and use agreements (referred to as cost share agreements) are a common method used in this Forest where there are large areas of intermingled landownership.

Council on Environmental Quality (CEQ) - An advisory council to the President established by the National Environmental Policy Act of 1969. Reviews federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters. (Abstracted from NEPA.)

Cover/forage Ratio - The mixture of cover and forage areas on a unit of land, expressed as a ratio.

Created Openings - Openings in the forest created by the silvicultural practices of: shelterwood regeneration cutting at the final harvest; clearcutting; seed tree cutting; or group selection cutting.

Crop Tree - Any tree forming or selected to form, a component of the final crop. Generally a tree selected in a young stand or plantation for carrying through to maturity.

Crown Height - In a standing tree, the vertical distance from ground level to the base of the crown, measured either to the lowest live branch whorl, or to the lowest live branch (excluding shoots arising spontaneously from buds on the stem of a woody plant), or to a point halfway in-between.

Cubic Foot - A unit of quantity for lumber or timber equal to a cube 1x1x1 foot.

Cull Material - Timber which does not meet the specified utilization standards (usually in a timber sale contract) for size and percent of sound wood See "Utilization Standards."

Culmination of Mean Annual Increment (CMAI) - The age at which the average annual growth is greatest for a stand of trees. Mean annual increment is expressed in cubic feet measure and is based on expected growth according to the management intensities and utilization standards assumed in accordance with 36 CFR 219.16(a)(2)(i) and (ii). Culmination of mean annual increment includes regeneration harvest (cutting) yields and any additional yields from planned intermediate harvests (cuttings).

Cultural Resource - The physical evidence of our Nation's heritage. Included are: archaeological sites; historic buildings, structures, and districts; and localities with social significance to the human community. In the plan, they are classified as archaeological and historical properties, and American Indian religious and cultural use areas.

Cumulative Effects or Impacts - The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR 1508.7 - these regulations use effects and impacts synonymously)

DBH (d.b.h.) - Diameter at breast height, measured at 4 feet 6 inches from the ground.

Debris Slide - A shallow landslide of soil, rock, and organic material that occurs on steep slopes.

Debris Torrent - A large debris slide that is charged with water and confined to a steep stream channel. Debris torrents may travel several thousand feet.

Decision Space - Decision space defines the outer limits past which it is not physically, biologically, or economically possible to produce a feasible combination of Forest goals and services, and land allocations

Demand - The amount of an output that users are willing to take at a specified price, time period, and condition of sale

Departure - A sale schedule that deviates from the principle of non-declining *flow by exhibiting a planned decrease in the sale schedule at any time during* the planning horizon A departure can be characterized as a temporary increase, usually in the beginning decade(s) of the planning horizon, over the base sale schedule that would otherwise be established, without impairing the future attainment of the long-term sustained yield capacity.

Developed Recreation - Recreation that requires facilities that, in turn, result in concentrated use of an area. Examples of recreation areas are campgrounds and ski areas; facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings See "Recreation Development Scale (Level)."

Dispersed Recreation - A general term referring to recreation use outside a developed recreation site, such as scenic driving, hiking, fishing, cross-country skiing, horseback riding, snow mobiling, hunting, backpacking, and recreation in primitive environments.

Diversity - The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan. See also "Edge," "Horizontal Diversity," and "Vertical Diversity "

Douglas-fir Type - An association of tree species in which Douglas-fir is recognized as one of the principal seral species.

Draft Environmental Impact Statement (DEIS) - The draft statement of environmental effects which is required for major federal actions under Section 102 of the National Environmental Policy Act, and released to the public and other agencies for comment and review.

Duff - Organic matter in various stages of decomposition on the floor of the forest.

Early Forest Succession - The early stage or condition of a plant community that occurs during its development from bare ground to climax.

Economic Efficiency - The usefulness of inputs (costs) to produce outputs (benefits) and effects when all costs and benefits that can be identified and valued are included in the computations Economic efficiency is usually measured using present net value, though use of benefit-cost ratios and rates-of-return may sometimes be appropriate.

Economic Impacts:

1. **Direct economic impact** - effects caused directly by forest product harvest or processing or by forest uses.

2. **Indirect economic impact** - effects that occur when supporting industries sell goods or services to directly affected industries.

3. **Induced economic impact** - effects that occur when employees or owners of directly or indirectly affected industries spend their income within the economy.

Ecosystem - An interacting system of organisms considered together with their environment; for example, marsh, watershed, and lake ecosystems

Edge - An interfacial area where plant communities meet or where successional stages or vegetative conditions within plant communities come together. See also "Diversity," "Edge Contrast" and "Horizontal Diversity."

Edge Contrast - A qualitative measure of the difference in structure of two adjacent vegetated areas; for example, "low," "medium," or "high" edge contrast.

Effects - Environmental consequences as a result of a proposed action. Included are direct effects, which are caused by the action and occur at the same time and place, and indirect effects, which are caused by the action and occur later in time and/or further removed in distance, but which are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air, water, and/or other natural systems, including ecosystems.

> Effects and impacts as used in this statement/plan are synonymous. Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic quality, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effects will be beneficial (40 CFR 1508.8).

Electronic Sites - Areas designated for the operation of equipment which transmits and receives radio signals (excluding television aerials and antennas) for individual pickup of programming, and passive reflectors.

Endangered Species - Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the Endangered Species Act of 1973, as amended.

Ending Inventory Constraint - The standing volume left in the inventory at the end of the planning horizon. The constraint insures that there is enough standing inventory at the end of the planning horizon to perpetuate long-term sustained yield capacity harvest levels on a nondeclining flow basis.

Environmental Analysis - A process associated with the preparation of an environmental assessment or environmental impact statement An analysis of alternative actions and their predictable short- and long-term environmental effects, including physical, biological, social, and economic.

Environmental Assessment - A concise public document, providing sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.

Environmental Impact Statement (EIS) - A statement of the environmental effects of a proposed action and alternatives to it. Required for major federal actions under Section 102 of the National Environmental Policy Act (NEPA), and released to the public and other agencies for comment and review. A formal document that must follow the requirements of NEPA, the Council on Environmental Quality (CEQ) guidelines, and directives of the agency responsible for the project proposal. *See DEIS and FEIS.*

Environmental Protection Agency (EPA) - An agency of the Executive Branch of the Federal Government which has the responsibility for environmental matters of national concern.

Erosion - 1) The wearing away of the land surface by running water, wind, ice, or other geologic agents, including such processes as gravitation creep; or 2) detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

Even-Aged Management - The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of stands of varying ages (tree sizes) throughout the forest area. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands. (36 CFR 219.3)

Even-aged Stands - Stands in which all trees are of about the same age. (A spread of 10 tO 20 years is generally considered one age class.) Cutting methods producing even-aged stands are clearcut, shelterwood, or seed tree systems.

Existing Visual Condition (EVC) - The "Existing Visual Condition" of the Forest was prepared in 1979. See "Visual Condition."

Final Environmental Impact Statement (FEIS) - The final version of the statement of environmental effects required for major federal actions under section 102 of the National Environmental Policy Act. A revision of the draft environmental impact statement to include public and agency responses to the draft

Final Harvest - Synonomous with "regeneration cutting" (harvest) in the clearcutting silvicultural system.

Fisheries Habitats - Streams, lakes, and reservoirs that support fish populations.

Floodplain - The lowland and relatively flat areas adjoining inland and coastal waters including, at a minimum, those areas subject to a 1-percent or greater chance of flooding in any given year (100-year recurrence).

Flood Proof - Using special measures during road construction to insure that flood occurrences will not cause road damage.

Forage - All browse and nonwoody plants that are available to livestock or game animals and used for grazing or harvested for feeding.

Forb - Any herb other than grass.

Foreground - A term used in visual management to describe the portions of a view between the observer and up to 1/4 to 1/2 mile distant. The stand of trees immediately adjacent to a high-value scenic area, recreation facility, or forest highway. See "Background," "Middleground."

Forest or Forest Land - 1) Forest is used in the text as a proper noun to substitute for Mt. Baker-Snoqualmie National Forest. 2) See "Timber Resource Land Suitability Classification."

Forest Model - An idealized (simplified) representation of the real life Forest system, developed from a set of simplifying assumptions. The "Forest Model" serves as a format to structure Forest management resource data, i.e. yields (activities and outputs) over time, acres, and management constraints. The "Forest Model" developed by the interdisciplinary team was incorporated into the computer program model FORPLAN for use in this planning effort. See "FORPLAN." See Appendix B for more detail.

Forest Service Handbook (FSH) - For Forest Service use, directives that provide detailed instructions on how to proceed with a specialized phase of a program or activity.

Forest Service Manual (FSM) - A system of manuals which provides direction for Forest Service activities.

Forest Types - A classification of forest land based upon the tree species presently forming a plurality of basal area stocking in live trees.

FORPLAN - Acronym for Forest Planning Model. A linear programming system used for developing and analyzing forest planning activities. Can be used to simulate management practices while at the same time optimizing for any given desired objective. As a manageable representation of reality, it can be used to manipulate information and look at alternative approaches to management, calculating tradeoffs and opportunity costs. See "Forest Model." See Appendix B for more detail

Fuel Management - The practice of planning and executing the treatment or control of living or dead vegetative material in accordance with fire management direction.

Fuel Treatment - The rearrangement or disposal of natural or activity fuels (generated by management activity, such as slash left from logging) to reduce fire hazard. Fuels are defined as both living and dead vegetative materials consumable by fire.

Fuels - Combustible wildland vegetative materials. While usually applied to above ground living and dead surface vegetation, this definition also includes roots and organic soils such as peat

Game Species - Any species of wildlife or fish for which seasons and bag limits have been prescribed and which are normally harvested by hunters, trappers, and fishermen under state or federal laws, codes, and regulations

Genetic Integrity - Refers to a normal, healthy genetic pool within a biological population to provide for long-term maintenance and survival of the species. Of specific concern in management direction is the prevention of loss of genetic variance and the avoidance of inbreeding. See the Draft SEIS, Spotted Owl Guidelines for more detail.

Genetic Seedlings - Tree seedlings from a genetically superior seed source. The seeds are collected from trees displaying exceptional form and raised in nurseries before outplanting. The seedlings usually have faster growth rates than naturally regenerated seedlings.

Geothermal - Of or pertaining to the internal heat of the earth.

Glaciolacustrine - Soil materials transported by glaciers and deposited by glacial meltwater in glacier lakes.

Goal - A concise statement that describes a desired condition to be achieved sometime in the future. It is normally expressed in broad, general terms with no specific completion date. Goal statements form the principal basis from which objectives are developed.

Goods:

1. **Nonmarket good** - an output that is not normally exchanged for money in a market. Usually no market has evolved because ownership of the good is not clear, exclusive use is not possible under current laws, or it is not possible to consistently define good.

2. **Public good** - an output for which it is impractical to impose a charge, either because it must be supplied to all if it is supplied to one or because the costs of collection and control exceed likely revenue.

Goods and Services - The various outputs, including on-site uses, produced from forest and rangeland resources.

Grass/forb - An early forest successional stage where grasses and forbs are the dominate vegetation.

Group Selection Cutting - Removal of tree groups ranging in size from a fraction of an acre up to about 2 acres. Area cut is smaller than the minimum feasible under even-aged management for a single stand.

Growing Season - That part of the year when temperature and moisture are favorable for vegetation growth.

Growing Stock Trees - Live trees, meeting specified standards of quality or vigor, that are included in growth and yield projections to arrive at the allowable sale quantity.

Guideline - An indication or outline of policy or conduct that is not a mandatory requirement (as opposed to a standard, which is mandatory).

Habitat - The place where a plant or animal naturally or normally lives and grows.

Habitat Capability - The estimated ability of an area, given existing or predicted habitat conditions, to support a wildlife, fish or plant population. Measured in tems of potential population numbers.

Habitat Diversity - The distribution and abundance of different plant and animal communities and species with a specific area.

Hardwood - A broad-leaved flowering tree.

Harvest Cutting Method - A combination of interrelated actions whereby forests are tended, harvested, and replaced The combination of management practices used to manipulate the vegetation results in forests of distinctive form and character. Harvest cutting methods are classified as even-aged and uneven-aged. See "Silvicultural System "

Harvest Dispersion (factor) - The dispersion of cutting units over the land base in order to meet clearcut size limitations, or other resource constraints. An example of a harvest dispersion constraint is: no more than 25 percent of an analysis area may be harvested in one decade.

Headwaters - The upper tributaries of a river.

Herbaceous - An adjective describing seed-producing plants that do not develop persistent woody tissue, but die down to ground level at the end of the growing season.

Hiding Cover - Any vegetation used by wildlife for security or to escape from danger. For example, hiding cover is capable of hiding 90 percent of an adult deer or elk from the view of a human at a distance of 200 feet or less.

Historic Site - Site associated with the history, tradition, or cultural heritage of national, state, or local interest, and of enough significance to merit preservation or restoration.

Horizontal Diversity - The distribution and abundance of plant and animal communities or successional stages across an area of land; the greater the number of communities, the higher the degree of horizontal diversity (or richness). This concept is similar but not identical to "even-aged management." Application of even-aged management, for example, can be designed to accomplish horizontal diversity objectives. See also "Vertical Diversity."

Hydrology - The scientific study of the properties, distribution, and effects of water in the atmosphere, on the earth's surface, and in soil and rocks

ID Team - See Interdisciplinary Team.

Impacts - See Effects.

IMPLAN - A computer-based system used by the Forest Service for constructing nonsurvey input/output models to measure economic input. The system includes a data base for all countries in the U.S. and a set of computer programs to retrieve data and perform the computational tasks for input/output analysis.

Indicator Species - Species identified in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish including those that are socially or economically important. See Management Indicator Species.

Instream Flows - A prescribed level (or levels) of streamflow, usually expressed as a stipulation in a permit authorizing a dam or water diversion, for the purpose of meeting National Forest System management objectives

Integrated Pest Management - A process for selecting strategies to regulate forest pests, in which all aspects of a pest-host system are studied and weighed. A basic principle in the choice of strategy is that it be ecologically compatible or acceptable. (36 CFR 219.3)

Intensive Forest Management - A high investment level of timber management that envisions initial harvest, regeneration with genetically improved stock, control of competing vegetation, fill-in planting, precommercial thinning as needed for stocking control, one or more commercial thinnings, and final harvest.

Interdisciplinary Approach - Using individuals representing two or more areas of knowledge and skills focusing on the same tasks, problem, or subject.

Interdisciplinary Team (ID Team) - A group of individuals with different training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately assess the situation.

Intermediate Cutting - Any removal of trees from a regular crop or stand between the time of its formation and the harvest cutting (final harvest). Generally includes cleaning, thinning, liberation, and improvement cuttings, increment fellings, and sometimes even salvage and sanitation cutting

Intermingled Ownerships - Lands within the National Forest boundaries or surrounded by National Forest lands owned by private interests or other government agencies. Because of early land grants, these lands frequently are in a checkerboard ownership pattern.

Intermittent Stream - A stream that runs water in most months, but does not run water during the dry season during most years.

Irretrievable - Applies to losses of production, harvest, or use of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sports site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

Irreversible - Applies primarily to the use of non-renewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity, that are renewable only over long time periods. Irreversible also includes loss of future options.

Issue - A point, matter, or question of public discussion or interest to be addressed or decided through the planning process

J-8 - A map code used on this Forest to designate unsuitable forest land not managed for timber production because there is no reasonable assurance that these lands can be adequately restocked within 5 years after harvest. This is based on existing technology and knowledge as reflected in current research and experience. See "Timber Resource Land Suitability Classification, 3.(d)."

Knutsen-Vandenberg Fund (KV) - Authorization to withhold a portion of timber sale receipt funds for reforestation of harvested areas, rehabilitation of streams and habitat affected by timber sales, etc.

Lacustrine - Refers to material deposited in lake water and later exposed either by lowering of the water level or by the elevation of the land.

Land Allocation - The assignment of a particular land area(s) to a specific "Management Area."

Landing - Any place where round timber is assembled for further transport, commonly with a change of method.

Landownership Classification Groups - All National Forest land and land in other ownerships within the Forest boundary will be classified in one of five landownership classification groups. This classification system identifies opportunities to acquire, retain, exchange, or relinquish lands to facilitate administration of the Forest (FSM 1920.42, 1982 or as revised).

Group I - Lands where Congress has either directly or indirectly instructed the Forest Service to retain ownership and acquire non-Federal lands for a designated purpose.

Group II - Retain National Forest ownership and acquire private land as the opportunity and/or need occurs.

Group III - Lands are available for land adjustment and usually will provide most of the land considered in exchange projects.

Group IV - Lands normally made available to acquire private lands in Groups I, II, or III

Group V - More intensive study and planning are necessary before landownership decisions are made.

Lands Not Appropriate for Timber Production - Includes lands that: 1) are proposed for resource uses that preclude timber production, such as Wilderness; 2) have other management objectives that limit timber production to the point where management requirements set forth in CFR 219.27 cannot be met; or 3) or are not cost efficient over the planning horzon in meeting forest objectives including timber production.

Lands Not Suited (Unsuitable) for Timber Production - Includes lands that: 1) are not forest land as defined in CFR 219 3; 2) are likely, given current technology, to suffer irreversible resource damage to soils productivity, or watershed condition; 3) cannot be adequately restocked as provided in 36 CFR 219.27; or, 4) have been withdrawn from timber production by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service. In addition, Forest lands other than those that have been identified as not suited for timber production shall be reviewed and assessed prior to formulation of alternatives to determine the costs and benefits of a range of management intensities for timber production.

Legendary - Locations that may have, or may have had, spiritual significance. They appear also to be areas which are significant to the cosmology of the Indian groups in the project area They are significant in mythology having to do with the origin and development of the area and of the people of that area.

Limits of Acceptable Change (LAC) - Maximum limit of human-caused change allowed in wilderness. Each WROS Class has a set of limits which presupposes that certain areas of wilderness (trails) will be allowed to receive higher levels of use than other areas (trailless), and thus will receive more change or resource impact. LAC's are not a management objective, but a maximum limit. See "Wilderness Recreation Opportunity Spectrum."

Local Roads - See "Road, Local "

Logging Systems - See "Yarding."

Tractor - Use of tracked or rubber-tired vehicle to skid logs to a central loading point. This method is typically used on dry, gently sloping ground; it is infrequently used on this Forest.

Highlead - A cable system operated from a tower or spar-tree, which drags logs to a central loading site. One end of a log may be lifted off the ground for short distances. Used most often in moderately steep terrain over relatively short distances.

Skyline - The log yarding cable is attached between a tower or spar-tree and an elevated point in the distance. Logs are transported partially or completely suspended above the ground with a movable carriage on the cable Used in steep or unstable terrain with minimal impacts on the land, this method can reach for long distances.

Helicopter - Use of helicopter to lift logs from a logging site to a nearby central loading point Most economical on relatively remote and difficult to reach sites. Avoids road building where roading is inappropriate because of steep terrain, unstable soils, visual consideration, etc.

Long-Term Sustained-Yield Capacity (LTSYC) - The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified management intensity consistent with multiple-use objectives.

Macropore Space - Space in soil composed of larger pore spaces. See "Pore space," "Porosity," and "Soil."

Management Area - An area or non-contiguous areas of the Forest assigned to a specific management strategy (the management strategy then becomes the management prescription for the area(s)).

Management Concern - An issue, problem, or condition which constrains the range of management practices identified by the Forest Service in the planning process

Management Direction - A statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them.

Management Emphasis - The major resource uses, outputs, and activities emphasized in a management area.

Management Indicator Species (MIS) - A species selected because its welfare is presumed to be an indicator of the welfare of other species using the same habitat. A species whose condition can be used to assess the impacts of management actions on a particular area. See "Indicator Species."

Management Intensity - A management practice or combination of management practices and associated costs designed to obtain different levels of goods and services.

Management Practice - A specific activity, measure, course of action, or treatment

Management Prescription - Management practices and intensity selected and scheduled for application on a specific area to attain multiple-use and other goals and objectives.

Management Requirement (MR) - Minimum standards for resource protection, vegetation manipulation, silvicultural practices, even-aged management, riparian areas, soil and water diversity, to be met in accomplishing National Forest System goals and objectives.

Management Strategy - A specific set of management practices appropriate for application to Forest lands or resources. The management strategy should define the management goals or objectives, resource priorities, and intensities to be considered. *See "Management Area" and "Management Prescription."*

Marginal Component - The portion of the regulated commercial Forest land on which it is presently not feasible (economically or technologically) to manage for timber crops because of soil constraints, difficulties in establishing tree regeneration or excessive development costs.

Market Resources - Products derived from renewable and nonrenewable resources that have a well-established market value for example, forage, timber, water, and minerals.

Market Value - The unit price of an output normally exchanged in a market after at least one stage of production. Market value is expressed in terms of prices as evidenced by market transactions.

Mass Movement - A general term for any of the variety of processes by which large masses of earth material are moved downslope by gravitational forces - either slowly or quickly.

Mass Wasting - All landslide events; the detachment and movement of soil or surface mantle material. Landslides may fall in a single mass or single event, moving downslope to cause debris slides and avalanches, or they may detach and move slowly downslope over a period of years.

Maximum Modification - See "Visual Quality Objectives."

May (or Can) - Verb used in the Management Prescriptions, Proposed Forest Plan. *Action is optional.*

MBF - One thousand board feet Lumber or timber measurement term.

MCF - One thousand cubic feet. Lumber or timber measurement term

Mean Annual Increment (MAI) - The total increment up to a given age divided by that age.

Mesotrophic - Habitats, particularly soil and water, of moderate nutrient capacity.

Middleground - The visible terrain beyond the foreground where individual trees are still visible, but do not stand out distinctly from the stand. See "Foreground" and "Background."

Mineral Entry - The filing of a mining claim upon public domain or related land to obtain the right to any minerals it may contain.

Mineral Soil - A soil consisting predominantly of, and having its properties determined predominantly by, mineral matter. It usually contains less than 20% organic matter but may sometimes contain an organic surface layer up to 30 centimeters thick. Mineral soil is the soil where surface erosion of individual soil particles can take place, not the loose unconsolidated organic surface layer.

Mineral Withdrawal - The exclusion of mining locations and mineral development work on areas required for administrative sites by the Forest Service and other areas highly valued by the public.

Minerals -

1. **Common** - mineral deposits which do not possess distinct, special economic value, such as common varieties of sand, stone, gravel, pumice, pumicite and cinders. They may have value for use in trade, manufacture, science, or in the mechanical or ornamental arts.

2. **Leasable** - federally owned minerals which are disposed of under the Mineral Leasing Act of 1920, as amended. These include coal, oil, gas, phosphate, sodium, potassium, oil shale, and in some states sulphur and geothermal steam.

3. **Locatable** - federally owned minerals which can be located and patented under the 1892 Mining Law, as amended. In general, the locatable minerals are those hardrock minerals which are mined and processed for the recovery of metals. They also may include certain nonmetallic minerals and uncommon varieties of mineral materials, such as valuable and distinctive deposits of limestone or silica.

4. **Valuable Deposit** - where minerals have been found and the evidence is of such a character that a person of ordinary prudence would be justified in further expenditure of his labor and means with a reasonable prospect of success in developing a valuable mine.

Minimum Streamflows - A specified level of flow through a channel that must be maintained by the users of streams for biological, physical, or other purposes.

Minimum Viable Population - The low end of the viable population range.

Mining Claim - A portion of the public lands which a miner, for mining purposes, takes and holds in accordance with mining laws.

Mining Claim, Perfection - All steps legally required to give a secured party an interest in subject property have been met. One cannot perfect a mining claim without actual discovery of minerals in place. Perfection occurs when a discovery of a "valuable" mineral deposit has been made within the boundaries of a mining claim which has been located on public lands in conformance with State and Federal statutes. Once the claim has been perfected, the claim has the effect of a grant by the US of the right of present and exclusive possession and the claimant may receive patent. Discovery normally precedes location, but (US v. Carlile 67 I.D. 417,420 (1960)) discovery may follow location and give validity to a previously located claim as of the time the discovery was made. When such occurs, the claim has been perfected.

Mining Claim, Validity - Synonymous with perfection when exclusive rights against the government are concerned. For a claimant to establish exclusive rights against the government, the claim must be located on public lands in conformance with State and Federal statutes and a discovery of a valuable mineral deposit must have been made within the boundaries of the claim.

Mitigation - Avoiding or minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the effected environment; reducing or eliminating the impact by preservation and maintenance operations during the life of the action.

MMBF - Million board feet. Lumber or timber measurement term.

MMCF - Million cubic feet. Lumber or timber measurement term.

Model - See "Forest Model."

Modification - See "Visual Quality Objectives."

Monitoring - A process to collect significant data from defined sources to identify departures or deviations from expected plan outputs.

Multiple Use - The management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions, that some lands will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

Municipal Supply Watershed - A watershed that provides water for human consumption, where Forest Service management could have a significant effect upon the quality of water at the intake point, and that provides water used by a community, or any other public water system that regularly serves at least 25 individuals at least 60 days out of the year or that provides at least 15 service connections. In addition to cities, this includes campgrounds, residential developments, and restaurants.

Must (or Shall) - A verb used in the Management Prescriptions, in the Proposed Forest Plan. Action is mandatory.

National Environmental Policy Act (NEPA) of 1969 - An act to declare a National policy which will encourage productive and enjoyable harmony between humankind and the environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, to enrich the understanding of the ecological systems and natural resources important to the Nation, and to establish a Council on Environmental Quality. (The Principal Laws Relating to Forest Service Activities, Agriculture Handbook No. 453, USDA, Forest Service, 359 pp)

National Forest Management Act (NFMA) of 1976 - A law passed as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring the preparation of Regional Guides and Forest Plans and the preparation of regulations to guide that development

National Forest System (NFS) Land - Federal lands that have been designated by Executive order or statute as National Forests, National Grasslands, or Purchase Units, and other lands under the administration of the Forest Service, including Experimental Areas and Bankhead-Jones Title III lands.

Natural Forest - The Forest that would occur on the planning area if natural processes were allowed to function without man's influence.

Natural Regeneration - Reforestation of a site by natual seeding from the surrounding trees. May or may not be preceded by site preparation.

Net Public Benefits - An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs), whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index. The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield.

Net Receipts - Net receipts are the total cash receipts received by the Forest Service less budget costs.

Nitrogen-Fixing (Nitrogen Fixation) - Conversion of free nitrogen into combined forms useful in nutrient cycles and other functions in the biosphere

Noncash Benefits - These are benefits or values that people derive from the good or service being provided, but where there is no market in which to exchange that good or service for cash, i.e the person benefitting does not pay any of the actual value received.

Nonchargeable Volume - All volume that is not included in the growth and yield projections for the selected management prescriptions used to arrive at the allowable sale quantity. (FSH 2409.13)

Non-consumptive Use - That use of a resource that does not reduce its supply, for example, non-consumptive uses of water include hydroelectric power generation, boating, swimming, and fishing.

Non-declining Flow - Where the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade, and this planned sale and harvest for any decade is not greater than the long-term sustained yield capacity.

Non-forest Land - Lands that never have had or that are incapable of having 10 percent or more of the area occupied by forest trees; or lands previously having such cover and currently developed for nonforest use.

Nongame - Species of animals not managed for sport hunting

Non-market - Products derived from National Forest resources that do not have a well-established market value for example, recreation, wilderness, wildlife.
Not Appropriate Land - See 36 CFR 219.4 and FSH 2409.13-23. See "Timber Resource Land Suitability Classification, Unsuitable."

No-Trace Camping - A concept of recreation use in wilderness which encourages the recreation user to leave "No-Trace" of a visit to aid in protection of the wilderness resource.

Not Suited Lands - See 36 CFR 219.14. See "Timber Resource Land Suitability Classification, Unsuitable."

Objective - A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals.

Off-Road Vehicle (ORV) - Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, *marsh, swampland, or other natural terrain. The term excludes any registered* motorboat, any military, fire, emergency, or law enforcement vehicle when used for emergency purposes, and any vehicle whose use is expressly authorized by the respective agency head under a permit, lease, license, or contract. (Executive Order 11644)

Old-Growth Stand - Any stand of trees 10 acres or greater generally containing the following characteristics: 1) stands contain mature and overmature trees in the overstory and are well into the mature growth stage; 2) stands will usually contain a multi-layered canopy and trees of several age classes; 3) standing dead trees and down material are present; and 4) evidence of human activity may be present, but does not significantly alter the other characteristics and would be a subordinate factor in a description of such a stand.

Opportunity Cost - The dollar-quantifiable net loss resulting from a less efficient course of action.

Optimal Cover - a forest stand with: 1) four layers (overstory canopy, sub canopy, shrub layer, and herbaceous layer); and 2) an overstory canopy which can intercept and hold substantial amount of snow yet has dispersed (<1/8 acre) openings These criteria are generally achieved when the dominant trees average 21 inches dbh or greater, have 70 percent or greater crown closure, and are in the large saw timber or old-growth condition.

Optimum Density - For wildlife, the maximum rate of animal stocking possible *without inducing damage to vegetation or related resources; may vary from year* to year because of environmental and/or population factors.

Organization Camp - A privately-operated facility providing lodging, meals, social, and educational recreation opportunities in a forest environment. An organization camp is operated on National Forest land under "Special Use Permit."

Output - The goods, end products, or services that are purchased, consumed, or used directly by people. Goods, services, products, and concerns produced by activities that are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. A broad term for describing any result, product, or service that a process or activity actually produces.

Overmature - The stage at which a tree declines in vigor and soundness, for example past the period of rapid height growth.

Overstory - That portion of the trees, in a forest of more than one story, forming the upper or uppermost crown canopy.

Ozone - An allotropic triatomic form of oxygen that is normally a faintly blue irritating gas with a characteristic pungent odor A predominant compound in a layer of the Earth's atmosphere (the ozone layer) which plays a key role in filtering the Sun's radiation

Partial Retention - See "Visual Quality Objectives."

Particulate (Concerning air quality) - Minute separate particle of matter suspended in air. Particulate as a measure of air quality condition or standard is expressed in microns per cubic meter.

Penstock - A sluice or gate for regulating a flow (as of water); or a conduit or pipe for conducting water.

Perennial Stream - A stream that flows year round.

Persons-At-One-Time (PAOT) - The number of people in an area or using a facility at the same time May be used as "maximum PAOT" to indicate the capacity of an area or facility to support peak usage within established user density standards and without degradation to biophysical resources.

Planning Criteria - Criteria prepared to guide the planning process. Criteria applied to collection and use of inventory data and information, analysis of the management situation, and the design, formulation, and evaluation of alternatives.

Planning Horizon - The overall time period considered in the planning process. Spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions which would influence the planning decision.

Planning Period - One decade. The time interval within the planning horizon that is used to show incremental changes in yields, costs, effects, and benefits.

Planning Records - The body of information documenting the decisions and activities which result from the process of developing a Forest Plan, revision, or significant amendment.

Pore Space - Total space not occupied by soil particles in a bulk volume of soil, commonly expressed as a percentage.

Porosity - The degree to which the total volume of a soil, sediment, or rock is permeated with pores or cavities, generally expressed as a percentage of the whole volume unoccupied by solid particles.

Potential Yield - Sustainable output of wood fiber available after the yield foregone for the management opportunities of other resources has been deducted from the biological potential.

Precommercial Thinning (PCT) - The practice of removing some of the trees less than merchantable size from a stand so that the remaining trees will grow faster.

Prescribed Fire - A wildfire burning under specified conditions that will accomplish certain planned objectives. The fire may result from either planned or unplanned ignitions. Use of unplanned ignitions must have prior approval by the Regional Forester.

Present Net Value (PNV) - The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area. (36 CFR 219.3)

Preservation - See "Visual Quality Objectives."

Presuppression - Activities organized in advance of fire occurrence to ensure effective suppression action.

Primary Cavity Excavators - Wildlife species that excavate cavities in wood, for food and shelter Example: woodpeckers

Primitive - See "Recreation Opportunity Spectrum (ROS) "

Program Element - Forest Service areas of responsibility, such as "Wildlife", "Recreation", "Timber" based upon the National Forest budgeting process. Used in this Forest Plan to organize the management area standards and guidelines and tie to budgeting.

Programmed Harvest - The amount of timber on the Forest that is scheduled for harvesting. The programmed harvest is based on current demand, funding, and *multiple-use considerations*

Project - An organized effort to achieve an objective identified by location, timing, activities, outputs, effects, accountability, and control of a project.

Public Issue - A subject or question of widespread public interest relating to management of National Forest System. (36 CFR 219 3)

Puddling - Soil puddling is a physical change in soil properties due to shearing forces that destroy soil structure and reduce porosity. Detrimental puddling can be observed as vehicle tracks when soil is molded and when depth of rutting has reached 6 inches or more.

Purchaser Credit - Credit earned by the purchaser of a National Forest timber sale by construction of contract-specified roads. Earned purchaser credit may be used by the purchaser as payment for National Forest timber removed.

Range - Land producing native forage for animal consumption, and lands that are revegetated naturally or artificially to provide forage that is managed like native vegetation.

Raptors - Predatory birds, such as falcon, hawks, eagles, or owls.

Real Dollar Value - A monetary value which compensates for the effects of inflation.

Reasonable Assurance - for the purposes of regeneration suitability decisions in the Forest planning process, "reasonable assurance" is provided when:

1) One or more reforestation projects are known to exist on NFS or non-NFS lands within the subject ecosystem or land stratum, which have succeeded in meeting Regional standards for adequate restocking (as defined in a subsequent portion of the direction), and either

2) The practices used in achieving the regeneration success are known and are accepted by experts in the field of reforestation as being generally applicable to the ecosystem or land stratum being examined.

3) Research results exist which are applicable to the subject ecosystem or land stratum and which provide the means to prescribe treatment(s) that will lead to successful reforestation

Where a successful regeneration project cannot be found, or applicable research does not exist to demonstrate that a prescription can be written to accomplish reforestation; reasonable assurance of regeneration has not been provided. The stratum or ecotype, therefore, will be classed as not suited for timber production due to regeneration difficulty.

Management prescriptions rely on existing technology Existing technology includes all techniques that have been proven in research or demonstrated successfully on the ground. Cost of practices will not be a criterion for excluding lands from the suitable land base at this stage in the planning process. For this round of planning, irrigation, exotic-species, and soil importation practices will not be considered as existing technology.

In determining whether or not natural regeneration may be reasonably assured, a certified silviculturist must be able to write a prescription that will provide for successful reforestation within a 5-year period following clearcutting, or a 10-year period following the seed cut when using the shelterwood method of regeneration cutting. The regeneration period is considered to start when the trees in a harvest unit are felled, and ends when the unit is adequately restocked.

Explanatory Notes: the phrase "reasonable assurance" is a subjective expression and is, therefore, not completely definable by precise objective and quantitative terms. By its very nature, the phrase recognizes the necessity of arriving at a decision through judgemental (subjective) processes rather than through precise quantitative analysis (objective) procedures based on measurable data with known statistical reliability.

Receipts - Those priced benefits for which money will actually be paid to the Forest Service recreation fees, timber harvest, mineral leases and special use fees.

Record of Decision - A document separate from but associated with an Environmental Impact Statement which states the decision, identifies all alternatives, specifying which were environmentally preferable, and states whether all practicable means to avoid environmental harm from the alternative have been adopted, and if not, why not.

Recreation Capacity - The number of people that can take advantage of the supply of a recreation opportunity during an established use period without substantially diminishing the quality of the recreation experience or the biophysical resources.

Recreation Development Scale (Level) - This is a scale of the level of recreation site modification and development coordinated with the ROS classes. The five development scales are described below. See "Recreation Opportunity Spectrum," and "Recreation Development."

Recreation Information Management (RIM) - A computer-oriented system for the organization and management of information concerning recreation use, occupancy, and management of National Forest lands.

Recreation Opportunity - The availability of choices for users to participate in the recreational activities they prefer within the settings they prefer.

Recreation Opportunity Spectrum Class	Development Scale	Level of Site Modification
Primitive	1	Minimum site modification. Rustic or rudimentary improvements designed for protection of the site rather than comfort of the users. Use of synthetic materials excluded. Minimum controls are subtle. No obvious regimentation. Spacing informal and extended to minimize contacts between users. Motorized access not provided or permitted.
Semi-primitive	2	Little site modification. Rustic or rudimentary improvements designed primarily for the protection of the site rather than the comfort of the users. Motorized access provided or permitted.
Nonmotorized		Use of synthetic materials avoided. Minimum controls are subtle. Little obvious regimentation. Spacing informal and extended to minimize contacts between users. Primary access over primitive roads. Interpretive services informal, almost subliminal.

Roaded Natural	3	Site modification moderate. Facilities about equal for protection of site and comfort of users. Contemporary/rustic design of improvements is usually based on use of native materials. Inconspicuous vehicular traffic controls usually provided. Roads may be hard surfaced and trails formalized. Development density about 3 family units per acre Primary access may be over high standard roads. Interpretive services informal, but generally direct.
Rural	4	Site heavily modified. Some facilities designed strictly for comfort and convenience of users. Luxury facilities not provided. Facility design may incorporate synthetic materials. Extensive use of artificial surfacing of roads and trails. Vehicular traffic control usually obvious. Primary access usually over paved roads. Development density 3-5 family units per acre. Plant materials usually native. Interpretive services often formal or structured.
Urban	5	High degree of site modification. Facilities mostly designed for comfort and convenience of users and usually include flush toilets; may include showers, bathhouses, laundry facilities, and electrical hookups. Synthetic materials commonly used. Formal walks or surfaced trails. Regimentation of users is obvious. Access usually by high-speed highways Development density 5 or more family units per acre. Plant materials may be foreign to the environment. Formal interpretive services usually available. Designs formalized and architecture may be contemporary. Mowed lawns and clipped shrubs not unusual.

Recreation Opportunity Spectrum (ROS) - A conceptual framework for defining types of recreation opportunities, physical settings, and experiences a visitor can expect. It is an inventory system and a management tool There are six ROS classes. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs, based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use. The six classes are:

1. Primitive--Area is characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.

2. Semi-primitive Nonmotorized--Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum onsite controls and restrictions may be present, but would be subtle. Motorized recreation use is not permitted.

3. Semi-primitive Motorized--Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum onsite controls and restrictions may be present, but would be subtle. Motorized recreation use of local primitive or collector roads with predominantly natural surface and trails suitable for motor bikes is permitted.

4. Roaded Natural--Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.

5. Rural--Area is characterized by a natural environment that has been substantially modified by development of structures, vegetative manipulation, or pastoral agricultural development. Resource modification and utilization practices may be used to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high A considerable number of facilities are designed for use by a large number of people Facilities are often provided for special activities. Moderate user densities are present away from developed sites. Facilities for intensified motorized use and parking are available.

6 Urban--Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are often used to enhance specific recreation activities. Vegetative cover is often exotic and manicured Sights and sounds of humans are predominant on site Large numbers of users can be expected both on site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site

Recreation Residence - A privately owned structure, authorized on National Forest land under a "Special Use Permit."

Recreation Visitor Day (RVD) - A measure of recreation use Twelve visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons.

Reforestation - The natural or artificial restocking of an area with forest trees; most commonly used in reference to artificial restocking.

Regeneration - The actual seedling and saplings existing in a stand; or the act of establishing young trees naturally or artificially.

Regeneration Cutting (Harvest) - Any removal of trees intended to assist regeneration already present or to make regeneration possible

Region - An area covered by a Regional Guide See FSM 1221.3 for organizational definitions

Regional Forester - The Forest Service official responsible for administering a single Region.

Regional Guide - The guide developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended. It guides all natural resource management activities, and establishes management standards and guidelines for the National Forest System lands within a given Region. It also disaggregates the assigned Regional RPA objectives to the Forests within that Region.

Regulations - Generally refers to the Code of Federal Regulations, Title 36, Chapter II, which covers management of the Forest Service.

Rehabilitation - Action taken to restore, protect, or enhance site productivity, water quality, or other resource values over a period of time.

Release - Freeing trees from competition for light, water, and nutrients by removing or reducing the vegetation growth that is overtopping or closely surrounding them.

Released Roadless - See "1) Unroaded," and "Roadless Areas."

Renewable Resources - Resources that are possible to use indefinitely, when the use rate does not exceed the ability to renew the supply.

Research Natural Area (RNA) - In USDA Forest Service usage, RNAs are areas designated to ensure representative samples of as many of the major naturally-occurring plant communities as possible. An area established specifically to preserve a representative sample of an ecological community, primarily for scientific and educational purposes.

Residual Stand - The trees remaining standing after some event such as selection cutting.

Residue Utilization - Removal and use of forest residue (such as slash, litter, brush, dead trees, and snags) for energy production, home heating, or wood products.

Resource - Anything which is beneficial or useful - be it animal, vegetable, mineral, a location, a labor force, a view, an experience, etc. Resources, in the context of land use planning, thus vary from such commodities as timber and minerals to such amenities as scenery, scenic view points, or recreation opportunities

Resource Use and Development Opportunities - A possible action, measure, or treatment and corresponding goods and services identified and introduced during the scoping process, which subsequently may be incorporated into and addressed by the Forest Land and Resource Management Plan in terms of a management prescription.

Retention - See "Visual Quality Objectives."

Riparian - Pertaining to areas of land directly influenced by water. Riparian areas usually have visible vegetative or physical characteristics reflecting this water influence. Stream sides, lake borders, or marshes are typical riparian areas.

Riparian Area - A geographically delineated area with distinctive resource values and characteristics that is comprised of aquatic and riparian ecosystems. This includes floodplains, wetlands, and all areas within a horizontal distance of approximately 100 feet from the normal line of high water of a perennial stream channel or from the shoreline of other bodies of water.

Riparian Ecosystem - A transition between the aquatic ecosystem, and the adjacent upland terrestrial ecosystem. Identified by soil characteristics and distinctive vegetation communities that require free or unbound water.

Road:

1. **Arterial** - A road that serves a large land area and usually connects with a public highway or other arterial road to form an integrated network of primary travel routes. The location and standard are often determined by a demand for maximum mobility and travel efficiency rather than specific resource-management service. They are usually developed and operated for long-term land and resource management purposes and constant service

2. **Collector** - A road that serves a smaller land area than an arterial road and is usually connected to an arterial road or public highway They collect traffic from local roads or terminal facilities. The location and standard are influenced by both long-term multi-resource service needs, as well as travel efficiency. Collector roads may be operated for either constant or intermittent service, depending on land use and resource management objectives for the area served by the facility (FSM 7700).

3. **Local** - A road that connects terminal facilities with a collector road, arterial road, or public highway. The location and standard are usually determined by that required to serve a specific resource activity, rather than travel efficiency. Local roads may be developed and operated for either long- or short-term service.

Roaded Natural (RN) - See "Recreation Opportunity Spectrum."

Roaded Modified (RM) - A classification of the Recreation Opportunity Spectrum that characterizes a predominately altered environment, allowing for noticeable to strongly-evident management activity

Roadless Area Review and Evaluation (RARE II) - A comprehensive process directed by the Secretary of Agriculture to identify roadless and undeveloped land areas in the National Forest system and to determine their uses for either wilderness or other resource management and development and to determine areas that would require further planning to make such a decision.

Roadless Areas - These lands, inventoried in the Roadless Areas Review and Evaluation (RARE II), were not designated wilderness by the Washington State Wilderness Act of 1984. See "Released Roadless," and Unroaded "

Rotation - The number of years required to establish, including the regeneration period, and grow timber crops to a specified condition or maturity for regeneration harvest. Rotation age is based on the selected management prescriptions in a Forest Plan Alternative.

RPA - The Forest and Rangeland Renewable Resources Planning Act of 1974. Also refers to the National Assessment and Recommended Program developed to fulfill the requirements of the act. The most recent recommended program was completed in 1985.

S-8 - A map code used to designate unsuitable forest land that is not managed for timber production because technology is not available to prevent irreversible damage to soils productivity, or watershed conditions. See "Timber Resource Land Suitability Classification, (3)C."

Sale Schedule - The quantity of timber planned for sale and harvest, by time period, from the area of suitable land covered by the Forest Plan. The first period, usually a decade, of the selected harvest schedule provides the allowable sale quantity. Future periods are shown to establish that sustained yield will be achieved and maintained.

Salvage Cutting (Harvest) - The exploitation of trees that are dead, dying, or deteriorating before their timber becomes worthless. Cutting done essentially to prevent the spread of pests or pathogens is termed "Sanitation Cutting."

Sanitation Cutting - See "Salvage Cutting."

Saprophyte - A plant living on dead or decaying organic matter.

Saturation Density - (Same as tolerance density) Intraspecific tolerance permits no future increase. Is most marked in territorial species. Space is the limiting factor to the further increase of this population density.

Sawtimber - Trees containing at least one 12-foot sawlog or two noncontiguous 8-foot logs, and meeting regional specifications for freedom from defect. Softwood trees must be at least 9 inches in diameter and hardwood trees 11 inches in diameter at breast height.

Scarified - Land in which the topsoil has been broken up or loosened in preparation for regenerating by direct seeding or natural seedfall. Also refers to ripping or loosening road surfaces to a specified depth for obliteration or "putting a road to bed".

Scenic Areas - Places of outstanding or matchless beauty which require special management to preserve these qualities. They may be established under 36 CFR 294 1 whenever lands possessing outstanding or unique natural beauty warrant this classification.

Scenic River Areas - See Wild and Scenic River.

Scheduled Timber Harvests - Volumes and acres programmed for harvest which are within the allowable sale quantity. This does not include salvage and sanitation harvesting.

Scion - A detached shoot or twig containing buds from a woody plant and used in grafting.

Scoping Process - A part of the National Environmental Policy Act (NEPA) process; early and open activities used to determine the scope and significance of the issues, and the range of actions, alternatives, and impacts to be considered in an Environmental Impact Statement.

Second Growth - Forest growth that has come up naturally after some drastic interference (for example, wholesale cutting, serious fire, or insect attack) with the previous forest growth.

Sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface.

Sedimentary - Rock formed of sediment, such as conglomerate, sandstone, or shales, formed of fragments of other rock transported from their sources and deposited in water. Also, rocks formed by precipitation from solution, as, rock salt and gypsum, or from secretions of organisms, as most limestone.

Seedlings and Saplings - Live trees less than five inches in diameter at breast height. (See also Size Class.)

Selection Cutting - The annual or periodic removal of trees (particularly mature), individually or in small groups ("Group Selection"), from an uneven-aged forest to achieve the balance among diameter classes needed for sustaining yield and to establish a new crop of irregular distribution representative of age and/or size classes.

Semi-primitive Motorized ROS Class - See "Recreation Opportunity Spectrum."

Semi-primitive Nonmotorized ROS Class - See "Recreation Opportunity Spectrum."

Sensitive Species - Plant or animal species which are susceptible or vulnerable to activity impacts or habitat alterations. Those species that have appeared in the Federal Register as proposed for classification and are under consideration for official listing as endangered or threatened species, that are on an official State list, or that are recognized by the Regional Forester as needing special management to prevent their being placed on Federal or State lists.

Sensitivity Analysis - A determination of the effects of varying the level of one or more factors, while holding the other factors constant

Sensitivity Levels - These levels represent an evaluation of public use and concern for the scenic quality of the National Forests. In Region 6 sensitivity levels will be reviewed every 5 years, and revised as necessary. There are three sensitivity levels, each identifying a different level of user concern for the visual environment:

1. Level 1 - Highest Sensitivity Level - An example would be seen areas from Interstate and U.S. Highways.

2. Level 2 - Average Sensitivity - (Also termed "Moderate Sensitivity") Examples are seen areas from county and Forest system roads not meeting the criteria for Level 1 sensitivity.

3. Level 3 - Lowest Sensitivity - An example would be seen areas from a local road in a Management Area where timber production is emphasized.

Seral - A biotic community that is a developmental, transitory stage in an ecological succession.

Series - A level of vegetation classification that is identified by the most common species found in the tree, shrub, and/or herbaceous layer of a plant community Series is a subdivision of a subformation.

Shall - See "must "

Shelterwood - The cutting method that describes the silvicultural system in which, in order to provide a source of seed and/or protection for regeneration, the old crop (the shelterwood) is removed in two or more successive shelterwood cuttings. The first cutting is ordinarily the seed cutting, though it may be preceded by a preparatory cutting, and the last is the final cutting. Any intervening cutting is termed removal cutting. An even-aged stand results

Should (or ought) - Verb used in the Management Prescriptions, Proposed Forest Plan. Action is required unless justifiable reason exists for not taking action.

Silviculture - The theory and practice of controlling the establishment, composition, constitution (the distribution and representation of age and/or size classes), and growth of forests

Silvicultural System - A process that applies silvicultural practices, including the tending (thinning, pruning, etc.), harvesting, and replacing, to a stand in order to produce a crop of timber and other forest products. The system is named by the cutting method with which the regeneration is established, e g. clearcutting, shelterwood, selection and group selection See "Harvest Cutting Methods."

Site Index - A numerical evaluation of the quality of land for plant productivity, .. based on the height of dominant trees in a stand at an arbitrarily chosen age.

Site Preparation - 1) An activity (such as prescribed burning, disking, and tilling) performed on a reforestation area, before introduction of reforestation, to ensure adequate survival and growth of the future crop; 2) manipulation follows harvest, wildfire, or construction in order to encourage the growth of favored species. Site preparation may include the application of herbicides; burning, or cutting of living vegetation that competes with the favored species; tilling the soil; or burning of organic debris (usually logging slash) that makes planting or seeding difficult.

Site Productivity - Production capability of specific areas of land.

Size Class - For purposes of Forest planning, size class refers to the intervals of tree stem diameter used for classification of timber in the Forest Plan data base.

seedling/sapling = less than five-inch diameter
pole/sapling = five-inch to nine-inch diameter
sawtimber = greater than nine-inch diameter

Skidding - A general term for hauling loads by sliding, not on wheels as developed originally, from stump to roadside, deck, skidway, or other landing.

Skyline Deflection - *The distance a skyline cable drops below line of sight* during the yarding operation.

Skyline Logging - See "Logging Systems "

Skyline Tailhold - Anchors consisting of stumps, trees, deadmen, or rock bolts to hold the end of the skyline yarding cable that is opposite the yarding machine.

Slash - The residue left on the ground after timber cutting or other vegetation disturbing activity and/or accumulating there as a result of storm, fire, or other damage. It includes unused logs, uprooted stumps, broken or uprooted tree stems, branches, twigs, leaves, bark, and chips

Slope Class - See "Topographic Class."

Small Game - Birds and small mammals typically hunted or trapped.

Snag - A standing dead tree

SOHA (Spotted Owl Habitat Area) - A habitat area designated to support one pair of owls. See the Final SEIS for the Pacific Northwest Regional Guide.

Special Component - The portion of the regulated commercial forest land that needs specially designed treatment of the timber resource to achieve landscape or other key resource objectives

Special Use Permit - The most common permit authorizing use of Forest lands by individuals and public agencies. Examples of use authorized are: recreation residence, pasture, power or telephone line, water transmission pipeline, powerplant, and electronic site.

Soil Stability Classes - A grouping of soil types on the Forest with respect to their tendency to erode or move from natural conditions or land use activities. The three soil stability classes used in the Forest are 1) Stable soils; 2) Moderately unstable; and 3) Highly unstable soils. See "Topographic Classes."

Spirit Sites - Locations where an individual may seek a personal spirit power. The areas are isolated, include fresh running streams or lakes, or are near some stands of cedar. They may also be areas that are considered inbued with a power of their own.

Stand (Tree Stand) - An aggregation of trees occupying a specific area and sufficiently uniform in species, composition, age arrangement, and condition as to be distinguishable from the forest in adjoining areas.

Standard - A statement which describes a condition when a job is done properly. Standards show how well something should be done, rather than what should be done.

Standards and Guidelines - Principles specifying conditions or levels of environmental quality to be achieved.

Standard Component - The portion of the regulated commercial forest land on which crops of industrial wood can be grown and harvested with adequate protection of the forest resources under the usual provisions of the timber sale contract.

Stream Class - See Class I,II,II, and IV Streams.

Streamflow - The flow of water, generally with its suspended load, down a well-defined water course.

Streamside Management Unit (SMU) - The stream and an adjacent area where practices that might affect water quality, fish, and other aquatic resources are modified, as necessary, to meet water quality goals for each class of stream. The width of the area will vary with the management goals for each class of stream, characteristics of the stream and surrounding terrain, and type and extent of the planned activity In the Mt. Baker-Snoqualmie National Forest, the area adjacent to wetlands and other bodies of water is termed a Wetland Management Unit (WMU). See "Class I, II, III, and IV streams."

Stream Structure - The arrangement of logs, boulders, and meanders which modify the flow of water, thereby causing the formation of pools and gravel bars in streams. Generally, there is a direct relationship between complexity of structure and fish habitat. Complex structure is also an indication of watershed stability.

Stocking - The degree of occupancy of land by trees as measured by basal area or number of trees and as compared to a stocking standard; that is, the basal area or number of trees required to fully use the growth potential of the land.

Stumpage (stumpage value) - The value of timber as it stands uncut, in terms of an amount per unit of volume.

Substantive Comment - A comment that provides factual information, professional opinion, or informed judgement germane to the action being proposed.

Successional Stage - A stage or recognizable condition of a plant community that occurs during its development from bare ground to climax.

Suitable - See "Timber Resource Land Suitability Classification."

Suitable Forest Land - Land to be managed for timber production on a regulated basis. See Timber Resource Land Suitability Classification.

Suitability - The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone A unit of land may be suitable for a variety of individual or combined management practices.

Suppression - The process of extinguishing or confining a fire

Surface Erosion - The detachment and transport of individual soil particles by wind, water, or gravity. Surface erosion can occur as the loss of soil in a fairly uniform layer across the land surface or in many small rills.

Sustained Yield of the Products and Services - The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest System without impairment to the productivity of the land.

Talus Slope - A collection of fallen disintegrated material which has formed a slope at the foot of a steeper descending slope.

Tentatively Suitable - See "Timber Resource Land Suitability Classification."

Thermal Cover - Cover used by animals to lessen the effects of weather; for elk, a stand of coniferous trees 40 feet or more tall with an average crown closure of 70 percent or more

Thinning - See "Intermediate Cutting" and "Precommercial Thinning "

Threatened Species - Those plant or animal species likely to become endangered species throughout all or a significant portion of their range within the foreseeable future.

Till - Nonsorted, nonstratified sediment carried or deposited by a glacier

Timber Resource Land Suitability Classification - National Forest System lands are classified according to the following definitions:

1. **Non-forest** - Land that has never supported forests and land formerly forested where use for timber production is precluded by development or other uses.

2. **Forest** - Land at least 10-percent stocked (based on crown cover) by forest trees of any size, or formerly having had such tree cover and not currently developed for non-forest use.

3. **Unsuitable Forest Land (Not Suited)** - Forest land that is not managed for timber production because (a) the land has been withdrawn by Congress, the Secretary, or the Chief; (b) the land is not producing or capable of producing crops of industrial wood; (c) technology is not available to prevent irreversible damage to soils, productivity, or watershed conditions, (d) there is no reasonable assurance that lands can be adequately restocked within 5 years after final harvest, based on existing technology and knowledge, as reflected in current research and experience, (e) there is at present, a lack of adequate information to responses to timber management activities; or (f) timber management is inconsistent with or not cost efficient (not appropriate) in meeting the management requirements and multiple-use objectives specified in a Forest Plan land management alternative.

4. **Tentatively Suitable Forest Land** - Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary, or the Chief; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils, productivity, or watershed conditions, (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

5. **Suitable** - Tentatively suitable forest land identified as appropriate for timber production in a Forest Plan land management alternative

6. **Commercial Forest (CFL)** - Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary of Agriculture, or the Chief of the Forest Service; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; and (c) where existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvesting.

Timber Production - The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use other than for fuelwood

Timber Sale Program Quantity (TSPQ) - The volume of timber planned for sale during the first decade of the planning horizon. It includes the allowable sale quantity (chargeable volume) and any additional material (nonchargeable volume) planned for sale. The timber sale program quantity is usually expressed as an annual average for the first decade.

Timber Stand Improvement (TSI) - Measures such as precommercial thinning, pruning, release cutting, prescribed fire, girdling, weeding, or poisoning of unwanted trees aimed at improving growing conditions for the remaining trees.

Topographic Class (Slope Class) - Divisions of the Forest important primarily for determining soil sediment outputs, tendency for soil erosion and slope failure, and difficulty in road construction and timber harvesting activities. The three classes defined in the Forest to reflect these concerns are:

A - Gentle topography, less than 35% slope.
B - Somewhat uneven topography with rock outcrops in less than 35% of the area. Steep slopes (35% to 80%).
C - Rugged highly dissected topography with rock outcrops in 35% - 100% of the area. Steep slopes (50% to 90%). Stream density greater than 5 miles per section.

See "Soil Stability Class." The latter (three classes) were used in combination with each topographic class to develop coefficients such as soil sediment output caused by management activities.

Tree Line - A loose term for the limit beyond which trees cannot or do not appear. The limiting factor is most commonly altitude or geographical latitude. A distinction may be drawn between tree line and timber line, the latter being roughly the limit of timber rather than isolated trees.

Turbidity - The cloudy condition caused by suspended solids in a liquid. See "Sediment."

Understory - The trees and other woody species growing under a more-or-less continuous cover of branches and foliage formed collectively by the upper portion of adjacent trees and other woody growth.

Undeveloped Area - Portion of the National Forest that is essentially unroaded.

Uneven-Aged Management - The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection. (36 CFR 219.3)

Unroaded - 1) RARE II roadless areas released by the Washington State Wilderness Act of 1984 from being considered for designation as wilderness during development of the initial Forest Plan; 2) In the Forest's FORPLAN Model, an analysis area identifier which includes roadless areas defined in "1" above in addition to other unroaded areas in the Forest containing tentatively suitable forest land; 3) A term used to equal the sum of recreation use or carrying capacity from the primitive, semi-primitive nonmotorized, and semi-primitive motorized recreation opportunity spectrum areas outside wilderness.

Unsuitable Lands - See CFR 36 219.14. See "Timber Resource Land Suitability Classification, Unsuitable."

Utility and Transportation Corridors - A strip of land designated for the transportation of energy, commodities, and communications. Examples are power transmission lines, pipelines, penstocks, water lines, etc. Transportation of minor amounts of power for short distances are not treated in the Forest Plan.

Utilization Standards - Standards guiding the use and removal of timber, which is measured in terms of diameter at breast height, top diameter inside the bark, and percent "soundness" of the wood.

Variety Class - A measure of visual diversity or inherent capability of the land to produce attractive scenery. There are three variety classes. See "Character Type."

Class A - Distinctive - Refers to areas where features of the landscape are of unusual or outstanding visual quality. They are usually not common in the character type.

Class B - Common - Refers to areas where features contain variety in form, line, color, texture, or combinations thereof, but which tend to be common throughout the character type. These landscapes are the benchmark from which distinctive and minimal can be judged.

Class C - Minimal - Refers to areas where features have little change in form, line, color, or texture. Includes all areas not found under Classes A and B.

Vegetation Leave Area - Area of land in which vegetation is left undisturbed in order to provide shade and organic debris to streams, or to prevent the acceleration of natural erosion processes. No regulated timber harvest is planned in these areas.

Vegetative Management - Activities designed primarily to promote the health of the crop forest cover for multiple-use purposes.

Vertical Diversity - The diversity in a stand that results from the complexity of the aboveground structures of the vegetation; the more tiers of vegetation and/or the more diverse the species makeup, the higher the degree of vertical diversity. This concept is similar but not identical to "uneven-aged management;" each may influence the other. Application of even-aged management, for example, can be designed to accomplish vertical diversity *objectives*. *See also "Horizontal Diversity."*

Viable Population - *The number of individuals of a species required to ensure* the long-term existence of the species in natural, self-sustaining populations adequately distributed throughout their region.

Viewshed - (Sometimes termed "Viewshed Corridor" or "Visual Corridor") Viewsheds are the "seen" landscape visible to most Forest visitors from roads, trails, rivers, and recreation areas. Most are corridors, one-quarter to two miles wide. Viewsheds viewed from primary travel routes and use areas are "Sensitivity Level 1." Viewsheds viewed from secondary travel routes and use areas are "Sensitivity Level 2."

Visual Absorption Capacity (VAC) - An estimate of the relative ability of a landscape to accept management manipulations without significantly affecting its visual character, or the relative capacity of the land to absorb visual change. Rated as low, moderate, and high.

Visual Condition - The visual appearance of a landscape described in terms of the degree of alteration of the natural appearing landscape. Descriptive degrees of alteration are:

1. Natural Appearing - Area appears untouched by man; changes are not visually evident.

2. Slightly Altered - Changes may be noticed by the average visitor but do not attract attention. Natural appearance dominates minor disturbances.

3. Moderately Altered - Changes are easily noticed by the average visitor and may attract attention. Disturbances are apparent.

4. Heavily Altered - Changes are strong and obvious to the average visitor. Changes dominate the landscape but may resemble natural patterns when viewed from a distance of 3 to 5 miles. Disturbances are major.

Visual Corridor - See "Viewshed."

Visual Quality Levels (VQL) - An inventoried measure of acceptable levels of modification of the visual resource. VQL's are used in Forest planning as an indicator of social (visual) acceptability and as an input for management decisions. VQL's become Visual Quality Objectives in the approved Forest Land Management Plan.

1. Preservation--Allows ecological changes only.

2. Retention--Human activities are not evident to the casual Forest visitor.

3. Partial Retention--Human activity may be evident, but must remain subordinate to the characteristic landscape.

4. Modification--Human activity may dominate the characteristic landscape, but must, at the same time, follow naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.

5 Maximum Modification--Human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

6. Enhancement--A short-term management alternative which is done with the express purpose of increasing positive visual variety where little variety now exists.

Visual Quality Objectives (VQO) - See "Visual Quality Levels."

Visual Resource - The composite of basic terrain, geologic features, water features, vegetative patterns, and land-use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

Wetlands - Areas that are inundated by surface water or groundwater with a frequency sufficient to support, and under normal circumstances does or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction (Executive Order 11990).

Wetland Management Unit (WMU) - See "Streamside Management Unit."

Wilderness - Areas designated by congressional action under the 1964 Wilderness Act. Wilderness is defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature, with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or for a primitive and confined type of recreation; include at least 5,000 acres or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition, and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest.

Wild and Scenic Rivers - Those rivers or sections of rivers designated as such by congressional action under the 1968 Wild and Scenic Rivers Act, as supplemented and amended, or those sections of rivers designated as wild, scenic, or recreational by an act of the Legislature of the State or States through which they flow. Wild and Scenic Rivers may be classified and administered under one or more of the following categories:

1. Wild River Areas--Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

2. Scenic River Areas--Those rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

3. Recreational River Areas--Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Wilderness Recreation Opportunity Spectrum - See "Recreation Opportunity Spectrum." Wilderness ROS and their standards apply to all designated wilderness on the Forest. For specific direction regarding Alpine Lakes, consult the Alpine Lakes Area Land Management Plan.

Within each WROS Class there are Limits of Acceptable Change (LAC). LAC is a maximum limit of change allowed. Managers try to achieve the best conditions possible rather than allowing conditions to deteriorate until the threshold is reached. See "Limits of Acceptable Change."

1. Transition - This trailed class includes system trails that have a travelway worn to mineral soil over long distances, and is characterized by having a large proportion of day-users, often mixed in with overnight and long distance travelers. This area is usually adjacent to trailheads and extends into the wilderness a distance that is typically traveled in one day by a hiker. This class includes areas accessed by trail, around lakes, or other attractions used by people or pack stock, within the day-use influence area. The class extends at least 500 feet on either side of a trail; it may be wider around lakes or heavily used areas. The length of this trail class will be established for each trail depending on ease of travel, distance from trailhead outside wilderness, and destination attractions inside wilderness. Length will generally be 3 to 5 miles inside the wilderness boundary. If the day-use activity occurs entirely outside wilderness, the trail will have no Transition Class.

2. Trailed - This class includes all managed system trails. It extends beyond the Transition Class. This class extends at least 500 feet on either side of the trail but may be wider around lakes or heavily used areas.

3. General Trailless - This class includes areas not falling into the other classes. It attracts very low use because of a relative lack of trails or destination spots. The area is unmodified; user-made trails are not encouraged, but they may exist. If obvious user-made trails become well established, or are causing resource damage, consideration will be given to their reconstruction in order to protect the wilderness resource from further damage. Reclassification from general trailess to railed requires a supplement of the Forest Plan, which shall include full public involvement. This class is available for new trail construction or relocation of existing trails to protect resources or meet objectives by dispersing use. If this should occur, the trail will only be constructed to no higher than "more difficult or "most difficult" standards.

4. Dedicated Trailless - This class is managed forever trailless; user-made trails are not permitted. It may include popular attractions accessed only by cross-country travel. Human impact and influence is, by design, minimal; therefore user restrictions may be necessary to insure that trailless experiences remain. Dedicated Trailless areas should be of a size that will allow for a meaningful experience and can be reasonably protected for the experiences and remoteness identified. Generally the class is at least 1,000 acres in size and contain whole drainages or basins out of sight and sound of trails or areas outside the wilderness.

5. Special Areas - The intent of this class is to provide for significant changes in standards or other management guidelines for unique areas. Areas that qualify for Special Area designation include congressionally acknowledged areas, areas of significant cultural or historic value, areas with special considerations, and areas with limited management options to deal with unique situations. Areas do not qualify for this class for administrative convenience in dealing with overuse. The class is rare and will not exist in many wildernesses.

Wildfire - Any wildland fire that is not a prescribed fire.

Wildland - Uncultivated land, other than fallow, virtually uninfluenced by human activity. It may be neglected altogether or maintained for such purposes as wood or forage production, wildlife habitat, recreation, or protective plant cover.

Wildlife Fish User Day (WFUD) - One WFUD consists of 12 hours of recreation that is the result of fish or wildlife, such as hunting, fishing, birdwatching, etc.

Will - Verb used in the Management Prescriptions, Proposed Forest Plan. Is not restrictive; applies only to a statement of future condition or an expression of time. Not used in the place of "shall."

Windfall - A tree thrown or the stem or other parts (such as branches, foliage, or fruit) broken off or blown down by the wind.

Wood Residue - The residual wood remaining as a result of timber cutting, other vegetation disturbing activity, storms, fire, or other natural event. It includes any unutilized woody material. See "Slash" and "Residue Utilization."

Yarding - The moving of logs from the stump where cut to a central concentration area or landing. See "Logging Systems."

Yield Tables - Tables that estimate the level of outputs that would result from implementing a particular activity. Usually referred to in conjunction with FORPLAN input or output. Yield tables can be developed for timber volumes, range production, soil and water outputs, and other resources.

APPENDIX A

Timber Program Activity Schedule

This appendix displays how the allowable sale quantity of chargeable sawtimber projected by the Forest Plan ,that is likely to be provided during the period 1990 through 1999. The first portion of table 1-A shows proposed sales in Fiscal Years 1990 through 1992. These sales are relatively firm, based on current conditions and information available. The second part of Table A-1 list a pool of possible projects (Timber Sales) that could be implemented over the remainder of the period, FY 1993 - 1999. These sales can be considered probable sales in the initial stages of sale preparation. Conditions and new information at any time may eliminate, delay, or revise a scheduled sale. The timber sale schedule may be modified during the implementation of this Plan. The degree of modification will determine whether the Plan needs amendment in accordance with the required process. Additional program information is provided for the entire ten year period in Table 4-1 of the Forest Plan.

The timber sale schedule displayed in Table A-1 will be modified if conditions change from those that existed when the Forest Plan was developed, and as new information becomes available during implementation of the Forest Plan. This sale schedule was developed from the Ten-Year Allowable Sale Quantity Goals by Working Group and Management Area, Table 4-1.

The (small sale) and miscellaneous sales category displayed in Table A-1 reflects sales that, individually, do not exceed 2.0 million board feet. These sales are located in areas that are already roaded, and are used to achieve a variety of special purposes. Typical uses of small sales includes salvage of windthrown trees, removal of hazard trees from along trails, and treatment of small areas that would be impractical to include in a regular scheduled large sale. A variety of silvicultural methods may be used to achieve the objectives of individual small sales.

A schedule of sales for non-chargeable forest products (chips, post, poles, firewood, etc-TSPQ) is not shown. These products will be made available to the public, as provided for in the Forest-wide standards and underlined.

The following abbreviations are used in the third column of the table, Harvest Method:

HCC Clearcut, even-aged regeneration method: group, patch, strip, or stand.

HFR Final Removal Cut, even-aged regeneration method: from a prescribed seed tree or shelterwood cutting unit.

HPR Partial Removal Cut. A partial overstory removal, usually occurring in even-aged stands exhibiting a layered condition.

HSH Shelterwood Seed Cut, even-aged regeneration method.

HSV Salvage (intermediate) Cut. Not to be used when blown down or other disaster results in reducing stocking on an area below minimum level.

HTH Commercial Thinning. This is an intermediate harvest chargeable to the Allowable Sale Quantity.

HSL Selection Cut. Harvest prescription requires cutting individual trees.

Table A-1
Timber Sale Activity Schedule

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
F I R S T T H R E E Y E A R S - F Y 1 9 9 0 - 1 9 9 2 P R O P O S E D S A L E S								
FY 1990 - MT. BAKER								
Lucky Son	T34N, R12E, 1, 2, 11, T34N, R13E, 5, 6	HCC	132	8.5	3 4	1.0	6	Eight D fir/cedar clearcut units located in the Cascade River drainage near Mineral Park Seven units in RARE II H6031.
Old Grade	T39N, R7E, Sect 9, 10, 16, 21, 22, 27	HCC	194	9.1	6 1		2B	Eleven white wood/cedar clearcut units located south of Thompson Creek east of the town of Glacier. Skyline Ten units in RARE II 6041
Louise	T34N, R10E, Sect.26, 35	HCC	58	2.6	0 4	0 5	17,2B,19	Three white wood/cedar clearcut units located on Suiattle Mtn. Grabinski and live skyline. All units in RARE II I6031
Razor Fly Salvage	T39N, R9E	HSV	30	0 05			2B	Seven units located along the Mt Baker Hwy and Razorhone Rd Five units in RARE II 6041
Hilt-White Creek Cedar Salvage	T34N, R10E	HSV		0 25			17	One unit cedar salvage from previous logging area On roads #16 and #1610 Harvest scattered over 400 acres.
Illabot Fly Cedar	T34N, R10E, T34N, R11E	HSV		1 2			17	Six unit salvage of windthrow on Road #16. All units in RARE II 6031. Harvest scattered over 2,000 acres
Bacon Road Salvage	T36N, R11E	HSV	4	0.035			14	Two unit salvage of windthrow on upper Road #1060.
Cascade Road Salvage	T34N, R12E, R13E T35N, R12E, R13E	HCC	31	0 05			1D	Salvage of windthrow on the Cascade and Kindy Road

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
Finney Fly #3	T34N, R8E	HSV		0.175			17	One unit salvage of windthrow at the end of Road #1715. Harvest scattered over 225 acres.
Slate Mountain	T39N, R8E, Sect 1 T39N, R9E, Sect.6-8	HPR	156	5 1			2B	Five white wood partial cut and clearcut units located northwest of Slate Mtn. Helicopter yarding required. All five units in RARE II 6041.
Boyd Creek	T35N, R7E, Sect 27, 28 33-35, T34N, R7E, Sect.2-4	HCC	72	3 8			2B	Four white wood/D fir clear-cut units located on the forest boundary between Boyd and O'Toole Creeks. Helicopter yarding required. All four units are in Rare II 6048.
Loretta	T39N, R7E, Sect.5, 6, T40N, R7E, Sect.31, 32	HTH HPR	86	2.0	1.0		2A, 2B	Two D.fir/cedar partial cut units located north of the town of Glacier.
Slippery Rock	T37N, R8E, Sect.26, 27, 34, 35	HPR	189	6.6	1 3		2B	D.fir/cedar/white wood clearcut units located west of Baker Lake Hwy and Rocky Creek.
Hannegan	T39N, R9E, T40N, R8E, T34N, R7E	HPR HCC HPR	300	7.1	0.5	1.7	2A, 2B	White wood/D fir clearcut units located on the North Fork of the Nooksack River drainage. Six units require skyline. Five units require helicopter and one unit requires tractor yarding. Six units in RARE II 6041.
SUBTOTAL - MT. BAKER	90		1,252	46.56	12.7	3.2		
FY 1990 - DARRINGTON								
Hurry On Salvage SSTS	T31N, R11E, Sect 13	HSV	11	0 86			17	SOLD
Flat Salvage SSTS	T30N, R9E, Sect 31, 34	HCC	34	1 1			2B, 17	SOLD

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
Whitehorse Flat	T32N, R8E, Sect.15	HCC	47	3.5	1.5		2B	One clearcut unit is planned on the lower slopes of Whitehorse Mtn. near French Creek.
Nowl Cedar Salvage	T30N, R8E, Sect.23, 26	HSV	23	0.037			23A	Salvage of down cedar on the lower slopes of Mt. Pilchuck
3 Saw Salvage	T32N, R9E, Sect 14	HSV		0.004			17	SOLD
Stalwart	T30N, R10E, Sect.22, 23, 26, 27	HCC	29	2.8	0 3	1.0	2A	Five small clearcut units are planned in the Perry Creek drainage. Douglas fir is the major species.
Goldfly Cedar Salvage	T32N, R10E, Sect 32, 33	HSV	74	0.018			2B	Salvage of down cedar on Gold Hill.
Suiattle Two Buyback	T32N, R11E, Sect 8, 17	HCC	37	3.0		1 3	17	Two clearcut units near Conrad Creek in the Suiattle drainage. Douglas fir is the major species. Advisory Board modifications
Sauk Alder	Sauk River Drainage	HCC	135	2.733			6, 2A	Seventeen clearcut units of hardwoods plus one partial cut in the Sauk River drainage.
Remnant Cedar Salvage	T30N, R9E, Sect.30	HSV	41	0.03			17	Salvage of down cedar in the Schweitzer Creek drainage
Huckleberry Flat	T32N, R9E, Sect 3, 4, 9, 10	HCC	90	5.5	2 1	5.3	17	One clearcut unit is planned on Huckleberry Mtn. Douglas fir is the major species.
Fork Cedar Salvage	T31N, R7E, Sect 12, T31N, R8E, Sect 7	HSV	70	0 04			17	Salvage of standing and down cedar in the North Fork Canyon Creek drainage.
White Cedar Salvage	T31N, R11E, Sect.16, 17	HSV	48	0 03			17	Salvage of standing and down cedar in the Whitechuck River drainage
Mallardy Cedar Salvage	T30N, R9E, Sect.28, 33	HSV	40	0.06			2B	Salvage down cedar in the Mallardy Creek drainage.

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
Gold Rush Salvage	T32N, R10E, Sect.19, 21	HSV	7	0.16			17	Two partial cut units of windthrown timber on Gold Hill.
Jaybird Cedar Salvage	T33N, R9E, Sect. 21	HSV	15	0.081			17	Salvage of down cedar in the south branch of the North Fork Stillaguamish River
Clear Creek	T30N, R9E, Sect 1, 2, T31N, R9E, Sect 23, 26, 35	HCC	98	7 1		9 2	2B, 1D	Eight clearcut units are planned in the Clear Creek drainage
Flat Cedar Salvage	T29N, R9E, Sect. 5, 6 T30N, R9E, Sect.31, 32	HCC	34	0 038			2B, 17	Salvage of down cedar salvage in Schweitzer Creek drainage Harvest scattered over 340 ac.
South Green Cedar Salvage	T30N, R8E, Sect 11, 12	HSV	30	0 06			2B	Salvage of standing and down cedar on the south side of Green Mtn
New Crevice Cedar Salvage	T33N, R9E, Sect.16, 17	HSV	66	0 048			17	Salvage of down cedar in the south branch of the North Fork Stillaguamish River.
Gold Coast Buyback	T32N, R10E, Sect 28, 29 32, 33	HCC	170	9.145		4.6	2B, 17	Six clearcut units on Gold Hill. Mixed species. Advisory Board modifications.
Median Buyback	T33N, R9E, Sect 4, 5, 8, 9	HCC	144	6.1		17 5	17	Five clearcut units are located in the North Fork Stillaguamish Hemlock and silver fir. Advisory Board modifications
Phantom #3	T31N, R10E, Sect. 3	HCC	29	1 56			2B	One clearcut unit on Gold Hill.
Small Salvage	T32N, R11E, Sect 16, 21 22, 23	HCC	17	0.55			17	Salvage of small diameter timber located between the Circle Creek and Straight Creek drainages.
Dead Duck	T31N, R11E, Sect.15, 16	HCC	115	7 16	0 9	0 1	17	Four clearcut units located on lower slopes of Mt Pugh. Mixed species.

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
Scraps	T30N, R9E, Sect 22, 27, 28, 32-34	HFR	142	6.225			2B, 17	Nine clearcut units are planned on Mallardy Ridge Cedar and hemlock. Advisory Board modifications.
Rounder Cedar Salvage	T33N, R8E, Sect.36	HSV	10	0 036			2B	Salvage of down western red cedar located in the Segelson Creek drainage.
SUBTOTAL - DARRINGTON 90			1,523	57 975	4.8	39 0		
FY 1990 - NORTH BEND								
Puget Power Settlement 90	T22N, R11E, Sect 22		1	0 015			27SF	SOLD Permanent land clearing.
NFS Salvage	T25N, R10E, Sect.7	HSV	1	0 035			27GF	
Railroad Leave	T22N, R10E, Sect.32	HCC	83	3 9	0.8		20A	Two clearcut units located in the Cedar River Watershed
Claim	T21N, R10E, Sect 4	HCC	46	4 5			20A	One clearcut unit in the Cedar River Watershed.
Calligan	T25N, R9E, Sect 34	HCC	96	4 2	1.5	2.1	27GF	Five clearcut units adjacent to Calligan Lake.
Abiel	T21N, R11E, Sect 6, T22N, R10E, Sect.36	HCC	159	9 0	3.8		20A	Ten clearcut units in the North Fork Cedar River drainage.
Baby Bear	T21N, R10E, Sect 10	HCC	35	1 8			20A	One clearcut unit in the Cedar River Watershed
Price Buyout	T20N, R11E, Sect. 14	HCC	93	5 7			21A	Five clearcut units in the Upper Green River Watershed
Dandy Pass Log Decks	T21N, R11E, Sect. 22		3	0 15				Permanent land clearing
SUBTOTAL - NORTH BEND 90			517	29 3	6 1	2 1		
FY 1990 - SKYKOMISH								
U S 2 Decks Salvage	T26N, R13E, Sect 30		2	0 091			27GF	SOLD U S. 2 Right-of-way
Money Creek Salvage Decks	T26N, R11E, Sect 30, 31	HSV	2	0 036			27GF & SF	SOLD

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
E-Z Beck Salvage (SSTS)	T27N, R14E, Sect.17, 18	HSV	18	0 1			17	
N. Windy Salvage (SSTS)	T26N, R14E, Sect 18	HSV	17	0 25			17	
North Fork SSTS	T28N, R12E, Sect 8, 9, 18, 19	HSV	5	0.11			1D	
Sawyer	T25N, R12E	HCC	78	3.5	1 0	1 0	27GF & SF	
Wayout Salvage	T26N, R12E Sect 36	HSV	8	0.05			27GF & SF	
Eagle Down Salvage	T26N, R11E, Sect 10	HSV	5	0.1			19	
Deception	T26N, R12E, T26N, R13E	HCC	58	4.156	1 0	0 5	17, 27GF	
Powerline Salvage	T26N, R12E Sect 29, 30	HSV		0 06			27GF & SF	Scattered harvest over 189 acres
Sobieski	T25N, R11E, T25N, R12E	HCC	59	3.428	1 0	0.5	27GF & SF	
North Heybrook	T27N, R10E	HCC	156	5.1	2 5	1 3	2A, 17	
SUBTOTAL - SKYKOMISH 90			408	16 981	5 5	3 3		
FY 1990 - WHITE RIVER								
Little Viola	T18N, R8E, Sect 25	HCC	85	4.5	0 4		17	Unit 5 in Roadless Area 6055.
NW Haller	T18N, R9E, Sect 2, 4, 9, 20, 30	HCC	167	8.4	1 0		2B,14,17	
Lower Huckleberry	T18N, R10E, Sect 7, 18	HCC	123	7.13	1 9		2B, 17	
Doe Creek	T18N, R10E, Sect 32, 33	HCC	90	3 6	2.5		17	Sale in Roadless Area 6058.
Side Burns	T17N, R7E, Sect 2,-12	HCC	146	5 67	3 0		17	Units 2 & 3 in Roadless Area 6055
7060 Salvage		HCC	4	0 16			17	
Evans Thin Resale		HTH	43	0 78			17	
SUBTOTAL - WHITE RIVER 90			658	30 24	8,8			
FOREST TOTAL FY 90			4,705	181 056	37 9	47 6		

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
FY 1991 - MT. BAKER								
Black Powder	T33N, R8E, Sect 24, 25, 35, T33N, R9E, Sect.10, 19, 29	HCC	145	5.1		1 0	17	White wood/cedar clearcut units located between Alder Creek and North Fork of the Stillaguamish.
Clapper	T37N, R7E, Sect.22, 27	HCC	50	2 0		1.0	17, 14	White wood clearcut units located on the South Fork of the Nooksack River. Some units are found in former RARE II area, Mt Baker West #6041
Little Bear	T38N, R9E, Sect 27, 28, 32-34	HCC	159	10.2	4.2	4 6	2A, 2B	Five clearcut units Highlead and skyline
Grouse Butte West	T39N, R6E, Sect.25, 36	HCC	51	1.8	1.3	0 5	23A	Two white wood clearcut units near Rocky Creek north of Clearwater Creek. Some units are found in former RARE II area, Mt. Baker West #6041.
Misc. Small Sales	Various		100	7 9				Various small sales consisting of roadside salvage and windthrow timber.
SUBTOTAL - MT BAKER 91			505	27.04	5.5	7.1		
FY 1991 - DARRINGTON								
North Canyon Buyback	T31N, R8E, Sect 7, 17, 18	HCC	45	2 9		2.0	17	Five clearcut units are planned in North Fork Canyon Creek. Hemlock and Pacific silver fir.
Tupso Pass	T31N, R8E, Sect. 9	HOR	46	2.7	0.3	3.0	1D	Harvest final removal unit near Tupso Pass Some units are found in former RARE II area, Boulder River #6050
Boxer	T32N, R12E, Sect.23, 24, 25, 26	HCC	145	11 9	1.6	7 4	6, 17	Eight clearcut units are planned on Box Mtn. Mixed species. Some units are found in former RARE II area, Glacier Peak #G6031.

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
Black Gold Salvage	T33N, R10E, Sect 19	HSV	5	0.48			2B	Helicopter logging of salvage resulting from fire.
Betwixt	T30N, R8E, Sect. 26, 35	HCC	80	3.5	1.0	0.3	2B, 17	Three shelterwood harvest and three final removal units are planned adjacent to Bear and Black Creeks.
Backside	T33N, R9E, Sect.19, 20, 29, 30	HCC	65	3 0	0 6	2.0	17	Two clearcut units located on south branch of the North Fork Stillaguamish River.
Beulah Johnson	T29N, R12E, Sect 8-11, 14-17	HCC	58	3 4		3 0	17	Seven clearcut units are planned in the North Fork Sauk River drainage. Some units are found in former RARE II area, Glacier Peak #J6031
Miscellaneous Sales	Various	HCC	80	2 4				Various small sales consisting of roadside salvage and wind thrown timber
SUBTOTAL - DARRINGTON 91			524	30 3	3.5	17.7		
FY 1991 - NORTH BEND								
Pioneer Creek	T20N, R12E, Sect. 26, T19N, R12E, Sect.2, 19	HCC HSL	96	4.4	2.6		21A	Five clearcut units located in the head of Tacoma and Pionner Creek within the Green River Watershed.
Ballard	T22N, R10E, Sect 32	HCC	41	1.8			20A	Clearcut unit located in the Cedar River Watershed
Prospector	T25N, R10E, Sect.16, 17, 21,22	HCC	77	4 2	1 5		14	Five clearcut units located in Lennox Creek drainage
Jig Saw	T22N, R10E, Sect. 36	HCC	97	5 7	1 1		20A	Three clearcut units in Findley Creek within the Cedar River Watershed.
Miscellaneous Salvage	District Wide	HCC	15	0.7				Various small sales District wide.

100 ac.

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
Border	T21N, R11E, Sect.8, 18	HCC HSL	80	3 2	1.6		20A	Seven clearcut units located in the Cedar River Watershed.
SUBTOTAL - NORTH BEND 91			406	20 0	6 8			
FY 1991 - SKYKOMISH								
Harbeck	T26N, R12E, Sect.16, 18-22	HCC	105	5.0	1.4	2.4	17	
Foss Reshape	T25N, R12E, Sect.18, 19	HSV	15	0 6			27GF	
Miscellaneous Sales	District Wide	HCC	54	1 0	1 5	1 0	14	
Mountain Hemlock Study	T25N, R11E, R12E, & R27N, R11E	HCC HTH HSH	59	1 18		0 4	19	Some units are found in former RARE II area, Eagle Rock #6054. HCC-35 ac HTH-8 ac HSH-16 ac.
US2 Salvage Rehab	Private Cutting Boundary		25	1.0	2.3		27SF	
SUBTOTAL - SKYKOMISH 91			258	8.78	5.2	3.8		
FY 1991 - WHITE RIVER								
Pyramid #2	T19N, R11E, Sect.20, 30	HCC,HSV	90	3.0	1.5		17	
West Milky	T18N, R8E, Sect. 1, 2, 11, 12, T18N, R8E	HCC	209	11.05	2.5		17	Some units are found in former RARE II area, Clearwater #6055
Lost Creek	T18N, R9E, Sect.36, T18N, R10E, Sect 31	HCC	106	5.6	1.0		2B, 17	Sale in Roadless Area #6058.
Miscellaneous Sales	Various	HSV	20	0.32			17	
SUBTOTAL - WHITE RIVER 91			425	20.00	5.0			
FOREST TOTAL FY 91			2,118	106 12	26.0	28.6		

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
FY 1992 - MT. BAKER								
Loose Bark	T35N, R9E, Sect.23	HCC	54	2.3	1.0		2B	Four D.fir/cedar/white wood clearcut units located on the south side of Sauk Mtn. Some units found in former RARE II area, Mt. Baker Noisy Diobsud #6041.
SSF & Miscellaneous Small Sales	District Wide	HSV	39	1.2				
Corkindale/Olson	T35N, R10E, Sect.10, 15, 16, 22	HCC	339	16.0	4.2	2.3	2B	D.fir/cedar/whitewood clearcut unit between Rocky and Corkindale Creeks. Some units are found in former RARE II area, Mt. Baker Noisy-Diobsud #6041.
Copper Tayl	T35N, R11E, Sect.3,4, T36N, R11E, Sect.27, 28, 32, 33, 34	HCC	126	5.5	4.0	3.5	2B	White wood clearcut units located NE of Marblemount. Some units found in former RARE II area, Alma Copper #6044.
SUBTOTAL - MT. BAKER 92			558	25.0	9.2	5.8		
FY 1992 - DARRINGTON								
Semi-Circle	T32N, R11E, Sect.35	HCC	80	3.2		0.5	17	Four clearcut units next to Circle Creek. Some units found in former RARE II area, Glacier Peak #G6031.
Big Tenas	T33N, R11E, Sect.19, 20, 26, 27, 34, 35	HCC	155	8.3	2.5	7.5	17	Seven clearcut units are planned along Tenas Creek. Mixed species. Some units found in former RARE II area, Glacier Peak #J6031.
Doe Creek	T32N, R11E, Sect.10, 11	HCC	90	5.8	1.0	1.0	6, 17	Four clearcut units are planned in Doe Creek. Some units found in former RARE II area., Glaicer Peak #J6031.
Higgins Thin	T32N, R8E, Sect.3, 4	HTH	160	2.5	1.0		2B	Commercial thinning of Douglas fir is planned on Higgins Mtn.

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
North Mountain	T33N, R9E, Sect.12, 13, 14	HCC	120	5.2	0.5	2.0	17	Two clearcut units are planned on North Mtn. Mixed species.
North Middle Buyback	T34N, R9E, Sect.29-32	HCC	80	6.0		5.0	17	Six clearcut units are planned along the middle branch of the Stillaguamish River. Mixed species.
Miscellaneous Sales	Various	HCC HSV	200	2.0				Misc. small sales. Cedar sales. HCC-100 ac., HSV-100 ac.
SUBTOTAL - DARRINGTON 92			955	33.0	5.0	16.0		
FY 1992 - NORTH BEND								
Hogback	T21N, R9E, Sect.8, 16	HCC	80	3.5	0.7		20A	Planning area is located near Lindsay Ridge in the Cedar River Watershed.
1812	T21N, R10E, Sect.18	HCC	57	2.7	1.4		20A	Three clearcut units in Seattle Creek within Cedar River Watershed.
Wolf Creek	T20N, R9E, Sect.36, T20N, R10E, Sect.30, 36	HCC	150	6.0	5.4		21A	Eight clearcut units in the Green River Watershed.
Crunch-Sheets	T20N, R12E, Sect.22, 26	HCC	76	3.8	0.7		21A	Seven clearcut units in Intake and Tacoma Creek in Green River Watershed.
Miscellaneous Sales	Various	HCC	88	4.0				
SUBTOTAL - NORTH BEND 92			451	20.0	7.0			
FY 1992 - SKYKOMISH								
Proctor Creek	T27N, R9E, Sect.34	HCC	44	3.48	0.3	2.0	17	
North Face	T26N, R10E, T26N, R11E	HCC	140	4.5	4.4	4.4	27GF & SF	Estimate.
San Juan	T27N, R11E, T27N, R12E	HCC	80	1.8		1.0	17	Some units are found in former RARE II area, Eagle Rock #6054.

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
FY 1992 - MT. BAKER								
Loose Bark	T35N, R9E, Sect 23	HCC	54	2.3	1.0		2B	Four D fir/cedar/white wood clearcut units located on the south side of Sauk Mtn. Some units found in former RARE II area, Mt. Baker Noisy Diobsud #6041
SSF & Miscellaneous Small Sales	District Wide	HSV	39	1 2				
Corkindale/Olson	T35N, R10E, Sect 10, 15	HCC	339	16 0	4 2	2 3	2B	D fir/cedar/whitewood

Plan-Appendix A

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
Grotto	T26N, R11E, Sect.17	HCC	75	3 0	2.3	6.0	27GF & SF	Some units are found in former RARE II area, Eagle Rock #6054
Miscellaneous Sales	District Wide	HCC	50	1.0				Estimate
SUBTOTAL - SKYKOMISH 92			389	13.8	7.0	13.4		
FY 1992 - WHITE RIVER								
High 20 #2	T17N, R7E, Sect.16, 17, 20, 21	HCC	110	4 0			23A, 17	
Miscellaneous Salvage	District Wide	HSV	40	0 9				
Chenuis	T18N, R7E, Sect 36, T18N, R8E, Sect 31-35	HCC	184	5.7			1D	Some units are found in former RARE II area, Clearwater #6055.
Upper Pigeon	T18N, R9E, Sect 31	HCC	169	9.45	2 7		17	Sale in Roadless Area #6055
SUBTOTAL - WHITE RIVER 92			503	20 05	2 7			
FOREST TOTAL FY 92			2,856	111 83	30 9	29.2		

F Y 1 9 9 3 - 1 9 9 9 P O O L O F P O S S I B L E P R O J E C T S

FY 1993-1999 - MT. BAKER								
Basin/Sibley	T34N, R12E, Sect.2,3,10, 11	HCC HPR	373	8 79	1.4	4.1	2B, 1D	D.fir/cedar/white wood clearcut units located in the Upper Cascade River drainage Cascade planning area. Some units are found in former RARE II area, Glacier Peak #H6031 and Hidden Lake #6045.

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
Kit-Kat	T39N, R7E, Sect 1,12, T39N, R8E, Sect 5-7	HPR	150	6 0	2.0	1 0	2A,2B,5B	White wood/D.fir clearcut units located in the North Fork Nooksack River drainage between Glacier and Wells Creek Westnook planning area. Some units found in former RARE II area, Mt Baker North #6041.
Boutface	T38N, R9E	HPR	75	3 0		2 5	2A,2B,17	White wood/cedar clearcut units located north of Baker Lake near Shannon and Swift Creeks. North Baker planning area. Some units found in former RARE II area, Mt Baker Noisy-Diobsud #6041.
Sky Pork	T36N, R11E, T37N, R11E	HCC	220	10 0	4.5	4 0	2B	White wood/D.fir clearcut units located in the lower reaches of Bacon Creek, Bacon Creek planning area.
Illabot Sweep	T34N, R10E, T34N, R11E	HPR	250	10.0	2.0	2.5	17	D fir clearcut units located in the Illabot Creek drainage. Illabot planning area. All units in RARE II #6031.
Anderson Creek	T37N, R9E	HPR	113	5 0	3 0	1 0	2B	D.fir/cedar/white wood clearcut units located east of Baker Lake. East Baker planning area. All units in RARE II #6041.
Quill	T34N, R7E, T35N, R7E	HPR	58	2 0	0 5	1.0	2B, 17	White wood clearcut units located in the headwaters of Pressentin Creek drainage South Skagit planning area All units in RARE II #6048
Thunder Bolt	T36N, R9E	HCC	100	4.0	2 0		2B	White wood clearcut units located east of Lake Shannon. Thunder Lake planning area. All units in RARE II #6041.

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
Sand Top	T37N, R8E, T37N, R9E	HCC	100	4.0		1.0	2A	White wood/D.fir/cedar clearcut units located east of Baker Lake in the Little Sandy Creek drainage. Sandy Creek planning area.
Sister Seymor	T38N, R7E, Sect 30, 32, 33, 36	HCC	175	6 5	3.5	6.0	23A	White wood clearcut units located in the three areas in the Middle Fork of the Nooksack River drainage. Middle Fork planning area. All units in RARE II #6041.
FY 1993-1999 - DARRINGTON								
Eubie	T30N, R11E, Sect 15, 16, 21, 22	HCC	105	5 0	1.0		2A, 2B	A sale is planned in the Sauk River drainage Some units found in former RARE II area, Glacier Peak #L6031.
Old Burn	T33N, R9E, Sect.2, 3, 10, 11	HCC	90	4.8	1.2	3.0	17	Four clearcut units are planned on Crevice Ridge. Douglas fir is the major species.
Straight Shot	T32N, R11E, Sect.28, 33	HCC	80	4.4			17	Five small clearcuts are planned in the Straight Creek drainage. Cedar and hemlock are the major species.
Whitehorse Flat Thin	T32N, R8E, Sect.14, 15	HTH	435	1.6	1.5		17, 2B	Commercial thinning of Douglas fir is planned for the lower slopes of Whitehorse Mtn.
Huckleberry	T33N, R11E, Sect 20, 28, 29, 30, 33	HCC	252	5 0	4 0		17	Ten clearcut units are planned on Huckleberry Mtn. Mixed species Some units found in former RARE II area, Glacier Peak #J6031.
Longstop	T32N, R10E, Sect.3, 10, 14, 15, 23	HCC	124	5 0			17	Planning area located on Prairie Mtn Some units found in former RARE II area, Prairie Mtn. #6060.

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
Black Creek Buyback	T30N, R8E, Sect 23-26	HCC	100	4 0		1.0	17	Four clearcut units are planned between Hemple and Wisconsin Creek. Cedar and hemlock are the major species.
Dubor Thin	T31N, R10E, Sect.14, 15 23	HCC HTH	370	13.2			2A, 6	Commercial thinning of Douglas fir in Sauk River drainage. 120 ac.-HCC and 250 ac. HTH.
Goldy	T30N, R8E, Sect.12-14	HCC	50	2 5	0.8	2.0	17	Two clearcut units are planned between Wiley and Benson Creeks Hemlock and cedar are the major species.
Bench Thin	T31N, R10E, Sect.13, 24, T31N, R11E, Sect.18-20	HTH	700	2.5			2B, 17	Commercial thinning of Douglas fir in the Whitechuck River drainage.
Tinhorn	T31N, R11E, Sect 20-22, 27, 28	HCC	93	2 5			17	Planning area in the Tenas Creek drainage. Roadless Area #6031, Glacier Peak.
Lower Mid Buyback	T33N, R9E, Sect.7, 17, 18	HCC	115	4.0			17	Four clearcut units are planned on the upper slopes of the south branch of the North Fork of the Stillaguamish River. Hemlock and silver fir.
Falls Creek	T30N, R10E, Sect.1, 2	HCC	81	4 5		6.6	1D, 17	
Snowline	T32N, R10E, Sect.1, 2	HCC	120	6.0	6 6	1.4	17	
FY 1993-1999 - NORTH BEND								
Receeding	T20N, R10E, Sect 12	HCC	70	3 2	0.5		21A	Planning area located near Bald Mtn. in the Green River Watershed.
Bear Ridge	T21N, R10E, Sect.2, T22N, R10E, Sect. 34	HCC	156	7.0	4.4		20A	Five clearcut units in the Cedar River Watershed
Green Canyon	T20N, R10E, Sect 10	HCC	65	2 8	0.5		21A	Planning area is located in Green Canyon Creek in the Green River Watershed.

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
King Sno Line	T26N, R9E, Sect.2	HCC	35	1.5			17	
South Fork Thin	T22N, R9E, Sect.1, T22N, R10E	HTH	300	3.0			27GF & SF	Commercial thinning planning area in the South Fork *Snoqualmie River drainage.*
Liner	T21N, R9E, Sect.24	HCC	40	1.7			20A	
Burnt Bridge	T24N, R10E, Sect.8-11, 14-16	HCC HTH	166	4.0	1.0	6.2	27GF & SF	Planning area is located within Quartz and Taylor Creek drainages of the Middle Fork Snoqualmie *River.* 66 ac.-HCC and 100 ac.-HTH.
Pratt	T23N, R10E T24N, R10E	HCC HTH	253	5.0	5.0		27GF & SF	Planning area is located within Pratt River drainage of the Middle Fork Snoqualmie River. 105 ac.-HCC and 148 ac.-HTH.
Upper Middle Fork	T23N, R11E, Sect.1, 2, 10, 15, 16	HCC	200	5.0		10.0	27SF	Planning area is located in the upper Middle Fork Snoqualmie drainage.
Quartz Mtn	T24N, R10E, Sect.18, 19	HSL	115	5.0	1.0		27GF	Planning area is located south of Quartz Mtn. in the Middle Fork Snoqualmie drainage.
Mc GLT Thin	T20N, R10E, Sect.14	HTH	200	1.0	2.5		21A	
Sawmill Ridge	T19N, R11E, Sect.4, 6, 8, 12	HCC	250	7.0	5.0		21A	Planning area is located near Sawmill Ridge within the Green River Watershed.
Mason Creek	T22N, R10E, Sect.6, T23N, R10E, Sect.31	HSL	50	1.0		2.0	27GF & SF	Planning area is located on *the north side of I-90 in* the South Fork Snoqualmie drainage.
Adios	T20N, R9E, Sect.16, 18, 20, 30	HCC	270	12.0	4.0		21A	
Already-Bumped	T21N, R11E, Sect.30	HCC	40	2.0			21A	
Dandy	T21N, R11E, Sect.22	HCC	40	1.7	0.5			

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Manage-ment Area	Remarks
FY 1993-1999 - SKYKOMISH								
M&M	T26N, R10E, T26N, R11E	HCC	130	5.0		1.0	27GF & SF	
Tonga Ridge	T25N, R12E	HCC	70	3.0	1.0		17	
Rapid River (H)	T27N, R12E, T27N, R13E	HCC	152	5.0		4.0	17	
Beckler II	T26N, R12E, R13E, T27N, R11E	HCC	250	4.6	3.0		17	
Trout Creek So.	T27N, R10E	HCC	86	3.0	0.5	2.0		
Salmon Creek	T28N, R10E, R11E	HCC	90	3.4		2.0	17	
Kelly Creek	T26N, R12E	HCC	111	4.5	0.5		17	
Johnson Creek	T26N, T27N, R12E	HCC	83	3.4	1.0		17	
Top West Thin Too	T25N, R12E, Sect.17-20, 30	HTH	100	2.7			27GF & SF	
William	T29N, R9E, R10E, T30N, R9E	HCC	93	6.0	1.5	6.0	22B	
FY 1993-1999 - WHITE RIVER								
Bronco	T18N, R10E, Sect.20, 21, 28, 33	HCC	93	4.4			2B	Partial in Roadless Area #6058.
Skinner	T18N, R9E, Sect. 17, 21, 22, 27, 28	HCC	122	4.4			17	Partial in Roadless Area #6057.
Goodby George	T18N, R11E, Sect. 6 & 7	HCC HSH	139	5.03	1.0		17	HCC-125 ac., HSH-14 ac. Some units found in former RARE II area, Norse Peak #6034.
Boot	T18N, R7E, Sect.13, 14, 22, 23	HCC	120	3.0	1.5		17	Some units found in former RARE II area, Clearwater #6055.
Butterfat	T18N, R8E, Sect.2, 4, 10, 11	HCC	111	5.0			17	
Minnie	T18N, R10E, Sect.2, 4, 8, 10, 15, 17	HCC	169	7.16			2B	Partial in Roadless Area #6034.

Sale Name, FY, and Ranger District	Township, Range, & Section Location	Harvest Method	Area Acres	Volume (MMBF)	Miles of Road Con-struction	Miles of Road Recon-struction	Management Area	Remarks
Silver Creek	T18N, R10E, Sect.34, 35	HFR	124	1.5	1.1		2A	Sale in Roadless Area #6059.
Trump	T18N, R8E, Sect 12, 13, T18N, R9E, Sect. 4-8	HCC	150	5 0			17	
Jimmy Hank	T18N, R9E, Sect.9, 10, 15, 16	HCC	119	3.59			17	
Lone Ranger	T18N, R10E, Sect 3, 5, 8, 10, 15, 17	HCC	120	4.0			2B	Partial in Roadless Area #6034
Sphinx	T18N, R10E, Sect 20, 21, 28, 33	HCC	119	4 8			17	
Down N' Out	T18N, R9E, Sect.26, 27, 34, 35	HCC	97	2.65			2B	Partial in Roadless Area #6057.
Martian	T17N, R7E, Sect.20, 28, 29	HCC	69	3.45			17	
Tolmie	T17N, R7E, Sect 4, 8, 9, 16, 17	HCC	214	8 03			1D, 17	
Sunny	T18N, R9E, Sect.13, 14, 23, 24	HCC	112	3 65			2B, 14 2A, 17	
Keelboat	T18N, R9E, Sect.1, 2, 11 12, 14	HCC	53	2.63			2B	
Slippery Twin	T20N, R9E, Sect.28, 30, 32, 34	HCC	241	7.95			17, 23A	
Sunfish	T18N, R9E, Sect.25, 36	HCC	72	2 93			2B	

APPENDIX B
Road and Bridge Capital Investment Projects

The projects are shown as proposed for implementation in either the first or second half of the first decade and by Ranger District location. They are not listed in any priority order.

Program Period: First half of first decade.

Project Name and Number*	Ranger District	Project Type	Length - Mi. Bridges - No.
Boulder Creek #11	Mt. Baker	Bridge replacement	1 bridge
Glacier Creek #39	Mt. Baker	Road reconstruction	7.8 miles
Canyon Creek #31, etc	Mt. Baker	Road reconstruction for fish habitat and stabilization	18.0 miles
Finney Cr #17 - Phase I	Mt. Baker	Road reconstruction for fish habitat and stabilization	18.0 miles
Loomis Nooksack #12, etc	Mt. Baker	Road reconstruction for fish habitat and stabilization	3.0 miles
Finney Cr #17 - Phase II	Mt. Baker	Road reconstruction for fish habitat and stabilization	12.0 miles
Wallace/Rankin #38	Mt. Baker	Bridge construction	2 bridges
Shannon Crossing #11	Mt. Baker	Road reconstruction	0.1 mile
Diobsud Cr #1050	Mt. Baker	Road reconstruction	3.0 miles
East Bank #1106	Mt. Baker	Road reconstruction	1.0 mile
Jackman #14	Mt. Baker	Road reconstruction for fish habitat and stabilization	7.0 miles
Loomis-Nooksack #12	Mt. Baker	Road reconstruction	3.4 miles
Suiattle River #26	Darrington	Road reconstruction	6.1 miles
Sunrise Mine #4065	Darrington	Road reconstruction	0.2 miles
Whitechuck/Suiattle #23 & 26	Darrington	Road reconstruction	7.6 miles
Tupso Pass #41	Darrington	Road reconstruction	6.7 miles
Pilchuck Road #42	Darrington	Road reconstruction	6.0 miles

Green Mtn #2680	Darrington	Road reconstruction	5.7 miles
Deer Cr #4052	Darrington	Road reconstruction	4.4 miles
Pilchuck #42	Darrington	Road reconstruction	3.5 miles
Squire Cr #2040	Darrington	Road reconstruction Bridge replacement	4.2 miles 1 bridge
MF Snoqualmie #56 & 5620 Phase I	North Bend	Road reconstruction	6.0 miles
Denny Creek #58	North Bend	Bridge replacement & road reconstruction	1 bridge 5.5 miles
Taylor/Quartz #5630 & 5640	North Bend	Road reconstruction	6.0 miles
Tacoma Creek #52	North Bend	Bridge replacement	1 bridge
Green River 2 #52	North Bend	Bridge replacement	1 bridge
MF Snoqualmie #5620 Phase II	North Bend	Road reconstruction	4.0 miles
Tinkham #55	North Bend	Road reconstruction Bridge construction	5.5 miles 1 bridge
1st Quartz Creek #5640	North Bend	Bridge replacement	1 bridge
2nd Quartz Creek #5640	North Bend	Bridge replacement	1 bridge
Beckler River #65	Skykomish	Road reconstruction 2 bridge replacements	5.5 miles 2 bridges
Suntop #73 & 7315	White River	Road reconstruction	7.2 miles
Corral Pass #41	White River	Road reconstruction	5.7 miles
Greenwater #70	White River	Road reconstruction 1 bridge replacement	0.5 miles

Program Period: Second half of first decade.

Project Name and Number	District	Type	Length - Mi. Bridges - No.
Deer Cr #1750, etc.	Mt. Baker	Road reconstruction for fish habitat and stabilization	7.0 miles
Anderson Creek #1107	Mt. Baker	Bridge replacement	1 bridge
Wells Creek #33	Mt. Baker	Road reconstruction Bridge replacement	0.6 mile 1 bridge

Finney Cr #17 - Phase III	Mt. Baker	Road reconstruction for fish habitat and stabilization	10.0 miles
Canyon Cr #31	Mt. Baker	Road reconstruction	2.3 miles
Pipeline #33	Mt. Baker	Bridge replacement	16 feet
Park Creek #1130	Mt. Baker	Bridge replacement	1 bridge
Little Deer Peak #1755	Mt. Baker	Bridge replacement	1 bridge
Lost Cr #49	Darrington	Bridge replacement	1 bridge
Rat Trap Pass Road	Darrington	Road reconstruction	0.2 miles
Moose Cr #2030	Darrington	Bridge replacement	1 bridge
Otter Creek #16	Darrington	Bridge replacement	1 bridge
Falls Creek #2080	Darrington	Bridge replacement	1 bridge
Black Oak #2440	Darrington	Bridge replacement	1 bridge
Lennox Creek #57	North Bend	Bridge replacement	1 bridge
Bear Creek #57	North Bend	Bridge replacement	1 bridge
5th Lennox Creek #57	North Bend	Bridge replacement	1 bridge
Wellington #6090050	Skykomish	Road reconstruction	0.3 miles
Lake Serene #6202110	Skykomish	Road reconstruction	2.0 miles
Army Camp #7305	White River	Bridge replacement	1 bridge
Greenwater #70	White River	Road reconstruction	7.0 miles

*The project number is the road number.

This listing is not complete. It contains only the major projects. Smaller projects such as trail head parking lot construction, road reconstruction related to fish habitat mitigation, bridge repair, slide stabilization, drainage improvements, and flood repair projects (large and small) will also be accomplished during the first decade.

Forest Highways

Forest Highways are routes under the jurisdiction of other agencies, State and local, that provide the link between the State primary highway system and the Forest Development Road System for the transport of Forest visitors and commodities.

Forest Highway projects compete on a State-wide basis and are determined by three parties: Washington State Department of Transportation (often representing the local agency), Federal Highway Administration, and the Forest Service. The list of MBS Forest Highways and proposed projects are as follows:

FH6	Mt. Baker Highway	1990	Double lane, pave 2.5 miles to Heather Meadows
FH7	Mtn. Loop Road	1990	Double lane, pave 2.8 miles between Darrington and South Side Sauk segment.
		1991	Repair 0.2 miles of "sink hole" near Verlot.
		1993-96	Double lane, pave 14 miles from end of South Side Sauk segment to Barlow Pass.
FH8	Stevens Pass Highway		No projects proposed.
SR 410	Mather Memorial Pkwy.	1993-96	Improve 10 miles to double lane parkway standards between west boundary of Mount Baker-Snoqualmie National Forest and north boundary of Mount Rainier National Park.
FH25	Baker River Highway		No projects proposed.
FH27	Cascade River Road	1990	Improve 1.6 miles of narrow sections to full double lane.
FH29	Middle Fork Snoqualmie		No Forest Highway projects proposed. See "Road and Bridge Capital Investment Projects" list for Forest Development Road project.
FH32	North Cascade Highway		No projects proposed.
FH33	Crystal Mountain Hwy		No projects proposed.
FH101	North Fork Skykomish Rd		No projects proposed.

APPENDIX C
Wildlife and Fish Habitat Project Schedules

The following wildlife and fish habitat improvement schedules describe the projects which achieve part of the outputs contained in Table 4-1. Project priorities and schedules will be shifted as necessary during implementation.

Projects funded by KV are mitigative and are not included in these improvement schedules. KV projects will be scheduled in conjunction with site-specific timber sale planning. This may affect scheduling and priority of non-KV projects also.

The schedules are partial lists of planned activities based on existing improvement opportunity information, derived from inventories and identified management needs and opportunities. In some cases, the information needs (Chapter 2) and standards and guidelines (Chapter 4) call for new inventories or resource plans, which will result in new projects and priorities. This will necessitate updating the schedules periodically, as new inventories and analyses are completed. Some of these inventories are included in this schedule. It is expected that the detailed schedules will require updating annually as a result of the budget process and watershed, area, or project plans.

Table C-1 displays the wildlife habitat improvement schedule for this Plan. Emphasis is placed on surveys for Threatened, Endangered, and Sensitive species and habitat improvements for T & E species, raptors, game species, cavity users, and habitats with special qualities and of limited availability (e.g. wetlands). The units of measure used in Table C-1 are the actual number of acres or structures for the activity.

Table C-2 shows the fish habitat improvement schedule for this Plan. Toward the end of the decade, the number of projects will level off and the emphasis will be on maintenance of in-place improvements. Fish outputs increase and remain at this higher level, showing the long-term benefit of improvements. Also, during the first five years of the decade, on-going inventories may identify the need for additional projects and changed priorities.

The cost of implementing the wildlife and fish program in this Plan includes costs for: (1) coordination of wildlife and fish objectives, standards, and guidelines with other project implementation; (2) habitat improvement; (3) gathering and evaluation of new information; (4) monitoring; and (5) General Administration. If budgets are significantly different than those contained in the Plan, project accomplishment could increase above or decrease below Plan objectives. This would result in an increase or reduction in expected outputs.

ACTIVITY/PROJECT	ACT CODE	COST/YR (0-5 YRS)	OUTPUTS (0-5 YRS)	COST/YR (6-10 YRS)	OUTPUTS (6-10 YRS)
Mount Baker Ranger District					
Spotted owl surveys	CT111	38.0	1 plan/yr	38.0	1 plan/yr
*Grizzly bear forage pintg	CT222	3.0	10 ac/yr	3.5	10 ac/yr
*Bald eagle nest plan	CT112	3.5	1 plan	0.0	-
Bald eagle perch improvemt	CT221	3 0	10 str/yr	3.0	10 str/yr
Bald eagle roost mgmt plan	CT112	3.0	1 plan/yr	3.5	1 plan/yr
Bald eagle roost surveys	CT111	10.0	1 plan/yr	10.5	1 plan/yr
Sensitive plant surveys	CT111	10.0	1 plan/yr	10.0	1 plan/yr
Marbeled murrelet surveys	CT111	15.0	1 plan/yr	15.0	1 plan/yr
Townsends bat surveys	CT111	10.0	1 plan/yr	10.0	1 plan/yr
*Bat roost structures	CT221	1 0	2 str/yr	1.0	2 str/yr
Pileated Wdpker snag mgmt	CW111	1.5	1 plan/yr	2.0	1 plan/yr
*Access mgmt structures	CW221	3.0	2 str/yr	3.5	2 str/yr
Dead and defective tree habitat management	CW221	30.0	300 str/yr	30.0	300 str/yr
*Deer/elk w. range forage	CW222	15.0	100 ac/yr	15.0	100 ac/yr
*Elk meadow maintenance (Middle Fork Nooksack)	CW23	0.5	4 ac/yr	0.0	0 ac/yr
Mtn goat range enhancement	CW222	2.0	20 ac/yr	2.5	20 ac/yr
Raptor nest surveys	CW111	3.0	1 plan/yr	3.0	1 plan/yr
Raptor nest platforms	CW221	1 8	2 str/yr	-	-
*Raptor perch structures	CT221	1 5	7 str/yr	2.0	7 str/yr
Misc nest structures	CW222	2.2	30 str/yr	2 5	30 str/yr
Cavity-nest animals invnty	CW111	2 0	1 plan/yr	2.0	1 plan/yr
Special habitats invntry	CW111	2.0	1 plan/yr	2 0	1 plan/yr
Wood/brush cover structure	CW221	1.0	10 str/yr	1.0	10 str/yr
Band-tailed pigeon habitat improvement	CW2	1.5	1 site/yr	2 0	1 site/yr
Pigeon habitat mtce	CW23	0 5	1 site/yr	0.5	1 site/yr
Wetland habitat impvts					
log structures	CW221	3.0	3 str/yr	3.0	3 str/yr
loon nest platforms	CW221	0 5	1 str/yr	0.5	1 str/yr
Wood duck nest boxes	CW221	1.0	10 str/yr	1 0	10 str/yr
Maintenance of impvts	CW23	3.5	20+ sites	4.0	20+ sites
Darrington Ranger District					
Spotted owl surveys	CT111	38.0	1 plan/yr	38.0	1 plan/yr
Bald eagle roost surveys	CT111	7 0	1 plan/yr	7.5	1 plan/yr
Bald eagle perch impvt	CT221	3 0	10+ str/yr	3.5	10+ str/yr
Sensitive plant surveys	CT111	3 0	1 plan/yr	3 5	1 plan/yr
*Peregrine falcon surveys	CT111	3.0	1 plan/yr	3 5	1 plan/yr
Thinning to improve stand conditions for spotted owls & other raptors	CT222	3.0	10 + ac/yr	3.0	10+ ac/yr
*Marbeled murrelet surveys	CT111	15 0	1 plan/yr	15.5	1 plan/yr
Access mgmt structures	CT221	7.0	4 str/yr	7 5	4 str/yr
Access mgmt str mtce	CT23	2.0	2 str/yr	2.5	2 str/yr
Dead and defective tree habitat improvement	CW221	4.0	20+ str/yr	4 5	20+ str/yr
Access mgmt structures	CW221	3.0	2 str/yr	3 5	2 str/yr
Access mgmt str mtce	CW23	1 5	1 str/yr	2 0	1 str/yr

ACTIVITY/PROJECT	ACT CODE	COST/YR (0-5 YRS)	OUTPUTS (0-5 YRS)	COST/YR (6-10 YRS)	OUTPUTS (6-10 YRS)
Deer/elk/mtn goat habitat planting/thinning	CW222	3.0	10+ ac/yr	3.5	10+ ac/yr
*Mtn goat mineral blocks	CW221	10.0	10+ str/yr	10.5	10+ str/yr
Mtn goat range enhancement	CW222	3.0	10+ ac/yr	3.0	10+ ac/yr
Pileated wdpkr snag mgmt	CW111	1.5	1 plan/yr	2.0	1 plan/yr
*Special habitat surveys	CW111	2.0	1 plan/yr	2.0	1 plan/yr
*Raptor nest surveys	CW111	3.0	1 plan/yr	3.5	1 plan/yr
Maintenance of impvts	CW23	5.0	20+ sites/yr	5.5	20+ site/yr
Info & ed sign preparation	CW2	1.5	2+ signs/yr	2.0	2+ signs/yr
*Wood/brush cover str	CW221	2.0	5+ str/yr	4.0	10+ str/yr
Black bear forage planting	CW222	3.0	10+ ac/yr	3.5	10+ ac/yr
*Bat roost boxes	CW221	1.5	5+ str/yr	2.0	5+ str/yr
*Pothole development	CW2	2.0	2 sites/yr	2.5	2 site/yr
*Raptor nest structures	CW221	2.0	2+ str/yr	2.0	2+ str/yr
*Raptor perch development	CW221	3.0	2+ sites/yr	3.5	2+ sites/yr
Band-tailed pigeon habitat improvement	CW2	1.5	1 site/yr	2.0	1 site/yr
*Nest boxes for wood ducks	CW221	2.0	5+ str/yr	2.5	5+ str/yr
Skykomish Ranger District					
Spotted owl surveys	CT111	19.0	1 plan/yr	19.0	1 plan/yr
Bald eagle perch impvt	CT221	1.8	12 str/yr	2.0	12 str/yr
Bald eagle roost surveys	CT111	5.0	1 plan/yr	5.5	1 plan/yr
Sensitive plant surveys	CT111	5.4	1 plan/yr	6.0	1 plan/yr
Dead & defective tree habitat mgmt	CW221	13.6	50+ str/yr	14.5	60+ str/yr
Deer/elk forage seed & ft	CW222	24.9	64 ac/yr	22.0	50+ ac/yr
Deer/elk browse planting	CW222	18.7	22 ac/yr	16.0	15+ ac/yr
Deer/elk browse pruning	CW222	0.4	2 ac/yr	1.5	6 ac/yr
*Deer/elk forage thinning	CW222	6.5	13 ac/yr	8.0	17 ac/yr
Mtn goat range enhancement	CW222	3.0	3 ac/yr	3.5	3 ac/yr
Access mgmt	CW221	0.5	2 str/yr	0.5	2 str/yr
Access mgmt str mtce	CW23	0.2	1 str/yr	0.2	1 str/yr
Pileated wdpkr snag mgmt	CW222	1.5	1 plan/yr	2.0	1 plan/yr
*Info & ed signing	CW2	3.2	5 signs/yr	4.5	8 signs/yr
Maintenance of impvts	CW23	4.0	20+ str/yr	4.5	20+ str/yr
Wood/brush cover str	CW221	1.4	8 str/yr	2.5	15 str/yr
*Pothole development	CW2	1.2	1 site/yr	2.0	1 site/yr
Bat roost boxes	CW221	0.8	8 boxes/yr	1.0	10 boxes/yr
*Osprey nest structure	CW221	0.9	2 str/yr	0.9	2 str/yr
Raptor perch	CW221	1.0	2 str/yr	2.5	4 str/yr
Nest boxes	CW221	1.2	8 boxes/yr	1.5	10 boxes/yr
North Bend Ranger District					
Spotted owl srvy/banding	CT111	33.0	1 plan/yr	19.0	1 plan/yr
Spotted owl nest cavities	CT221	3.5	5 sites/yr	5.0	10 sites/yr
Spotted owl habitat impvt by silvicultural means	CT222	5.7	3 sites/yr	5.9	3 sites/yr

Access mgmt structure	CT221	5.0	3 str/yr	5.5	3 str/yr
Access mgmt str mtce	CW23	3.0	3 str/yr	3.5	5 str/yr

ACTIVITY/PROJECT	ACT CODE	COST/YR (0-5 YRS)	OUTPUTS (0-5 YRS)	COST/YR (6-10 YRS)	OUTPUTS (6-10 YRS)
Dead and defective tree habitat improvement	CW221	3.2	20+ str/yr	3.3	20+ str/yr
Deer/elk/mtn goat forage seeding and planting	CW222	5.2	40+ ac/yr	5.4	40+ ac/yr
Deer/elk forage thinning (Middle Fork Taylor)	CW222	3.0	20 ac/yr	3.5	20 ac/yr
Mtn goat inventory	CW111	4.0	1 plan/yr	5.0	1 plan/yr
Mtn goat range enhancement	CW222	5.0	20 ac/yr	5.5	20 ac/yr
Pileated wdpkr snag mgmt	CW111	1.5	1 plan/yr	2.0	1 plan/yr
Aerial video inventory of habitat areas & projects	CW111	5.0	1 plan/yr	3.0	1 plan/yr
Pothole development	CW2	6.0	5 sites/yr	6.5	5 sites/yr
Nest/roost boxes	CW221	2.9	20+ str/yr	3.0	20+ str/yr
Nest/roost box maintenance	CW23	2.2	50+ str/yr	2.3	50+ str/yr
Wood/brush cover structure	CW221	2.5	10 str/yr	3.0	10 str/yr
Nest platforms	CW221	2.5	5 str/yr	3.0	5 str/yr
Herpetofauna inventory	CW111	5.0	1 plan/yr	5.0	1 plan/yr
White River Ranger District					
Spotted owl surveys	CT111	19.0	1 plan/yr	19.0	1 plan/year
Bald eagle surveys	CT111	2.1	1 plan/yr	2.5	1 plan/year
Sensitive plant surveys	CT111	3.0	1 plan/yr	3.5	1 plan/year
Government Meadows burn	CW222	6.0	50 ac/yr	6.5	50 ac/yr
Deer/elk range inventory	CW111	2.0	1 plan/yr	2.5	1 plan/year
Deer/elk w.range impvt	CW222	7.0	30 ac/yr	7.5	30 ac/yr
Cavity-nest animals invnty	CW111	2.0	1 plan/yr	2.5	1 plan/year
Dead and defective tree habitat improvement	CW221	3.0	20 str/yr	3.5	20 str/year
Pileated wdpkr snag mgmt	CW111	1.5	1 plan/yr	2.0	1 plan/year
Special habitats invnty	CW111	2.0	1 plan/yr	2.5	1 plan/year
Bat/squirrels roost boxes	CW221	4.0	30 str/yr	4.5	30 str/yr
Info & ed sign preparation	CW2	3.0	10 signs/yr	3.5	10 signs/yr
Waterfowl habitat improvemt	CW222	3.0	1 ac/yr	3.5	1 ac/yr
Upland game bird inventory	CW111	2.0	1 plan/yr	2.5	1 plan/year
Maintenance of impvts	CW23	3.3	20+ sites	3.8	20+ sites
Forest-wide					
Prepare management guides for Sensitive species	CT112	4.0	1 plan/yr	5.0	1 plan/yr

*NOTE: Projects are listed by Ranger District with activities specified in the preferred alternative of the Forest Plan listed first for each District. Note also that * means potential Challenge Cost Share project.

Table C-2 - Fish Habitat Improvement Schedule

Fish Priority	PROJECT NAME Activity	Target Species	District	Unit of Measure	Amount Planned by Fiscal Year 1990	1991	1992	1993	1994	1995
1	DEER CREEK Streambank and channel stabilization	Anadromous Fish - coho salmon, steelhead	Mt. Baker	structures acres	60 4	60 4	60 4	60 4	60 4	10 4
2	SAUK RIVER, SUIATTLE RIVER AND TRIBUTARIES Rearing area development	Anadromous Fish - coho salmon, steehead	Darrington	structures acres	50 1	40 2	50 1	50 2	50 1	50 2
3	GREENWATER RIVER & HUCKLEBERRY CREEK Habitat restoration	Coho salmon, spring chinook	White River	structures acres	64 3	46 3	78 10	79 10	75 10	64 12
4	DISTRICT WIDE Resident fish habitat improvement	Rainbow trout, cutthroat trout	North Bend	structures acres	6 0	10 1	20 2	25 2	30 1	30 1
5	DISTRICT WIDE Resident fish habitat improvement	Bull trout and others	Skykomish	structures acres	10 1	5 2	10 1	5 2	10 1	5 5
6	NORTH FORK NOOKSACK Rehabilitation	Spring chinook	Mt. Baker	structures acres	20 1	20 1	20 1	30 --	30 --	20 --
7	DISTRICT WIDE Resident fish habitat improvement	Cutthroat trout	White River	structures acres	20 1	50 3	20 1	20 1	20 1	20 1
8	DISTRICT WIDE Resident fish habitat improvement	Bull trout, cutthroat trout	Mt. Baker	structures acres	50 5	50 5	50 5	50 5	50 5	50 5
9	FINNEY CREEK Fish rehabilitation	Rainbow trout, cutthroat trout	Mt. Baker	structures acres	0 0	30 4	30 4	30 4	30 4	30 4
10	CANYON CREEK Fish rehabilitation	Spring chinook	Mt. Baker	structures acres	70 4	70 4	70 4	70 4	70 4	30 0
11	SOUTH FORK NOOKSACK RIVER Spawning and rearing area improvement	Anadromous Fish - spring chinook	Mt. Baker	structures acres	100 4	100 4	100 4	100 4	100 4	100 0
12	BAKER AND SKAGIT RIVER TRIBUTARIES Rearing area improvement	Anadromous Fish - coho salmon, steelhead	Mt. Baker	structures acres	30	20	50 10	50 --	50 --	50 --
13	SOUTH FORK STILLAGUAMISH RIVER AND TRIBUTARIES I Rearing area and channel improvement	Anadromous Fish - coho, chinook salmon	Darrington	structures acres	10 1	-- 1	10 --	10 1	10 1	10 1
14	SOUTH FORK SKYKOMISH RIVER AND TRIBUTARIES Rearing area improvment	Anadromous Fish - coho salmon	Skykomish	structures acres	15	15	20	20	20	20 2

APPENDIX D
Recreation Implementation Schedules

The following section presents the project schedules for viewsheds, cultural resources, and developed recreation construction and reconstruction. Costs shown in these schedules are planned costs for the first three years and estimated costs in later years. Outyear projects may shift with changing priorities and budgets. If budgets should differ significantly from those projected in the plan, some of these projects will not be accomplished, which will result in a reduction of expected outputs. Budgets could also be greater, which would result in a speed-up of the schedule.

It is expected that the schedules will require updating annually as a result of the budget process and new action plans. Cost estimates contained in the schedules are rough approximations.

The developed recreation construction/reconstruction schedule (Table D-3) shows each project broken down into three phases: planning, design, and construction. These three phases typically occur in three consecutive years. Funds for each phase may come out of several budgets: recreation, Forest road program, or trails.

The following schedules are included:

- Viewshed Plans — Table D-1
- Cultural Resources — Table D-2
- Developed Recreation CIP — Table D-3
- Trailhead Const/Reconst. — Table D-4

Table D-1

Viewshed Plans

Travel Route	District	Cost	Year
Mt. Baker Highway	Mt. Baker	$ 3,000	1990
Mt. Loop Highway	Darrington	$ 3,000	1990
Mt. Baker Highway	Mt. Baker	$ 15,000	1991
Mt. Loop Highway	Darrington	$ 15,000	1991
Skagit River/North Cascade Highway	Mt. Baker	$ 15,000	1992
Baker Lake Highway	Mt. Baker	$ 15,000	1992
Mather Memorial Parkway	White River	$ 15,000	1993
Crystal Mountain Highway	White River	$ 15,000	1993
Middle Fork Snoqualmie	North Bend	$ 15,000	1994
Miller River	Skykomish	$ 15,000	1994
Beckler River	Skykomish	$ 15,000	1995

Cultural Resources Implementation Schedule

Activity	Unit of Measure	Year 1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Inventory											
NHPA Sec 106 surveys 1/	M acres	Variable, expected to average 12 000 ac/yr Dependent upon timber, recreation, etc implementation schedules Surveys are to be completed at time of project environmental assessment approval									
		$90M	$75M	$75M	$75M	$75M	$75M	$75M	$75M	$75M	$75M
NHPA Sec 110 survey 2/	Project	Alpine Lakes Wilderness Naches Trail	Mt Baker Wilderness/Twin Lakes	Jackson Wilderness/Monte Cristo	Glacier Wilderness/Sauk River	Alpine Lakes/ Snoqualmie Mining District	Boulder Wilderness/ Silverton	Northern Pacific RR Corridor	Clearwater Wilderness/ Carbon River	Norse Peak Wilderness/ White River	Mt Baker Wilderness/ Mt Baker
		$8M	$20M	$20M	$20M	$15M	$20M	$20M	$20M	$20M	$15M
Site Recording 3/	Sites	0	70	70	70	70	70	70	70	70	70
			$15M	$15M	$15M	$15M	$15M	$15M	$15M	$15M	$15M
Evaluations/ Nominations 4/	Properties	Kennedy G S Naches Trail	Darrington Barn, Glacier R S	Naches Lithic Scatter	Snow Lake Lithic Scatter	Twin Lakes area sites	Sauk R Logging RR System	Snoqualmie Mining District	Northern Pacific RR Corridor	Everett-Monte Cristo RR	Monte Cristo & Silverton Sites
		$7M	$6M	$25M	$20M	$12M	$12M	$12M	$12M	$12M	$12M
Management Plans	Plans	Stevens Pass Historic District	Forest Inventory Plan	Naches Trail, Verlot R S	Lookouts, Recreation Shelters	Snoqualmie Pass Wagon Rd.	Wilderness Cultural Resources	RR Logging Systems	Northern Pacific RR Corridor	Mining Districts	Lithic Scatters
		$10M	$10M	$7M	$8M	$4M	$12M	$12M	$12M	$12M	$12M

Cultural Resources Implementation Schedule (Cont.)

Activity	Unit of Measure	Year 1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Data Recovery 5/ & Documentation	Sites	Sauk R Lumber Co Bedal Camp, Boulder Cr Br , Bldg 2033	1 data recovery, 2 documentations	Same	Same	Same	Same	Same	Same	Same	Same
		$25M	$30M	$30M	$30M	$30M	$30M	$30M	$30M	$30M	$30M
AIRFA Inventory Updates 6/	Reports		1					1			
			$15M					$15M			
Overview Updates	Reports			1					1		
				$15M					$15M		

1/ Surveys supporting timber sales recreation construction and reconstruction, land exchanges, facility construction/reconstruction, and similar development projects, for compliance with Section 106 of the National Historic Preservation Act Figures are based on experience from 1987-1990

2/Surveys to complete the inventory of Forest cultural resources, and address management issues not related to specific undertakings Responds to Section 110 of the National Historic Preservation Act and 1989 amendments to the Archeological Resource Protection Act

3/ Reduction of the backlog of sites reported but not adequately recorded Responds to Section 110 of the National Historic Preservation Act and the 1989 amendments to the Archeological Resource Protection Act

4/ Evaluation of National Register of Historic Places eligibility to address management issues not related to NHPA compliance "Properties" may include sites portions there of (buildings) or aggregations thereof (geographic and thematic groups) All evaluations will result in nomination of properties found eligible

5/For mitigation of adverse effects of development projects In response to NHPA and 36 CFR 800 Out-year needs vary in response to results of compliance inventories, and cannot be predicted in this context Figures used are based on experience from 1987-1990 and Facilities Master Plan

6/To identify changes in use patterns occurring since compilation of Inventory of Native American Religious Use, Practices, Localities and Resources

Cultural Resources Implementation Schedule (Cont.)
Capital Investment Program

The cultural resource capital investment program includes stabilization, rehabilitation and interpretation projects which maintain or create structures and facilities All dollar amounts are in thousands

Project Name	District	Planning Phase (Year and $)				Design Phase (Year and $)				Construction Phase (Year and $)			
		FY	CR	FRP	Trail	FY	CR	FRP	Trail	FY	CR	FRP	Trail
Iron Goat Trail I	Skykomish	91	16	3	70	92	9	5	23	91	84	32	130
Iron Goat Trail II	Skykomish	92	14	3	10	93	60	6	28	94	161	132	80
Wayside Signs	Mt Baker & Skykomish	92	8	0	0	93	14	0	0	94	16	0	0
Suntop L.O	White River	92	2	0	0	93	6	0	34	94	6	0	104
Lookout Repairs	Mt Baker, Darrington, Skykomish	93	1	0	0	94	3	0	0	95	6	0	0
Barlow Pass Sign	Darrington	93	8	0	0	94	14	0	0	95	16	0	0
Nooksack Mining Interpretation	Mt Baker	93	10	0	0	94	15	0	0	95	20	0	0
Iron Goat III	Skykomish	94	1	1	7	95	2	5	29	96	39	20	47
Taylor River R S Interpretation	North Bend	94	5	0	5	95	8	0	8	96	10	0	10
Kennedy Guard Station Repairs	Darrington	94	10	0	0	95	15	0	0	96	20	0	0
Naches Trail Interpretation	White River	95	10	0	0	96	25	0	0	97	20	0	0
Monte Cristo Historical Tour	Darrington	95	10	8	0	96	10	8	0	97	30	45	0
Silver Springs G S.	White River	95	5	0	0	96	10	0	0	97	30	0	0
Darrington Barn Repairs	Darrington	96	5	0	0	97	10	0	0	98	30	0	0
Koma Kulshan G.S Repairs/Interpretation	Mt Baker	96	5	0	0	97	10	0	0	98	20	0	0
Snoqualmie Wagon Road Interpretation	North Bend	96	5	0	0	97	8	0	0	98	20	0	0

Planned Schedule for Developed Recreation Construction/Reconstruction Projects
All Dollar Figures are Thousand Dollars

Project Name	Funding Program	District	Planning Phase (Year & $)				Design Phase (Year & $)				Construction Phase (Year & $)			
			FY	Rec	FRP	Trail	FY	Rec	FRP	Trail	FY	Rec	FRP	Trail
SCHEDULED PROJECTS														
Gold Basin Mill Pond	Tr CCS	Darrington	89				90				90			17 0
Silver/Twin Rehab	RecCIP	Darrington	88				89				90	28 0		
Gold Cr. Pond 1	RW CCS	North Bend	90	5 0			90				90	32.0	7	33 0
" " "	Partnership										90	115.0		
Shadow of Sentinels	FERC\1	Mt Baker	Koma Kulshan				89				90	100.0		
Nighthawk Picnic	FERC\1	Skykomish	Snohomish PUD				89				90	486 0		
S Fork Boat Launch	FERC\1	Skykomish	Snohomish PUD				89				90	346 0		
Bear Cr VPt	FERC\1	Skykomish	Snohomish PUD				89				90	257 0		
Culmback Dam VPt	FERC\1	Skykomish	Snohomish PUD				89				90	42 0		
Deception Falls Picnic	RecCIP	Skykomish	89	7 0			90	8 0		1 0	91	107.0	56.0	137 0
Heather Meadows 3	RecCIP	Mt Baker	--				--				91	375.5		
Nooksack Falls Overlook	FERC\1	Mt Baker	Nooksack Falls Relicense				92				93			
Barclay Lake TH/Cpg	FERC\1	Skykomish												
Evergreen Lookout	Vol	Skykomish					90				90			
Lonesome Lake	KV/Vol	White River									90	18 0		
Darrington NWS	RecCIP	Darrington	91	12 0	1 0		92	33 5	15 0		93	290 6	99.0	33.5
--Restrooms/info display														
--RV Dump Station														
Mt. Baker Toilets	RecCIP	Mt Baker	91	3 0			92	10.0			93	230.0		
--Douglas Fir Cpg 4												(80)		
--Silver Fir 3												(60)		
--Austin Pass												(40)		
--Twin Lakes TH												(25)		
--Hannegan Pass TH												(25)		
Big Four	RecCIP	Darrington	91	2.2	1 1		92	6.7	8.0		93	53 0	16 4	
The Dalles Campground	RecCIP	White River	91	30.1			92	44.8			93	536 7	190 5	
Shannon Creek	RecCIP	Mt Baker	91	27 0			92	19 0			93	134 0	65 0	6.0
Denny C/Asahel H20	RecCIP	North Bend	91	8 3	5		92	30 0	6 0		93	275 0	19 0	
Darrington Toilets	RecCIP	Darrington	92	15 1	1 0		93	53 5	3 7		94	498.0	18 1	
--Verlot PSC toilets/H20														
--Verlot Cpg toilets/H20														
--Turlo Cpg toilets/H20														
--Verlot RV dump														
--trailhead toilets 2														

1990 PROPOSALS

MBS H20 & San	RecCIP		92	24 0			93	71 5			94	495 9				
--North Bend Toilets		North Bend	92				93				94					
----Denny Cr Cpg 4 toilets																
----Asahel Curtis 1 toilet																
----trailhead toilets 2																
--Skykomish		Skykomish	92				93				94					
----Beckler Water System																
----Beckler 3 toilets																
----trailhead toilets 2																
--White River Sanitation		White River	92				93				94					
----Suntop picnic																
----Trailhead toilets 2																
Mather Parkway Info	RecCIP	White River	91	24 8	4 2	3 3	92	34 4	25 7	4 4	93	291 0	90 5	45 6		
--Silver Cr Restrooms/info																
--Ranger Creek TH																
--Misc Interp																
Baker Lake Basin	RecCIP	Mt Baker	92	18 0	6 0	2 0	93	53 5	33 0	3 5	95	862 5	450 0	42 0		
--Entrance Sta/kiosk																
--Horseshoe/Pan Pt Cpg																
Gold Creek Pond 2	CCS	North Bend	91				92				93	88 0	18 0			
" "	Partnership										93	106 8				
Heavy Maintenance		MBS									91	200 0				
Heavy Maintenance		MBS									92	200 0				
Forest Partnerships		MBS	91	25							91	75.0				
Forest Partnerships		MBS	92	25							92	75 0				

OUTYEAR PROPOSALS

Cascade Interp Center	RecCIP	Skykomish	91	45 0			92	45 0			94	360 0				
Mtn Loop Fed Hwy Comp		Darrington	92	15 0			93	15 0			94	120				
Gold Creek Pond 3	RW CCS	North Bend	92	31 0			93	62 5			94	250 0				
" " "	Partnership										94	375 0				
Road Paving	FRP	Darrington	92		5 0		93		10 0		94		360 0			
--Verlot, Turlo, Lake 22, Bedal, Boardman campgrounds																
Pilchuck Rec Area	RecCIP	Darrington	92	30 0			93	30 0			94	200	2500 0	200		
Companion	Rd CIP															
Mt Baker NRA Trailheads	RecCIP	Mt Baker	92	5 0		10 0	93	10 0		14 0	94	100 0		218 0		
MBS Water & Sanitation	RecCIP		93	85 5	7 5		94	85 5	7 5		96	700	60 0			
--Tinkham Cpg 4 toilets		North Bend										(120)				
--Misc Trailheads 10		MBS										(200)				
--Gold Basin Showers		Darrington										(250)	(35)			
--Sky RV dump station		Skykomish										(15)	(15)			
Silver Spgs Cpg Reconst	RecCIP	White River	93	75 0			94	75 0			96	600 0				
Snoqualmie Pass VIC	RecCIP	North Bend	93	21 0			94	45 0	61 0		96	550 0	49 0	8.0		
Heavy Maintenance											93	200 0				
Forest Partnerships		MBS	93	25 0							93	75.0				

Darrington Info		Darrington	94	75	0				95	75	0				97	500			
--RS Reception																(200)			
--Verlot PSC Info/Remodel																(300)			
Corral Pass Campground	RecCIP	White River	94						95						97	250	0		
Money Creek Cpg Reconst	RecCIP	Skykomish	94						95						97				
Bayview Campground	RecCIP	Mt Baker	94						95						97	999.0			
Heavy Maintenance															94	200	0		
Forest Partnerships		MBS	94	25	0										94	75	0		
Greenwater Rec Area	RecCIP	White River	95						96						97			150	0
Hwy 2/North Fork Cpg	RecCIP	Skykomish	95						96						98	500.0		200	0
--Troublesome Ck Campground																			
--San Juan Campground																			
Decline Campground		Darrington	95						96						98	500	0	300	0
Mountain View Cpg		North Bend	95	75	0	6	0		96	75	0	30	0	2.0	98	500	0	300	0
Heavy Maintenance		MBS	95												95	200	0		
Forest Partnerships		MBS	95	25	0										96	75	0		
Evans Creek Campground		White River	96						97						98	200	0		
Heather Meadows Phase IV		Mt Baker	96						97						98	300	0		
Miller River Campground		Skykomish	96						97						99				
Heavy Maintenance		MBS	96												96	200.0			
Forest Partnerships		MBS	96	25	0										96	75.0			
Twin Lakes Rehabilitation		Mt Baker	97	5	0			5	0	98					99	85	0		
Clear Creek Conversion		Darrington	97						98						99				
Quartz Creek Horsecamp		Skykomish	97						98						99				
Heavy Maintenance		MBS	97												97	200	0		
Forest Partnerships		MBS	97	25	0										97	75	0		

MISCELLANEOUS PROJECTS

White Chuck Dispersed	KV	Darrington	92	93	95		
Monte Cristo Lake Picnic		Darrington	93	94	95	80	0
Sheep Mountain Picnic		Darrington	93	94	95	80	0
Coplay Lake	KV	White River					
Silver-Fir Cpg Reconst		Mt Baker					
Skagit R System Facil		Mt Baker					
Douglas Fir Cpg Reconst		Mt Baker					
Marble Creek Campground		Mt. Baker					
Suiattle Park-n-launch		Darrington					
Buck Ck Camp		Darrington					
Mt Baker Scenic Byway		Mt Baker					
Bacon Cr. Picnic Area		Mt Baker					
Lake Elizabeth Rec. Site		Skykomish					
Scenic Bicycle Camp		Skykomish					
Stevens Pass Historic District		Skykomish					
Park Creek Campground		Mt. Baker					
Boulder Creek Campground		Mt. Baker					
Mineral Park Campground		Mt. Baker					
Excelsior Campground		Mt Baker					
Nooksack Campground		Mt Baker					
Canyon Cr Campground		Mt Baker					
Perry Creek Campground		Darrington					
Hemple Ck Picnic Area		Darrington					
Dick Sperry Campground		Darrington					
Coal Lake Campground		Darrington					
French Ck Camp		Darrington					
Glacier Peak Viewpoint		Darrington					
Bedal Campground Expansion		Darrington					
Sloan Creek Campground		Darrington					
Twin Bridge Day Use		Darrington					
Wiley Group		Darrington					
Red Bridge Campground		Darrington					

\1 *FERC negotiated recreation mitigation projects*
RecCIP = recreation capital investment program
Rd CIP = roads capital investment program
FRP = forest roads program
CCS = challenge cost share
KV = Knudtson Vandenberg timber sale receipts
Vol = Volunteer
PC = purchaser credit
RW = recreation/wildlife

Table D-4
Planned Schedule for Developed Trailhead Construction/Reconstruction Projects
All Dollar Figures are Thousand Dollars

Project Name		District	Planning Phase (Year & $)				Design Phase (Year & $)				Construction Phase (Year & $)			
			FY	Rec	FRP	Trail	FY	Rec	FRP	Trail	FY	Rec	FRP	Trail
CURRENT PROGRAM														
Gold Basin Mill Pond	TH CIP	Darrington									90	8 0	32 0	
Sunrise Mine TH	KV/PC	Darrington	89				90				91	35.0		
Companion	Rd CIP													
Schreibers TH	FRP	Mt. Baker					89				90			
Loomis/Nooksack Snopark	FERC\1	Mt Baker	Koma Kulshan				89				90	20 0		
Sulphur Cr Snopark	FERC\1	Mt Baker	Koma Kulshan				89				90	20 0		
MARCH 1990 PROPOSALS FOR REGIONAL CIP														
Middle Fk Snoqualmie	TH CIP	North Bend	91		2 0	2 0	92	1 5	20.0	25 9	93	29 0	69 0	129 8
Companion	Rd CIP													
Iron Goat Trailheads	TH CIP	Skykomish	91	6.1	1 2		92	49 1	12.8		93	72 0	51 7	94 2
--Scenic Trailhead														
--Martin Creek Trailhead														
Schreibers Horse Facil	TH CIP	Mt Baker	89				91	5 0			91	77 0		
Barlow Pass TH	TH CIP	Darrington	92	6 0			93	8 0			94	77.0		
Pyramid Snowpark	TH CIP	White River	91		3 3		91		6.7		92	76.0		
Loomis Snowpark	TH CIP	Mt Baker	91		1.0		91	3 0	2.0		92	33.0	39.0	
OUTYEAR PROPOSALS FOR REGIONAL CIP														
Wellington Trailhead	TH CIP	Skykomish	92				93				94			
Beaver Lake TH	CCS	Darrington	92	3 0			93	4 0			94	25 0		
Green Mountain TH		Darrington	92	2 0			93	3 0			94	40 0		
Companion	Rd CIP													
Mc Clellan Butte T H	TH CIP	North Bend	92	1.0	2 0	.5	93	8.0	9 0	2	94	40.7	90 5	5 0
Companion	Rd CIP													
Lake Serene Trailhead		Skykomish	92				93				94			
Companion	Rd CIP													
Naches TH	TH CIP	White River	93		2 0		94		6 0		95	2 0	50.0	
Hannegan Trailhead	TH CIP	Mt Baker	93				94				95	50 0		
Perry Creek TH	TH CIP	Darrington	93	3.0			94	4 0			95	45 0		
Tonga Ridge Trailhead		Skykomish					93				94			
Denny Cr T H		North Bend	94	1 0	2.0		95	2 0	5.0		96	10.0	25.0	
Dickerman TH		Darrington	94	3 0			95	4 0			96	30.0		
West Fork Snowpark		White River	94		2 0		95		4.0		96		70 0	
Mt. Pugh TH		Darrington	95	3 0			96	4 0			97	30 0		
Talapus T.H		North Bend	95	2 0	2.0		96	4 0	5.0		97	12 0	15 0	
Foss River Sno/Necklace TH		Skykomish	95				96				97			
Meadow Mtn/Circle Cr/Crystal														
Lk TH		Darrington	96	3 0			97	5 0			98	50 0		
West Fork Foss Trailhead		Skykomish	96				97				98			
Downey Creek TH		Darrington	97	2 0			98	3.0			99	30 0		
Lake Dorothy Trailhead		Skykomish	97				98				99			

Lost Creek Ridge TH		Darrington	98			99			00	
Beckler River Snowpark		Skykomish	98			99			00	
Ridge Trail TH		Darrington	99	4	0	00	5	0	01	60 0
Surprise Lake Trailhead		Skykomish	99			00			01	
FOREST TRAILHEAD PROGRAM										
Bald Eagle TH	FRP	Darrington	94	2	0	95	3	0	96	15 0
Segelson Snowmobile TH	FRP	Darrington	95	2	0	96	4	0	97	15 0
Mallardy TH	FRP	Darrington	96	2	0	97	3	0	98	20 0
Coal Lake TH	FRP	Darrington	96	2.0		97	3	0	98	20 0
Thorton Lake TH	FRP	Darrington	97	2.0		98	3	0	99	15 0
Sloan Peak Climber TH	FRP	Darrington	98	2	0	99	3	0	00	10 0
Marten Creek TH	FRP	Darrington	99	2	0	00	3	0	01	10.0
Summit Lake TH	FRP	White River	94	2	0	95	3.0		96	30.0
Skookum Flats TH	FRP	White River	95	2	0	96	3.0		97	20 0
Silver Creek Snowpark	FRP	White River	90	2	0	91	2.0		91	20 0
MISCELLANEOUS TRAILHEADS										
Tinkham ORV Area	IAC	North Bend	88	IAC		89	IAC		91	IAC Funds
Cable Drop Staging Area	CCS	Skykomish								
Lake Isabel Trailhead		Skykomish								
White Chuck TH		Darrington								
Boulder River TH		Darrington								
Three Fingers TH		Darrington								
Mt Higgins TH and ROW		Darrington								
White Chuck Bench TH		Darrington								
Halls Peak TH		Darrington								
Suiattle TH		Darrington								
8 Mile TH		Darrington								
Noble Knob		White River								
Goat Creek		White River								
Divide		White River								
Colquhoun		White River								

APPENDIX E
Trail Management Plan and Implementation Schedule

A. INTRODUCTION

This is a plan for management of the trail system of the Mt. Baker-Snoqualmie National Forest. It will be reviewed and updated periodically; it replaces a similar 1979 Interim Trails Plan.

The trail system is an essential ingredient in the management and use of the Forest and its eight wildernesses. It provides access to more than half the Forest that lacks road access; it serves a rapidly growing, diverse clientele of recreational users engaged in a wide variety of activities. The direction taken in management of the trail system will, in turn, influence the management of related resources such as wilderness, recreation, fish and wildlife.

The majority of the trails now in use were developed over the years by prospectors, miners, sheepherders, and for administration and fire suppression by the Forest Service. In addition, some follow Indian trade routes between Eastern and Western Washington; the North Fork of the Sauk being one of these. Some of the trails with historical significance being used in part are: Naches Pass Wagon Road, Elliot Creek Wagon Road, Snoqualmie Pass Wagon Road and the route over Poodle Dog Pass from Silver Creek used by the discovers of the "broad bold ledge of gold" that built Monte Cristo. Portions of the Monte Cristo Railroad, outside the National Forest, have been opened by volunteers. Some historical routes being considered for operation as recreation trails are the Monte Cristo Wagon Road, the Great Northern Railroad-Scenic to Tye (1892-1929) and the Snoqualmie Pass Wagon Road.

Railroad grades and wagon roads generally make good trails because of the attention paid to drainage and water control during design and construction. Most old trails, however, were located by the most economical route between two points, using natural openings and steep grades. The design provided only a way to move supplies, generally by pack string, with some degree of safety. These trails served their purpose at the time because of the low use and little worry about environmental concerns.

With the large increase in recreational use, the majority of these trails are no longer adequate. An example is the trail from the Chiwawa River through Buck Creek Pass to the Glacier Peak mines. It was constructed about 1890, and is still in use today. Water control is difficult or impossible on most of its length.

During the 1950's and 1970's many miles of trail were replaced by the rapidly expanding road system. Aircraft were increasingly used to provide access to areas not accessible by road. Grazing in the mountain meadows declined and mining and prospecting were at a low ebb. As a result, the trail system lost most of its traditional reasons for existing. Many miles of trail were abandoned and most of the rest were not maintained to standard.

However, by the 1960's a new clientele for the trail system had emerged and was rapidly growing--the recreational visitor. There had always been some recreational use of trails, but it now became the primary use. Recreational activities became diversified with day hikers, backpackers, horsemen,

motorbikers, climbers and others competing for use of a trail system that had been originally developed for none of them and was in a general state of disrepair. Bicycle riders and handicapped persons found almost no trails suitable for their use. The season of use expanded from summer and autumn to nearly year around as snow camping, winter mountaineering and cross-country skiing became more popular, and as people increasingly sought snow free trails for winter and early spring trips.

In 1977, the Ice Caves Trail on the Darrington Ranger District was designated as a National Recreation Trail, the first on the Forest. Since 1977 the Deception Falls Trail, Shadow of the Sentinels and Skookum Flats Trails have also been designated. Several more trails are proposed for National Recreation Trail status, but formal designation must await reconstruction of these trails to meet required standards. The criteria for National Recreation Trails states that these trails should be to an acceptable standard to serve anticipated use at the time they are designated, and that they should normally not be located in wilderness.

This Trail Plan is a revision of the 1979 Interim Trails Plan; it is responsive to Management Area assignments made in the Forest Plan and to public comments made in response to the DEIS. It will be coordinated with other plans and land uses, including:

1. Existing land management plans and designated land uses. Some of the Forest landbase has been designated to specific uses or has limitations on its use that affect trail planning, including:

    a. Wildernesses: Glacier Peak, Alpine Lakes, Mt. Baker, H.M. Jackson, Noisy-Diobsud, Boulder River, Norse Peak, Clearwater.

    b. Existing RNA's: Lake Twenty-two, Long Creek and North Fork Nooksack Research Natural Areas; recommended RNAs at North Fork Nooksack addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

    c. Municipal Watersheds: such as the Cedar, Tolt, Green, and Sultan.

    d. Alpine Lakes Land Management Plan.

    e. Skagit River Final Management Plan.

    f. Pacific Crest National Scenic Trail.

    g. Mt. Baker National Recreation Area.

All trail planning in these areas must conform to the Forest Plan.

2. Bordering and intermingled lands that are not National Forest. Lands of a variety of ownerships and management border the Forest, or are intermingled with National Forest land inside the Forest boundary. Trail planning must fit this complex situation. These areas include:

    a. Mt. Rainier and North Cascade National Parks.

    b. Canada.

c. Lands managed by the Washington State Department of Natural Resources and Washington State Parks.
Washington State trails system
Local County trails system

d. Intermingled private land ownership.

3. Forest Off-Road Vehicle Plan. This plan, completed in 1977, has been revised and updated (see Appendix H) to interface with the land assignments of the Forest Plan, and new wilderness designations of the 1984 Washington State Wilderness Act.

B. OBJECTIVES

Forest-Wide Objectives and Policies.

The following Forest-wide objectives and specific management policies have been prepared to guide the preparation of this plan and management actions arising from it.

Overall Objectives Applicable to the Entire Forest.

1. To provide a system of trails with routes, construction standards and maintenance standards that compliment the resource capabilities and management objectives of the area served. The system will also provide for necessary administrative access, provide for safe use on various difficulty levels of trails, and have minimum impact on soil, water, visual and other sensitive values.

2. To provide on a Forest-wide basis (not necessarily on each Ranger District) a broad spectrum of trail travel opportunities including: trails at various elevations, trails in diverse settings, and trails suitable to various kinds of users and modes of travel.

3. To proceed from the present trail system to an optimum future system as rapidly as is practicable through reconstruction, relocation, new construction, and the rehabilitation of unneeded trails to a natural condition.

4. To achieve a unified trail system, on and adjacent to the Forest, and assure that the Forest trail system complements management of adjacent land and vice-versa.

5. To assure that the trail system meets the needs of trail users, while remaining consistent with resource capabilities and land allocations.

6. To apply available funds to the highest priority trail reconstruction, construction, and maintenance projects.

7. Trails shall assume the visual quality level of the management area they pass through.

Specific Policies Applicable to the Entire Forest.

1. A broad spectrum of trails will be provided, varying in degree of ease and convenience. Trails will meet the primary objective and difficulty level standards as described in FSH 2309.18.

2. Trails may be provided where soil and vegetation, on and adjacent to the trail route, are suitable for such uses.

3. Each trail shall be managed to a particular "primary objective" (user type). If conflicts arise they will be minimized thru information and education, or as a last resort, closed to users other than the primary objective user.

4. Motorized and/or pack and saddle use of existing trails will be allowed only where the trail, as presently constructed (and soils and vegetation adjacent to the trail), can absorb such use without unacceptable damage.

   In some cases the long range "primary objective" may not exist until the trail is reconstructed to that standard. Closures may exist until the trail meets the planned "primary objective" standard.

5. Existing and potential heavy use areas (focal areas) will receive special attention in planning so that necessary facilities are provided, and trails do not introduce undesirable use. Such planning will be completed prior to major construction and/or reconstruction affecting such focal areas.

6. Hiker-only trails shall, when feasible, be separated from trails open to other kinds of users. Trails open to other kinds of users should not dead-end at a hiker-only trail.

7. Trails for pack and saddle use should, when topographically possible, by-pass focal areas, such as alpine lakes, by at least 200 feet in elevation or 500 yards horizontally.

8. Trail systems should provide for loop trails and interconnecting links where consistent with other needs, constraints, and land allocations.

9. Special emphasis will be given to identification and planning for trails at elevations where the ground is usually snow free for at least half of the year.

10. Seasonal use restrictions will be used where appropriate to protect soil, vegetation, wildlife, and to manage conflicts in use.

11. Maps showing restrictions on the use of trails will be developed and made available to the public.

12. Only system trails are considered safe for use. Only system trails will be signed on the ground and shown on maps. Publishers of guidebooks will be encouraged to follow a similar policy.

13. Priority for use of trail funds will generally be as follows:

a) Maintenance of the existing system.

b) Reconstruction and relocation of existing trails to protect the resources.

c) Reconstruction and relocation of existing trails for user safety and convenience.

Within these priority levels, individual projects will be prioritized based on such factors as environmental protection concerns, user safety, volume of use, and length of season of use.

14. The use of volunteers for trail maintenance will be encouraged.

15. Wheeled motorized vehicles will be prohibited on groomed snowmobile and cross-country ski trails.

Specific Policies Applicable to Certain Management Areas on the Forest.

1. Wilderness.

a. Management objectives will be aimed toward providing a primitive recreational experience in a natural wilderness setting.

b. Trail management objectives will be closely related and coordinated with the WROS zone to be served.

c. A diverse spectrum of opportunities and experiences by difficulty level, mode of travel, distance and kind of destination will be sought.

d. Visitors will be discouraged from establishing additional informal trails.

e. Normally, no new trail construction or major reconstruction will be undertaken until an environmental analysis has been completed for the site specific project.

f. The major objective in trail planning is to minimize the impact of trails on soils, vegetation, visual and other resource values.

g. Trail construction and maintenance in wilderness areas using motorized equipment may be allowed only with approval of the Regional Forester. Approval will be on a one-time, case-by-case basis.

h. Bridges will be provided only when:

- The most suitable and logical crossings cannot be safely negotiated during primary periods of use.

- When less formal devices (i.e., footlogs) are likely to be frequently destroyed by flood waters.

i. Native materials (wood, local rock, bank-run gravel) that blend with the trails environment will be used where such materials are necessary as a part of trail construction.

j. Signing will be held to a minimum and consist of rustic white oak signs showing trail destination.

2. Unroaded Management Areas Outside of Wilderness. This includes all areas of sufficient size to constitute a manageable entity that, based on classification, resource capability, and/or land use planning recommendations, will continue to be managed in a roadless condition for the foreseeable future. The following specific policies will apply to each such area:

   a. The trail system will be based on, and consistent with, the resource capability and management objectives of the area.

   b. In most areas, management objectives will aim at providing a primitive recreational experience in a near-natural setting.

   c. Compared to wilderness, a greater degree of modification of the natural environment will be allowed in trail construction and maintenance, if necessary to achieve standards consistent with management objectives. Non-native materials and motorized equipment may be used.

3. Roaded Management Areas. This includes all areas that are presently roaded or that, based on classification, resource capability and/or land use planning recommendations, will be roaded in the foreseeable future. The following specific policies will apply to such areas:

   a. This Trail Plan and Trail System planning will be an integral part of project planning.

   b. Significant trail opportunities will be identified and managed as the road systems are developed. Examples of "significant trail opportunities" include:

      - Trails from a road to a significant feature or attraction such as a fishing stream or viewpoint.

      - Trails that will be snow-free for at least half the period from November through April.

      - Trails of historical significance.

      - Trails that are part of a continuous route from low to high elevations.

   c. Trails interrupted by logging or road construction will be restored or substitute trails with the same primary objective and difficulty level provided so that the mileage of trails in the same general area is not diminished. Trails will be kept open, and clear directions for users provided during interrupting activities.

d. Where resource capabilities and management objectives permit, consideration will be given to the development of trails suitable for motorized use.

e. Abandoned or closed portions of the road system will be considered for management as trails.

f. Hiker & interpretative trails should be provided near most large campgrounds to provide for visitor use and enjoyment. Some of these should be suitable for barrier free access.

g. Trails suitable for barrier free users will be provided so as to make recreation opportunities more available to them.

4. Pacific Crest National Scenic Trail. This is a part of the National Trail system by Act of Congress. It is managed for hiker and pack/ saddle use. Standards for construction and maintenance have been established for its entire length. The following specific policies will apply:

a. Where the trail passes through wilderness; location, design, construction and maintenance standards will be modified to the extent needed to meet the intent of WROS zone through which it passes.

b. In non-wilderness areas manage to meet standards of ROS zone that the trail passes through.

c. Management will be fully coordinated with the Wenatchee National Forest and the National Park Service.

d. Motorized and mountain bike use shall not be allowed on any trail or segment of trail that terminates at the Pacific Crest Trail, unless there is a logical destination point of attraction prior to the PCNST.

e. Mountain bikes are not allowed on the Pacific Crest Trail, as per Regional Forester closure notice, August 31, 1988.

5. National Recreation Trails. The National Recreation Trails System highlights certain trails that provide outstanding opportunities for recreational use located near centers of population.

a. Potential National Recreation Trails will be identified that meet the established criteria.

b. Priority will be given to bringing existing and potential NRT trails to standard.

c. As they are brought to standard, they will be formally proposed for designation.

6. Areas Where Public Use is Prohibited or Not Encouraged. This includes some municipal watersheds and the Research Natural Areas. The following specific policies will apply to such areas:

a. In Research Natural Areas, research personnel will be consulted about any trail plans or proposals.

b. Public use of existing trails in Research Natural Areas may be allowed to continue, but increases in such use or off-trail use will not be encouraged.

c. Trails in, or on the border of municipal watersheds will not be constructed or reconstructed before local officials have been contacted.

7. Trailhead Policy. A trailhead is the place where a trail connects with a road or a navigable body of water. Trailhead use, and therefore trailhead development, varies greatly. The following specific policies will apply to trailheads:

a. Trailheads are part of the transportation system and will be developed and maintained with Forest Roads Program funds.

b. As a minimum, a trailhead will provide adequate parking for an average peak season weekend day's use. This may be provided by turnouts located within 1/4 mile of the trail. Signs and posters needed to inform the trail user should be provided.

c. Heavier use situations may include off-road parking, horse-handling facilities, toilets and garbage containers. Only under unusual circumstances will such facilities as potable water and camping facilities be provided at trailheads.

d. When a trail will be intersected by new road construction, the needed trailhead facilities should be part of the road construction "package".

C. TRAIL EVALUATION AND ANALYSIS

Based on the objectives and policies stated in Section B, each existing trail has been evaluated. Both long term and short term management have been proposed. New trails have been proposed. A summary of this information follows, in Table E-1.

D. EVALUATION OF THE PROPOSED TRAIL SYSTEM AGAINST MANAGEMENT OBJECTIVES

The trail plan presented in Table E-1 reflects the best judgment of the Ranger District personnel. However, they need to be looked at on a Forest-wide basis to see if they fit into a logical, comprehensive network that will meet the needs of recreational visitors and users, protect and maintain fragile resources and be economically feasible to construct, operate and maintain. Accordingly, the entire trail system has been evaluated in the light of several issues, as follows:

1. Is the total trail mileage adequate for future needs? In recent years, use of trails on the Forest has increased steadily and now is about 304,000 visitor days annually. Past data from the Glacier Peak Wilderness, believed to be fairly typical of the medium to high elevation areas on the

Forest, indicates that about 87% of total use occurs between July 1 and September 15 and that about 35% of total use occurs on Saturdays and Sundays. If this is the case, on a typical summer weekend day, the trail system presently receives about 4,200 visitor days of use. The average user spends about 4 hours per day on-trail, so this 4,200 visitor days of use represents use by 12,600 persons, or about 8.8 persons per mile of trail per day. On a typical summer weekday, the comparable figures would be 3,125 visitor days of use, 9,377 persons and 6.5 persons per mile. Thus, the system, as a whole, is not overused and could probably experience twice as much use as at present without seeming overcrowded to the average user. However, there are certain trails in the system that regularly experience heavy overuse. One of the main problems is that users tend to use the same trails every year.

At present, some segments of the system are overcrowded. However, as the inadequate portions of the system are brought up to standard, use could become spread more evenly over the entire system. With the new mileage proposed, the system should be adequate to meet future needs and management objectives.

2. Is the proposed new trail mileage appropriate? The 440 miles of proposed new trail constructed (decades 1 and 2) in the plan are identified to serve several needs:

   a. Provide trails for barrier free use. Only 8.6 miles of such trail now exists. Additional 13.4 miles will be needed and will be considered during trail planning process.

   b. Low elevation trails to provide additional opportunities during winter and early spring.

   c. Medium to high elevation trails that penetrate areas that presently lack trail access, especially in non-wilderness settings.

      New trail construction in wilderness areas are the most controversial. The trailless areas concerned are presently used by persons who enjoy the challenge and solitude of off-trail scrambling. Some contain lakes that at present levels of use, provide quality fishing, but might deteriorate with additional pressure. Thus, while a few new trails are included in the plan, their future construction will depend on the need for these facilities to protect the wilderness resource from deterioration. Construction would occur only after a complete environmental analysis.

      Trail density in wilderness is also of concern. Large areas of Designated Trailless will exist in the wilderness without trail access, and will continue to provide unusual opportunities for solitude.

3. Is an adequate mileage of trails to serve various modes of travel provided?

   a. Hiker. Over 80% percent of all trail use on the Forest is by hikers. Of the existing and proposed trails about 42 percent will be designed and open for hiker use. This is considered to be an adequate share of the Forest trail system.

b. Pack and Saddle. About 8 percent of all trail use on the Forest is by equestrians. About 32 percent of the existing and proposed trails will be designated "primary user" pack and saddle and open to horse use. This is considered to be adequate to disperse use and provide a variety of trail riding experiences.

c. Motorized. Two-wheeled motorized vehicle travel accounts for about 8 percent of the present trail use on the Forest. This mode of travel is probably somewhat depressed by a lack of suitable trails. About 15 percent of the existing and proposed trail mileage will be designated for motorized use, including snowmobiles, and open to motorized use. This alone, is not considered to be adequate. However, there are other sources of opportunities for motorized trail travel that this plan does not fully explore:

- Fairly concentrated networks of trails developed specifically for motorized use.

- A considerable mileage of low standard roads that are normally closed to other forms of motorized travel.

Several areas have been tentatively identified as having potential for development of motorized trails. More detailed planning for these units is presently impeded by several conditions, including:

- An intermingled land ownership pattern where the private landowner has been reluctant to participate.

- Strong public opposition to County motorized trail proposals in the some areas. Very strong opposition to state funding of ORV trails has emerged. This makes the public acceptance of Forest Service proposals in similar areas rather doubtful.

d. Barrier Free. There is no estimate of the present use of the Forest by physically Barrier free persons. The additional three trails totalling 2 miles proposed for Barrier free use is considered to be inadequate to provide opportunities for this segment of the population. About two miles have been constructed to barrier free standards.

e. Mountain Bicycle. Bicycle use of the existing trail system is growing in popularity. Bicycling opportunities for the future will be on paved and unpaved Forest roads and on specifically designated trails for mountain bikes. The roaded bikeways may be physically separate from and parallel to the road. Several routes through the Forest that are now paved or will probably be paved in the future, appear to offer excellent possibilities. They include the Mt. Baker Highway (State Route 542), the Baker Lake Highway, the Mountain Loop Highway, the Beckler River-North Fork Skykomish loop, the Middle Fork Snoqualmie River Road and the White River Highway (State Route 410). As sections of these routes are reconstructed, provision for bicycle travel should be included. Because some of these roads are state highway routes,coordination with state agencies will be needed.

Mountain bike use is on the increase but still is not significant. As use increases beyond its present level, and pressure for such use increases, the forest will provide for this type of recreational experience when and where appropriate. The forest has recognized the need for some mountain bike trails, and has designated 24.9 miles of existing trails for such use. An additional 46.9 miles are proposed in the future.

f. Four-Wheel Drive Routes. This plan deals only with trails, which by definition, are travelways for vehicles less than 40 inches wide. Therefore, this plan makes no provisions for four-wheel drive use. This subject is covered in the Forest Off-Road Vehicle Plan, see Appendix H, of the Forest Plan.

g. Snow Trails. Ski touring, snowshoeing and snowmobiling are increasingly popular activities on the Forest. Presently, ski touring and snowshoeing use totals about 40,000+ visitor days and snowmobiling about 18,000+ visitor days. Most use occurs on cross country routes or on roads that are snowcovered. Other routes may be desirable and should be planned for.

4. Is the plan economically feasible? The annual maintenance needs identified in the individual trail evaluations total approximately $250,000 for the Forest. This is comparable to current trail maintenance budgets.

Reconstruction costs total $7,400,000 for the existing system. To complete this work over a 10 year period would require more than $740,000 per year. Proposed new construction would cost $5,500,000. To complete this work over a 10 year period would require close to $1,300,000 per year.

Legend for Table E-1
System Trail Inventory

The following table (E-1) shows the system trails on the Forest, listed in numerical order by Ranger District. The first column is the trail number, followed by trail name. Column three shows the trail termini, or where the trail, or trail segment, begins and ends.

County (Co) this column indicates county.

W = Whatcom
SK = Skagit
SN = Snohomish
K = King
P = Pierce

Trail Difficulty (Diffi) is coded in column four with the following codes.

E = Easiest
M = More Difficult
D = Most Difficult

Primary Objective (Pri_Obj) or the primary user group for which the trail is to be managed. While, in some cases, other users may use the trail, the trail facility will be managed, designed and maintained to the primary objective (user) standard. See Table H-1 for specific closures.

1 = Hiker
2 = Pack and Saddle
3 = Bicycles
4 = Motorbike
6 = Snowmobile
7 = Cross-country skiing
8 = Barrier free
9 = Interpretive
10 = Jeep Trail
12 = Portage Trail

Use refers to the current use level.

X = Extra Heavy - 5,000 plus users per year
H = Heavy - 2,501 - 5,000 users per year
M = Medium - 501 - 2,500 users per year
L = Low - 1 - 500 users per year

Area delineates the type of area the trail passes through; these mileages do not overlap.

Non = Nonwilderness
Wild = Wilderness
NRA = National Recreation Area
RNA = Research Natural Area
W&SR = Wild and Scenic River
Byway = Scenic byways

EX-MI lists the miles of existing trail, these miles are further broken down by miles that are adequate or inadequate.

The final column Propo refer to proposed miles of trail to be constructed.

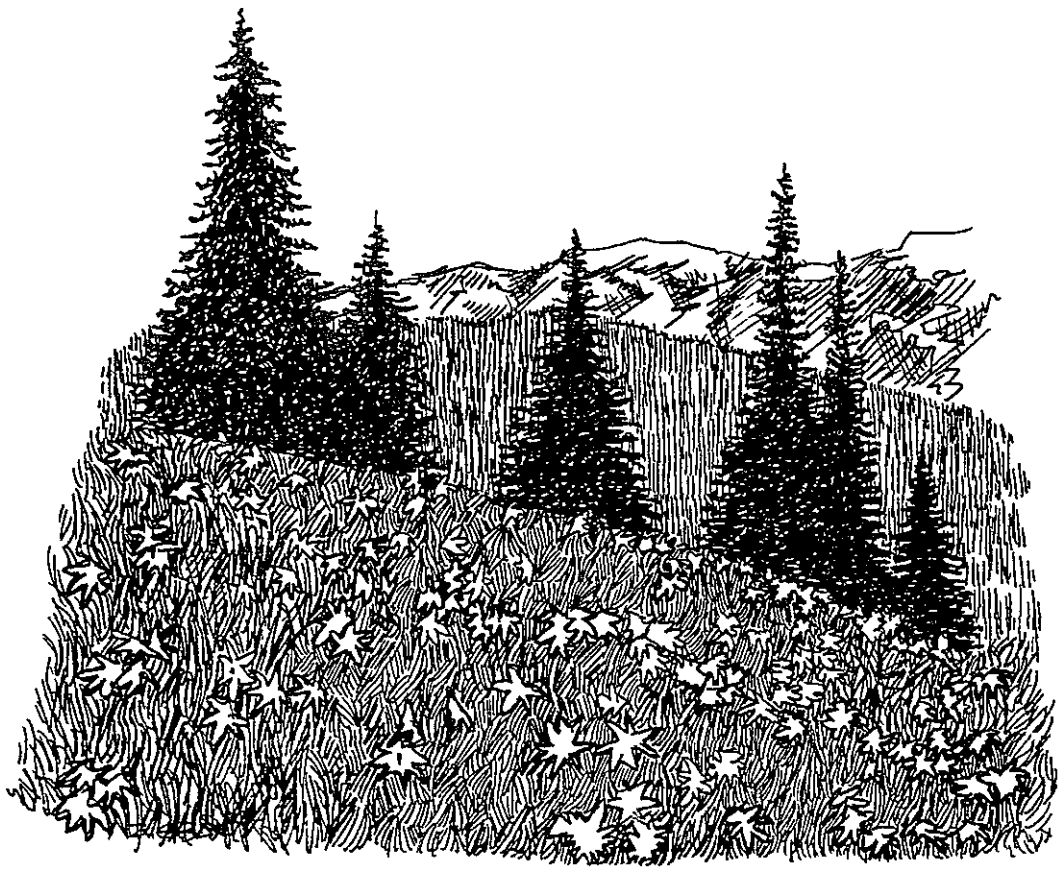

Table E-1 Trail Inventory

	DIST_	TRAIL_NO	TRAIL_NAME	TRAIL_TERMINI	CO	DIFFI	PRI_OBJ	USE	AREA	EX_MI	ADEQ	INADEQ	PROPO
1	01	100	CANYON CREEK 31	CANYON CR CC TO EXCELSIOR PASS	W	M	6	H	NON	9 0	9.0	0.0	0.0
2	01	100 1	BALD MTN 3140	CANYON CR CC TO END OF RD 3140	W	D	6	L	NON	8.0	8 0	0.0	0 0
3	01	100.2	CHURCH LK 3160	RD 31 TO CHURCH LK	W	M	6	H	NON	5.0	5 0	0 0	0 0
4	01	100 3	BEARPAW LK 3170	RD 31 TO ROAD END	W	D	6	M	NON	3.0	3.0	0.0	0.0
5	01	101	GLACIER CREEK 39	THOMPSON CR BR TO LOOKOUT MTN	W	M	6	H	NON	12 0	12.0	0.0	0.0
6	01	101.1	GROUSE BUTTE 3600	RD 39 TO ROAD END	W	M	6	M	NON	4 0	4 0	0 0	0 0
7	01	101.2	GROUSE BUTTE 3620	RD 3600 TO ROAD END	W	M	6	M	NON	2.0	2 0	0 0	0 0
8	01	103	NORTH FORK 34	SHUKSON PA TO TR 104	W	M	7		NON	0 0	0 0	0 0	7 0
9	01	104	SALMON RIDGE	HWY 542 TO HWY 542	W	E	7	H	NON	15 0	15.0	0.0	2.0
10	01	105	HEATHER MEADOWS	HWY 542 TO HWY 542	W	E	7	X	NON	3.0	3 0	0 0	0 0
11	01	105.1	ARTIST POINT	HWY 542 TO ARTIST POINT	W	M	7		NON	0.0	0 0	0 0	2.0
12	01	105 2	TABLE MTN TRAVERSE	HWY 542 TO WILD BDRY	W	D	7		NON	0 0	0 0	0 0	1 0
13	01	105.21	TABLE MTN TRAVERSE	WILD BDRY TO WILD BDRY	W	D	7		WILD	0 0	0 0	0.0	2 0
14	01	105.22	TABLE MTN TRAVERSE	WILD BDRY TO HWY 542	W	D	7		NON	0 0	0.0	0.0	1.0
15	01	106	LOOMIS-NOOKSACK 12	FH 25 TO WANLICK PASS	W	E	6	M	NON	7 0	7.0	0 0	0 0
16	01	106.1	BLUE LAKE 1230	RD 12 TO ROAD END	W	E	6	M	NON	4.0	4 0	0 0	0 0
17	01	106 2	SCHRIEBER MDWS 13	RD 12 TO EASTON GLACIER	W	M	6	X	NRA	7.0	7 0	0 0	0 0
18	01	107	ANDERSON CREEK 1107	RD 11 TO ROAD END	W	M	6	L	NON	9 0	9 0	0 0	0 0
19	01	108	RAINBOW FALLS LOOP	RD 11 TO RD 11	W	M	7	M	NON	7 0	7.0	0 0	0.0
20	01	108.1	BOULDER RIDGE 1131	TR 108 TO END OF RD 1131	W	M	7	L	NON	3 0	3.0	0.0	0 0
21	01	108 2	MARTIN LK 1130	TR 108 TO END OF RD 1130	W	M	7	L	NON	4.0	4 0	0 0	0 0
22	01	109	SEGELSON PASS 17	RD 17 TO FOREST BDRY	SK	M	6	M	NON	15 0	0 0	15 0	0 0
23	01	600	LAKE ANN	HWY 542 TO WILD BDRY	W	M	1	X	NON	0 6	0 6	0 0	0.0
24	01	600 01	LAKE ANN	WILD BDRY TO NATL PARK BDRY	W	M	1	X	WILD	4 2	4.2	0.0	0.0
25	01	601	COUGAR DIVIDE	RD 33 TO TR 682.1	W	M	1	M	WILD	3 0	0.0	3.0	12 3
26	01	602	NOOKSACK FLAT	RD 12020 TO WILD BDRY	W	M	1	L	NON	7 0	4 0	3 0	0 0
27	01	602.01	NOOKSACK FLAT	WILD BDRY TO SEC 18	W	M	1	L	WILD	1 0	0 0	1 0	0 0
28	01	602 1	WANLICK CK	TR 602 TO SCOTT PAPER BRIDGE	W	M	1	L	NON	1 0	0 0	1 0	0 0
29	01	603	PARK BUTTE	RD 13 TO PARK BUTTE L.O.	W	M	2	X	NRA	3 5	3 5	0 0	0.0
30	01	603 1	SULPHUR MORAINE	TR 603 TO TR 603	W	M	1	M	NRA	1 5	0.0	1.5	5.0
31	01	603.2	RAILROAD GRADE	TR 603 TO MEADOW PT	W	M	1	M	NRA	2 0	0.0	2.0	1.0
32	01	603.3	MAZAMA PARK	TR 697 TO WILD BDRY	W	M	2	M	NON	2.0	0 7	1.3	0 0
33	01	603.31	MAZAMA PARK	WILD BDRY TO WILD BDRY	W	M	2	M	WILD	2.0	1 0	1 0	0 0
34	01	603.32	MAZAMA PARK	WILD BDRY TO TR 603	W	M	2	M	NRA	1 0	0 0	1 0	1 0
35	01	604	BLUE LAKE	RD 1230 TO BLUE LK	W	E	1	X	NON	0 7	0 3	0 4	0 0
36	01	604 1	DOCK BUTTE	TR 604 TO DOCK BUTTE	W	M	1	M	NON	1 5	1 0	0 5	0.0
37	01	605	BOULDER RIDGE	RD 1131 TO WILD BDRY	W	M	1	M	NON	2 1	0.5	1.6	0.0
38	01	605.01	BOULDER RIDGE	WILD BDRY TO CRATER MORAINE	W	M	1		WILD	1 5	0 0	0.0	1.5
39	01	606	BAKER RIVER	RD 1168 TO NCNP BDRY	W	E	1	H	NON	1.6	1 6	0 0	0 0
40	01	607	SWIFT CREEK	PARK CR CG TO MOROVITZ RANCH	W	E	8		NON	0.0	0 0	0 0	0 5
41	01	607 01	SWIFT CREEK	MOROVITZ RANCH TO WILD BDRY	W	M	1		NON	0.0	0 0	0 0	2 0
42	01	607 02	SWIFT CREEK	WILD BDRY TO TR 600	W	M	1	M	WILD	7 5	4 0	3 5	0 0
43	01	608	SHUKSAN LAKE	RD 1160 TO SHUKSAN LK	W	D	1	M	NON	2 0	1.2	0.8	0 0
44	01	610	EAST BANK	RD 1107 TO TR 606	W	E	2	H	NON	4 0	3.0	1.0	9.0
45	01	610 1	ANDERSON POINT	TR 610 TO ANDERSON PT	W	E	1	H	NON	0 3	0 3	0.0	0.0
46	01	610 2	NOISY CREEK LOOP	TR 610 TO TR 610	W	M	1	L	NON	1 0	0 0	1 0	1.5
47	01	611	WATSON LAKES	RD 1107 TO WILD BDRY	W	E	1	X	NON	2 0	1 3	0 7	0.0
48	01	611.01	WATSON LAKES	WILD BDRY TO WATSON LKS	W	E	1	X	WILD	0 3	0 0	0 3	0 0
49	01	611.1	ANDERSON BUTTE	TR 611 TO ANDERSON BUTTE	W	M	1	M	NON	1.5	0 4	1 1	0 0
50	01	611.2	ANDERSON LAKES	TR 611 TO TR 763	W	M	1	H	NON	0 4	0 0	0 4	2 0
51	01	612	GEE POINT	RD 1722 TO GEE POINT	SK	M	1	L	NON	1 2	1 2	0 0	0 0
52	01	613	SAUK MOUNTAIN	RD 1030 TO SAUK MT	SK	E	1	X	NON	2 1	1 8	0 3	0 0

Table E-1 Trail Inventory Continued

	DIST_	TRAIL_NO	TRAIL_NAME	TRAIL_TERMINI	CO	DIFFI	PRI_OBJ	USE	AREA	EX_MI	ADEQ	INADEQ	PROPO
53	01	613.1	BALD MOUNTAIN	TR 613 TO TR 763 2	SK	M	1	M	NON	1.5	1.1	0.4	4.0
54	01	613.2	BALD LAKE	TR 613.1 TO LAKE	SK	D	1		NON	0.0	0.0	0.0	0.5
55	01	616	FINNEY PEAK	RD 1735 TO FINNEY PEAK	SK	D	4	L	NON	2 5	1.0	1.5	0.0
56	01	617	BAKER HOT SPNGS	RD 1144 TO HOT SPRINGS	W	E	2	H	NON	0 3	0 3	0.0	0.0
57	01	618	PARK CREEK	RD 11 TO RD 11	W	M	8		NON	0 0	0.0	0.0	2.0
58	01	619	SULPHUR CREEK FALLS	RD 1106 TO FALLS	W	E	1		NON	0.0	0.0	0.0	0 5
59	01	620	CUMBERLAND PASS LOOP	RD 17 TO RD 17	SK	E	1		NON	0.0	0.0	0 0	0.5
60	01	621	IRON MTN LOOP	RD 1755018 TO TR 621	SK	E	4		NON	0.0	0.0	0 0	7.0
61	01	621 1	IRON MTN LOOP	TR 621 TO TR 621	SK	E	4		NON	0.0	0.0	0.0	1 0
62	01	621.2	MILL RIDGE	TR 621 TO FOREST BDRY	SK	M	4		NON	0.0	0.0	0.0	3 0
63	01	622	THREE LAKES	RD 1260 TO BEAR LAKE	W	M	2		NON	0.0	0.0	0.0	4 5
64	01	622.1	HEART LAKE	TR 622 TO WILD BDRY	W	M	1		NON	0.0	0.0	0.0	0.5
65	01	622.11	HEART LAKE	WILD BDRY TO WILD BDRY	W	M	1		WILD	0 0	0.0	0.0	1.5
66	01	622.12	HEART LAKE	WILD BDRY TO TR 622	W	M	1		NON	0 0	0 0	0.0	1.2
67	01	623	SHADOW OF SENTINELS	RD 11 TO RD 11	W	E	8	X	NON	0.5	0.0	0 5	0.0
68	01	624	DRUID GROVE	HWY 542 TO HWY 542	W	E	9		BYWAY	0.5	0.0	0 5	0.0
69	01	625	DAMFINO/BEARPAW LOOP	RD 31 TO RD 3170	W	M	1	H	NON	2.5	1.0	1 5	6.5
70	01	625.1	EXCELSIOR PEAK	TR 625 TO EXCELSIOR PEAK	W	D	1	M	WILD	0.5	0.2	0 3	0 0
71	01	625.2	CHURCH LAKE	TR 625 TO LAKE	W	D	1		NON	0.0	0.0	0.0	0 5
72	01	625.3	BEARPAW LAKE	TR 625 TO LAKE	W	D	1		NON	0.0	0.0	0.0	0.3
73	01	627	JORDAN LAKE	RD 16 TO WILD BDRY	SK	D	1		NON	3.0	3.0	0.0	0.0
74	01	627.01	JORDAN LAKE	WILD BDRY TO LAKE	SL	D	1		WILD	1.0	1.0	0.0	0.0
75	01	628	FALLS LAKE	RD 16 TO LAKE	SK	M	1		NON	1.5	0 0	0.0	0.0
76	01	629	MARTEN LAKE	RD 16 TO LAKE	SK	M	1		NON	1.0	0.0	0.0	0 0
77	01	630	HIGH DIVIDE	HWY 542 TO RD 3060	W	M	2	H	WILD	13.0	8.0	5.0	0 0
78	01	631	DIOBSUD CREEK	RD 1050 TO MP 1 5	SK	M	1	L	NON	1.5	1.2	0.3	0 0
79	01	635	SLIDE LAKE	RD 16 TO WILD BDRY	SK	M	1	H	NON	1.0	0 6	0.4	0.0
80	01	635.01	SLIDE LAKE	WILD BDRY TO SLIDE LK	SK	M	1	H	WILD	0 4	0.0	0.4	0.0
81	01	635.02	ENJAR LAKE	SLIDE LAKE TO ENJAR LAKE	SK	D	1	L	WILD	3.0	3.0	0.0	0.0
82	01	655	LAVA DIVIDE LOOP	RD 1130 TO WILD BDRY	W	D	1		NON	0.0	0.0	0 0	0 5
83	01	655.01	LAVA DIVIDE LOOP	WILD BDRY TO WILD BDRY	W	D	1		WILD	0.0	0.0	0.0	3 0
84	01	655.02	LAVA DIVIDE LOOP	WILD BDRY TO 1130	W	D	1		NON	0 0	0 0	0.0	0.5
85	01	669	ARTIST RIDGE	HWY 542 TO HUNTOON PT	W	E	9	X	BYWAY	1 0	1 0	0.0	0.0
86	01	671	CHURCH MOUNTAIN	RD 3040 TO CHURCH MT	W	M	1	H	NON	4.2	3.2	1 0	0.0
87	01	671.1	FOSSIL PASS	TR 671 TO TR 625	W	M	1		NON	0.0	0.0	0.0	0 5
88	01	672	SILESIA CREEK	TR 675 TO RAPID CR	W	M	2	L	WILD	8.0	2.5	4.7	0.0
89	01	673	GOAT MOUNTAIN	RD 32 TO WILD BDRY	W	M	2	M	NON	1 5	1 5	0.0	0.0
90	01	673.01	GOAT MOUNTAIN	WILD BDRY TO BM 6721	W	M	2	M	WILD	2 7	1.2	1 5	1.0
91	01	673.1	OLD GOAT	TR 673 TO BM 4115	W	M	1	L	WILD	0.5	0.0	0 5	0 0
92	01	674	HANNEGAN PASS	RD 32 TO NCNP BDRY	W	E	2	X	WILD	5.0	4.8	0.2	0 0
93	01	674.1	HANNEGAN PEAK	TR 674 TO HANNEGAN PK	W	M	1	H	WILD	1.0	0.0	1.0	0.0
94	01	674.2	RUTH ARM	TR 674 TO SNOWLINE	W	D	1	M	WILD	2 0	0 0	2.0	0.0
95	01	675	LONE JACK	RD 3065 TO RD 32	W	D	1	L	WILD	2.0	2 0	0.0	4.0
96	01	676	HIGH PASS	TR 685 1 TO TR 686	W	M	1	M	WILD	3.0	2.5	0 5	2 0
97	01	677	HELIOTROPE RIDGE	RD 39 TO LATERAL MORAINE	W	E	1	X	WILD	2.7	2.0	0.7	0.0
98	01	677.1	HOGSBACK ROUTE	TR 677 TO CLIMBERS CAMP	W	M	1	X	WILD	1.0	1.0	0.0	0.0
99	01	677.2	GLACIER VIEW LOOP	TR 677 TO TR 677	W	M	1	L	WILD	2 3	0 0	2.3	0.0
100	01	678	SKYLINE DIVIDE	RD 37 TO WILD BDRY	W	M	2	H	NON	1 5	1 0	0 5	0.0
101	01	678.01	SKYLINE DIVIDE	WILD BDRY TO SEC 35	W	M	2	H	WILD	4.0	2.0	2 0	0 0
102	01	678.1	RANGER CAMP	TR 678 TO BM 5884	W	M	2	M	WILD	0.5	0.3	0.2	0.0
103	01	678.2	DEADHORSE CAMP	TR 678 01 TO DH CAMP	W	D	2		WILD	0.5	0.0	0.5	0.0
104	01	679	GROUSE RIDGE	RD 39 TO GROAT MTN	W	M	1		NON	0.0	0 0	0.0	3.5

Table E-1 Trail Inventory Continued

	DIST_	TRAIL_NO	TRAIL_NAME	TRAIL_TERMINI	CO	DIFFI	PRI_OBJ	USE	AREA	EX_MI	ADEQ	INADEQ	PROPO
105	01	680	NOOKSACK RIVER	GLACIER PSC TO SILVER FIR CG	W	M	3		BYWAY	2 0	0 0	2.0	16 0
106	01	680 1	THOMPSON CREEK	TR 680 TO RD 37	W	M	3		NON	1 5	0 0	0 0	2 5
107	01	681	TABLE MOUNTAIN	HWY 542 TO SUMMIT	W	M	1	X	BYWAY	0 7	0 7	0 0	0.0
108	01	681 01	TABLE MOUNTAIN	SUMMIT TO WILD BDRY	W	D	1	X	NON	0.7	0 3	0.4	0 0
109	01	681 02	TABLE MOUNTAIN	WILD BDRY TO TR 682	W	D	1	M	WILD	1.2	0 5	0 7	0 0
110	01	682	CHAIN LAKES	HWY 542 TO WILD BDRY	W	E	1	X	NON	0 5	0 5	0 0	0 0
111	01	682 01	CHAIN LAKES	WILD BDRY TO WILD BDRY	W	E	1	X	WILD	4 0	3 0	1 0	0.0
112	01	682 02	CHAIN LAKES	WILD BDRY TO TR 684.1	W	E	1	X	NON	1 0	0.5	0.5	0 0
113	01	682.1	PTARMIGAN RIDGE	TR 682 TO SHOLES GLACIER	W	M	1	H	WILD	5.0	3 5	1 5	0.0
114	01	682.2	WELLS CREEK	RD 33 TO WILD BDRY	W	D	1	L	NON	1 0	0 0	1 0	0 0
115	01	682 21	WELLS CREEK	WILD BDRY TO TR 682	W	D	1	L	WILD	2 0	0 0	2 0	0.0
116	01	682.3	HAYES LAKE	TR 682 TO TR 682	W	E	1		WILD	0 3	0.0	0.0	0 0
117	01	684	HEATHER MDWS	HWY 542 TO HWY 542	W	E	1	X	BYWAY	5.0	1.0	4.0	0 0
118	01	684.1	BAGLEY LAKES	SKI AREA TO AUSTIN PASS	W	E	1	X	BYWAY	2 8	1 0	1.8	0.0
119	01	684 2	FIRE AND ICE	AUSTIN PASS TO AUSTIN PASS	W	E	8		BYWAY	0 6	0 0	0 6	0 0
120	01	684 3	WILD GOOSE	TERMINAL LK TO ARTIST PT	W	M	1	H	BYWAY	1 0	0.0	1 0	0.0
121	01	684.4	BLUEBERRY LOOP	SKI AREA TO SKI AREA	W	E	8		BYWAY	0.0	0 0	0 0	0.5
122	01	684.41	PANORAMA DOME	TR 684 4 TO TR 600	W	M	1	H	NON	1 5	0 0	1.5	0 0
123	01	685	TWIN LAKES	RD 3065 TO RD 3065	W	E	1	X	NON	1 0	0 0	1 0	0 0
124	01	685 1	WINCHESTER MT	TR 685 TO WINCHESTER LO	W	M	1	H	WILD	2 1	1 8	0 3	0 0
125	01	686	TOMYHOI LK	RD 3065 TO WILD BDRY	W	M	1	H	NON	0 5	0.5	0 0	0.0
126	01	686.01	TOMYHOI LK	WILD BDRY TO TOMYHOI LK	W	M	1	H	WILD	3.5	3.3	0.2	0.0
127	01	686.1	YELLOW ASTER	TR 686 TO TR 699	W	M	1		WILD	0.0	0 0	0.0	2 0
128	01	687	HORSESHOE BEND	HWY 542 TO HWY 542	W	E	1	X	BYWAY	0 7	0 0	0 7	0 0
129	01	688	BOUNDARY WAY	TR 625 TO MP 2 5	W	M	1	L	NON	2 5	1 6	0 9	0.0
130	01	689	CANYON RIDGE	RD 31 TO RD 3140	W	D	4	L	NON	9 1	5.0	4 1	0.0
131	01	689.1	CANYON CREEK LOOP	TR 689 TO TR 689	W	M	4		NON	0 0	0.0	0.0	12.0
132	01	689.2	HUDSON WAY	TR 689 TO MP 1.5	W	D	4	L	NON	1.5	0.0	1.5	0.0
133	01	696	RIDLEY CREEK	RD 38 TO WILD BDRY	W	M	2	M	WILD	2.5	0 0	2.5	0 0
134	01	696 01	RIDLEY CREEK	WILD BDRY TO TR 603 2	W	M	2	M	NRA	0 5	0 0	0 5	0 0
135	01	697	ELBOW LAKE	RD 38 TO WILD BDRY	W	M	2	M	NON	3 0	0 8	2 2	0 0
136	01	697.01	ELBOW LAKE	WILD BDRY TO WILD BDRY	W	M	2	M	WILD	2 0	0 4	1 6	0.0
137	01	697.02	ELBOW LAKE	WILD BDRY TO TR 602	W	M	2	M	NON	1.2	0.2	1.0	0.7
138	01	697.1	BELL PASS	TR 697 TO TR 603 3	W	M	2		WILD	0.0	0.0	0.0	3.0
139	01	697.2	WISEMAN LAKE	TR 697 TO WISEMAN LK	W	D	1	L	WILD	1.5	1 5	0 0	0 0
140	01	699	KEEP KOOL	RD 3065 TO WILD BDRY	W	M	1	H	NON	0 5	0 0	0 5	0 0
141	01	699 01	KEEP KOOL	WILD BDRY TO BUTTE	W	M	1	H	WILD	3 0	0 0	3 0	0.0
142	01	699.1	TOMYHOI PEAK	TR 699 TO PEAK	W	D	1	L	WILD	3 0	3.0	0 0	0 0
143	01	735	PICTURE LAKE	HWY 542 TO HWY 542	W	E	8	X	BYWAY	0.5	0.5	0 0	0.0
144	01	742	SHANNON RIDGE	RD 1152014 TO NCNP BDRY	W	D	1	M	NON	1.9	1.4	0 5	0.0
145	01	743	LOOKOUT MT	RD 15 TO LOOKOUT MT LO	SK	M	1	M	NON	4.7	4 1	0.6	0 0
146	01	743 1	MONOGRAM LK	TR 743 1 TO NCNP BDRY	SK	M	1	M	NON	0 8	0 0	0 8	0 0
147	01	744	BEAVER POND	PAN PT CG TO PAN PT CG	SK	E	8		NON	0 0	0 0	0 0	0 7
148	01	745	HIDDEN LAKE	RD 1540 TO HIDDEN LAKE LO	SK	E	1	H	NON	4 5	3 5	1 0	0 0
149	01	746	BEAR LAKE	RD 1550 TO BEAR LAKE	SK	M	1	L	NON	1 5	1 5	0 0	0 0
150	01	750	RUTH GORGE	RD 32 TO RUTH GORGE	W	D	8		NON	0 0	0 0	0 0	1 0
151	01	750.01	NOOKSACK CIRQUE	RUTH GORGE TO WILD BDRY	W	M	1	H	NON	3.5	3.0	0 0	0 5
152	01	750.02	NOOKSACK CIRQUE	WILD BDRY TO NCNP BDRY	W	M	1	H	WILD	3 0	2.5	0 5	0.0
153	01	750.1	PRICE LAKE	TR 750 TO NPS BDRY	W	D	1	L	WILD	1.0	1.0	0.0	0.0
154	01	751	BIG CEDAR	SILVER FIR CG TO SILVER FIR CG	W	E	8		BYWAY	0.0	0.0	0.0	1 5
155	01	757	BEARPAW LAKE	RD 3170 TO TR 671	W	D	1	L	NON	1.0	0.0	1.0	3.5
156	01	757.1	CHURCH LAKE	RD 3160 TO TR 757	W	M	1	L	NON	0.5	0 0	0.5	0 0

Table E-1 Trail Inventory Continued

	DIST_	TRAIL_NO	TRAIL_NAME	TRAIL_TERMINI	CO	DIFFI	PRI_OBJ	USE	AREA	EX_MI	ADEQ	INADEQ	PROPO
157	01	762	WHITE SALMON	RD 3075 TO NCNP BDRY	W	D	1	L	WILD	2 0	2.0	0 0	0 0
158	01	763	THUNDER RIDGE	RD 1140 TO STATE RD	SK	M	2	L	NON	6 4	3.6	2.8	18.0
159	01	763.1	ROCKY CREEK	HWY 20 TO TR 763	SK	D	2	L	NON	4 0	0.0	4.0	0 0
160	01	763 2	JACKMAN RIDGE	TR 763 TO LAKE (SEC 6)	SK	M	2		NON	0 0	0.0	0.0	3.0
161	01	763 3	CLEAR LAKE	TR 763 TO LAKE	SK	M	1		NON	0.0	0.0	0.0	3.0
162	01	765	FOUND LAKE	RD 1570 TO WILDERNESS BDRY	SK	D	1	L	NON	1.5	1 0	0.5	0.0
163	01	765.01	FOUND LAKE	WILD BDRY TO LAKE	SK	D	1	L	WILD	2.5	2.5	0.0	0 0
164	01	766	KINDY CREEK	RD 1570030 TO WILD BDRY	SK	M	1	L	NON	0.5	0.5	0 0	0 0
165	01	766.01	KINDY CREEK	WILD BDRY TO END	SK	M	1	L	WILD	1 2	1.2	0 0	0.0
166	01	769	CASCADE RIVER	MARBLE CR CG TO W B.	SK	E	1		WSR	0 5	0.5	0.0	2.5
167	01	769 1	MIDDLE FK CASCADE	TR 769 TO SEC 1	SK	M	1	M	WILD	4.5	2 0	2.5	0.5
168	01	769 2	SOUTH FK CASCADE	TR 769 TO S CASCADE LAKE	SK	D	1	L	WILD	8.5	6 0	2.5	0.0
169	02	"	FRENCH CR LOOP	RD 2010 TO RD 2010	SN	E	1	"	NON	0.0	0 0	0.0	2 0
170	02	"	SWIFT CR.	BEDAL CG TO TR. 716	SN	M	2	"	NON	"	"	"	"
171	02	2000 01	PCNST	SUIATTLE PASS TO SUIATTLE R.	SN	M	2	H	WILD	7 7	7.7	0.0	0 0
172	02	2000.02	PCNST	SUIATTLE R. TO E FK BASIN	SN	M	2	H	WILD	10.8	9.8	1.0	0 0
173	02	2000.03	PCNST	E. FK. BASIN TO MILK CR	SN	M	2	H	WILD	3.3	2.3	1.0	0.0
174	02	2000.04	PCNST	MILK CR TO MICA LAKE	SN	M	2	H	WILD	4.0	3 8	0.2	0.0
175	02	2000.05	PCNST	MICA LAKE TO FIRE CR PASS	SN	M	2	H	WILD	1.1	1 1	0.0	0 0
176	02	2000 06	PCNST	FIRE CR PASS TO TR 639	SN	M	2	H	WILD	5 9	3 9	2 0	0 0
177	02	2000 07	PCNST	TR 639 TO OLD GLA PK. LO	SN	M	2	H	WILD	7 0	4.0	3 0	0 0
178	02	2000.08	PCNST	OLD GLA PK. LO TO TR 1507	SN	M	2	H	WILD	5 6	4.6	1.0	0.0
179	02	632	COAL LAKE	RD 4060 TO SO END LK	SN	E	1	M	NON	0.1	0.1	0.0	0.2
180	02	633	FORKS	RD 41 TO SHELTER	SN	M	1	L	NON	1.3	1 3	0.0	0.0
181	02	638	CRYSTAL LAKE	RD 2710011 TO WILD BDRY	SN	M	1	L	NON	1.3	1.3	0 0	0.0
182	02	638.01	CRYSTAL LAKE	WILD BDRY TO LAKE	SN	M	1	L	WILD	0 2	0.0	0 2	0 0
183	02	638.1	CIRCLE PEAK	TR 638 TO PEAK	SN	M	1	L	NON	2 5	0.5	2.0	2.0
184	02	639	KENNEDY RIDGE	TR 643.01 TO TR 2000	SN	M	2	M	WILD	2.0	1.0	1.0	0.0
185	02	640	MT. HIGGINS	DNR RD TO BM 4849	SK	M	1	L	NON	4.5	1.0	3.5	0.0
186	02	640.1	MYRTLE LAKE	TR 640 TO LAKE SEC 30	SK	E	1	L	NON	0.3	0.2	0 1	0.0
187	02	641	THREE FINGERS	RD 41 TO SADDLE CAMP	SN	M	1	M	WILD	6 2	2.0	4.2	0.0
188	02	641 1	SADDLE LAKE	TR 641 TO LAKE	SN	M	1	M	WILD	0.2	0.0	0.2	0.0
189	02	643	WHITE CHUCK	RD 23 TO WILD BDRY	SN	E	2	X	NON	0.4	0 4	0.0	0.0
190	02	643.01	WHITE CHUCK	WILD BDRY TO TR 643 1	SN	E	2	X	WILD	6.5	4 7	1 8	0.0
191	02	643.1	KENNEDY HP CAMP	TR 643.01 TO HOT SPRINGS	SN	E	1	X	WILD	0 5	0.2	0 3	0.0
192	02	644	MT. PUGH	RD 2095 TO TIMBERLINE	SN	M	2	M	NON	3.5	2.5	1.0	0.0
193	02	645	FALLS CR PASS L	RD 2080 TO RD 4060	SN	M	2	L	NON	4.0	1 0	3.0	0.0
194	02	646	LOST CR RIDGE	RD 49 TO WILD BDRY	SN	M	2	M	NON	4.6	1.5	3 1	0.0
195	02	646.01	LOST CR RIDGE	WILD BDRY TO K HOT SPRINGS	SN	M	1	M	WILD	6 5	3.0	3.5	2.5
196	02	646 1	ROUND LAKE	TR 646 TO ROUND LAKE	SN	M	1	M	WILD	0.7	0.6	0.1	0.0
197	02	647	ELLIOT CREEK	RD 4080 TO WILD BDRY	SN	E	1	H	NON	4.2	4.2	0.0	0.0
198	02	647.01	ELLIOT CREEK	WILD BDRY TO GOAT LAKE	SN	E	1	H	WILD	1.0	1 0	0 0	0.0
199	02	648	SLOAN PEAK	RD 49 TO WILD BDRY	SN	D	1	M	WSR	2 0	2.0	0.0	0.0
200	02	648.01	SLOAN PEAK	WILD BDRY TO TIMBERLINE	SN	D	1	M	WILD	2.5	2.5	0.0	0.0
201	02	649	N FK SAUK	RD 49 TO TR 2000	SN	M	2	M	WILD	8.4	4.9	3.5	0.0
202	02	650	BALD EAGLE	RD 4920 TO WILD BDRY	SN	M	2	L	NON	1.4	1.4	0 0	0 0
203	02	650.01	BALD EAGLE	WILD BDRY TO CURRY GAP	SN	M	2	L	WILD	0.3	0.3	0.0	0.0
204	02	651	RED MOUNTAIN	TR 649 TO SEC 28	SN	M	1	L	WILD	0.9	0.8	0.1	0.0
205	02	652	PILOT RIDGE	TR 649 TO TR 650.01	SN	D	2	L	WILD	11.0	7 0	4.0	0.0
206	02	652.1	BLUE LAKE HIGH	TR 652 TO TR 650.01	SN	D	1	L	WILD	2.0	0.8	0.3	0.0
207	02	652.2	JOHNSON MTN	TR 652 TO JOHNSON MTN	SN	M	1	L	WILD	1.0	1.0	0.0	0.0
208	02	653	NEIDERPRUM	RD 2030 TO WILD BDRY	SN	D	1	L	NON	0.5	0.5	0.0	0.0

Table E-1 Trail Inventory Continued

	DIST_	TRAIL_NO	TRAIL_NAME	TRAIL_TERMINI	CO	DIFFI	PRI_OBJ	USE	AREA	EX_MI	ADEQ	INADEQ	PROPO
209	02	653.01	NEIDERPRUM	WILD BDRY TO SEC 30	SN	D	1	L	WILD	1 5	1 4	0.1	0 0
210	02	654	SQUIRE CREEK	RD 2040 TO W BDRY	SN	M	1	M	NON	0 5	0.0	0 5	0.0
211	02	654 01	SQUIRE CREEK	WILD BDRY TO WILD BDRY	SN	M	1	M	WILD	2 9	0 0	2.9	0.0
212	02	654 02	EIGHT-MILE CR	WILD BDRY TO RD 2065	SN	M	1	L	NON	2 5	0 5	2.0	0.0
213	02	656	PEEK-A-BOO LAKE	RD 2084 TO LAKE	SN	M	1	L	NON	2.5	0.8	1 7	0.0
214	02	657	MEADOW MTN	RD 2710 TO WILD BDRY	SN	M	2	M	NON	7 0	0 0	7 0	0 0
215	02	657 01	MEADOW MTN	WILD BDRY TO TR 643	SN	M	2	M	WILD	10.6	5 0	5.6	0.0
216	02	657.1	MEADOW LAKE	TR 657 TO LAKE	SN	M	2	M	WILD	0.7	0 0	0 7	0.0
217	02	657 2	DIAMOND LAKE	TR 657 TO LAKE	SN	M	2		WILD	0 8	0 0	0.8	0 0
218	02	658	PRAIRIE MTN	RD 2430 TO SUMMIT	SN	M	1		NON	0 0	0.0	0 0	3.0
219	02	659	FROG LAKE	CLEAR CREEK CG TO LAKE	SN	M	1	L	NON	1.0	0 9	0 1	0 0
220	02	660	N FK FALLS	RD 49 TO FALLS	SN	E	1	M	WSR	0.2	0 2	0.0	0.0
221	02	661	BEAR LAKE	RD 4021 TO LAKE	SK	E	8	X	NON	0.3	0.0	0 3	0.3
222	02	663	BOULDER BASIN	TR 2000 TO TIMBERLINE	SN	D	1	M	WILD	1.8	0.0	1 8	0 0
223	02	664	ROUND MTN	RD 1850 TO ROUND MT.	SK	M	1	L	NON	1.6	0 5	1.1	0 4
224	02	665	WHITE CHUCK MT	RD 2436036 TO TIMBERLINE	SN	D	1		NON	0 0	0 0	0.0	1.0
225	02	667	COPPER CREEK	RD 2065 TO WILD BDRY	SN	M	1	L	NON	0 4	0.4	0.0	0.0
226	02	700	PILCHUCK LO	RD 42 TO PILCHUCK L.O.	SN	M	1	X	NON	2.7	0 0	2 7	0 0
227	02	700.1	PILCHUCK CREST	TR 700 TO PINNACLE LAKE	SN	M	1		NON	0 0	0 0	0.0	4.0
228	02	700 2	PILCHUCK CREST	TR 700 1 TO BALD MT.	SN	M	1	-	NON	0 0	0 0	0 0	8.0
229	02	701	HEATHER LAKE	RD 42 TO LAKE	SN	E	1	H	NON	2.0	1.6	0 4	0.3
230	02	702	LAKE 22	FH-7 TO LAKE	SN	E	1	X	RNA	2.7	2.7	0 0	0 5
231	02	703	PINNACLE LAKE	TR 661 TO TR 700.1	SN	M	1	M	NON	1 8	0 3	1.5	1.0
232	02	703 1	PINNACLE LAKE	TR 703 AROUND LAKE	SN	M	1	M	NON	0 0	0 0	0.0	0.2
233	02	704	BOARDMAN LAKE	RD 4020 TO DNR TR	SN	E	1	H	NON	0.8	0.8	0 0	1 4
234	02	704.1	BOARDMAN CAMP	TR 704 TO TR 704	SN	E	1	M	NON	0 2	0 2	0.0	0 6
235	02	704 2	EVANS LAKE	TR 704 TO LAKE	SN	E	8		NON	0 1	0 0	0.1	0.4
236	02	704.3	ASHLAND LK TIE	TR 700 2 TO ASHLAND LK DNR TR	SN	E	1		NON	0 0	0 0	0 0	1 5
237	02	705	BEDAL CREEK	RD 4096 TO WILD BDRY	SN	M	1	L	NON	0.5	0 0	0 5	0 0
238	02	705.01	BEDAL CREEK	WILD BDRY TO SEC 35	SN	M	1	L	WILD	1 5	0 0	1.5	0 0
239	02	706	MALLARDY RIDGE	RD 4032 TO BALD MT TR	SN	M	1		NON	1 0	0.0	1 0	3.3
240	02	706 1	MALLARDY RIDGE	TR 706 TO RD 4032	SN	M	1	-	NON	0 0	0.0	0 0	2.8
241	02	707	SUNRISE MINE	RD 4065 TO VESPER PEAK	SN	M	1	M	NON	3.0	1 5	1.5	0 0
242	02	708	POODLE DOG PASS	COUNTY RD TO WILD BDRY	SN	M	1	H	NON	0 5	0 0	0.5	0 0
243	02	708 01	POODLE DOG PASS	WILD BDRY TO SILVER LAKE	SN	M	1	H	WILD	1 9	0 0	1 9	0 0
244	02	708 1	TWIN LAKES	TR 708 01 TO LAKE	SN	M	1	M	WILD	2 7	2 7	0 0	0 0
245	02	709	BARLOW PT.	FH-7 TO SUMMIT SEC 31	SN	M	1	M	NON	1 2	1 2	0 0	0 0
246	02	710	DICKERMAN MTN	FH-7 TO SUMMIT SEC 24	SN	M	1	M	NON	4 3	2 3	2.0	0 0
247	02	710 01	DICKERMAN EAST	TR 710 TO TR 716	SN		2		NON	0 0	0 0	0 0	1.2
248	02	711	PERRY CREEK	RD 4063 TO FALLS	SN	E	1	H	NON	2 0	1.8	0 2	0.0
249	02	711.01	PERRY CREEK	FALLS TO SEC 18	SN	M	1	H	NON	1 6	0 0	1 6	0 0
250	02	712	INDEPENDENCE LAKE	RD 4060 TO TR 717	SN	E	1	M	NON	0 7	0 0	0 7	3 5
251	02	712 1	NORTH LAKE	TR 712 TO NORTH LAKE	SN	M	1	M	NON	2 5	0 5	2.0	0 0
252	02	713	MARTEN CREEK	FH-7 TO CLEAR CK	SN	M	1	M	WILD	3 3	0 0	3 3	1.5
253	02	714	FRENCH CR VIEW	RD 2010 TO SEC 14	SN	E	1		NON	0 0	0.0	0 0	2.0
254	02	714 1	FRENCH CK	TR 714 TO TR 714 (LOOP)	SN	E	1	-	NON	0 0	0 0	0 0	1 5
255	02	715	SADDLE CREEK	RD 41 TO SADDLE LAKE	SN	M	1	M	WILD	5 8	0 0	5.8	0 0
256	02	716	RIDGE TRAIL	RD 4060 TO BARLOW POINT	SN	M	2		NON	0 0	0 0	0 0	7 7
257	02	716.1	SOUTH LAKE	TR 716 TO SOUTH LAKE	SN	M	1		NON	0 0	0.0	0 0	1 0
258	02	717	DEER CREEK PASS	RD 4052 TO WILD BDRY	SN	M	1	L	NON	0.2	0.0	0 2	0 0
259	02	717.01	DEER CREEK PASS	WILD BDRY TO WILD BDRY	SN	M	1	L	WILD	0.8	0 0	0 8	0 0
260	02	717.02	DEER CREEK PASS	WILD BDRY TO RD 2060	SN	M	1	L	NON	0 5	0 0	0.5	0.0

Table E-1 Trail Inventory Continued

	DIST_	TRAIL_NO	TRAIL_NAME	TRAIL_TERMINI	CO	DIFFI	PRI_OBJ	USE	AREA	EX_MI	ADEQ	INADEQ	PROPO
261	02	718	KELCEMA LAKE	RD 4052 TO LAKE	SN	M	1	M	WILD	0.4	0 0	0.4	0 5
262	02	719	GLACIER BASIN	COUNTY ROAD TO WILD BDRY	SN	M	1	X	NON	1.6	1 4	0.2	0 0
263	02	719.01	GLACIER BASIN	WILD BDRY TO SEC 23	SN	D	1	X	WILD	0.5	0.0	0.5	0 0
264	02	720	CANYON LAKE	RD 4111 TO LAKE	SN	E	1	M	WILD	0.1	0 0	0.1	0 0
265	02	721	LAKE LOUISE	RD 2642 TO LAKE	SK	M	1		NON	0.0	0.0	0.0	2.0
266	02	721.1	ILLABOT PEAK	TR 721 TO PEAK	SK	M	1		NON	0.0	0 0	0.0	1.8
267	02	722	SILVER GULCH	FH-7 TO SEC 29	SN	D	1	L	NON	0.0	0 0	0.0	1.9
268	02	723	ICE CAVES	RD 4059 TO ICE CAVES	SN	E	1	X	NON	1.0	1.0	0.0	0.0
269	02	724	WEDEN CREEK	COUNTY RD TO FOREST BDRY	SN	D	1	M	NON	1 8	0.0	1 8	0.0
270	02	725	VERLOT NATURE	VERLOT CG TO TURLO CG	SN	E	9	H	NON	0 3	0.2	0 1	0.0
271	02	726	THORTON LAKE	RD 27 TO LAKE	SN	M	1		NON	0 0	0.0	0 0	1.5
272	02	727	GOLD BASIN NATURE	FH-7 TO FH-7	SN	E	9		NON	0 0	0.0	0 0	1.0
273	02	728	OLD SAUK	RD 20 TO RD 20	SN	E	8	L	WSR	3 0	0.0	3 0	0.0
274	02	729	SCHWEITZER	FH-7 TO FH-7	SN	E	7	L	NON	10 5	10.2	0.3	0.0
275	02	730	BEAVER CREEK	FH-7 TO FH-7	SN	E	7	L	NON	6 6	6.3	0.3	0.0
276	02	731	WHITE CHUCK BENCH	RD 22 TO RD 23	SN	E	2	L	NON	3.3	0.0	3 3	0.0
277	02	732	NO FK GORGE	RD 20 TO RD 49	SN	E	1		WSR	0.0	0.0	0.0	1 0
278	02	733	OLD GOV'T TRAIL	RD 4063 TO TR 709	SN	E	2	L	NON	1.2	1.2	0.0	3 0
279	02	734	BOULDER RIVER	RD 2010018 TO WILD BDRY	SN	E	1	H	NON	1.0	1 0	0.0	0 0
280	02	734 01	BOULDER RIVER	WILD BDRY TO FORD	SN	E	1	H	WILD	3.3	3.3	0.0	2 5
281	02	736	HALL PEAK LOWLAND	RD 4031 TO TR 723	SN	M	1		NON	0.0	0 0	0.0	5 0
282	02	736 1	MARBLE GULCH	TR 736 TO SEC 30	SN	D	1		NON	0.0	0 0	0.0	2 0
283	02	737	MOUNTAIN LOOP	FH 7 TO MONTE CRISTO LAKE	SN	E	8		NON	0.0	0 0	0.0	2.0
284	*02*	*737 01*	*MOUNTAIN LOOP*	*MONTE CRISTO LAKE TO RD 20*	*SN*	*E*	*1*		*NON*	*0.0*	*0 0*	*0.0*	*12.0*
285	02	738	YOUTH-ON-AGE	RD 4040000 TO RD 4040000	SN	E	8	M	NON	0.3	0 3	0.0	0.0
286	02	739	PALMER CR FALLS	RD 4065 TO FH7/BARLOW PASS	SN	E	8		NON	0.0	0.0	0 0	1.5
287	02	740	BOULDER LAKE	RD 2060014 TO WILD BDRY	SN	D	1		NON	0.6	0 0	0 6	0.0
288	02	740.01	BOULDER LAKE	WILD BDRY TO LAKE	SN	D	1		WILD	1 1	0.0	1 1	0.0
289	02	748	MT FORGOTTEN	RD 20 TO TR 711	SN	~	1	~	NON	0.0	0.0	0 0	4.0
290	02	749	NO FK SAUK LOWLAND	BEDAL CG TO WB	SN	~	1	~	NON	0 0	0.0	0.0	7.5
291	02	749 01	NO FORK SAUK LOWLAND	WB TO TR 650	SN	~	1	~	WILD	0 0	0.0	0.0	5 5
292	02	752	BLACKJACK LO	RD 4031 TO BLACKJACK LO	SN	~	1	~	NON	0.0	0 0	0.0	2.5
293	02	753	CANYON CREEK	RD 4150001 TO RD 41 (SEC 36)	SN	~	1	~	NON	0.0	0 0	0.0	6.0
294	02	754	WHITECHUCK EXTENSION	TR 731 TO 643	SN	~	1	~	NON	0.0	0 0	0.0	6.0
295	02	768	DOWNEY CREEK	RD 26 TO WILD BDRY	SN	M	2	M	NON	0.4	0 4	0.0	0.0
296	02	768.01	DOWNEY CREEK	WILD BDRY TO BACHELOR CREEK	SN	M	2	M	WILD	6 2	4 9	1.3	0.0
297	02	778	CLEAR CR FALLS	RD 2060 TO RD 2060	SN	E	1		NON	0 0	0.0	0.0	0.3
298	02	780	HUCKLEBERRY MT	RD 26 TO WILD BDRY	SN	M	2	L	NON	5 5	3.5	2 0	0 0
299	02	780 01	HUCKLEBERRY MT	WILD BDRY TO SEC 25	SN	M	2	L	WILD	1.5	1.5	0 0	0 0
300	02	781	BUCK CREEK	RD 2600014 TO SEC 12	SN	E	1	L	WILD	1.0	0 9	0.1	0 0
301	02	782	GREEN MTN	RD 2680 TO WILD BDRY	SN	M	2	H	NON	1.0	1 0	0.0	0.0
302	02	782.01	GREEN MTN	WILD BDRY TO GREEN MT LO	SN	M	2	H	WILD	3.0	2.2	0.8	0.0
303	02	783	BEAVER LAKE	RD 20 TO RD 20	SN	E	8	L	WSR	2.5	0 0	2.5	0.0
304	02	784	SUIATTLE	RD 26 TO TR 2000	SN	E	2	H	WILD	10.8	10.8	0 0	0.0
305	02	785	MINERS RIDGE	TR 784 TO TR 2000	SN	E	2	H	WILD	9 9	4.4	5 5	0.0
306	02	785.1	IMAGE LK HIKER	TR 785 TO TR 785	SN	E	1	H	WILD	0 6	0.4	0 2	0 0
307	02	785.2	BACKPACKER CAMP	TR 785 TO IMAGE LAKE CAMP	SN	E	1	H	WILD	0 1	0.1	0.2	0 0
308	02	785.3	MINERS RIDGE LO	TR 785 TO LO	SN	E	2	M	WILD	0 1	0.1	0 0	0 0
309	02	786	DUSTY RIDGE	TR 798 TO CREEK	SN	M	1	L	WILD	3 5	1.5	2 0	0 0
310	02	787	SHEEP CAMP	TR 789 TO SEC 23	SN	M	2	L	WILD	1 0	0.9	0.1	0.0

Table E-1 Trail Inventory Continued

	DIST_	TRAIL_NO	TRAIL_NAME	TRAIL_TERMINI	CO	DIFFI	PRI_OBJ	USE	AREA	EX_MI	ADEQ	INADEQ	PROPO
311	02	788	GRASSY POINT	TR 2000 TO GRASSY PT	SN	M	2	M	WILD	3.5	3.0	0.5	0.0
312	02	789	BUCK CREEK PASS	TR 2000 TO TR 1513 (WEF)	SN	M	2	M	WILD	5.0	0.0	5 0	0 0
313	02	790	MILK CREEK	TR 784 TO TR 2000	SN	M	2	H	WILD	6 5	6 0	0 5	0 0
314	02	791	GAMMA WAY	TR 798 TO SEC 31	SN	M	2	L	WILD	6.0	3 5	2.5	0 0
315	02	792	TRAID CREEK	TR 798 TO TR 1513 (WEF)	SN	M	1	L	WILD	4 7	3.0	1 7	0.0
316	02	793	SULPHUR CR	RD 26 TO WILD BDRY	SN	E	1	L	WSR	0.2	0.2	0 0	0 0
317	02	793.01	SULPHUR CR	WILD BDRY TO SEC 13	SN	E	1	L	WILD	1 6	1 2	0.4	0 0
318	02	794	SULPHUR MTN	TR 784 TO SEC 29	SN	M	2	L	WILD	5 0	2.8	2.2	0.0
319	02	795	MINERS CABIN	TR 785 TO TR 785	SN	E	2	M	WILD	2 1	0 7	1 4	0.0
320	02	797	CANYON LAKE	TR 785 TO LK SEC 28	SN	D	1	L	WILD	7 0	4.4	2 6	0 0
321	02	798	UPPER SUIATTLE	TR 2000 TO TR 792	SN	M	2	M	WILD	4.0	2.0	2.0	0 0
322	02	798.01	UPPER SUIATTLE RIV	TR 798 TO SEC 7	SN	M	1	M	WILD	3.0	2.0	1.0	0 0
323	02	799	FLOWER DOME	TR 789 TO FLOWER DOME	SN	M	2	L	WILD	1.0	0 5	0 5	0.0
324	05	1000	SUNDAY LAKE	RD 5720 TO WILD BDRY	K	E	1	H	NON	0.5	0 0	0.5	0.0
325	05	1000 01	SUNDAY LAKE	WILD BDRY TO LAKE	K	E	1	H	WILD	1.1	1.0	0.1	0 0
326	05	1001	LENNOX CR	RD 5700210 TO WILD BDRY	K	M	1	H	NON	0.2	0.2	0.0	0.0
327	05	1001.01	LENNOX CR	WILD BDRY TO ANDERSON LAKE	K	M	1	H	WILD	3.9	1 0	2.9	0 0
328	05	1002	SNOQUALMIE LK	RD 5630 TO WILD BDRY	K	E	2	M	NON	3 3	3 3	0.0	0.0
329	05	1002.01	SNOQUALMIE LK	WILD BDRY TO DIST BDRY	K	M	2	M	WILD	4 3	1 9	2.4	0.0
330	05	1003	MIDDLE FORK	TR 1035 TO END RD 5620	K	E	2	L	NON	8.8	5 0	3.8	9.0
331	05	1003 1	MIDDLE FORK TIE	TR 1003 TO RD 56	K	E	2	L	NON	0.0	0.0	0 0	0 2
332	05	1003 2	DINGFORD CK TIE	TR 1003 TO RD 5620	K	E	2	L	NON	0.0	0 0	0.0	0 2
333	05	1004	NORDRUM LAKE	TR 1002 TO WILD BDRY	K	D	1	L	NON	0.3	0 0	0.3	0 0
334	05	1004.01	NORDRUM LAKE	WILD BDRY TO N. LAKE	K	D	1	L	WILD	2 3	0 0	2.3	0.0
335	05	1005	DINGFORD CREEK	RD 5620 TO WILD BDRY	K	M	2	M	NON	0 8	0.8	0 0	0.0
336	05	1005.01	DINGFORD CREEK	WILD BDRY TO L MYRTLE LAKE	K	M	2	M	WILD	5.9	2.4	3 5	0 0
337	05	1005 02	DINGFORD CREEK	L. MYRTLE LAKE TO TR 1002	K	D	1	M	WILD	0.0	0.0	0.0	2 6
338	05	1005 1	HESTER LAKE	TR 1005 TO HESTER LAKE	K	M	2	M	WILD	2.5	0 5	2.0	0 0
339	05	1006	MARTEN LAKE	TR 1002 TO WILD BDRY	K	D	1	L	NON	0 5	0 0	0.5	0 0
340	05	1006.01	MARTEN LAKE	WILD BDRY TO M. LAKE	K	D	1	L	WILD	1 0	0 0	1 0	0.0
341	05	1007	PRATT LAKE	RD 9034 TO WILD BDRY	K	M	1	X	NON	2 5	2.5	0 0	0.0
342	05	1007.01	PRATT LAKE	WILD BDRY TO PRATT LAKE	K	M	1	X	WILD	3.5	1.5	2 0	0.0
343	05	1009	MT DEFIANCE	TR 1007 TO THOMPSON LAKE	K	M	1	M	WILD	6.8	5.8	1 0	0.0
344	05	1009 01	THOMPSON LAKE	GRANITE CR RD TO T LAKE	K	D	2	M	NON	1.0	0.5	0 5	0 0
345	05	1010	KALEETAN LAKE	TR 1035 TO KELEETAN LK	K	M	1	H	WILD	2.4	2.4	0.0	0 0
346	05	1011	MELAKWA LAKE	TR 1035 TO TR 1014	K	D	1	M	WILD	2 4	2 4	0.0	0 0
347	05	1012	HIGH LAKES	TR 1013 TO WILDCAT LAKE	K	D	1	H	WILD	3 8	2.5	1 3	0 0
348	05	1013	SNOW LAKE	RD 9040 TO WILD BDRY	K	M	2	X	NON	2 0	2 0	0 0	0.0
349	05	1013.01	SNOW LAKE	WILD BDRY TO WILD BDRY	K	M	2	X	WILD	4 7	4 7	0 0	0.0
350	05	1013 02	SOURCE LAKE	WILD BDRY TO TR 1003	K	M	2	M	NON	0 9	0.9	0 0	0.0
351	05	1013 1	SOURCE LAKE	TR 1013 TO LAKE	K	M	1	X	NON	0.5	0.5	0 0	0 0
352	05	1014	DENNY CREEK	RD 5830 TO WILD BDRY	K	M	1	X	NON	0.8	0.0	0.8	0 0
353	05	1014 01	DENNY CREEK	WILD BDRY TO MELAKWA LAKE	K	M	1	X	WILD	3.5	3 5	0.0	0 0
354	05	1014.02	MELAKWA PASS	MELAKWA LK TO TR 1012	K	D	1	M	WILD	1 5	0.0	1.5	1.0
355	05	1015	MCCLELLAN BUTTE	RD 55 TO RIDGE	K	M	1	X	NON	4 4	4 4	0 0	0.0
356	05	1016	GRANITE MTN	TR 1007 TO WILD BDRY	K	M	1	H	NON	2 0	1 0	1 0	0.0
357	05	1016.01	GRANITE MTN	WILD BDRY TO LOOKOUT	K	M	1	H	WILD	1 1	0.5	0 6	0.0
358	05	1017	TINKHAM TRIALS	BPA ACCESS RD. TO END	K	M	4	L	NON	0.0	0 0	0 0	5.0
359	05	1018	CRATER LAKE	RD 6420 TO RED MTN	K	M	1	L	NON	1.0	0 0	0 0	1.0
360	05	1019	ANNETTE LAKE	RD 55 TO ANNETTE LK	K	M	1	X	NON	3.9	3.0	0.9	0.0
361	05	1019 01	ABIEL PASS	TR 1019 TO TR 2000	K	D	1	M	NON	0.0	0.0	0 0	2.0
362	05	1021	WAGON ROAD	RD 58 TO TR 1036	K	E	9	H	NON	1.0	1.0	0.0	0 0

Table E-1 Trail Inventory Continued

	DIST_	TRAIL_NO	TRAIL_NAME	TRAIL_TERMINI	CO	DIFFI	PRI_OBJ	USE	AREA	EX_MI	ADEQ	INADEQ	PROPO
363	05	1023	ASAHEL CURTIS	RD 9035 TO NATURE LOOP	K	E	9	H	NON	1.3	1.3	0.0	0.0
364	05	1030	DUTCH MILLER GAP	RD 5620 TO WILD BDRY	K	M	2	M	NON	0.6	0.5	0.1	0.0
365	05	1030.01	DUTCH MILLER GAP	WILD BDRY TO DM GAP	K	M	2	M	WILD	6.8	3.1	3.7	0.0
366	05	1030.1	WILLIAMS LAKE	TR 1030 TO W LAKE	K	M	1	M	WILD	1 0	1.0	0.0	0.0
367	05	1031	KELLY BUTTE	RD 510 TO RD 54	K	M	2	L	NON	6 0	1.0	5 0	0.0
368	05	1033	COMMONWLTH BASIN	TR 2000 TO TR 1003	K	M	1	L	WILD	2 5	2.5	0 0	2.0
369	05	1035	PRATT RIVER	TR 1003 TO WILD BDRY	K	M	2	L	NON	7.0	6.0	1.0	2.0
370	05	1035.01	PRATT RIVER	WILD BDRY TO PRATT LAKE	K	M	2	L	WILD	2.0	2 0	0.0	1 0
371	05	1035.1	THOMPSON CREEK	TR 1035.01 TO TR 1009.1	K	M	2	L	NON	0.0	0 0	0.0	3.5
372	05	1036	FRANKLIN FALLS	RD 5830 TO FRANKLIN FALLS	K	E	1	H	NON	1.0	0.5	0.5	0.0
373	05	1037	BARE MOUNTAIN	RD 57 TO WILD BDRY	K	M	1	L	NON	1 1	1.1	0 0	0.0
374	05	1037.01	BARE MOUNTAIN	WILD BDRY TO BARE MT	K	M	1	L	WILD	3.2	3.2	0 0	0.0
375	05	1038	MASON LAKE	RD 9031 TO WILD BDRY	K	D	1	H	NON	1 8	0.3	1.5	0 0
376	05	1038 01	MASON LAKE	WILD BDRY TO TR 1009	K	D	1	H	WILD	1.0	0 0	1.0	0 0
377	05	1039	TALAPUS LAKE	RD 9030 TO WILD BDRY	K	M	1	H	NON	2.0	2.0	0.0	0.0
378	05	1039.01	TALAPUS LAKE	WILD BDRY TO OLALLIE LAKE	K	M	1	H	WILD	1.1	1.1	0.0	0.0
379	05	1039.1	TALAPUS CUTOFF	TR 1039 TO TR 1007	K	M	1	H	WILD	0 2	0.2	0 0	0.0
380	05	1040	MT CATHERINE LOOP	PAC WEST BASE TO PAC WEST BASE	K	E	7	X	NON	6.0	6.0	0 0	0.0
381	05	1041	OLLALIE CREEK	WINDY PASS TO THREE FORKS	K	M	7	M	NON	2 5	2.5	0.0	0.0
382	05	1042	HIDDEN VALLEY	THREE FORKS TO TR #1040	K	M	7	M	NON	2.5	2 5	0.0	0.0
383	05	1250	GOLD CR PONDS	RD 9080 TO RD 9080	K	E	1	M	NON	0.0	0 0	0.0	0.5
384	05	1251	RUSSIAN BUTTE	TR 1035 TO TR 1009N CR	K	M	2	M	NON	0.0	0.0	0.0	5.0
385	05	1252	RAINY LK	TR 1003 TO RAINY LK	K	D	2	M	NON	0 0	0.0	0 0	3.0
386	05	1253	GREEN PASS	RD 52007040 TO TR 2000	K	M	2	L	NON	0.0	0.0	0.0	2.0
387	05	1254	MEADOW MTN	TR 2000 TO MEADOW MTN	K	M	2	L	NON	2.0	0.0	2.0	0 0
388	05	1255	GARDNER RIDGE	RD 9020110 TO TR 1256	K	M	3	M	NON	0.0	0 0	0.0	12.0
389	05	1256	SCOUT LK	RD 5510210 TO ANNETTE LK	K	M	3	M	NON	0.0	0.0	0.0	2.0
390	05	1257	ABIEL PK	TR 1255 TO TR 2000	K	M	1	M	NON	0.0	0.0	0 0	2.5
391	05	1258	HUMPBACK MTN	JOHN WAYNE TR TO TR 1256	K	M	1	M	NON	0.0	0.0	0 0	4.0
392	05	1259	TINKHAM	CAMPGROUND TO CAMPGROUND	K	E	1	M	NON	0.0	0 0	0.0	0.5
393	05	1260	MC LAIN PEAK	RD 5730 TO MC LAIN PK	K	M	1	M	NON	0.0	0.0	0.0	2.5
394	05	1260.1	DAMON	TR 1260 TO RD 6420	K	M	1	M	NON	0.0	0.0	0.0	1.0
395	05	1261	N.F. SNOQUALMIE	RD 5730 TO WILD BDRY	K	D	1	M	NON	0.0	0.0	0.0	0.5
396	05	1261.01	N.F. SNOQUALMIE	WILD BDRY TO TR 1037	K	D	1	M	NON	0 0	0.0	0.0	2 0
397	05	1262	LK PHILIPPA	RD 57 TO LAKE	K	M	1	M	NON	0.0	0 0	0.0	1.0
398	05	1262	THREE FORKS	RD 9070110 TO NORDIC PASS	K	M	7	M	NON	2.5	0 0	0.0	0.0
399	05	1314	GOLD CREEK	PVT. RD TO WILDERNESS BDRY	K	E	1	M	NON	0.5	0.0	0.5	0.0
400	05	1314.01	GOLD CREEK	WILD BDRY TO SEC 25	K	E	1	M	WILD	3 5	0.0	3.5	0 0
401	05	1314.02	GOLD CREEK	SEC 25 TO SEC 27	K	D	1	H	WILD	1.0	0 0	1.0	0 0
402	05	1314 1	ALASKA LAKE	TR 1314 TO TR 2000	K	D	1	M	WILD	0.0	0 0	0.0	2.0
403	05	1344	KENDALL LAKES	RD 2235 TO LAKES	K	D	1	L	NON	1.5	0.0	1.5	0.0
404	06	1050	QUARTZ CREEK	RD 63 TO WILD BDRY	K	M	2	L	NON	0 3	0.3	0 0	0.0
405	06	1050.01	QUARTZ CREEK	WILD BDRY TO CURRY GAP	K	M	2	L	WILD	4 1	4.1	0 0	0.0
406	06	1051	N FK SKYKOMISH	RD 63 TO WILD BDRY	SN	M	2	L	NON	0.5	0 5	0.0	0.0
407	06	1051.01	N FK SKYKOMISH	WILD BDRY TO TR. 2000	SN	M	2	L	WILD	7.5	1 0	6.5	0.0
408	06	1052	BLANCA LK	RD 63 TO WILD BDRY	SN	D	1	X	NON	3 0	2.5	0 5	0.0
409	06	1052.01	BLANCA LK.	WILD BDRY TO BLANCA LAKE	SN	D	1	X	WILD	0.5	0 5	0.0	0 0
410	06	1053	PASS CREEK	TR 1051 TO TR 2000	SN	M	2	L	WILD	3.5	0 0	3.6	0.0
411	06	1054	W CADY RIDGE	RD 63 TO WILD BDRY	SN	M	2	M	NON	2.5	2.1	0.4	0.0
412	06	1054.01	W CADY RIDGE	WILD BDRY TO TR 2000	SN	M	2	M	WILD	3.1	0.0	3 1	0.0
413	06	1054.1	BENCHMARK MTN	TR 1054 TO TR 1054	SN	M	2	M	WILD	0.5	0.0	0.5	0.0
414	06	1055	BARCLAY LK.	RD. 6024 TO BARCLAY LAKE	SN	M	7	X	NON	2.2	2.0	0.2	0.0

Table E-1 Trail Inventory Continued

	DIST_	TRAIL_NO	TRAIL_NAME	TRAIL_TERMINI	CO	DIFFI	PRI_OBJ	USE	AREA	EX_MI	ADEQ	INADEQ	PROPO
415	06	1055	BARCLAY LAKE	RD 6024 TO BARCLAY LAKE	SN	E	1	X	NON	2.2	2.2	0 0	0.0
416	06	1055 01	EAGLE LAKE	BARCLAY LK TO EAGLE LAKE	SN	D	2	M	NON	0.0	0.0	0 0	1 5
417	06	1055.02	PARADISE MEADOWS	EAGLE LK TO RD 6514	K	M	1	L	NON	0 0	0 0	0 0	1.5
418	06	1056	EVERGREEN MTN	RD 6554601 TO LO	SN	M	4	H	NON	1 5	1 4	0.1	0.0
419	06	1056.01	EVERGREEN MTN	LO TO WILD BDRY	SN	M	1	M	NON	1 0	0 0	1.0	1.8
420	06	1056.02	EVERGREEN MTN	WILD BDRY TO TR 1057	SN	M	1	M	WILD	0.0	0 0	0.0	2.2
421	06	1057	MEADOW CREEK	RD 6530 TO WILD BDRY	SN	M	2	L	NON	1.5	1.0	0 5	0.0
422	06	1057 01	MEADOW CREEK	WILD BDRY TO TR 2000	SN	M	2	L	WILD	5.0	4.0	1 0	0.0
423	06	1057 1	W CADY CUTOFF	TR 1057 TO WILD BDRY	SN	M	2	L	NON	0.0	0 0	0 0	1.5
424	06	1057.11	W CADY CUTOFF	WILD BDRY TO TR 1054	SN	M	2	L	WILD	0.0	0 0	0.0	1 5
425	06	1058	TONGA RIDGE	RD 6830310 TO WILD BDRY	K	M	2	H	NON	0.5	0 5	0.0	0 0
426	06	1058.01	TONGA RIDGE	WILD BDRY TO WILD BDRY	K	M	2	H	WILD	4 5	4.0	0.5	0 0
427	06	1058.02	TONGA RIDGE	WILD BDRY TO WILD BDRY	K	M	2	0	NON	0.0	0 0	0.0	1.0
428	06	1058 03	TONGA RIDGE	WILD BDRY TO TR 1059	K	M	2	0	WILD	0.0	0 0	0.0	0 7
429	06	1058 1	FISHER LAKE	TR 1058 TO FISHER LAKE	K	M	1	L	WILD	2.0	0 0	2.0	0.0
430	06	1058.12	TERRACE LK	FISHER LK TO TERRACE LK	SN	D	1	L	WILD	0.0	0 0	0.0	1.5
431	06	1058.2	TONGA RIDGE ALSO	TR 1058 TO WILD BDRY	K	M	2	H	NON	0.2	0 0	0.2	0.0
432	06	1058.21	TONGA RIDGE ALSO	WILD BDRY TO RD 6830	K	M	2	H	WILD	0.2	0.0	0 2	0.0
433	06	1059	DECEPTION CREEK	RD 6088 TO WILD BDRY	K	M	1	L	NON	0.5	0.5	0 0	0.0
434	06	1059.01	DECEPTION CREEK	WILD BDRY TO TR 2000	K	M	1	L	WILD	9.9	1.5	8 4	0 0
435	06	1059 1	DECEPTION CR CUTOFF	RD 6830 TO WILD BDRY	K	M	2	H	NON	0.3	0 3	0 0	0 0
436	06	1059 11	DECEPTION CR CUTOFF	WILD BDRY TO TR 1059 01	K	M	2	H	WILD	0.2	0.2	0 0	0 0
437	06	1059 2	DECEPTION LKS	TR 1059 01 TO TR 2000	K	M	2	L	WILD	1.2	0 0	1.2	0 0
438	06	1060	SURPRISE CREEK	RD 6090 TO WILD BDRY	K	M	1	X	NON	0 3	0 3	0 0	0 0
439	06	1060 01	SURPRISE CREEK	WILD BDRY TO TR 2000	K	M	1	X	WILD	4 4	2 8	1.6	0.0
440	06	1060.1	TRAP PASS	TR 1060 01 TO TR 2000	K	M	2	L	WILD	0 6	0 6	0.0	0 0
441	06	1060.2	SURPRISE CR.	US HWY 2 TO WILD BDRY.	K	D	7	H	NON	0 8	0 8	0.0	0.0
442	06	1060.21	SURPRISE CR	WILD BDRY TO SURPRISE LK.	K	D	7	H	WILD	3 7	3 7	0.0	0.0
443	06	1061	TUNNEL CREEK	RD 6095 TO TR 2000	K	M	2	L	NON	1 6	1 2	0.4	0.0
444	06	1062	NECKLACE VALLEY	RD 68 TO WILD BDRY	K	E	1	H	NON	2 0	2 0	0.0	0.0
445	06	1062	NECKLACE VALLEY	RD 68 TO WILD BDRY	K	M	7	H	NON	2.0	2 0	0.0	0.0
446	06	1062 01	NECKLACE VALLEY	WILD BDRY TO E FK FOSS	K	E	1	H	WILD	2.5	1 5	1.0	0 0
447	06	1062 02	NECKLACE VALLEY	E FK FOSS TO FEOHN LK	K	D	1	H	WILD	4.5	0 0	0.0	1.0
448	06	1062 1	NECKLACE VALLEY	WILD BDRY TO 5 MI BRIDGE	K	M	7	H	NON	5.0	5 0	0 0	0.0
449	06	1063	SURPRISE MTN	TR 2000 TO SURPRISE MTN	K	D	1	M	WILD	1.5	1 5	0 0	0.0
450	06	1064	W FK FOSS	RD 68 TO TROUT LK	K	E	1	X	WILD	1.5	1 3	0 2	0.0
451	06	1064 01	W FK FOSS	TROUT LK TO BIG HEART LK	K	M	1	H	WILD	5.3	3 3	2 0	0.0
452	06	1064 02	W FK FOSS	BIG HEART LK TO CHETWOOD LK	K	D	1	0	WILD	0.0	0.0	0 0	2.0
453	06	1064 1	MALACHITE	TR 1064 TO MALCHITE LK	K	M	1	M	WILD	0.5	0.0	0 5	0.0
454	06	1064 2	OTTER LAKE	TR 1064 TO OTTER LAKE	K	D	1	0	WILD	0.0	0.0	0 0	1.3
455	06	1064 3	W FK FOSS LKS	END OF RD 68 TO TROUT LK	K	D	7	M	WILD	1.5	1.5	0 0	0.0
456	06	1065	SKYLINE	STEVENS PASS TO TR 2000	K	E	1	L	NON	1.0	0.0	0 0	2.0
457	06	1066	LK CLARICE	DECEPTION PASS TO LK CLARICE	K	M	2	H	WILD	4.0	3.5	0 5	0.0
458	06	1066.1	MARMOT LK	TR 1066 TO MARMOT LK	K	M	2	H	WILD	0.7	0.7	0 0	0.0
459	06	1067	JOHNSON RIDGE	RD 6526 TO RD 6530	SN	M	4	L	NON	4 3	3.3	1 0	2.5
460	06	1067.1	JOAN LK	TR 1067 TO JOAN LK	SN	M	1	L	WILD	0 3	0.0	0 3	0.0
461	06	1068	LAKE SERENE	RD 6020110 TO LK SERENE	SN	M	1	0	NON	0.0	0.0	0 0	1.2
462	06	1069	EVANS LK	RD 6840 TO EVANS LAKE	K	E	8	M	WILD	0.0	0 0	0 5	0.5
463	06	1070	HEYBROOK	HWY 2 TO RD 6024	SN	M	3	M	NON	1.0	1 0	0 0	2.8
464	06	1071	ELIZABETH LAKE	RD 6420 TO RD 6420	K	E	1	H	NON	0.5	0 2	0.3	0.0
465	06	1072	LK DOROTHY	RD 6412 TO WILD BDRY	K	E	1	X	NON	0.3	0.3	0.0	0.0
466	06	1072.01	LK DOROTHY	WILD BDRY TO INLET	K	E	1	X	WILD	3.2	2 2	1.0	0.0

Table E-1 Trail Inventory Continued

	DIST_	TRAIL_NO	TRAIL_NAME	TRAIL_TERMINI	CO	DIFFI	PRI_OBJ	USE	AREA	EX_MI	ADEQ	INADEQ	PROPO
467	06	1072 02	LK DOROTHY	INLET TO DIST BDRY	K	M	1	H	WILD	1.0	0.0	1 0	0.0
468	06	1073	BECKLER RIVER	RD 6510 TO RD 6540	K	E	1	0	NON	0 0	0.0	0.0	7 0
469	06	1074	IRON GOAT	RD 6710 TO RD 6700	K	-	8	0	NON	0 0	0.0	0.0	1 0
470	06	1074.01	IRON GOAT	TR 1074 TO TR 1074.1	K	E	1	0	NON	0.0	0 0	0.0	3 6
471	06	1074 1	IRON GOAT	TR 1074 TO STEVENS PASS/HWY 2	K	E	1	L	NON	0.0	0.0	0 0	7.4
472	06	1076	KELLEY CREEK	RD 6710 TO TR 1067 1	K	M	1	L	NON	3 0	0.0	3 0	0.0
473	06	1078	DECEPTION FALLS	HWY 2 TO HWY 2	K	E	9	H	NON	0.5	0.0	0.5	0 0
474	06	1079	TROUBLESOME CR	TROUBLESOME CG TO TROUBLESM CG	SN	E	9	H	NON	0.5	0 5	0.0	0 0
475	06	1079 1	TROUBLESOME CR	TR 1079 TO WILD BDRY	SN	M	1	L	NON	0.0	0.0	0 0	2.0
476	06	1079 12	TROUBLESOME CR	WILD BDRY TO BLANCA LK	SN	M	1	L	WILD	0 0	0.0	0 0	1.5
477	06	1080	LK ISABEL	RD 6010110 TO LAKE	SN	M	1	M	NON	1 0	0.0	1.0	0.0
478	06	1226	RAGGED RIDGE	TR 1080 TO TR 1226.5	SN	M	1	L	NON	0.0	0 0	0.0	11 0
479	06	1226.1	NORTH STAR	TR 1226 TO TR 1226	SN	M	1	L	NON	0.0	0 0	0.0	5.0
480	06	1226 2	LK ISABEL	TR 1226 TO LK ISABEL	SN	M	1	L	NON	0.0	0.0	0 0	0.5
481	06	1226 3	N.F SULTAN	RD 6330 TO TR 1226	SN	N	1	L	NON	0 0	0.0	0 0	8.5
482	06	1226.4	RAGGED RIDGE CONN.	TR 1226 TO TR 1226.3	SN	M	1	L	NON	0 0	0.0	0.0	1 0
483	06	1230	CONGLOMERATE	RD 6300 TO EAGLE LK	SN	M	1	L	NON	0.0	0.0	0.0	10 0
484	06	1230.1	CONGLOMERATE PT	CONGLOMERATE PT TO TR 1230	SN	M	1	L	NON	0.0	0 0	0.0	3.0
485	06	1231	SAN JUAN CR	RD 6500110 TO TR 1230	SN	M	1	L	NON	0.0	0.0	0 0	3.0
486	06	1232	BOULDER CR	RD 6548220 TO TR 1230	SN	M	1	L	NON	0.0	0.0	0 0	1.5
487	06	1233	TOWNSEND LOOP	RD 6540 TO TR 1230	SN	M	1	L	NON	0.0	0.0	0.0	6.0
488	06	1233.1	4TH JULY CR	TR 1233 TO TR 1230	SN	M	1	L	NON	0 0	0.0	0.0	1 5
489	06	1234	TROUT CR	RD 6300 TO EAGLE LK	SN	D	1	L	NON	0.0	0.0	0.0	6.0
490	06	1235	SUNSET LK	TR 1234 TO TR 1230.1	SN	M	1	L	NON	0.0	0 0	0.0	1.0
491	06	1236	FROZEN MTN	RD 6031 TO RD 6240	K	M	1	L	NON	0.0	0 0	0.0	4.5
492	06	1237	CRATER LK	TR 1236 TO TR 1018	K	M	1	L	NON	0.0	0.0	0.0	4.0
493	06	1237.1	CEMENT LK	TR 1237 TO CEMENT LK	K	D	1	L	NON	0 0	0.0	0 0	1.0
494	06	1237.2	PALMER MTN	TR 1237 1 TO PALMER MTN	K	D	1	L	NON	0 0	0.0	0 0	1.0
495	06	1238	SILCA MTN	TR 1056 01 TO TR 1239	SN	M	1	L	NON	0 0	0.0	0 0	4 5
496	06	1238 1	FROG MTN	TR 1238 TO FROG MTN	SN	D	1	L	NON	0 0	0.0	0.0	1 5
497	06	1239	W. CADY CR	RD 6580110 TO TR 1057 1	SN	M	2	K	NON	0 0	0.0	0.0	2 5
498	06	1240	ALPINE BALDY	RD 6660 TO TR 1076	K	M	1	L	NON	0 0	0.0	0.0	6 5
499	06	1240.1	FERNOW POTHOLES	TR 1240 TO POTHOLES	K	M	1	L	NON	0.0	0 0	0.0	1 5
500	06	1241	VALHALLA	TR 1076 TO TR 2000 (UNION GAP)	SN	M	1	L	NON	0.0	0 0	0.0	6.5
501	06	1242	CABLE DROP	RD 6020 TO RIVER	SN	M	12	L	NON	0.0	0 0	0 0	0.3
502	06	1243	SAUCER LK	TR 2000 TO CUP LK	SN	M	1	L	WILD	0.0	0.0	0 0	1.0
503	06	1244	PEACH LK	TR 2000 TO PEACH LK	SN	M	1	L	WILD	0 0	0.0	0 0	0.5
504	06	1245	MT PERSIS	RD 6220 TO MT PERSIS	K	D	1	L	NON	0 0	0.0	0.0	2.0
505	06	1590	SMITHBROOK ROAD	HWY 2 TO MP 2.5	SN	M	6	-	NON	2 5	2.5	0.0	0.0
506	06	2000	PCNST	STEVENS PASS TO WILD BDRY	SN	M	2	H	NON	4.7	4.2	0.5	0 0
507	06	2000	PCNST	WILD BDRY TO TRAP PASS	K	M	2	H	NON	7.5	7.0	0.5	0 0
508	06	2000	PCNST	TRAP PASS TO DECEPTION PASS	K	M	2	H	NON	9.9	9 9	0.0	0.0
509	06	6024	BARCLAY CR. RD	US HWY 2 TO END RD 6024	SN	D	7	X	NON	6.2	6 2	0 0	0.0
510	06	6410	MILLER RIVER RD	MILLER RIV CMP GR TO RD 6412	K	M	7	M	NON	6.0	6 0	0 0	0.0
511	06	6412	E FK MILLER RIVER RD	RD 6410 TO ROAD END	K	M	7	M	NON	4 6	4.6	0 0	0.0
512	06	6420	MONEY CR RD	SNOWLINE TO END RD	K	D	7	M	NON	7.0	7.0	0 0	0.0
513	06	650.02	BALD EAGLE	CURRY GAP TO BALD EAGLE MTN.	K	D	2	M	WILD	7 6	6.0	1 6	0.0
514	06	650 03	BALD EAGLE	BALD EAGLE MTN. TO TR 2000	K	M	2	M	WILD	2 0	0.0	2 0	0.0
515	06	6500	LOWER BECKLER RIV	US HWY 2 TO RD 6530	K	E	7	M	NON	6 5	6.5	0 0	0 0
516	06	6500	U BECKLER/NO.FK LOOP	RD 6500 TO RD 6550 TO RD 6500	SN	D	6	M	NON	16.0	16.0	0.0	0.0
517	06	6800	FOSS RIV. RD.	BN RR TRESTLE TO RD 6830	K	E	6	X	NON	6 0	6.0	0.0	0.0
518	06	6830	TONGA RIDGE RD	JCT. w/RD 6800 TO RD. END	K	D	6	X	NON	16.0	16.0	0.0	0.0

Table E-1 Trail Inventory Continued

	DIST_	TRAIL_NO	TRAIL_NAME	TRAIL_TERMINI	CO	DIFFI	PRI_OBJ	USE	AREA	EX_MI	ADEQ	INADEQ	PROPO
519	06	6960	UPPER MILL CR ROAD	HWY 2 TO MP 5.0	K	M	6		NON	5.0	5 0	0 0	0.0
520	07		LONESOME LAKE	RD 7530 TO RD 7530	P	E	8	L	NON	0 0	0 0	0 0	0 8
521	07	1140	EVANS 1140	RD 7920 TO RD 7920	P	M	4	X	NON	2 7	2 4	0 3	0 0
522	07	1140 1	EVANS 1140 1	TR 1140 TO TR 1140	P	M	4	X	NON	1 4	1 4	0 0	0 0
523	07	1145	EVANS 1145	JEEP RD 520 TO TR 1147	P	M	4	X	NON	3 0	3 0	0 0	0 0
524	07	1145 1	EVANS 1145 1	TR 1145 TO RIDGE	P	M	4	X	NON	0 1	0 1	0 0	0 0
525	07	1146	EVANS 1146	RD 7920 TO RD 7920	P	M	4	X	NON	2 9	2.9	0 0	0 0
526	07	1147	EVANS 1147	RD 7930 TO RD 7930	P	M	4	X	NON	1 0	1.0	0 1	0.0
527	07	1148	EVANS 1148	TR 1147 TO RD 7930	P	M	4	X	NON	1.2	1.1	0.1	0.0
528	07	1150	EVANS 1150	RD 7920 TO TR 1150	P	E	4	X	NON	1 6	1.6	0.0	0.0
529	07	1151	EVANS 1151	RD 7930 TO JEEP 519	P	M	4	X	NON	1.6	1.5	0.1	0.0
530	07	1153	EVANS 1153	RD 7920 TO JEEP RD 102	P	D	4	X	NON	0.8	0.8	0.0	0.0
531	07	1154	EVANS 1154	TR 1153 TO JEEP TR 311	P	D	4	X	NON	1.7	0.3	1.4	0.0
532	07	1154 1	EVANS 1154 1	RD 7920 TO TR 1154	P	M	4	X	NON	0.3	0.0	0 3	0.0
533	07	1155	RAINIER VIEW	RD 7174 TO WILD BDRY	P	M	2	M	NON	0.5	0.5	0 0	0.0
534	07	1155 01	RAINIER VIEW	WILD BDRY TO TR 1188	P	M	2	M	WILD	1.7	1 2	0 5	0 0
535	07	1156	BULLION BASIN	RD 7190410 TO TR 2000	P	M	2	H	NON	2.2	1.7	0 5	0.0
536	07	1157	ECHO LAKE	TR 1176 TO TR 1185	P	D	2	L	WILD	0.0	0 0	0 0	2 0
537	07	1158	RIDGETOP	TR 1184 TO TR 1157	P	M	2	L	WILD	0.0	0 0	0 0	2 0
538	07	1159	CEDAR LAKE	FOR BDRY TO CEDAR LAKE	P	M	1	M	WILD	1 0	0 0	1 0	0.0
539	07	1160	PYRAMID PK	TR 2000 TO PEAK	P	M	2	M	NON	0 7	0 0	0 7	0 0
540	07	1161	GOAT LAKE	TR 1191 TO TR 2000	P	M	2	H	NON	2 5	0 0	2 5	0 0
541	07	1162	JOHN MUIR NATURE TR	DALLES CG	P	E	8	H	NON	0.8	0.4	0 4	0 2
542	07	1162.1	DALLES RIVER TR	DALLES CG TO RD 73	P	E	3	M	NON	0.8	0.4	0 4	0 0
543	07	1163	CRYSTAL MTN	RD 7190510 TO TR 1192	P	E	2	H	NON	9.1	8 6	0 5	0 0
544	07	1163.1	CRYSTAL MTN	TR 1163 TO RD 7176	P	M	2	M	NON	0 0	0 0	0 0	4.0
545	07	1164	SKOOKUM PASS	TR 1194 TO TR 1182	P	M	1		NON	0.0	0 0	0.0	6 0
546	07	1165	TIN SHACK	TR 1176 TO TR 2000	P	M	2	M	WILD	4.5	2 0	2 5	0 0
547	07	1166	STOOL CAMP	TR 1165 TO TR 2000	P	M	2	M	WILD	1.5	1 0	0 5	0 0
548	07	1167	SNOQUERA FALLS	TR 1199 TO TR 1199	P	D	1	H	NON	2.4	2 0	0 4	0 0
549	07	1168	CMP SHEPPARD CUTOFF	TR 1167 TO TR 1197	P	M	1		NON	0 0	0 0	0 0	2 0
550	07	1169	BUCK CREEK	TR 1194 TO TR 1199	P	E	1	M	NON	0.5	0 4	0 1	0 0
551	07	1170	GRASS MTN	TR 1171 TO FOR BDRY	P	M	4	L	NON	6.0	3.0	3 0	0 0
552	07	1171	CHRISTOFF	RD 7130 TO CHRISTOFF	K	D	4	M	NON	3.3	0 0	3 3	0.0
553	07	1172	DIVIDE	RD 7032 TO CHRISTOFF	K	M	4	M	NON	8.5	6 5	2 0	0 0
554	07	1172.1	BENE LAKE	TR 1172 TO CHRISTOFF	K	M	4	M	NON	1 0	0.0	0 0	0 0
555	07	1173	DALLES RIDGE	RD 7250210 TO TR 1184	P	M	2	M	NON	1 8	1.0	0 8	0 0
556	07	1173 1	DALLES RIDGE	RD 7140 TO RD 7265	P	M	1	M	NON	3.8	0 0	0 0	0 0
557	07	1174	DOE FALLS	TR 1183 TO FALLS	P	M	1	M	NON	0 5	0 0	0 5	0 0
558	07	1175	NACHES PASS WEST	RD 7033 TO RD 7065210	P	M	1	H	NON	0.7	0 0	1 5	0 0
559	07	1175 01	NACHES PASS WEST	RD 7065210 TO NACHES PASS	P	M	11	X	NON	5.0	1 9	2 3	0 0
560	07	1176	GREENWATER	RD 7033 TO WILD BDRY	P	E	2	X	NON	2.3	0 0	2 3	0.0
561	07	1176 01	GREENWATER	WILD BDRY TO WILD BDRY	P	M	2	X	WILD	9.4	7.9	1 5	0.0
562	07	1176 02	GREENWATER	WILD BDRY TO RD 7174	P	M	2	X	NON	0.2	0.0	0.2	0.0
563	07	1177	SUMMIT LAKE	RD 7810 TO WILD BDRY	P	E	2	H	NON	0 7	0.4	0.3	0.0
564	07	1177 01	SUMMIT LAKE	WILD BDRY TO SUMMIT LK	P	E	2	H	WILD	1 8	1.8	0 0	0 0
565	07	1177 02	SUMMIT LAKE	SUMMIT LAKE TO TR 1178	P	D	1	L	WILD	2 3	0 0	2 3	0 0
566	07	1178	CLEARWATER	RD 7450 TO WILD BDRY	P	M	2	L	NON	0 1	0 1	0 0	0 0
567	07	1178 01	CLEARWATER	WILD BDRY TO WILD BDRY	P	M	2	L	WILD	7 8	5 2	2 6	0 0
568	07	1178 02	CLEARWATER	WILD BDRY TO RD 7720	P	M	2	L	NON	2 3	0 0	2 3	0 0
569	07	1178.1	LYLE LAKE	WILD BDRY TDO TR 1178	P	M	1	L	WILD	2 0	0 0	2 0	1 0
570	07	1179	CARBON	RD 74 TO TR 1177	P	M	2	L	WILD	9 4	6 4	3 0	0 0

Table E-1 Trail Inventory Continued

	DIST_	TRAIL_NO	TRAIL_NAME	TRAIL_TERMINI	CO	DIFFI	PRI_OBJ	USE	AREA	EX_MI	ADEQ	INADEQ	PROPO
571	07	1179.1	BEARHEAD	TR 1179 TO BEARHEAD MTN	P	M	2	L	WILD	0 8	0.8	0 0	0 0
572	07	1180	FROG MTN	RD 74 TO RD 7450210	P	M	4	L	NON	3 1	1.0	2 1	0 0
573	07	1181	CLEARWEST PK	RD 7430 TO CLEARWEST PK	P	M	4	M	NON	0 8	0.8	0 0	0 0
574	07	1182	HUCKLEBERRY CR	RD 7340 TO NPS BDRY	P	E	1	M	NON	0 9	0.9	0.0	0 0
575	07	1183	SUNTOP	RD 7160210 TO LO	P	E	4	M	NON	5 5	3.3	2.2	0 0
576	07	1184	NOBLE KNOB	RD 72 TO RD 7222	P	M	2	H	NON	2 9	0.0	0.0	0 0
577	07	1184.01	NOBLE KNOB	RD 7222 TO RD 7174	P	M	4	H	NON	5 0	3.0	2 0	0 0
578	07	1184.1	GEORGE LK	TR 1184 TO LAKE	P	M	2	M	NON	0 3	0.3	0.0	0 0
579	07	1185	LOST LK	TR 1176 TO TR 1184	P	M	2	H	WILD	5 1	3.1	2.0	0.0
580	07	1186	MAGGIE CREEK	TR 1176 TO TR 2000	P	M	2	M	WILD	5 0	4.0	1 0	0 0
581	07	1187	ARCH ROCK	TR 1176 TO TR 2000	P	D	2	M	WILD	3 1	0.0	3.1	0 0
582	07	1188	CASTLE MTN	TR 1176 TO TR 2000	P	M	2	L	WILD	4 1	0.5	3 6	1 0
583	07	1189	GOAT FALLS	RD 7176 TO FALLS	P	E	1	M	NON	0 5	0.5	0 0	0 0
584	07	1190	SAND FLAT	RD 7190 TO RD 7176	P	E	2	M	NON	2 7	2.0	0 7	3 5
585	07	1191	NORSE PEAK	RD 7190410 TO WILD BDRY	P	M	2	X	NON	4 8	4.5	0 3	0 0
586	07	1191.01	NORSE PEAK	WILD BDRY TO TR 2000	P	M	2	X	WILD	0 4	0.4	0 0	0 0
587	07	1191.1	NORSE PEAK VIEW	TR 1191 TO NORSE PEAK	P	M	2	H	NON	0 7	0.0	0 7	0 0
588	07	1192	SILVER CREEK	RD 7190410 TO TR 2000	P	E	2	H	NON	2.1	1.9	0.2	0 0
589	07	1193	HENSKIN LK	TR 1163 TO TR 2000	P	M	3	H	NON	0 7	0.5	0 2	0 0
590	07	1194	SKOOKUM FLATS	RD 73 TO NPS BDRY	P	E	1	H	NON	8.2	5.5	2 7	0 0
591	07	1195	COLQUHOUN PK	RD 7036050 TO PEAK	P	D	4	L	NON	0.5	0 0	0 5	0.0
592	07	1196	DEEP CREEK	TR 1199 TO TR 1184	P	M	3	M	NON	4.0	3 0	1 0	0.0
593	07	1197	RANGER CREEK	TR 1199 TO TR 1173	P	M	3	M	NON	5.8	4 0	1.8	0.0
594	07	1198	PALISADE	TR 1199 TO TDR1197	P	M	3	M	NON	6.6	5 0	1.6	0.0
595	07	1199	WHITE RIVER	RD 7174 TO TR 1197	P	E	2	H	NON	3.1	2.0	1.1	0.0
596	07	1199 01	WHITE RIVER	TR 1197 TO HWY 410	P	E	3	H	NON	4.0	3.6	0.4	0.0
597	07	1200	EVANS CR-JEEP 102	RD. 7920 TO RD 7920	P	D	11	X	NON	4.8	4.8	0.0	0.0
598	07	1201	EVANS CR-JEEP 120	RD. 7920 TO RD 7920	P	E	11	X	NON	1 0	1.0	0.0	0 0
599	07	1202	EVANS CR-JEEP 197	TR 196 TO TR 198	P	D	11	X	NON	0 6	0.3	0 3	0.0
600	07	1203	EVANS CR-JEEP 198	RD. 7920 TO RD 7920	P	D	11	X	NON	1 8	1.8	0 0	0 0
601	07	1203.1	EVANS CR-JEEP 196	RD 7920 TO TR 198	P	D	11	X	NON	0.5	0 5	0 0	0.0
602	07	1204	EVANS CR-JEEP 199	RD. 7920 TO TR 519	P	E	11	X	NON	1.0	1 0	0 0	0.0
603	07	1205	EVANS CR-JEEP 311	RD. 7930311 TO RD 7920	P	M	11	X	NON	2.3	2 3	0 0	0.0
604	07	1205 1	EVANS CR-JEEP 310	EVANS CR CG TO TR 311	P	E	11	X	NON	0.5	0 5	0.0	0.0
605	07	1206	EVANS CR-JEEP 519	RD 7930 TO RD 7920	P	E	11	X	NON	3.0	3.0	0.0	0.0
606	07	1206 1	EVANS CR-JEEP 517	TR 519 TO TR 519	P	M	11	X	NON	0 5	0.5	0.0	0.0
607	07	1206.1	EVANS CR -JEEP 519A	JEEP 519 TO JEEP 519	P	M	11	M	NON	0 5	0.5	0 0	0.0
608	07	1207	EVANS CR-JEEP 520	RD 7930 TO RD 7930	P	E	11	X	NON	3 0	3.0	0 0	0 0
609	07	1208	EVANS CR -JEEP 510	RD. 7920 TO END OF JEEP 510	P	E	11	X	NON	1 2	1 2	0 0	0.0
610	07	1209	EVANS CR.-JEEP 519	TR 102 TO RD 7920	P	M	11	X	NON	0 0	0 0	0 0	1.0
611	07	1210	COPLEY LK	RD 7840 TO RD 7840	P	E	8	M	NON	0.0	0 0	0.0	0.5
612	07	2000	PCNST	TR 1318 TO WINDY GAP	P	E	2	M	NON	7.7	7 7	0 0	0.0
613	07	2000	PCNST	WINDY GAP TO WILD BDRY	P	E	2	M	NON	3.4	2 4	1.0	0.0
614	07	2000	PCNST	WILD BDRY TO WILD BDRY	P	M	2	X	WILD	12.8	9 8	3.0	0.0
615	07	2000	PCNST	WILD BDRY TO CHINOOK PASS	P	M	2	X	NON	9 8	9.3	0 5	0 0
616	07	7030	GREENWATER/NACHES	RD 7030 LOT TO RD 7030 LOT	P	M	6	M	NON	38 0	38.0	0 0	0 0
617	07	7184	SILVER SPRINGS	SILVER SPRINGS CG TO HWY 410	P	M	7	M	NON	1 0	0 7	0 3	0 0
618	07	7300	HUCKLEBERRY XC	RD 7315 TO HUCKLEBERRY CR	P	E	7	M	NON	4 7	4 7	0 0	0 0
619	07	7315	SUNTOP XC	RD 73 TO LOOKOUT	P	M	7	M	NON	5.2	5 2	0 0	0.0

Legend for Table E-2
10 Year Trails Capital Investment Program

The following table (E-2) shows the Capital Investment Program for the trail system over the next ten years. The first column is the PROJECT NUMBER, followed by TRAIL NAME, and TRAIL NUMBER.

PRIMARY OBJECTIVE, or the primary user group that the trail is intended to serve, is listed next. These mileages do not overlap, although many different groups may use a trail besides the primary users with the exception of the hiker only trails. For instance, hikers may use a pack and saddle trail.

1 = Hiker
2 = Pack and Saddle
3 = Mountain Bike
4 = Motorbike
5 = ATV
6 = Snowmobile
7 = Cross-country skiing
8 = Handicap
9 = Interpretive
10 = Jeep

MI refers to the miles within the project, while TYPE refers to reconstruction (R) or construction (C).

AREA delineates the type of area the trail passes through; these mileages do not overlap.

Non = Nonwilderness
Wild = Wilderness
NRA = National Recreation Area
RNA = Research Natural Area
W&SR = Wild and Scenic River

The capital investment process usually involves three phases: PLAN refers to the year planning is done, PRE-C refers to the year pre-construction is done and C-RE is the year construction or reconstruction is done.

The last three columns designate the dollars required for planning (P), preconstruction (PC) and construction/reconstruction (RC).

Table E-2 TRAIL CAPITAL INVESTMENT

MT. BAKER RANGER DISTRICT

PRJ #	TRAIL NAME	MI.	AREA	TYPE	YR.
103	BOULDER RIDGE	2.0	NON	R	91
103	BOULDER RIDGE	1.6	WILD	R	91
107	HIGH DIVIDE	14.5	WILD	C	93
107	HIGH DIVIDE	6.0	NON	C	93
113	MAZAMA PARK	1.0	NRA	R	94
113	MAZAMA PARK	2.5	WILD	R	94
113	MAZAMA PARK	2.0	NON	R	94
113	RAILROAD GRADE	3.0	NRA	R	94
115	NOISY CR LOOP	2.5	NON	R	92
115	BAKER RIV BRIDGE	0.1	NON	R	92
115	EAST BANK +BR	8.0	NON	R	92
116	BELL RIDGE	3.0	WILD	R	94
116	ELBOW LK.	1.5	WILD	R	95
116	ELBOW LK.	5.0	NON	R	95
117	RIDLEY CR.	3.5	WILD	R	95
118	CHAIN LKS.	5.0	WILD	R	93
118	CHAIN LKS.	1.0	NON	R	93
118	TABLE MTN. #2	0.7	WILD	R	93
118	TABLE MTN. #2	1.0	NON	R	93
119	THUNDER RID #1	9.0	NON	C	96
119	ANDERSON LKS.	2.0	NON	C	96
119	WATSON LK.	2.0	NON	R	96
120	WINCHESTER MT.	2.0	WILD	R	93
121	RUTH GORGE	1.1	NON	R	93
121	NOOKSACK CIRQUE	3.0	NON	R	93
122	RAILROAD GRADE	3.0	NRA	R	94
123	SWIFT CR.	7.5	WILD	R	93
123	SWIFT CR. +BR	0.1	NON	C	93
123	SWIFT CR.	2.5	NON	C	93
124	BEAVER POND	0.5	NON	C	96
125	PARK CR. FALLS	2.0	NON	C	96
126	SULPHUR CR. FALL	1.0	NON	C	96
134	HELIO. BRIDGES	0.2	WILD	R	92
135	BAGLEY LK BRIDGE	0.1	NON	R	91
135	BAGLEY LAKES	2.5	NON	R	91
135	WILD GOOSE	1.0	NON	C	91
135	PANORAMA DOME	2.5	NON	R	91
135	BLUEBERRY HILL	0.5	NON	C	91
143	YELLOW ASTER	2.5	WILD	R	93
146	RUTH ARM	2.0	WILD	R	92
147	CASCADE RIVER	3.0	NON	R	94
147	CASCADE RIVER	13.5	WILD	R	94
148	HIDDEN LK.	4.5	NON	R	94
149	BLUE LK.	1.0	NON	R	95
150	DOCK BUTTE	4.0	NON	R	95
151	THREE FORKS	4.5	NON	C	95
151	HEART LK.	2.7	NON	C	95
151	HEART LK.	0.5	WILD	C	95

PRJ #	TRAIL NAME	MI.	AREA	TYPE	YR.
152	BALD MTN.	4.0	NON	C	97
152	CLEAR LK.	3.5	NON	C	97
152	THUNDER RID. #2	9.0	NON	C	97
152	ROCK CR.	4.0	NON	R	97
152	JACKMAN RIDGE	3.0	NON	C	97
153	NOOKSACK RIVER	18.1	NON	C	98
153	THOMPSON CREEK	6.0	NON	R	98
154	SKYLINE DIVIDE	2.0	NON	R	98
154	SKYLINE DIVIDE	4.0	WILD	R	98
155	BIG CEDAR	1.5	NON	C	98
156	DRUID GROVE	0.5	NON	R	98
157	TWIN LKS.	1.0	NON	R	99
158	LONE JACK	5.0	WILD	R	99
159	SILESIA	7.2	WILD	R	99
160	GOAT MTN.	3.0	NON	R	99
160	GOAT MTN.	2.0	WILD	R	99
161	LOOKOUT MTN.	4.7	NON	R	99
162	LAVA DIVIDE	1.0	NON	C	99
162	LAVA DIVIDE	3.0	WILD	C	99
163	GROUSE RIDGE	3.5	NON	C	99
164	COUGAR DIVIDE	15.3	WILD	C	99

Table E-2 TRAIL CAPITAL INVESTMENT

DARRINGTON RANGER DISTRICT

PRJ #	TRAIL NAME	MI.	AREA	TYPE	YR.
204	POODLE DOG +RW	0.5	NON	R	94
204	POODLE DOG +RW	1.2	WILD	R	94
206	PILCHUCK-R/W	2.5	NON	R	91
207	WEDEN CR.	1.5	NON	R	91
208	HEATHER LK.	2.6	NON	R	92
209	MEADOW MTN.	9.0	WILD	R	94
209	MEADOW MTN.	5.0	NON	R	94
211	KENNEDY H.SP.-BR	0.1	WILD	R	91
214	PEEK A BOO	1.7	NON	R	95
216	LAKE 22	0.8	NON	C	93
217	MILK CR. BRIDGE	0.1	WILD	R	91
218	DOWNEY CR.	2.5	WILD	R	93
218	DOWNEY CR.	0.5	NON	R	93
219	LOST CR. RIDGE	3.0	NON	R	95
220	BEAVER LK. +BR	2.5	NON	R	96
221	DICKERMAN MTN.	2.0	NON	R	97
221	DICKERMAN EAST	1.5	NON	R	97
222	UPPER WHITECHUCK	1.8	WILD	R	96
223	HALLS CR LOWLAND	5.0	NON	C	97
225	CIRCLE PEAK	2.5	NON	R	95
226	MARBLE GULCH	2.0	NON	C	97
227	RIDGE #1	2.0	NON	C	96
229	SQUIRE CR./8 MILE	3.6	WILD	R	99
228	SUNRISE MINE +RW	3.5	NON	R	94
230	PERRY CR.	1.8	NON	R	95
231	PILCHUCK CREST#1	7.0	NON	C	93
233	MT. HIGGINS	3.9	NON	C	98
234	RIDGE #2	1.5	NON	C	98
235	MYRTLE LK.	0.3	NON	R	98
237	CRYLTAL LK.	1.2	WILD	R	98
238	EVANS LK.	0.5	NON	C	99
238	EVANS LK.	0.1	NON	R	99
239	RIDGE #3	4.5	NON	C	00
240	SLOAN PEAK +BR.	2.0	NON	R	00
240	SLOAN PEAK +BR.	2.5	WILD	R	00
245	BIG FOUR LOOP	0.5	NON	C	97
246	MALLARD RIDGE	3.0	NON	C	98
247	THORTON LK	1.5	NON	C	99
248	ELLIOT CR.	4.0	NON	R	00
251	VERLOT NAT. TR.	0.3	NON	R	93
252	GREEN MTN.	4.0	WILD	R	00
253	GLACIER BASIN	1.5	WILD	R	96
254	SNOW GULCH	1.5	NON	C	99

Table E-2 TRAIL CAPITAL INVESTMENT

NORTH BEND RANGER DISTRICT

PRJ #	TRAIL NAME	MI.	AREA	TYPE	YR.
504	DUTCH MILLER	1.3	NON	R	91
504	DUTCH MILLER	10.0	WILD	R	91
505	MID. FK.#2 +BR	5.8	NON	C	92
506	HESTER LK.	2.5	WILD	R	92
506	DINGFORD CR.	7.5	WILD	R	92
506	DINGFORD CR.	1.8	NON	R	92
508	MARTIN LK.	1.0	WILD	C	94
508	MARTIN LK.	0.5	NON	R	94
509	PRATT RIV.+BR,RW	8.0	NON	R	92
509	PRATT RIV +BR,RW	0.4	WILD	C	92
512	MASON LK.	1.0	WILD	R	94
512	MASON LK.	1.8	NON	R	94
514	SUNDAY LK. +BR/RW	1.0	WILD	R	94
514	SUNDAY LK. +BR/RW	0.5	NON	R	94
516	SNOQ LK +BR	4.0	WILD	R	94
516	SNOQ. LK +BR	3.5	NON	R	94
517	MCCLELLAN B.+R/W	4.4	NON	R	93
519	TALAPUS LK.	2.0	NON	R	97
519	TALAPUS LK.	1.1	WILD	R	97
520	GOLD CR./ALASKA LK	5.2	WILD	C	98
522	SNOW LK. +R/W	0.5	NON	C	93
523	HUMP BACK CR +BR	0.1	NON	R	93
525	TINKHAM NAT. TR.	0.8	NON	C	93
526	THOMPSON CR.	1.0	NON	C	95
526	THOMPSON CR.	7.5	WILD	C	95
527	COMMONWEALTH	6.0	WILD	C	96
527	COMMONWEALTH	0.5	NON	C	96
528	MELAKWA/DENNY +BR	3.5	WILD	R	96
529	MID. FORK #4 +BR	0.2	NON	C	93
530	ROCK CR.	3.8	WILD	R	95
530	ROCK CR.	1.0	NON	R	95

Table E-2 TRAIL CAPITAL INVESTMENT

SKYKOMISH RANGER DISTRICT

PRJ #	TRAIL NAME	MI.	AREA	TYPE	YR.
602	WEST CADY	3.1	WILD	R	94
602	WEST CADY	2.5	NON	R	94
602	BENCHMARK MTN.	0.5	WILD	R	94
603	NO. FORK SKY	5.0	WILD	R	93
604	BALD EAGLE	6.0	WILD	R	94
605	W. FK. FOSS +BR	6.5	WILD	R	93
605	MALACITE LK.	0.5	WILD	R	93
606	NECKLACE VAL.+BR	4.0	WILD	R	93
607	LK. DOROTHY	4.2	WILD	R	95
608	SURPRISE LK.	4.4	NON	R	95
610	LK. SERENE	3.0	NON	C	91
611	IRON G.#1 +BR RW	4.6	NON	C	93
613	MEADOW CK..	0.5	WILD	R	94
613	MEADOW CK..	1.0	WILD	R	94
614	TONGA RIDGE	0.5	WILD	C	95
614	TONGA RIDGE	1.0	NON	C	95
614	TONGA RIDGE	0.5	WILD	R	95
615	DECEPTION CR.	8.7	WILD	R	96
617	EAGLE LK.	2.0	NON	R	95
617	PARADISE MDWS.	1.5	WILD	C	95
618	DECEPTION LK.	1.2	NON	R	96
620	TUNNEL CR.	0.2	WILD	R	92
620	TUNNEL CR.	0.2	NON	R	92
620	TUNNEL CR.	0.2	WILD	R	92
621	W. FK. FOSS #2	2.0	NON	C	95
622	IRON GOAT #2	2.6	NON	C	94
623	IRON GOAT #3	3.2	NON	C	95
624	PCNST REROUTE	3.0	WILD	C	91
626	MEADOW CR. EXT.	0.5	WILD	C	93
627	INDEX RIV. ACC.	0.3	NON	C	92
629	BLANCA LK.	0.5	NON	R	92
630	HEYBROOK	0.5	NON	R	94
631	PCNST - SKY	1.5	WILD	R	94
632	LK. CLARICE	0.5	NON	R	95
633	ELIZABETH LK.	0.5	NON	R	95
634	SKYLINE	3.0	NON	R	95
635	JOHNSON RIDGE	1.0	NON	R	96
635	JOHNSON RIDGE	2.5	WILD	C	96
635	JOAN LK.	0.3	WILD	R	96
637	EVANS LAKE	0.5	WILD	R	96
637	EVANS LAKE	0.5	NON	C	96
639	LK. ISABEL	1.0	NON	C	96
640	KELLEY CR.	3.0	WILD	R	97
641	SURPRISE MTN	1.5	WILD	R	97
642	TRAP PASS	0.6	WILD	R	97
643	RAGGED RID. 1226	8.5	NON	C	98
644	BECKLER RIV.	7.0	NON	C	98
645	HAYBROOK	12.5	NON	C	99

Plan - Appendix E

PRJ #	TRAIL NAME	MI.	AREA	TYPE	YR.
646	TROUBLESOME CR.	1.5	NON	C	98
646	TROUBLESOME CR.	1.5	WILD	C	98
647	MT. PERSIS	0.8	NON	C	98
648	FROZEN LK.	4.5	NON	C	99
649	CRATER LK.	4.0	NON	C	00
650	CONGLOMERATE	10.0	NON	C	00

Table E-2 TRAIL CAPITAL INVESTMENT

WHITE RIVER RANGER DISTRICT

PRJ #	TRAIL NAME	MI.	AREA	TYPE	YR.
703	RAINIER VIEW	2.2	WILD	R	92
704	CASTLE MTN.	1.5	WILD	R	94
706	THE DALLES NAT. TR.	0.8	NON	R	92
709	GOAT LK.	2.5	NON	R	92
710	SUNTOP	2.2	NON	R	95
711	SEQUERA FALLS	1.0	NON	R	99
713	PALLISADES	1.6	NON	R	94
714	BULLION BASIN	0.5	NON	R	93
715	CLEARWATER	4.9	WILD	R	95
716	CARBON	3.0	WILD	R	96
717	LYLE LK.	2.0	WILD	C	94
719	SAND FLATS	4.7	NON	R	95
720	NACHES WEST	3.8	NON	R	96
721	ARCH ROCK	3.1	NON	R	96
722	BUCK CR. BRIDGE	0.1	NON	R	94
723	GREENWATER BR	0.1	NON	R	95
724	NOBLE KNOB #2	4.7	NON	R	96
725	WHITE RIVER	1.5	NON	R	97
726	DEEP CR.	1.0	NON	R	97
727	RANGER CR.	1.8	NON	R	98
728	SILVER SPRINGS	0.3	NON	R	97
730	EVANS CR. #1	3.0	NON	R	91
731	SUMMIT LK. #2	2.3	WILD	C	94
736	PCT/WRRD #3	9.0	NON	R	93
737	NOBLE KNOB #1	7.9	NON	C	94
738	COPLEY LK. N.T.	1.0	NON	C	94
739	SKOOKUM FLATS	2.7	NON	R	99
742	EVANS CR. #2	5.0	NON	C	96
740	ECHO LK.	2.0	WILD	C	00

NOTE:

The following is the key and definitions which will help with interpreting this table. It takes at least three (3) years to get a trail ready for construction/reconstruction, therefore the environmental assessment and the preconstruction (survey) of each project will start prior to the year indicated.

PJT # -- is the project number for that project it is not the trail number. Duplicate numbers means that these trails will be constructed/reconstructed at the same time.

TRAIL NAME --- The official name of the trail.

MI. -- is the miles to be constructed/reconstructed not necessarily the length of the trail.

AREA -- this denotes the area in which the trail is. Wild is designated Wilderness and non is those lands outside of Wilderness. NRA is the designated Mt. Baker National Recreation Area.

TYPE -- this is the type of activity. C is new construction and R is reconstruction of the old trail on its present location.

YR. -- is the year that the construction/reconstruction is desired. Funding will dicatate the actual projects as well as the year.

APPENDIX F
Wilderness Rehabilitation

The following locations or areas currently are exceeding the standards set by the Limits of Acceptable Change. Corrective action is planned on all of these sites within the next five years. On many of the site rehabilitation will be an ongoing process over several years. A large portion of the cost of rehabilitation includes on-site monitoring and maintenance following the initial work.

Mt. Baker District — $5,000 annually X 8 Sites = $40,000

Table Mt./ Chain Lakes
Lake Ann
Hannigan Pass
Heliotrope Ridge (Kulshan Cabin Route)
High Divide (Excelsior to High Pass)
Anderson-Watson Lakes
Skyline Divide
Elbow Lake

Darrington District — $5,000 annually X 15 Sites = $75,000

Goat Lake
Kennedy Hot Springs
Goat Flats
North Lakes Area
Image Lake
Boulder Basin
White Pass
Boulder Lake
Slide Lake
Kelcema Lake
Silver Lake/ Twin Lake
Glacier Basin
Lime Ridge
Bath Lakes
Ptarmigan Traverse

Skykomish District — $5,000 annually X 6 Sites = $30,000

Lake Dorothy
West Fork Foss (Trout, Copper, Malachite, Little Heart, and Big Heart Lakes)
Blanca Lake
Surprise Lake/Glacier Lake
Hope Lake/Mig Lake
Tonga Ridge/Fisher Lake

North Bend District $5,000 annually X 19 Sites = $95,000

Ridge and Gravel Lake - (Shared responsibility w/Cle Elum District)
Talapus Lake
Snow Lake
Melakwa Lake
Pratt Lake
Snoqualmie/ Deer Lake/ Bear Lake
Ollalie Lake
Mason Lake
Rainbow Lake
Chain Lake
Williams Lake
Island Lake
Myrtle Lake
Paradise Lake Claim Site
Sunday Lake
Crawford Lake
Nordrum Lake
Bear Lakes Cabin Site

White River District $5,000 annually X 7 Sites = $37,000

Summit Lake
Hidden Lake
Airplane Meadows
Echo Lake
Arch Rock Area
Lyle Lake
Cedar Lake

APPENDIX G
Land Adjustment Plan

The goal of landownership adjustment is to achieve an ownership pattern that best accommodates the land and resource objectives of this plan. The public and private lands within the Forest have been classified and examined for acquisition or exchange with the intent of eventually achieving the optimum land ownership pattern. All land has been placed in one of the following groups:

Group I- This group includes those lands where Congress has either directly or indirectly instructed the Forest Service to retain ownership and acquire non-Federal lands.

Group II- Landownership direction for Group II lands is to retain National Forest ownership and acquire private lands as the opportunity and/or need occurs.

Group III- These lands will be available for land adjustment and usually will provide most of the land considered in exchange projects.

Group IV Lands in this group are normally made available to exchange for private lands in Groups I, II, or III.

Group V More intensive study and planning are necessary before landownership decision area made.

The classification of an area into a land ownership group is contained in the Forest management prescriptions, the acreages within each group are summarized in Table G-1. Guidance for land exchange within the Alpine Lake Management Unit and the Skagit Wild and Scenic River is contained within those plans, and has been included by reference within this plan.

Table G-1
Landownership Classification - In Acres

Group I	721,718
Group II	312,255
Group III	527,620
Group IV	9,102
Group V	13,241
Alpine Lakes	117,650
Skagit River	15,036

Group I lands shall be assigned the highest priority for acquisition, followed by Groups II and III. The highest priority of lands to be used in exchanges for private lands are in Group IV areas, followed by Group III.

A estimate of the acres to be exchanged during the first decade of the plan follows. In this projection, the acres shown are the non-Federal acres being acquired by the United States, a similar acreage of National Forest Land should be considered as going into private ownership.

Table G-2
Acres Exchanged by Year

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
M-Acres	8.6	15.5	43.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0

The above table includes the following exchanges within the first three years.

Yr.	Exchange Name	Non-Federal Acres	Federal Acres
90	DNR #3	4239	4396
91	City Of Tacoma	6000	1010
91	Snohomish PUD	1500	4150
91	Champion International	1375	1481
92	Weyerhaesuer	31300	10100
92	Murray Pacific Corp	1073	790

A detailed map of the land exchange program is available for review at the Forest Supervisors Office.

APPENDIX H
Off-Road Vehicle Use and Trail Closure Plan

Introduction

This Off-Road Vehicle Plan for the Mt. Baker-Snoqualmie National Forest will be implemented by the issuing of closure orders, as authorized in 36 CFR 261.50. Closures or restrictions established by the orders will be reviewed and updated every five years.

The Off-Road Vehicle (ORV) plan for this Forest has been prepared in response to a 1972 Executive Order, which calls on all federal land management agencies to inventory ORV opportunities and adopt regulations governing this type of use. The ORV Plan included in this Appendix has been updated and is now part of the Forest Plan.

The operation of motorized vehicles will be permitted on all roads, trails and general forest areas on National Forest lands except where noted as closed in this plan.

This plan is a result of the area assignments made in the Forest Plan, and is responsive to the management objectives of the Plan.

As described in this ORV Plan, most trails on this Forest are not open to motorized use. Of those trails that are open in summer, almost all are suited to motorized vehicles of no more than 40 inches in width. The reasons for this lack of suitability are explained, trail-by-trail, in the plan. In most cases, lack of suitability is due to steep terrain with unstable soils, fragile vegetation, heavy hiking use, designated wilderness, or trail construction standards that physically do not allow ORV use.

However, nearly all of the 2,829 miles of forest roads are open to motor vehicle use, in both summer and winter. Of this total, 1,483 miles are open only for high clearance vehicles.

Most of the National Forest land without roads or trails is not well suited to cross-country vehicle use because of dense vegetation in the low and middle elevations, fragile vegetation in the highcountry, and universally rugged terrain. There are, however, a number of trails on the forest which might be suitable for off-road vehicle use with reconstruction and periodic maintenance.

During the coming years, all Ranger Districts will identify these trails and estimate the cost of developing them into useable ORV routes. With public involvement, a priority will be determined among these projects, and reconstruction will be scheduled as funds are available. In some cases it may be possible to accomplish these reconstruction projects with a minimum of funding by utilizing volunteer labor from ORV user groups and/or State Interagency Committee funding.

Definitions

Off-Road Vehicles - Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other terrain including but not limited to, such vehicles as four-wheel-drive, motorcycle, snowmobile, amphibious, and air cushion vehicles; except that such term excludes (1) any registered motorboat, (2) any military, fire, emergency or law enforcement vehicle when used for official or emergency purposes, and (3) any vehicles whose use is expressly authorized by the Chief, Forest Service, under a permit, lease, license, or contract.

Official Use - An employee, agent, or designated representative of the Federal Government or one of its contractors in the course of his/her employment, agency, or representation.

Trail - A designated path or way of varying width which is commonly used by and maintained for hikers, horsemen, snow travelers, bicyclists, or for motorized vehicles with a total width of 40 inches or less.

National Forest Land(s) - National Forests, National Grasslands, and other lands and interest in land administered by the Forest Service.

Four-Wheel Motorized Vehicles - This term is intended to apply to all four-wheeled and four-wheel-drive vehicles.

Bicycles - This term is intended to include all human powered two wheel vehicles such as mountain bikes.

Two-wheel Motorized Vehicles - This term is intended to apply to all two-wheeled motorized vehicles and to smaller three-wheeled vehicles which are 40 " or less in width.

Over-snow Vehicle - This term is intended to apply to all motorized vehicles designed or adapted for over-the-snow travel, such as snowmobiles.

General Conditions

1. The operation of motorized vehicles will be permitted on all roads, trails and general forest areas on National Forest land, except where noted as closed in this Plan. However, it should be known that quad-wheelers and three wheelers that are not licensed for State Highway use are currently prohibited from being used on Forest Development roads.

2. Closures of short duration for specific reasons, such as fire situations, weather, road construction, wildlife, and/or timber harvest activities, may be implemented as the need arises on both existing and planned future roads and trails. In addition, signing along roads may be necessary to inform the public of off-road restrictions due to wildlife habitat areas.

3. All roads closed in "Cedar River Watershed", North Bend Ranger District, per agreement with City of Seattle.

4. All roads in Tacoma "Green River Watershed" west of Lester are closed.

5. The following trails, roads, and areas on National Forest land within the boundary of the Mt. Baker-Snoqualmie National Forest will be closed to motorized use, or otherwise restricted as to width, season of use, or area of operation:

Contents: Specific closures are listed in Table H-1, by Ranger District.

Mt. Baker Ranger District
Facility: TRAILS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
600	Lake Ann	4 8	Enters Wilderness	FY	FY	FY	FY	FY	FY
601	Cougar Divide	15 3	Enters Wilderness	FY	FY	FY	FY	FY	FY
602	Nooksack Flats	7.0	Important elk calving & summer range	FY	FY	FY	FY	FY	
603	Park Butte	3.5	User conflicts, heavy summer use		FY	FY	FY	11/1-8/15	
603 1	Sulphur Moraine	6 5	User conflicts, heavy summer use		FY	FY	FY	FY	FY
603 2	Railroad Grade	3 0	User conflicts, heavy summer use.		FY	FY	FY	FY	FY
603 3	Mazama Park	5 0	Enters Wilderness.	FY	FY	FY	FY	11/1-8/15	
604	Blue Lake	0.5	Fragile subalpine lake		FY	FY	FY	FY	
604.1	Dock Butte	1.5	Steep trail through subalpine meadows.	FY	FY	FY	FY		
605	Boulder Ridge	3 6	Enters Wilderness	FY	FY	FY	FY	FY	FY
606	Baker River	1 6	Enters No. Cascades National Park	FY	FY	FY	FY	FY	FY
607	Swift Creek	10 0	Enters Wilderness.	FY	FY	FY	FY	FY	
608	Shuksan Lake	2.0	Steep trail, not designed for ORV or bike use	FY	FY	FY	FY	FY	
610	East Bank	13.0	Sensitive wildlife nesting habitat	FY	FY	FY	FY		
610 1	Anderson Point	0 3	Leads to hiker only camp	FY	FY	FT	FY	FY	
610 2	Noisy Creek	2 5	Enters Wilderness.	FY	FY	FY	FY	FY	FY
611	Watson Lakes	2.3	Enters Wilderness.	FY	FY	FY	FY	FY	FY
611.1	Anderson Butte	1.5	Enters Wilderness	FY	FY	FY	FY	FY	FY
611 2	Anderson Lakes	2 4	Fragile subalpine lake	FY	FY	FY	FY	FY	FY
612	Gee Point	1 5			FY			11/1-7/15	
613	Sauk Mountain	2.1	26 switchbacks, safety hazard for vehicles.	FY	FY	FY	FY	FY	FY
613 1	Bald Mountain	5.5	Fragile subalpine lake & meadows	FY	FY	FY	FY	FY	FY
613 2	Bald Lake	0.5	Subalpine lake	FY	FY	FY	FY	FY	FY
614	Thompson Creek	4 0			FY	FY		11/1-8/15	
616	Finney Peak	1 6			FY			11/1-7/15	
618	Park Creek	2.0	Proposed nature trail.	FY	FY	FY	FY	FY	FY
619	Sulphur Cr Fall	0 5	Proposed nature trail	FY	FY	FY	FY	FY	FY
620	Cumberland Pass	0 5	Proposed nature trail	FY	FY	FY	FY	FY	FY
621	Iron Mountain	7.0	Proposed ORV trail.		FY			FY	
621.1	Mill Ridge	3.0	Proposed ORV trail		FY			FY	
622	3 Lakes	4.5	Proposed trail to subalpine lake and meadows	FY	FY	FY		11/1-7/15	
622.1	Heart Lake	3.0	Proposed trail will enter Wilderness.	FY	FY	FY	FY	FY	
623	Shdw of Sentinl	0.5	Nature trail with heavy use	FY	FY	FY	FY	FY	FY
624	Druid Grove	0.5	Within Research Natural Area	FY	FY	FY	FY	FY	FY
625	Damfino/Bearpaw	9.0	Accesses Wilderness.		FY	FY	FY	FY	
625.1	Excelsior Peak	0 5	Enters Wilderness.	FY	FY	FY	FY	FY	
625.2	Church Lake	0.5	Proposed scramble trail		FY	FY	FY	FY	FY
625 3	Bearpaw Lake	0.3	Proposed scramble trail.		FY	FY	FY	FY	FY
627	Jordan Lake	3.0	Enters Wilderness	FY	FY	FY	FY	FY	FY
628	Falls Lake	1 5	Steep scramble trail	FY	FY	FY	FY	FY	FY
629	Martin Lake	1 0	Steep scramble trail	FY	FY	FY	FY	FY	FY
630	High Divide	13 0	Enters Wilderness.	FY	FY	FY	FY	11/1-8/15	
631	Diobsud Creek	1 5	Enters Spotted Owl Habitat Area	FY	FY	FY		FY	
635	Slide Lake	1 2	Enters Wilderness	FY	FY	FY	FY	FY	FY
636	Enjar Lake	3.0	Enters Wilderness	FY	FY	FY	FY	FY	FY
655	Lava Divide	4 0	Proposed trail will enter Wilderness	FY	FY	FY	FY	FY	
669	Artist Point	1 1	Area closure in Heather Mdws due to heavy use.	FY	FY	FY	FY	FY	FY

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
671	Church Mountain	4 2	Switchbacks through fragile subalpine meadows		FY	FY	FY	FY	
671.1	Fossil Pass	0 5	Proposed trail to fragile subalpine meadows		FY	FY	FY	FY	
672	Silesia Creek	8 0	Enters Wilderness	FY	FY	FY	FY	11/1-8/15	
673	Goat Mountain	5 2	Enters Wilderness	FY	FY	FY	FY	11/1-8/15	
673 1	Old Goat	0 5	Enters Wilderness	FY	FY	FY	FY	11/1-8/15674	Hannegan
Pass	5.0	Enters Wilderness		FY	FY	FY	FY	11/1-8/15	
674.1	Hannegan Peak	1 0	Enters Wilderness	FY	FY	FY	FY	FY	FY
674.2	Ruth Arm	2 0	Enters Wilderness	FY	FY	FY	FY	FY	FY
675	Lone Jack	5 0	Enters Wilderness	FY	FY	FY	FY	FY	
676	High Pass	4 0	Enters Wilderness	FY	FY	FY	FY	FY	FY
677	Heliotrope Rdg	2.7	Enters Wilderness	FY	FY	FY	FY	FY	FY
677 1	Hogsback Route	1.0	Enters Wilderness	FY	FY	FY	FY	FY	FY
677 2	Glacier View	2.3	Enters Wilderness	FY	FY	FY	FY	FY	FY
678	Skyline Divide	3.5	Enters Wilderness	FY	FY	FY	FY	11/1-8/15	
678 1	Ranger Camp	0 5	Enters Wilderness	FY	FY	FY	FY	11/1-8/15	
678 2	Deadhorse Camp	0.5	Enters Wilderness	FY	FY	FY	FY	11/1-8/15	
680	Nooksack River	18.0	Proposed Mt Bike Trail	FY	FY	FY			
681	Table Mountain	2.5	Enters Wilderness	FY	FY	FY	FY	FY	FY
682	Chain Lakes	6.5	Enters Wilderness	FY	FY	FY	FY	FY	FY
682.1	Wells Creek	3.0	Enters Wilderness	FY	FY	FY	FY	FY	FY
682 2	Hayes Lake	0.3	Enters Wilderness	FY	FY	FY	FY	FY	FY
683	Ptarmigan Rdg	5.0	Enters Wilderness	FY	FY	FY	FY	FY	FY
684	Heather Mdws.	5 0	Area closure in Heather Mdws due to heavy use	FY	FY	FY	FY	FY	FY
684 1	Bagley Lakes	2.8	Area closure in Heather Mdws due to heavy use	FY	FY	FY	FY	FY	FY
684.2	Fire and Ice	0.5	Area closure in Heather Mdws due to heavy use	FY	FY	FY	FY	FY	FY
684.3	Wild Goose	0.6	Area closure in Heather Mdws due to heavy use	FY	FY	FY	FY	FY	FY
684 4	Panorama Dome	0.5	Area closure in Heather Mdws due to heavy use	FY	FY	FY	FY	FY	FY
685	Twin Lakes	1.0	Fragile subalpine lake and meadows	FY	FY	FY	FY	FY	
685.1	Winchester Mt.	2.1	Enters Wilderness	FY	FY	FY	FY	FY	FY
686	Tomyhoi Lake	4.0	Enters Wilderness	FY	FY	FY	FY	FY	FY
686.1	Yellow Aster	4.0	Proposed trail will enter Wilderness	FY	FY	FY	FY	FY	FY
686.2	Yellow Atr Bt	0 5	Proposed trail will enter Wilderness	FY	FY	FY	FY	FY	FY
686.3	Tomyhoi Peak	2.3	Enters Wilderness	FY	FY	FY	FY	FY	FY
687	Horseshoe Bend	0 7	Family hike near campground Stair sections	FY	FY	FY	FY	FY	FY
688	Boundary Way	2 5			FY	11/1-8/15	11/1-8/15	11/1-8/15	
689	Canyon Ridge	9 1			FY	11/1-8/15	11/1-8/15	11/1-8/15	
689 1	Canyon Creek	12 0	Proposed ORV trail		FY	11/1-8/15	11/1-8/15	11/1-8/15	
689.2	Hudson Way	1 5			FY	11/1-8/15	11/1-8/15	11/1-8/15	
696	Ridley Creek	3 5	Enters Wilderness	FY	FY	FY	FY	11/1-8/15	
697	Elbow Lake	6 9	Enters Wilderness	FY	FY	FY	FY	11/1-8/15	
697.1	Bell Pass	3.0	Proposed trail will enter Wilderness	FY	FY	FY	FY	11/1-8/15	
698	Welcome Pass	2.8	Enters Wilderness	FY	FY	FY	FY	11/1-8/15	
699	Keep Kool	2.5	Enters Wilderness	FY	FY	FY	FY	FY	
735	Picture Lake	0 5	Area closure in Heather Mdws due to heavy use	FY	FY	FY	FY	FY	FY
742	Shannon Ridge	1 9	Accesses No Cascades National Park	FY	FY	FY	FY	FY	FY
743	Lookout Mtn	4 7	Accesses No Cascades National Park	FY	FY	FY	FY	FY	
743A	Monogram Lake	0 7	Accesses No Cascades National Park	FY	FY	FY	FY	FY	FY
744	Beaver Pond	0 7	Proposed nature trail	FY	FY	FY	FY	FY	FY
745	Hidden Lake	4 5	Accesses No Cascades National Park	FY	FY	FY	FY	FY	FY
746	Bear Lake	0.5	Not designed for motorcycles		FY	FY		FY	

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
750	Ruth Gorge	0.5	Proposed nature trail	FY	FY	FY	FY	FY	FY
750.1	Nooksack Cirq	6 5	Accesses No Cascades National Park.	FY	FY	FY	FY	FY	FY
750 2	Price Lake	1 0	Accesses No Cascades National Park.	FY	FY	FY	FY	FY	FY
751	Big Cedar	1 0	Proposed nature trail	FY	FY	FY	FY	FY	FY
762	White Salmon	2 0	Accesses No Cascades National Park	FY	FY	FY	FY	FY	FY
763	Thunder Ridge	18.0	Proposed trail to subalpine lakes & meadows.	FY	FY	FY	FY	11/1-7/15	
763.1	Rocky Creek	4.0	Proposed trail to subalpine lakes & meadows	FY	FY	FY	FY	11/1-7/15	
763 2	Jackman Ridge	3 0	Proposed trail to subalpine lakes & meadows	FY	FY	FY	FY	11/1-7/15	
763 3	Clear Lake	3 0	Proposed trail to subalpine lakes & meadows	FY	FY	FY	FY	FY	
765	Found Lake	4 0	Enters Wilderness	FY	FY	FY	FY	FY	FY
766	Kindy Creek	1.0	Enters Wilderness	FY	FY	FY	FY	FY	
769	Cascade River	3 0	Proposed trail that will enter Wilderness	FY	FY	FY	FY	FY	FY
769 1	M. Fk Cascade	5 5	Enters Wilderness.	FY	FY	FY	FY	FY	FY
769 2	S. Fk Cascade	8 5	Enters Wilderness	FY	FY	FY	FY	FY	FY

Mt.Baker Ranger District
Facility: ROADS

ROAD #	NAME	LENGTH (miles)	REMARKS	SNOW-MOBILES	COMMERCIAL VEHICLES	2, 3 & 4 WHEEL MOTORIZED VEHICLES
1043	Upper Olson	3.2	Entire length Close between projects for AIRFA	FY		FY
1060	Bacon Creek	6.5	Entire length Bald Eagle winter use area	FY	11/15-4/1	
1064	West Bacon	2.3	Entire length. Bald Eagle winter use area	FY	11/15-4/1	
11	Baker Lake Hwy	10.6	Beyond jct of Rd 1168. Bald Eagle Nest	FY		FY
1107	Anderson Creek	1.4	Beyond MP 9 0. (sign w/monitoring) Mtn Goat MR	FY	11/1-6/15	12/25-6/1
1107022	Trail Ridge	0.9	Closed beyond MP 1.0 between projects (AIRFA)	FY		FY
1114	Sulphur Cr. Cutoff	2.0	Entire length (Gated) X-C Ski Rte & Wildlife Hab	FY	**** 12/1 - 4/15 ****	
1122	Lower Sandy Creek	2.2	Entire length (sign w/monitoring) Wildlife Habit.	FY	**** 12/1 - 4/15 ****	
1124	Sandy Creek	3.2	Entire length (sign w/monitoring). Wildlife Habit.	FY	**** 12/1 - 4/15 ****	
1130	Marten Lake	9 0	Entire length X-C Ski Rte / Wildlife Habitat	FY	12/1-4/15	12/25-4/15
1131	Boulder Ridge	4 7	Entire length (sign w/monitoring) Mtn. Goat MR	FY	11/1-6/15	12/25-6/15
1144	Morovitz Creek	2 9	Up to Baker Hot Springs (sign w/monitoring) X-C Ski Route and Wildlife Habitat	FY	**** 12/1 - 4/15 ****	
1146	Black Bear	0 3	Entire length (sign w/monitoring) Wildlife Habitat	FY	**** 12/1 - 4/15 ****	
1152	Shuksan Creek	7 5	MP 0 0 to MP 7 5 (sign w/monitoring) Wildlife Hab	FY	12/1-4/15	12/25-4/15
1152	Shuksan Creek	2 0	Beyond MP 7 5 (sign w/monitoring) Mtn Goat MR	FY	11/1-6/15	12/1-6/15
1152014	Shannon Creek	3 5	Entire Length (sign w/monitoring) Mtn Goat MR	FY	11/1-6/15	12/1-6/15
1160	East Shannon	6 0	Entire length (sign w/monitoring) Mtn Goat MR	FY	11/1-6/15	12/1-6/15
12	Loomis Nooksack	9 7	Beyond jct of Rd 1240, Elf calving area	FY	**** 12/1 - 7/1 ****	
1240	Loomis Creek	3 1	Entire Length (sign w/monitoring) Mtn Goat MR	FY	11/1-6/15	12/1-6/15
1200100	Beaver Pond	1 3	Entire length Wildlife Habitat (Gated)	FY	**** 12/1 - 4/15 ****	
1303	Dillard Ridge	3 3	Entire length Mtn Goat MR (Gated)	FY	11/1-6/15	12/1-6/15
1420	Thunder Lakes	2 8	Beyond MP 4 0 (sign w/monitoring) Mtn Goat MR	FY	11/1-6/15	12/1-6/15
1420011	North Jackman	2 2	Entire length Close between projects(Bald Eagle)	FY	FY	FY
1540015	Sibley Burn	1 7	Entire length (sign w/monitoring) Mtn Goat MR	FY	**** 11/1 - 6/15 *****	
1550	Irene Creek	6 0	Entire length Bald Eagle winter use area	FY	11/15-4/1	12/25-4/1
1551	Irene Ridge	1 4	Entire length Close between projects for AIRFA	FY	----	FY
16	Illabot Creek	2 0	Beyond MP 22.0 Mtn Goat MR (sign w/monitoring)	FY	11/1-6/15	12/1-6/15
16	Illabot Creek	1 3	Beyond MP 24 0, close between projects for AIRFA	FY	----	FY
1610021	Suiattle Mtn	0 85	Entire length Mtn Goat MR (Gate)	FY	11/1-6/15	12/1-6/15
1621	Louise	0 5	Entire length Mtn Goat MR (sign w/monitoring)	FY	11/1-6/15	12/1-6/15
1707	Upper Gee	4 8	Entire length Spotted Owl Habitat Area	FY	2/15-8/15	----
3035	Four Mile	0 8	Close between project use Mtn Goat MR	FY	11/1-6/15	12/1-6/15
3066	Swamp Creek	1 8	Entire length Mtn. Goat MR (sign w/monitoring)	FY	11/1-6/15	12/1-6/15
3070	Razorhone	3 0	Entire Length. X-C Ski Rte & Wildlife Habitat	FY	12/1-4/15	12/25-4/15
3071	Anderson Creek	3.0	MP 0 0 to MP 3 0 X-C Ski Rte & Wildlife Habitat	FY	12/1-4/15	12/25-4/15
3071	Anderson Creek	3 0	Beyond MP 3 0 Close between proj Mtn Goat MR	FY	11/1-6/15	FY
31	Canyon Creek	12 7	Beyond jct of Rd 3120 Groomed snowmobile trail		12/1-4/15	12/25-4/15
3120	West Church	6.1	Entire length Wildlife Hab (sign w/monitoring)	FY	12/1-4/15	12/25-4/15
3122	Little Mountain	2 9	Entire Length Mtn Goat MR (sign w/ monitoring)	FY	11/1-6/15	12/1-6/15

Mt.Baker Ranger District
Facility: ROADS CONTINUED

ROAD #	NAME	LENGTH (miles)	REMARKS	SNOW-MOBILES	COMMERCIAL VEHICLES	2, 3 & 4 WHEEL MOTORIZED VEHICLES
32	Hannegan	3 0	MP 0 0 to MP 3.0 X-C Ski Rte & Wildlife Habitat	FY	12/1-4/15	12/25-4/15
32	Hannegan	2 5	Beyond MP 3.0 Mtn Goat MR (sign w/monitoring)	FY	11/1-6/15	12/25-6/15
33	Wells Creek	11 2	Beyond MP 0.8 Mtn Goat MR (Gate)	FY	**** 11/1 - 7/1 *****	
3600	Grouse Butte	2.0	Beyond jct. w/Rd#3620, Mtn Goat MR (sign w/monitor)	FY	11/1-6/15	12/1-6/15
3630	Elk Horn	1 9	Entire length. Mtn Goat MR (sign w/monitoring)	FY	11/1-6/15	12/1-6/15
37	Dead Horse	12.3	MP 0 0 - MP 12 3, X-Country Ski Route	FY		
37	Dead Horse	1 5	MP 4 5 to MP 6 0 (sign w/monitoring) Wildlife Hab	FY	12/1-4/15	12/25-4/15
37	Dead Horse	5 5	Beyond MP. 12 3, Mtn Goat MR (sign w/monitoring)	FY	11/1-6/15	12/25-6/15
38	Middle Fk Nooksack	6 0	Beyond MP. 9 0 Mtn Goat and wildlife hab (sign)	FY	11/1-6/15	12/1-6/15
39	Glacier Creek	1 4	Beyond jct of Rd 3600 Mtn Goat MR (sign w/monit)	FY	11/1-6/15	12/1-6/15
3910	Thompson Creek	3 0	Beyond MP 1 3, wildlife habitat (w/monitoring)	FY	12/1-4/15	12/1-4/15
3940	Smith Basin	1 5	Entire length, Mtn Goat MR (sign w/monitoring)	FY	11/1-6/15	12/1-6/15

NOTE: Selected roads which are physically closed to motorized vehicles over 40 inches in width may be made available to motorcycle, quad-wheeler, or three-wheeler use if such use is not in conflict with other land management objectives, such as important wildlife habitat, erosion control in sensitive soil areas, etc. The roads which are open to use would be signed rather than those prohibited so as to portray a positive message.

Mt.Baker Ranger District
Facility: AREAS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
	North Fork Nooksack		Area closed to motorized and mechanized use to preserve its natural characteristics for future research opportunities.	FY	FY	FY	FY		
	Noisy-Diobsud Wilderness			FY	FY	FY	FY		
	Mt. Baker Wilderness			FY	FY	FY	FY		
	Mt. Baker National Recreation Area		Area closed to vehicles over 40", motorcycles, and bicycles because of fragile subalpine vegetation and user conflicts Snowmobile use is permitted when snow depth is 2' or more when measured at Schriebers Meadow.		FY	FY	FY		
	Twin Lakes		All trails and areas off road within the Twin Lakes area are closed to motorized and mechanized use to protect wilderness values, wildlife habitat, and fragile subalpine vegetation	FY	FY	FY	FY		
	Middle Fork Nooksack		Area including Road #38, is closed to all motorized use at the Forest Boundary in order to protect elk, deer and mountain goat winter range	FY	--12/1-6/15--				
	South Fork Nooksack		Closure to protect elk wintering and calving grounds.	FY	------- 12/1-7/1-------				

Darrington Ranger District
Facility: TRAILS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
783	Beaver Lake	3 5	Designed as a special purpose nature trail ORV use would disrupt wildlife spring and summer, and would disturb deer in winter. User conflicts would also arise Potential for major soil erosion		FY	FY	FY		
632	Coal Lake	0 1	The purpose of the trail is to serve campsites and fishing along the lake shore. This area is heavily used by campers and fisherman. There would be a user conflict Also, it is located in a sensitive area (lake shore).		FY	FY		FY	
633	Forks	1.5	The potential exists for trail bike use if the trail is relocated and reconstructed. On its present location it cannot support ORV use		FY	FY		FY	
634	Circle Peak	4.5	Location and standards not suitable for ORV use.			FY	FY		
634.1	Circle Creek	1.5	Location and standards not suitable for ORV use			FY	FY		
638	Crystal Lake	1.0	Wilderness access with no intermediate destination points	FY	FY	FY	FY	FY	
640	Mt Higgins	4.5	Trail not located or designed for ORV use. Waterbars and dips could not be maintained with ORV use and are necessary to prevent resource damage.		FY	FY		FY	
640 1	Myrtle Lake	0.3	Water and soils problems Resource damage around the lake would occur from ORV use.		FY	FY			
643	White Chuck	0.4	Access to Wilderness with no intermediate destination points.	FY	FY	FY	FY		
644	Mt Pugh	3 5	Used by climbers and backpackers. Trailtread is narrow and outsloped Minimal maintenance in recent years Tight switchbacks which could not be maintained with ORV use	FY	FY	FY			
645	Falls Creek	3.5	Not constructed or located for ORV use. Brushy, with water and soil problems.		FY	FY	FY		
646	Lost Creek Rdg	4.6	Not suitable for ORV use due to soils and use problems. User conflicts	FY	FY	FY	FY		
647	Elliot Creek	3.3	Wilderness access with no intermediate destination points	FY	FY	FY	FY	FY	
648	Sloan Peak	2.0	Wilderness access Open to snowmobile and Mtn. bikes from Rd 49 to Sauk River.		FY	FY		FY	

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
650	Bald Eagle	1 4	Wilderness access with no intermediate destination points Not constructed to ORV standards.	FY	FY	FY	FY		
653	Neiderprum	0.5	Wilderness access and mostly in wilderness soils problems	FY	FY	FY	FY		
654	Squire Creek	0 5	Wilderness access and mostly in wilderness soils problems	FY	FY	FY	FY		
654 1	Eight Mile Ck	0.3	Wilderness access and soils problems	FY	FY	FY	FY		
656	Peek-a-boo Lake	2 5	Not located or constructed for ORV use Long stretches of narrow outsloping tread Soil and water problems would arise with ORV use.	FY	FY	FY			
657	Meadow Mountain	3.0	Wilderness access and soils problems	FY	FY	FY	FY		
659	Frog Lake	1 0	Not constructed for ORV use potential major soils problems.			FY	FY		
660	North Fork Sauk Falls	0.2	This is a very short trail to a scenic point Not suitable for ORV use		FY	FY	FY	FY	
661	Bear Lake	0.3	A very short trail which has been heavily developed to provide opportunities for all types of hikers. Part of the shoreline of Bear Lake is a marshy meadow. There would be a conflict with the present heavy hiker and backpacker use. The area around Bear Lake is already showing the effects of overuse Additional traffic would be unacceptable		FY	FY	FY	FY	
664	Round Mountain	1 6	Climber route Abandoned in mid 1950's and not maintained since Impassable to ORV travel. Even if reconstructed it would be too steep for ORV use without significant resource damage		FY	FY			
667	Copper Creek	0.4	Wilderness access with no intermediate destination points	FY	FY	FY	FY		
700	Pilchuck LO	3.0	This is a heavily used trail and there would be extreme conflict with hikers and climbers Parts of this trail are on D.N R. and State Park land. The trail leads into alpine country that is already suffering the effects of overuse	FY	FY	FY	FY	FY	
701	Heather Lake	2.0	This is a heavily used trail that leads to a sensitive (wet boggy) area along the lake A lot of the trail is puncheon over wet areas This is a popular hiker trail and there would be a user conflict	FY	FY	FY	FY	FY	

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
702	Lake 22	2 7	This trail is located in the Lake 22 Research Natural Area Additional use would be unacceptable User conflicts.	FY	FY	FY	FY	FY	
703	Pinnacle Lake	1 8	The location around Bear Lake is showing the effects of heavy use already Much of its margin is marshy and any more traffic here would be undesirable. The upper portion of this trail leads through alpine country, some of it wet.		FY	FY		FY	
704	Boardman	0 8	Unstable soils and user conflicts		FY	FY	FY	FY	
705	Bedal Creek	1 5	Wilderness access and potential for significant soil problems.	FY	FY	FY	FY	FY	
707	Sunrise Mine	2 5	Potential for major soil erosion problems		FY	FY	FY	FY	
708	Poodledog Pass	0 5	Wilderness access and user conflicts	FY	FY	FY	FY	FY	
709	Barlow Point	1 2	This short trail is part of the Monte Cristo Historic Tour, with heavy public use		FY	FY		FY	
710	Dickerman Mountain	4.3	This trail leads into fragile alpine meadows that could not handle vehicular traffic Much of the trail is on steep slopes with unstable soils.	FY	FY	FY	FY	FY	
711 & 711.01	Perry Creek	3.6	Proposed RNA The present trail leads through a canyon that is famous for its fern population At least 17 species and many unique hybrids have been found along the sides of the trail Some of these are delicate and relatively rare	FY	FY	FY	FY	FY	
712 & 712 01	North Lake	3 2	ORV's would conflict with the established use pattern and major potential for soils problems.		FY	FY	FY	FY	
717	Deer Pass	0 2	Wilderness access with no intermediate destination points	FY	FY	FY	FY	FY	
719	Glacier Basin	1.6	Wilderness access with potential for major user conflicts.	FY	FY	FY	FY	FY	
723	Ice Caves	1.0	This is a special purpose trail It is designed to accommodate hikers. It presently sees well over 8500 visitors per year. There would be a definite user conflict. Potential for major soil erosion problems and loss of unique low elevation alpine meadows.	FY	FY	FY	FY	FY	
724	Weden Creek	1 8	Potential for major soil erosion problems and destruction of subalpine vegetation type.	FY	FY	FY	FY	FY	
725	Verlot Nature	0.3	Designed as hiker only trail User and soil conflict problems.	FY	FY	FY	FY	FY	

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
728	Old Sauk	3 0	Located a wild and scenic river corridor. In a zone of fragile soil and water conditions. Several stream crossings which would suffer water quality problems from ORV use.		FY	FY			
729	Scheitzer	10.5	Maintained opportunity for exclusive snow foot winter Recreation use			.....12/1 to 4/1			
730	Beaver Creek	6.6	Maintained opportunity for exclusive snow foot winter Recreation use			. ..12/1 to 4/1. ..			
731	White Ch Bench	6 0	Potential for major soil erosion problems.		FY	FY			
733	Old Government Trail	2.0	ORV use would conflict established use patterns.			FY	FY		
734	Boulder River	1 0	Wilderness access and potential for major soil erosion problems and user conflicts	FY	FY	FY	FY	FY	
738	Youth-on-Age	0.3	Designed and maintained for disabled persons.	FY	FY	FY	FY	FY	
768	Downey Creek	0 4	Wilderness access with no intermediate destination points.	FY	FY	FY	FY		
780	Huckleberry Mtn	5.5	Wilderness access with no intermediate destination points Steep trail. Accesses fragile alpine areas.	FY	FY	FY	FY		
781	Buck Creek	1 0	Wilderness access with no intermediate destination point. Potential for major soil problems	FY	FY	FY	FY	FY	
782	Green Mountain	1 0	Proposed RNA Provide access to wilderness with no intermediate designation points	FY	FY	FY	FY		
784	Suiattle	10 6	Wilderness. One mile outside Wilderness with no focal point between trailhead and Wilderness boundary.	FY	FY	FY	FY		
793	Sulphur Creek	1 8	Wilderness access with no intermediate destination points	FY	FY	FY	FY		

Darrington Ranger District
Facility: ROADS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
1800014	Cascade Cutoff		Not presently maintained to a level suitable for motorized use		FY	FY			
1855000	Coney Pass		Not presently maintained to a level suitable for motorized use		FY	FY			
188000	Bolt Camp	4 5	Road presently closed and not maintained Proposed management for ORV activity.						
189000	Round Mtn Rd	4 7	Closed to provide opportunity for non-motorized winter recreation activities	12/1-4/1	12/1-4/1				
2010000	French Ck Rd	6 3	From milepost 3.6 to end to provide opportunity for non-motorized winter recreation activities	12/1-5/1	12/1-5/1				
2080000	Falls Creek	7 0	Seasonal closure at MP 2 for wildlife habitat		10/15 to 6/1. . ..				
2095000	Pugh Mountain		Seasonal closure for wildlife habitat		10/15 to 6/1 .				
2097	Skull Creek	1.9	Closed from gate at M P 7 to end to protect winter, summer Mtn Goat habitat.	FY	FY	FY			
2130000	No Side Dans Cr		Closed to avoid conflicts with adjacent private land.		FY	FY			
2140000	Prairie Mtn Road		Entire length to provide opportunity for non-motorized winter recreation activities.	12/1-4/1	12/1-4/1	12/1-4/1			
2211000	Sauk View		Not presently maintained to a level suitable for motorized use.		FY	FY			
2311000	Pugh Ridge	5 0	Summer goat and deer range Steep grades with soil problems	FY	FY	FY			
2400015	Strom		Not presently maintained to a level suitable for motorized use		FY	FY			
2420040	N. Side Divide	1 2	Closed to protect summer mountain goat habitat		FY	FY			
2420060	Tathum Spur		Not presently maintained to a level suitable for motorized use		FY	FY			
2436000	Upper Black Oak		Proposed closure to highway vehicles to allow for management for OHV activity						
2510000	Conrad Creek	2 3	Closed at M P 7 to protect wildlife habitat Not maintained.		FY	FY			

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
2514000	Target Lake		Closed to protect wildlife habitat		FY	FY			
2540000	Marsh Creek		Not presently maintained to a level suitable for motorized use		FY	FY			
2600017	Buck Camp		Not presently maintained to a level suitable for motorized use		FY	FY			
2642016	Middle Grade		Not presently maintained to a level suitable for motorized use.		FY	FY			
2650000	Big Creek	9 8	Closed to protect wildlife habitat Not maintained.		FY	FY			
2710000 2710011	Meadow Mtn High	5 0 1.6	Roads closed to control use impacts generated by ease of access to popular wilderness destination.			FY	FY		
2720000	Meadow Sky	2 5	Not presently maintained to a level suitable for motorized use		FY	FY			
2800018	Dog	1 1	Not presently maintained to a level suitable for motorized use		FY	FY			
2840016	Low Middle	1 0	Not presently maintained to a level suitable for motorized use		FY	FY			
2860000	South	1 5	Not presently maintained to a level suitable for motorized use		FY	FY			
2900000	Rinker Ridge	9 0	Proposed closure to highway vehicles to allow for management for OHV activity						
2920000	Old North Mtn		Not presently maintained to a level suitable for motorized use			FY	FY		
4025000	East Boardman	0 8	Closed for erosion control Not maintained		FY	FY			
4031000	Bender Creek		Proposed closure to highway vehicles to allow for management for OHV activity						
4020023	Cedar Flats		Proposed closure to highway vehicles to allow for management for OHV activity						
4041000	Silver		Not presently maintained to a level suitable for motorized use		FY	FY			
4052000	Deer Creek Rd	4 4	Closed to prevent user conflict in an area that receives heavy snow play use	FY	12/1-4/1				
4054000	Double Eagle	3 0	Closed to protect winter mountain goat habitat	FY					
4080	Elliot Creek	0.7	Closed to control Wilderness access	FY	FY	FY	FY		
4110018	318Z	0.3	Closed for erosion control. Not maintained		FY				

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
4110031	Green Mt Vista	0 7	Closed at gate. Provides access to radio repeater	FY	FY	FY			
4200000	Mt Pilchuck Rd		Closed seasonally at gate to provide for non-motorized winter use	-------12/1 to 4/1-----					
4930	June Mtn	2.5	Seasonal closure for wildlife habitat	--------4/1 to 8/1-----					

Darrington Ranger District
Facility: AREAS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
	Glacier Peak Wilderness		Designated Wilderness	FY	FY	FY	FY		
	Boulder River Wilderness		Designated Wilderness	FY	FY	FY	FY		
	Henry M. Jackson Wilderness		Designated Wilderness	FY	FY	FY	FY	FY	
	Green Mtn RNA		Closed to preserve RNA values	FY	FY	FY	FY	FY	
	Perry Creek RNA		Closed to preserve RNA values	FY	FY	FY	FY	FY	
	Lake 22 RNA		Closed to preserve its natural characteristics for future research opportunities	FY	FY	FY	FY	FY	
	Long Creek RNA		Closed to preserve RNA values	FY	FY	FY	FY	FY	

North Bend Ranger District
Facility: TRAILS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
1000	Sunday Lake	0.5	Wldnss access with no intermediate destinations	FY	FY	FY	FY	FY	
1000.01	Sunday Lake	1.1	Wilderness	FY	FY	FY	FY	FY	
1001	Lennox Creek	0 2	Wldnss access with no intermediate destinations	FY	FY	FY	FY	FY	
1001.01	Lennox Creek	3 9	Wilderness	FY	FY	FY	FY	FY	
1002	Snoqualmie Lk	3.3	Wilderness access with user conflicts	FY	FY	FY	FY	FY	
1002.01	Snoqualmie Lk	4 3	Wilderness, Heavy use	FY	FY	FY	FY	FY	
1003	Middle Fork	17 0	Non-wilderness, Heavy use.	FY	FY	FY	FY		
1004	Nordrum Lake	0.3	Wldnss access with no intermediate destinations	FY	FY	FY	FY	FY	
1004.01	Nordrum Lake	2.3	Wilderness	FY	FY	FY	FY	FY	
1005	Dingford Crk	0.8	Wldnss access with no intermediate destinations	FY	FY	FY	FY		
1005 01	Dingford Crk	5 9	Wilderness	FY	FY	FY	FY		
1005.1	Hester Lake	2.5	Wilderness	FY	FY	FY	FY		
1006	Marten Lake	1 0	Wldnss access with no intermediate destinations	FY	FY	FY	FY	FY	
1007	Pratt Lake	2.5	Wldnss access with no intermediate destinations	FY	FY	FY	FY	FY	
1007.01	Pratt Lake	3 2	Wilderness, heavy use area.	FY	FY	FY	FY	FY	
1009	Mt. Defiance	6.8	Wilderness	FY	FY	FY	FY	FY	
1009.1	Thompson Lake	1.0	Wldnss access with no intermediate destinations	FY	FY	FY	FY	FY	
1010	Kaleetan Lake	4 0	Wilderness	FY	FY	FY	FY	FY	
1011	Melakwa Lake	3.0	Wilderness	FY	FY	FY	FY	FY	
1012	High Lakes	3 8	Wilderness	FY	FY	FY	FY	FY	
1013	Snow Lake	2 0	Wldnss access with no intermediate destinations	FY	FY	FY	FY		

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
1013.01	Snow Lake	1 3	Wilderness	FY	FY	FY	FY		
1013.1	Rock Creek	0.9	Wldnss access with no intermediate destinations	FY	FY	FY	FY		
1013.11	Rock Creek	3.4	Wilderness	FY	FY	FY	FY		
1013.2	Source Lake	0 5	Wilderness access, extra heavy use.	FY	FY	FY	FY	FY	
1014	Denny Creek	0 8	Wilderness access, extra heavy use.	FY	FY	FY	FY	FY	
1014.01	Denny Creek	3.5	Wilderness, extra heavy use	FY	FY	FY	FY	FY	
1015	McClellan Butte	1 0	Iron Horse Trail access.	FY	FY	FY			
1015.01	McClellan Butte	3 4	User conflict, extra heavy use.	FY	FY	FY	FY	FY	
1016	Granite Mtn	1 1	Wldnss access with no intermediate destinations	FY	FY	FY	FY	FY	
1016.01	Granite Mtn	2 0	Wilderness, extra heavy use.	FY	FY	FY	FY	FY	
1018	Crater Lake	1 0		FY	FY	FY	FY	FY	
1019	Annette Lake	1.0	Iron Horse Trail access	FY	FY	FY			
1019.01	Annette Lake	2 9	User conflict, extra heavy use.	FY	FY	FY	FY	FY	
1019.1	Abiel Pass	1 0		FY	FY	FY	FY	FY	
1021	Wagon Road	1.0	User conflict, interpretive trail	FY	FY	FY	FY	FY	FY
1023	Asahel Curtis	1.3	User conflict, interpretive trail	FY	FY	FY	FY	FY	FY
1030	Dutch Miller Gp	0 6	Wldnss access with no intermediate destinations	FY	FY	FY	FY		
1030.01	Dutch Miller Gp	6 8	Wilderness	FY	FY	FY	FY		
1030.01	Williams Lk	1 0	Wilderness	FY	FY	FY	FY	FY	
1031	Kelly Butte	1 0	Not designed or constructed for motorized use.	FY	FY	FY			
1031.1	Kelly Butte	5 0	Not designed or constructed for motorized use	FY	FY	FY			
1033	Comnwlth Basin	2 5	Wilderness	FY	FY	FY	FY	FY	
1035	Pratt River	7 0	*No motorized access to protect wilderness*	FY	FY	FY	FY		
1035.01	Pratt River	1 0	Wilderness	FY	FY	FY	FY		

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
1036	Franklin Falls	1.0	User conflicts, extra heavy use	FY	FY	FY	FY	FY	FY
1037	Bare Mountain	1.1	Wldness access with no intermediate destination	FY	FY	FY	FY		
1037 01	Bare Mountain	3 2	Wilderness	FY	FY	FY	FY	FY	
1038	Mason Lake	1 8	Wldness access with no intermediate destination	FY	FY	FY	FY	FY	
1038 01	Mason Lake	1.0	Wilderness	FY	FY	FY	FY	FY	
1039	Talapus Lake	2.0	Wldness access with no intermediate destination	FY	FY	FY	FY	FY	
1039.01	Talapus Lake	1.0	Wilderness, extra heavy use	FY	FY	FY	FY	FY	
1039.1	Talapus Cutoff	0 2	Wilderness, extra heavy use	FY	FY	FY	FY	FY	
1040	Mt Catherine Loop	6 0	X-Country Ski Trail	FY					
1040	Olallie Crk	2 3	X-Country Ski Trail	FY					
1041	Hidden Valley	2.5	X-Country Ski Trail	FY					
1314	Gold Creek	0.5	Wldness access with no intermediate destination	FY	FY	FY	FY	FY	
1314.01	Gold Creek	3.5	Wilderness	FY	FY	FY	FY	FY	
1314.2	Gold Creek	1 0	Wilderness	FY	FY	FY	FY	FY	
1344	Kendall Peaks	1.5	User conflict	FY	FY	FY	FY	FY	
1262	Grand Junct.	2 5	X-Country Ski Trail	FY					

North Bend Ranger District
Facility: ROADS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES				
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
5630	Taylor River		Rd 5640 to Marten Creek		Closed to motor vehicles over 40" for FY.				
5630	Taylor River		Marten Creek to road end.		Closed to all motorized vehicles				
5640	Quartz Creek		Rd 5630 to road end.		Closed to motor vehicles over 40".				
5740120	Bear Creek		Rd. 57 to road end		Closed to all motorized vehicles.				
9031	Bandera		M P 3.3 to road end		Closed to all motorized vehicles				
9070	Cold Creek		User conflict during winter Pac-West ski run		--12/01 - 3/31--				
9070110	Hyak Lake		User conflict during winter Pac-West ski run. Closed to all motorized vehicles for season		--12/01 - 3/31--				
9080	Gold Creek		User conflict during winter.		Closed to motorized vehicles when posted.				
9090	Coal Creek		Closed to reduce overuse at Kendall Peak Lakes and Wilderness Closed to all motorized vehicles.		Closed to all motorized vehicles.				

North Bend Ranger District
Facility: AREAS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
	Alpental, Snoqualmie Summit, Ski Acres, Pacific West Ski Areas		User conflict with developed ski areas and skiers Note Roads 9070 and 9070110 are open during those periods when they are free of snow.	FY	FY	FY			
	Annette Lake Recreation Area		Special area. See specific trail or road for specific closures.						
	Denny Creek Recreation Area		Special area See specific trail or road for specific closures						
	Alpine Lakes Wilderness Area		All backcountry areas within wilderness not covered by specific closures.	FY	FY	FY	FY		
	Cedar River Wtshd		Public access restricted						

Skykomish Ranger District
Facility: TRAILS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
1050	Quartz Creek	4 4	Wilderness access with no intermediate destination points	FY	FY	FY	FY		
650	Bald Mtn	9 6	Entire trail is in wilderness	FY	FY	FY	FY		
1051	North Fork Skykomish	8 0	Wilderness access with no intermediate destination points.	FY	FY	FY	FY		
1053	Pass Creek	3 6	Entire trail is in wilderness	FY	FY	FY	FY		
1052	Blanca Lake	3.5	Wilderness access with no intermediate destination points. All campsites within 100 feet of lake; limited campsites; sanitation concerns around lakeshore. This is a heavily used trail, very steep, user conflicts, and resource problems at lake.	FY	FY	FY	FY	FY	FY
1054	W Cady Ridge	6 0	Wilderness access with no intermediate destination points.	FY	FY	FY	FY		
1055	Barclay Lake	2 2	Conflict with other users Fragile lakeshore Trail not constructed to accommodate wheeled vehicles	FY	FY	FY	FY	FY	FY
1056	Evergreen	1 5	Not designed or constructed for vehicles wider than 40 inches Trail is not wide enough to accommodate 3 wheel vehicle Closed to ORV and mountain bikes until reconstructed	FY	FY	CUR	CUR		
1057	Meadow Creek	6 5	Wilderness access with no intermediate destination points.	FY	FY	FY	FY		
1058	Tonga Ridge	6 0	Wilderness access with no intermediate destination points.	FY	FY	FY	FY		

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
1058 1	Fisher Lake	2 0	Trail goes through fragile meadows Entirely in wilderness. Designated as hiker only in Alpine Lakes plan	FY	FY	FY	FY	FY	FY
1059	Deception Crk	10 3	Wilderness access with no intermediate destination points. Designated as hiker only trail in Alpine Lakes plan from Deception Ck trailhead to jct of 1059 1	FY	FY	FY	FY		
1059 1	Deception Ck C/O	0.3	Wilderness access with no intermediate destination points	FY	FY	FY	FY		
1059 2	Deception Lks.	1.2	Entire trail in wilderness	FY	FY	FY	FY		
1060	Surprise Creek	4.5	Wilderness access with no intermediate destination points Unsafe for pack & saddle stock due to existing trail structures. Designated as hiker only in Alpine Lakes Plan	FY	FY	FY	FY	FY	FY
1060 1	Trap Pass	0.6	Entire trail in wilderness Designated as hiker only trail	FY	FY	FY	FY	FY	
1061	Tunnel Creek	1.6	Wilderness access with no intermediate destination points Unsafe for pack & saddle stock until trail is reconstructed.	FY	FY	FY	FY	CUR	
1062	Necklace Valley	7.5	Wilderness access with no intermediate destination points Designated as hiker only in Alpine Lakes Plan.	FY	FY	FY	FY	FY	
1063	Surprise Mtn.	1 5	Entire trail in wilderness. Designated as hiker only in Alpine Lakes Plan	FY	FY	FY	FY	FY	
1064	W Fork Foss	6.8	Wilderness access with no intermediate destination points Designated as hiker only in Alpine Lakes Plan	FY	FY	FY	FY	FY	
1064.1	Malachite Lake	0.5	Entire trail in wilderness. Designated as hiker only in Alpine Lakes Plan Limited camping at lake	FY	FY	FY	FY	FY	FY
1066	Lake Clarice	4.0	Entire trail in wilderness	FY	FY	FY	FY		
1066.1	Marmot Lake	0 7	Entire trail in wilderness Fragile lakeshore, resource damage is occurring around lake. Limited camping around lake	FY	FY	FY	FY	FY	FY

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
1067	Johnson Ridge	4 6	Closed to 4 wheel vehicles due to width of trail Closed beyond Scorpion Mtn to 2/3 wheel vehicles and mountain bikes because it enters wilderness User conflicts.	FY	FY			FY	FY
1068	Evans Lake	0 5	Wilderness access with no intermediate destination points. Short trail, under water during high water. Designated as hiker only in Alpine Lakes Plan	FY	FY	FY	FY	FY	FY
1070	Heybrook	1.0	Conflict with other users Heavy use during early and late seasons. Favorite lowland trail	FY	FY	FY	FY	FY	FY
1071	Lake Elizabeth	0.5	Conflict with fishermen and other day users Trail not constructed to accommodate motorized and stock use	FY	FY	FY	FY	FY	FY
1072	Lake Dorothy	0 3	Wilderness access with no intermediate destination points. Designated as hiker only in Alpine Lakes Plan.	FY	FY	FY	FY	FY	
1078	Deception Falls	0 5	Nature trail - user conflict, designed as barrier free trail.	FY	FY	FY	FY	FY	FY
1079	Troublesome Cr	0 5	Nature trail - user conflict	FY	FY	FY	FY	FY	FY
2000	PCNST	22 1	National Scenic Trail Closed by law	FY	FY	FY	FY		

Skykomish Ranger District
Facility: ROADS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
6022	Heybrook LO	3 8	Hazardous railroad crossing User conflicts, protection of wildlife habitat	FY	FY	FY			
6517	East Eagle	1.5	Closures to protect goat winter range, gated Not maintained for traffic.	FY	FY	FY	FY	FY	FY

Skykomish Ranger District
Facility: AREAS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
	Stevens Pass		User conflict with developed ski area & skiers Pack & saddle stock and llamas permitted on Pacific Crest Trail only	FY	FY	FY	FY		
	Alpine Lake Wilderness		Wilderness	FY	FY	FY	FY		
	HMJ		Wilderness	FY	FY	FY	FY		
	MT Index Scenic Area		User conflicts and uncompatible with ALW Plan.	FY	FY	FY			

FY - Full Year Closure
CUR - Closed Until Reconstructed

White River Ranger District
Facility: TRAILS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
1155	Rainier View	2 2	Access to Wilderness	FY	FY	FY	FY		
1156	Bullion Basin	2 2	Access to Pacific Crest Trail & Wilderness with no intermediate destination points.	FY	FY	FY	FY		
1159	Cedar Lake	1 0	Wilderness	FY	FY	FY	FY	FY	
1160	Pyramid Peak	0 7	Accessed from the Pacific Crest Trail	FY	FY	FY	FY		
1162	John Muir N.T	0.8	Campground use	FY	FY	FY	FY	FY	FY
1162 1	Dalles River	0 8	Campground use	FY	FY	FY		FY	FY
1163	Crystal Mtn	9 0	Crystal Mountain Ski Area	FY	FY	FY			
1167	Snoquera Falls	2.4	Designed for foot traffic only	FY	FY	FY	FY	FY	
1169	Buck Creek	0 5	Hiker suspension bridge only	FY	FY	FY		FY	FY
1170	Grass Mountain	6 0	Mixed ownership	FY	FY				
1171	Christoff	3 3	Mixed ownership	FY	FY				
1172	Divide	8 1	Mixed ownership		FY				
1173	Dalles Ridge	1.8	Access to Wilderness with no intermediate destination points	FY	FY	FY			
1174	Doe Falls	0 5	Designated for foot traffic only	FY	FY	FY	FY	FY	
1175	Naches Pass W	0 6	Steep Historic Cliffs	FY	FY	FY	FY	FY	FY
1175 01	Naches Pass W	5.1	Open Rd. 7065 to east						
1176	Greenwater	12.0	Heavily used access to Wilderness	FY	FY	FY	FY		
1177	Summit Lake	0 3	Wilderness access with no intermediate destination points	FY	FY	FY	FY		
1178	Clearwater	10 2	Wilderness. Impassable to horses.	FY	FY	FY	FY		
1178.1	Lyle Lake	2 0	Wilderness	FY	FY	FY	FY		
1179	Carbon	9 4	Wilderness Impassable to horses.	FY	FY	FY	FY		
1179.1	Bearhead	0 8	Wilderness	FY	FY	FY	FY		
1180	Frog Mountain	3.1	Not designed or constructed for vehicles wider than 40 inches.	FY	FY				
1181	Clearwest Peak	0 8	Not designed or constructed for vehicles wider than 40 inches.	FY	FY				
1182	Huckleberry	0.9	Access to National Park, hiker only trail	FY	FY	FY	FY	FY	FY

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
1183	Suntop	8 3	Steep, rutted.	FY	FY				
1184	Noble Knob	7 9	All of 1184 is closed to mountain bikes because of Wilderness	FY	FY	FY	FY		
1185	Lost Lake	5.1	Wilderness	FY	FY	FY	FY		
1186	Maggie Creek	5 0	Wilderness	FY	FY	FY	FY		
1187	Arch Rock	3 1	Wilderness	FY	FY	FY	FY		
1188	Castle Mtn	4.1	Wilderness	FY	FY	FY	FY		
1189	Goat Falls	0 5	Designed for foot traffic only	FY	FY	FY	FY	FY	FY
1191	Norse Peak	5 5	Heavily used access to Wilderness.	FY	FY	FY	FY		
1191 1	Norse Peak	0.8	Heavily used access to Wilderness	FY	FY	FY	FY		
1192	Silver Creek	2 1	Crystal Mountain Ski Area	FY	FY	FY			
1193	Henskin lake	0.7	Crystal Mountain Ski Area	FY	FY	FY			
1194	Skookum Flat	8 2	Foot path that includes steps. (National Scenic Trail)	FY	FY	FY		FY	FY
1195	Colquhoun Peak	0.5	Not designed or constructed for vehicles wider than 40 inches.	FY	FY				
1196	Deep Creek	4.0	Steep grade, not designed or constructed for vehicles wider than 40 inches.	FY	FY	FY			
1197	Ranger Creek	5.8	Steep grade, not designed or constructed for vehicles wider than 40 inches.	FY	FY	FY			

White River Ranger District
Facility: JEEP TRAILS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES SNOW-MOBILES	4-WHEELED VEHICLES	MOTOR-CYCLES	MOUNTAIN BIKES
102	1200	4 8	Evans Ck ORV Area - 4 Wheel Drive Trails				
120	1201	1.0	Evans Ck ORV Area - 4 Wheel Drive Trails				
197	1202	0 6	Evans Ck ORV Area - 4 Wheel Drive Trails				

White River Ranger District
Facility: MOTORCYCLE TRAILS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES					
				SNOW-MOBILES	4-WHEEL MOTOR VEHICLE	2-WHEEL MOTOR VEHICLE	BICYCLES	PACK & SADDLE STOCK	LLAMAS
1140	1140	2.7	Evans Ck ORV Area - Motorcycle Trails	FY	FY				
1140A	1140 1	1 4	Evans Ck. ORV Area - Motorcycle Trails	FY	FY				
1145	1145	3.0	Evans Ck ORV Area - Motorcycle Trails	FY	FY				
1145A	1145.1	0 1	Evans Ck ORV Area - Motorcycle Trails	FY	FY				
1146	1146	2 9	Evans Ck. ORV Area - Motorcycle Trails	FY	FY				
1147	1147	1 0	Evans Ck ORV Area - Motorcycle Trails	FY	FY				
1148	1148	1 2	Evans Ck ORV Area - Motorcycle Trails	FY	FY				
1150	1150	1.6	Evans Ck ORV Area - Motorcycle Trails	FY	FY				
1151	1151	1 6	Evans Ck ORV Area - Motorcycle Trails	FY	FY				
1153	1153	0 8	Evans Ck. ORV Area - Motorcycle Trails	FY	FY				
1154	1154	1.7	Evans Ck ORV Area - Motorcycle Trails	FY	FY				
1154A	1154 1	0 3	Evans Ck ORV Area - Motorcycle Trails	FY	FY				

White River Ranger District
Facility: JEEP TRAILS

NUMBER	NAME	LENGTH (MILES)	REMARKS	CLOSURES			
				SNOW-MOBILES	4-WHEELED VEHICLES	MOTOR-CYCLES	MOUNTAIN BIKES
102	1200	4 8	Evans Ck ORV Area - 4 Wheel Drive Trails				
120	1201	1 0	Evans Ck ORV Area - 4 Wheel Drive Trails				
197	1202	0 6	Evans Ck ORV Area - 4 Wheel Drive Trails				
198	1203	1 8	Evans Ck ORV Area - 4 Wheel Drive Trails				
196	1203 1	0 5	Evans Ck. ORV Area - 4 Wheel Drive Trails				
199	1204	1.0	Evans Ck ORV Area - 4 Wheel Drive Trails				
311	1205	2 5	Evans Ck ORV Area - 4 Wheel Drive Trails				
110	1205.1	0 5	Evans Ck ORV Area - 4 Wheel Drive Trails				
518	1209	1 0	Evans Ck ORV Area - 4 Wheel Drive Trails				
519	1206	3 0	Evans Ck ORV Area - 4 Wheel Drive Trails				
517	1206 1	0 5	Evans Ck. ORV Area - 4 Wheel Drive Trails				
520	1207	3.0	Evans Ck ORV Area - 4 Wheel Drive Trails				

White River Ranger District
Facility: AREAS

MAP CODE	NAME	REMARKS	CLOSURES				
			SNOW-MOBILES	4-WHEELED VEHICLES		MOTOR-CYCLES	MOUNTAIN BIKES
1	Crystal Mountain Ski Area	Developed ski and summer resort area User conflict and resource damage if ORV's permitted off existing road system Motorized use permitted on existing surfaced roads. Snowmobile use prohibited anywhere within the area, including roads, due to safety hazards and user conflicts.	FY	FY	FY	FY	
2	The Dalles Recreation Residence Tract	Lack of plowed parking areas for snowmobile staging areas is principal problem resulting in safety hazards, conflicts among users and blocked roads.	FY				
3	Deep & Silver Creeks Recre-ation Tracts	Lack of plowed parking areas for snowmobile staging areas is principal problem resulting in safety hazards, conflicts among users and blocked roads	FY				
4	Camp Sheppard Organization Camp	Lack of plowed parking areas for snowmobile staging areas is principal problem resulting in safety hazards, conflict among users and blocked roads.	FY				
5	Buck Creek Organization Camp	Lack of plowed parking areas for snowmobile staging areas is principal problem resulting in safety hazards conflicts among users and blocked roads	FY				
6	Alta Crystal Resort	Lack of plowed parking areas for snowmobile staging areas is principal problem resulting in safety hazards, conflict among users and blocked roads					
7	Huckleberry Camp (Military)	Lack of plowed parking areas for snowmobile staging areas is principal problem resulting in safety hazards, conflicts among users and blocked roads	FY				
	Norse Peak Wilderness	Wilderness	FY	FY	FY	FY	FY
	Clearwater	Wilderness	FY	FY	FY	FY	FY

Appendix I
Watershed Rehabilitation Program

The Watershed Rehabilitation Program will include inventories, project development, implementation and monitoring of needed Watershed Rehabilitation Projects throughout the Forest. Each area listed will be inventoried as a unit for all road related, in-unit and instream Watershed Rehabilitation Projects. Projects will include vegetative slope stabilization, grass seeding, road drainage improvement, sidecast removal, amelioration of soil disturbance and compaction, instream structures and other projects needed to improve or protect watershed resources.

Inventory and project development will be in year one. In year two, project development will continue. Implementation and establishment of photopoints will begin in year two and continue for two to three years. Year three to five will also involve monitoring to determine if measures have been correctly implemented, and to determine additional needs.

The areas listed represent a 10 year plan. Work will begin on each district or working circle area on those areas identified by the cumulative effects ID teams as having major watershed problems.

Average cost for each project area will be $600,000 for the inventory through implementation progress. (Based on 1990 dollars.)

Table I-1
Watershed Rehabilitation Program

Ranger District	Drainages	AZ Number
Mt. Baker	Deer Creek/Higgens Creek	32
	Little Deer Creek	29
	Canyon Creek (Nooksack River drainage)	4
	Finney Creek	30
	South Fork Nooksack River/Wanlick Creek	11
	Upper North Fork Nooksack River	9
	Lower North Fork Nooksack River/Glacier Creek	6
	Bacon	23
	Baker Lake Basin	15
	Anderson Creek	16
	Shannon Creek	15
	Sandy Creek	15
	Dillard Creek	15
	Cascade River	26
	Illabot Creek	26
	White Creek	2
Darrington	Canyon Creek (South Fork Stillaguamish)	44
	North Fork Stillaguamish	37
	South Side Green Mountain - South Fork Stillaguamish through Wiley Creek	46
	Lime and Circle Creeks (Suiattle)	
	Rat Trap Creek (Suiattle)	40
	Murphy Goodman Brown Creeks (Sauk River)	39
	Dan's Creek	39
	South Fork Sauk	49
	South Side South Fork Stillaguamish (Pilchuck)	46
	North Side South Fork Stillaguamish Deer Creek to Barlow Pass	48
	South Side South Fork Stillaguamish Sweitzer to Black Jack Creeks	48
	Grade Big Tenas (Suiattle)	48
	Conrad-Black-Straight Creeks (Suiattle)	
Skykomish	Beckler River (emphasis on Eagle Creek)	60
	Martin Creek	59
	Silver Creek and Salmon Creek	54
North Bend	Upper Green (including Sunday Creek)	81
	North Green (emphasis McCain and Friday Creek)	82
	South Green (emphasis Rock Creek and Champion Creek)	83
	South Fork Snoqualmie River (emphasis Garcia system)	77
White River	Greenwater (emphasis Pyramid Creek)	84
	West Fork White River	91
	Evans Creek	93

Table I-2
Capital Investment Projects

Ranger District	Location		Cost
Mt. Baker	Hurst Creek	Slope/Channel Stabilization Risk of debris jam and sluiceout contributing sediment to the North Fork Nooksack.	$25,000
	Sulpher Creek	Slope Stabilization Mass wasting contributing sediment directly into Sulpher Creek and Baker River.	$50,000
	Rockport Water System	Creek Stabilization Protect drinking water source from potential sedimentation.	$20,000
Darrington	Benson Creek	4111 Road	$75,000
	Sapphire	Canyon Creek north side of Green Mountain	$30,000
	Trout Creek		$20,000
	Silver Creek Slide		$14,000
	Rapid River Burn		$18,000
North Bend	Friday Creek Slide		$ 8,500
	West Creek Slide		$ 7,000
	Mason Creek Slide		$15,000
White River	5 Creeks Slide		$ 6,500
	Dallas Burn		$12,000
	Greenwater		$16,000
	FSR# 7550		$14,000
	Dinner Creek Slide		$ 6,000

Table I-3
Rehabilitation Needs within Heavy Use Recreation Sites

Ranger District	Location	Cost
Skykomish	Blanca Lake	$ 9,000
	West Fork Foss	$21,200
	Little and Big Heart	$13,700
	Dorothy Lake	$15,000
North Bend	Snow Lake	$13,000
	Melawka Lakes	$23,000
	Talapus Lake	$23,000
	Island Lake Trail	$24,000
	Hansen Creek Mining	$ 8,000
	Dutch Miller Trail	$ 5,000
White River	Pyramid Dispersed Recreation Recreation Camp (Greenwater)	$14,000
	Dispersed Recreation Camp in Sec. 20 (Greenwater)	$18,000
	Coplay Lake	$11,000
	Lonesome Lake	$12,000

APPENDIX J

Noxious Weed Control

Project Name	Cost - $ Per Year	Outputs - Acres Per Year
Blue Bird Horse Pasture and Prairie Mountain Road 1/	1,000	30

1/ Same site, ten acres, treated three times a year. Treatment consist of hand pulling tansy ragwort. Estimated to continue for the next 10 years.

APPENDIX K

Special Use Permits Activity Schedule

Special Use Permits - Activity Schedule for Decade 1

Category 1/

Ranger Dist.	100	200	300	400	500	600	700	800	900	Total
Mt. Baker	21	80	0	9	35	40	12	2	8	99
Darrington	8	6	1	5	1	1	3	4	6	35
Skykomish	18	6	2	8	8	12	2	8	12	76
North Bend	42	2	6	8	8	2	6	6	2	82
White River	212	10	0	1	0	2	1	2	70	298
TOTAL	301	32	9	31	52	21	24	22	98	590

1/ Category
100 - Recreation
200 - Agriculture
300 - Community and Public Information
400 - Feasibility
500 - Industry
600 - Energy Generation & Transmission
700 - Transportation
800 - Communications
900 - Water
700 - Transportation
800 - Communications

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RECORD OF DECISION

MT. BAKER-SNOQUALMIE NATIONAL FOREST

Land and Resource Management Plan
Final Environmental Impact Statement

Mt. Baker-Snoqualmie National Forest

King, Pierce, Skagit, Snohomish, and Whatcom Counties
Washington State

USDA Forest Service

June 1990

RECORD OF DECISION

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SECTION I

INTRODUCTION

BASIS AND NEED FOR DECISION

This Record of Decision (ROD) documents my decision and rationale for approving the Land and Resource Management Plan (Forest Plan) for the Mt Baker-Snoqualmie National Forest.

Throughout this ROD, I have used some technical terms which may be foreign to a large segment of the public. In some cases I have been able to explain the term, but in other cases explanations would have made this document unnecessarily long. The reader is encouraged to refer to the final Environmental Impact Statement (EIS), Glossary which defines terms used in this document.

A draft EIS and proposed Forest Plan were filed with the Environmental Protection Agency (EPA) on January 8, 1988. Additional details on meetings, notices, and documents preceding the final EIS and Forest Plan are available in the final EIS, Appendices A and J.

Authority

The final EIS and Forest Plan were developed under the National Forest Management Act (NFMA) and its implementing regulations (36 CFR 219). The final EIS satisfies requirements of the National Environmental Policy Act of 1969 (NEPA) and Council on Environmental Quality regulations (40 CFR 1500).

The Forest Plan is part of a framework for long-range planning established by the Forest and Rangeland Renewable Resources Planning Act (RPA). The Forest Plan establishes general direction for 10 to 15 years, and must be revised at least every 15 years [36 CFR 219.10(q)]. The Forest Plan replaces previous resource management plans, including the:

Multiple Use Plan, Glacier Ranger District
Multiple Use Plan, Baker River Ranger District
Multiple Use Plan, Darrington Ranger District
Multiple Use Plan, Monte Cristo Ranger District
Multiple Use Plan, Skykomish Ranger District
Multiple Use Plan, North Bend Ranger District
Multiple Use Plan, White River Ranger District
Timber Management Plan, Mt. Baker National Forest
Timber Management Plan, Snoqualmie National Forest
Wilderness Management Plan, Glacier Peak Wilderness
Land Adjustment Plan, Snoqualmie National Forest
Land Adjustment Plan, Mt. Baker National Forest

All outstanding and future permits, contracts, cooperative agreements, and other instruments for occupancy and use of lands included in this Forest Plan will be brought into agreement with this Plan, subject to valid existing rights of the parties involved. This will be done as soon as practicable, and generally within three years of the date of this Plan.

AFFECTED AREA

The Mt. Baker-Snoqualmie National Forest is located on the west slopes of the Cascade Range of northwestern Washington. The planning area includes the entire Forest located in portions of King, Pierce, Skagit, Snohomish, and Whatcom counties.

The Forest is currently headquartered in Seattle, but will relocate to Mountlake Terrace in the summer of 1990. Ranger District Offices are in Sedro Wooley, Darrington, Skykomish, North Bend, and Enumclaw.

PUBLIC INVOLVEMENT

Pursuant to the intent of NFMA, the Mt Baker-Snoqualmie National Forest conducted a large-scale public involvement program Formal activities included a Notice of Intent to Prepare an EIS printed in the Federal Register, a formal public comment period on draft documents, and many meetings, presentations, and information distributions. In addition to formal activities, Forest employees informally explained the purpose of the Forest Plan and how to effectively participate in the process. Special public involvement activities were also conducted for the Hydrologic Cumulative Effects analysis process (See final EIS, Appendix H and J).

On the basis of public response received on the draft EIS, the Forest conducted new Wild and Scenic Rivers eligibility and suitability studies, modified some alternatives, and developed two new alternatives. The Forest also performed additional analyses and changed some management emphases in the Preferred Alternative. My staff and I were briefed on the public comments, the final EIS, and the Forest's changes to the draft Forest Plan. I used this information to make my decision.

Issues

Land and resource management planning began with identification of issues and concerns through contacts with local civic and community organizations; individuals, local, state and federal agencies; private industries; adjacent landowners; various interest groups, American Indian tribes, and Forest Service employees. Public comments and management concerns were analyzed, and ten major issues were identified Between the draft EIS and the final EIS, the ten issues were revisited and adjustments made based on responses to the draft EIS. The primary adjustments were to more clearly describe the issues, combine issues that were closely linked, and develop separate issues where a facet of a previous issue had become more visible and important to the public. As a result of these adjustments, nine issues which are described in detail in the final EIS, Chapter I and Forest Plan, Chapter III are specifically addressed in this ROD in Section III, Rationale for the Decisions. The issues deal with:

- **Development versus Nondevelopment of the Forest**
- **Timber Supply**
- **Old Growth Ecosystems and Fish/Wildlife/Plant Diversity**
- **American Indian Religious and Cultural Use**
- **Recreation Opportunities**
- **Wild and Scenic Rivers**
- **Management of Municipal Watersheds**
- ***Effects of Timber Management and Related Activities***
- **Adjacent and Intermingled Lands**

WHAT THE FOREST PLAN IS, AND IS NOT

As a long-range strategy for managing the Mt. Baker-Snoqualmie National Forest, the Forest Plan and accompanying final EIS are programmatic. The Forest Plan provides management direction to produce goods, services and uses in a way that maximizes long-term net public benefits. It is not a plan for day-to-day administrative activities of the Forest; it does not address such matters as vehicle and equipment management or organizational structure. The Forest Plan emphasizes application of

various management practices to achieve multiple-use goals and objectives in an environmentally sound and economically efficient manner

It is vital for the reviewer to understand what the Forest Plan does not do; it does NOT:

- **Maximize any single resource use or public service;**
- **Propose the use of any resource beyond the physical or biological capability of the land to sustain that use;**
- **Propose management of any resource based solely on values in the market place.**

The Forest Plan does not emphasize site-specific decisions, but through Standards and Guidelines and Management Area direction, it significantly influences design, execution, and monitoring of site-specific activities (see Forest Plan, Chapter IV).

Standards and Guidelines are principles specifying conditions or levels of environmental quality to be achieved. They are the rules that govern our resource management practices and are the key to successful implementation of the plan. Standards and Guidelines will not be violated to achieve annual targets A Management Area consists of one or more areas of land which have similar management objectives and a common management prescription.

SECTION II

DECISIONS

SUMMARY OF THE DECISION

My decision is to approve, adopt, and implement the Forest Plan which accompanies the final EIS. This decision is referred to as Alternative J (Preferred Alternative) for management of the Mt. Baker-Snoqualmie National Forest. Alternative J is a modification of the draft EIS Preferred Alternative and is a response to public comments and updated information and methodologies. Differences between the draft Preferred Alternative and final Preferred Alternative include more acres allocated to dispersed recreation opportunities; more acres included in Spotted Owl Habitat Areas; more protection for water resources; more acres allocated to scenic viewshed protection, recommendations for increased Wild and Scenic River designation; recommendation for increased numbers of Special Areas; protection of more old-growth;

fewer acres allocated to timber production; and more acres maintained in an undeveloped condition.

The Forest Plan establishes multiple-use goals and desired future conditions. These are discussed in detail in the Forest Plan, Chapter IV.

Although the allowable sale quantity (ASQ) has dropped from the level in the DEIS Preferred Alternative, I have decided that a Supplement to the DEIS is not necessary for a variety of reasons. The rationale for this decision is based on my review of the staff paper discussing the socioeconomic effects of the reduced ASQ, all of which are disclosed in the ROD and FEIS, Chapter IV. The staff paper also reviewed the CEQ regulations requiring the issuance of a supplement. This rationale is set forth below.

First, the effects were carefully analyzed utilizing the most current available data and are fully disclosed in the planning documents. Based on this information, I conclude that the reduction in the ASQ will not have a significant effect on the human environment. Further, the reduction was based on response to the public comments on the Draft EIS and updated information and methodologies, which came to light after the Draft was released.

Second, I reviewed the CEQ Regulations. I find that the changes made between the Draft Preferred Alternative and the Alternative Selected in this Record of Decision are not substantial in terms of the negative impacts on the human environment. Rather, the environmental impacts are lessened and the Selected Alternative provides for recovery from the environmental effects of past development activities. I do not project substantially different environmental impacts from the Preferred Alternative in the Draft EIS; the environmental impacts will occur at lower intensities, less frequently, and will be mitigated more carefully.

Third, the environmental circumstances today are not significantly different than at the time of the Draft EIS. The areas in identified in the Plan as being in an environmentally unsatisfactory condition were largely in that condition when the Draft EIS was issued. I do not project the Selected Alternative will significantly change the circumstances on these lands in the near future.

Fourth, no significantly new information was used in developing the Selected Alternative. The Forest simply updated existing information and methodologies. This resulted in applying the information differently in response to public comments received on the Draft EIS.

As set forth in this Record of Decision and the FEIS, Chapter IV, I have given the environmental consequences of this Forest Plan the "hard look" required by the U.S. Supreme Court and am making an informed decision. Further, my decision not to issue a Supplement to the Draft EIS is based on the foregoing rationale, which is also set forth in the Staff paper in the Planning Record, and is not an arbitrary and capricious decision. Agency decisions made in this manner are accorded the most extreme deference by the courts

ELEMENTS OF THE DECISION

The program decisions I make here are accompanied by the necessary supporting environmental analysis and disclosure required by law and regulation. Additional environmental analysis for these decisions is neither expected nor required. These decisions may be revisited or reassessed during implementation, but they do not have to be. These decisions establish or identify the following:

- Forest-wide goals and objectives.

- Forest-wide desired future condition.
- Forest-wide Standards and Guidelines.
- Management Area goals and location.
- Management Area desired future condition.
- Management Area Standards and Guidelines.
- Monitoring program and evaluation process.
- Lands suitable and selected for timber harvesting.
- Forest-wide allowable sale quantity.
- Location of additional Special Areas (SA's).
- Incorporation of the Alpine Lakes Area Land Management Plan and the Skagit Wild and Scenic River Management Plan.

Intended Activities

I also intend to carry out certain scheduled activities. Unlike the programmatic decisions listed above, these are **not** accompanied by all supporting NEPA analysis and disclosure required by law and regulation. Additional environmental analysis will be done during Forest Plan implementation. These proposed and probable activities are displayed in activity schedules in the Forest Plan, Appendices A through K.

It is important to note that all proposals in the Forest Plan can be accomplished from physical, biological, economic, social, and legal perspectives. It is not certain that these proposals will be accomplished. First, outputs specified in the Forest Plan are estimates and projections based on available inventory data and assumptions.

Second, all activities, many of which are interdependent, may be affected by annual budgets. The Forest Plan is implemented through various site-specific projects, such as timber sales, wildlife habitat improvements, and campground development. Budget allocations for any given year covered by the Forest Plan may cause projects to be rescheduled. However, the goals and land use allocations described in the Forest Plan would not change unless the Forest Plan itself were changed. If actual budgets are significantly different from those projected over a period of several years, the Forest Plan may have to be amended and, consequently, would reflect different outputs and environmental conditions. The significance of changes related to budgets or other factors is determined in the context of the particular circumstances.

During implementation, when the various projects are designed, site-specific analyses are performed. These analyses will be disclosed in an environmental document and may lead to an amendment or revision of the Forest Plan. Any resulting documents are to be tiered to the final EIS for the Forest Plan, pursuant to 40 CFR 1508.28.

Recommendations

I also am recommending certain decisions to others with the authority to make those final decisions. Like my final decisions, recommendations **are** accompanied by all supporting NEPA analysis and disclosure required by law and regulation. However, authority to make a final decision on these issues is not mine. If others with higher authority accept the recommendation, the resulting final decision **will not** ordinarily be revisited or reassessed by the Forest Service during implementation of the Forest Plan.

My recommendations include identification of:

- **Location of additions to the Research Natural Area system.**
- **Additions to the National Wild and Scenic Rivers System.**

SECTION III

RATIONALE FOR THE DECISIONS

I approached my decisions by first looking at major issues and public comments on them and then comparing the responses of various alternatives to the issues. I present my rationale for these decisions in the same manner below.

During the period between the draft and final EIS, Mt. Baker-Snoqualmie National Forest employees held numerous meetings with interested members of the public. Forest employees used the information gathered at these meetings along with written responses to the draft EIS to develop the alternatives presented in the final EIS. Information gathered from the meetings and written responses were also used to develop recommendations to me.

In arriving at these decisions, my staff and I were thoroughly briefed on the Plan and alternatives presented in the FEIS. I gave particular attention to how the selected alternative responded to public issues and management concerns. In my judgement, Alternative J maximizes net public benefits and best responds to the issues. It balances adequate protection of the environment with production of both monetary and non-monetary resource outputs.

RATIONALE FOR RESOLVING EACH ISSUE

The response of each alternative to the nine major issues was a primary consideration in choosing the selected alternative. The alternatives and their resolution of issues are discussed below, and are disclosed in greater detail in the final EIS, Chapters I and II.

ISSUE 1: Development versus Nondevelopment of the Forest

Two major questions emerged in assessing this issue:

- **How should the released, "roadless" areas as identified in the Roadless Area Review and Evaluation II (RARE II) be allocated and how will the resources be managed?**

- **At what rate should the Forest Service enter those "roadless" areas that are allocated for development?**

Portions of all twenty-five roadless areas identified in the second Roadless Area Review and Evaluation (RARE II) remain unroaded at this time. Of the 786,000 acres identified as roadless in RARE II, 341,000 acres were added to the National Wilderness Preservation System by the 1984 Washington State Wilderness Act. Approximately 403,000 acres of the remaining roadless acres outside of Wilderness on the Mt Baker-Snoqualmie National Forest are currently unroaded. The other 42,000 acres of RARE II roadless areas no longer remain roadless as a result of development activities including timber harvesting and road building since 1984. Boundaries and current acreages of roadless areas are displayed in the final EIS, Appendix C.

The allocation and management of unroaded areas remains a highly controversial issue. These areas equal approximately 51 percent of the roadless areas inventoried in RARE II, and 23 percent of the net Forest acres. These roadless lands were released from wilderness consideration by the 1984 Act. However, the legislation did not settle the issue.

The commercial forest land within the roadless areas was included in the calculation of the annual potential yield in the amended Timber Management Plans. However,

timber on these lands was not available for harvest from 1972 until passage of the Washington State Wilderness Act in 1984. As a result, harvest levels between 1972 and 1984 were based on a larger land base than was actually available for harvest. Thus, for more than ten years, timber harvest on the Forest was concentrated on about 1/2 of the land base used to determine the annual potential yield in the Timber Management Plans. Approximately 155,700 acres, or 39 percent, of the unroaded areas are tentatively suitable for timber production.

In response to the draft EIS, some organizations and individuals referred to the "released" roadless areas, but many more focused less on the RARE II remnants and more on the general issue of whether the remaining unroaded and undeveloped lands on the Forest should be managed for commodity production/roaded recreation or remain undeveloped. This key issue encompasses facets of nearly all the other Issues, Concerns, and Opportunities.

Some elected officials, State agencies, environmental groups, many hikers, some Indian Tribes, and wildlife organizations want the unroaded areas to remain undeveloped and unroaded. Their concerns include: protection of wildlife habitat and old growth (especially low-elevation old growth), providing non-motorized recreation opportunities, and protection of water, soil, cultural, and scenic values. They also want to maintain the option of future consideration for wilderness. A number of individuals and groups support a proposal for Backcountry Areas, roughly corresponding to five roadless areas.

Timber companies, trade organizations, energy-related industries, and some individuals feel that the 1984 Washington State Wilderness Act "released" these lands for multiple uses. They are concerned that nondevelopment will limit the amount of timber and minerals available for use, affect the local and regional economy, and lead to future wilderness designation. Many people felt there is a need for more motorized access to the roadless areas, to encourage recreation. Individuals, primarily living outside the Seattle metropolitan area, are concerned about saving timber jobs.

The Forest evaluated a range of alternatives that would maintain various amounts of the areas as undeveloped. The range of roadless area assigned to unroaded allocations in the alternatives is from 64 percent to 93 percent. Alternatives with lesser amounts of roadless areas assigned to unroaded allocations were not considered reasonable for several reasons. First, fifty-five of the parcels are less than 1,000 acres in size and are generally "slivers" that remained after Congress established the wilderness boundaries in the Washington Wilderness Act of 1984. Secondly, the general character of many of the roadless parcels can be described as high elevation, steep terrain, with difficult or impossible development opportunities. Also, as stated above, only 155,700 acres of tentatively suited timber lands occur in the roadless areas. Finally, significant amounts of roadless areas are needed to provide wildlife habitat to meet management requirements.

It is my decision to proceed with implementation of the selected alternative which directs that approximately 77 percent (309,000 acres) of inventoried roadless area acres be maintained in a roadless character. The remaining approximately 23 percent (94,000 acres) are allocated to various levels of development involving roading and production of both market and nonmarket outputs to meet the demands for a broad range of Forest goods and services. Only 16% of the tentatively suitable lands are allocated to non-development.

The acres to be managed for multiple uses in an unroaded condition increased about 60,000 acres between the draft and final EIS. The increase is the net result of several changes in allocations made between the draft and final EIS. While some areas allocated to development in the draft EIS preferred alternative are allocated to unroaded uses in the final EIS preferred alternative, there are also areas that

have been changed from unroaded allocations in the draft EIS to development allocations in the final EIS. Overall in the selected alternative, net increases occurred in allocations to unroaded uses, including: dispersed recreation uses, spotted owl habitat, special areas (botanic, scenic), pileated woodpecker and pine marten habitat, mountain goat habitat, and mountain hemlock zone. Many of the changes in allocations involved roadless areas. The multiplicity of uses accommodated in these unroaded allocations cannot be provided for in designated wilderness Uses that may occur in the unroaded areas that cannot occur in wilderness include structural wildlife habitat improvements; recreation facility developments such as trail shelters, sanitary facilities, and primitive camp sites; and under certain conditions, special uses such as small hydroelectric facilities and electronic sites. In addition, the use of mechanical equipment will be allowed in the maintenance and administration of lands in the unroaded allocations.

Management of the roadless areas on the Forest will proceed according to the land use allocation. Approximately 20,000 acres of the 94,000 acres of roadless area allocated to development will be affected by development (including timber sales) in the next 10 years and no longer meet the definition of roadless as used in RARE II. By the end of fifteen years, an additional 12,000 acres of roadless areas will be affected by development. Proposed development activities scheduled for roadless areas will receive appropriate environmental analysis and documentation before they are implemented

I make this decision with the firm belief that it provides an equitable balance between development and preservation of roadless areas. Land use allocations are displayed on the Forest Plan Map and additional discussion of roadless areas can be found in Chapter II and Appendix C of the final EIS. In addition, all of the roadless areas, whether or not they are allocated to roadless or developed uses, will be managed for a variety of uses and not as wilderness.

ISSUE 2: Timber Supply

This issue includes the following major questions:

- **What is the capability and suitability of the Mt. Baker-Snoqualmie National Forest to produce timber?**
- **What should the timber harvest level be considering all resources on the forest and their relationship to social, economic, and environmental factors including local, regional, and national demands?**

Related issues and concerns are:

- **How the National Forest timber supply affects jobs and the local and regional economy?**
- **What is the rate of harvest of old growth?** (See discussion on page ROD-12)
- **What is the rate of entry into the unroaded areas?** (See previous section)
- **What are the social and environmental effects?**
- **How will wood residue be utilized?**

The 1963 Timber Management Plans address timber volume on the basis of board-foot measure. As amended in 1984 in response to the Washington State Wilderness Act, the Timber Management Plans projected an annual potential yield of 203 8 million board feet (MMBF). This included 7 MMBF of salvage material. These terms are defined in the final EIS, Glossary. Potential yield (PY) in the 1963 Plans was calculated using different assumptions, land base, yield tables, utilization standards, etc. than used to calculate ASQ in this Forest Plan The two terms are not directly comparable. PY is most comparable to Timber Sale Program Quantity (TSPQ) because both PY and TSPQ include salvage (dead) volume; ASQ includes only net live (green) volume. The potential yield in the amended Timber Management Plans assumed that all tentatively

suited lands in the roadless areas not included in the wildernesses would be available for timber production. Actual annual harvest of chargeable timber averaged 230 MMBF for the period of 1979 to 1988. The draft Forest Plan proposed an average annual ASQ of 34.8 million cubic feet (MMCF) (170 MMBF).

Many of the issues raised and subjects discussed during the planning process affect ASQ. Some of these issues include: land selected as suitable for timber production; silvicultural practices; cumulative effects on other resources--especially watersheds, fish and wildlife; achieving other resource objectives; and effects on jobs and local communities.

Public opinion is divided as to appropriate sale level for the Forest. Support for maintaining or increasing the timber supply comes from timber industry (management & employees), some elected officials, some community leaders, businesses dependent on the timber industry, county school boards, and economic development agencies. Many individuals want the timber supply to be maintained, primarily to protect jobs. Many individuals, environmentalists, some recreation users, wildlife and some hunting interests, fishing organizations, Indian tribes, some community leaders, and State Wildlife agencies strongly support restricting or reducing the timber harvest, especially in low-elevation old growth Their concerns include protecting roadless areas from development, and the effects of timber harvest and related activities on wildlife, fisheries, water quality, soils, scenery, and recreation opportunities.

The Forest's five-county zone of influence including Whatcom, Skagit, Snohomish, King, and Pierce Counties, Washington contains a very large population (2.6 million) and a highly diversified economy. These five counties account for over 60 percent of all wage and salary employment in the State of Washington. Employment in the forestry and lumber and wood products manufacturing sectors account for less than one and one-half percent of employment in the five counties. By individual counties, Skagit County had over four percent of its wage and salary jobs in these sectors in 1988. Whatcom, Pierce, and Snohomish Counties had between two and three percent of their employment in the forestry and lumber and wood products manufacturing sectors. King County employment in these sectors was less than one percent of total employment in 1988. The forest products industry has already experienced major changes over the last decade A shakeout of marginal mills plus extensive modernization, coupled with new products and expanding markets have led to high levels of wood products in the past three years, but with about 25 percent fewer employees than required for similar output levels in the late 1970's. This trend in employment reduction is expected to continue, as new processes and technologies emerge in wood products manufacturing, regardless of the ASQ set by this Plan.

The Forest considered alternatives with 1st-decade average annual ASQ's ranging from 13.8 MMCF (66 MMBF) to 41.7 MMCF (204 MMBF) in the final EIS. No alternative was developed with an annual average ASQ above 41.7 MMCF (204 MMBF) since that level is achieved in the No Change Alternative which does not incorporate all the NFMA management requirements and therefore could not be implemented. For details of the timber management program for the various alternatives see FEIS Chapter II, page II-75. The draft EIS considered alternatives with 1st-decade average annual ASQ's ranging from 16.1 MMCF (79 MMBF) to 41.7 MMCF (204 MMBF). The lowering of the range of ASQ levels considered is due in large part to changes in management requirements and methods of meeting management requirements made between the DEIS and FEIS, to be responsive to comments received on the DEIS. Management requirements that were changed between the DEIS and FEIS included increasing the northern spotted owl habitat requirements from 1,000 acres per Spotted Owl Habitat Area to 2,200 acres per Spotted Owl Habitat Area. Also the amount of habitat set aside for mountain goat was increased between the DEIS and FEIS to correct an error made in the DEIS. Another major change in ASQ resulted from a change in the method of meeting the water quality management requirement. As a result of review and comment on the DEIS, the Forest revisited the methods used to meet the water quality management requirement. It was

apparent the methods used in the DEIS would not assure compliance with the various water quality laws. To insure compliance, the Forest developed and implemented a hydrologic cumulative effects analysis process. See Chapter II of the FEIS, Chapter III of Appendix B of the FEIS, and Appendix H of the FEIS for a full discussion of management requirements and the effects of meeting those requirements.

Two alternatives in the draft EIS proposed to manage timber on harvest schedules that would depart from nondeclining flow. Public comments generally opposed departure schedules because the public perceived these alternatives could pose unacceptable risks of adverse environmental impacts and not provide timber supplies needed to sustain local economies over the long-term. A departure alternative was also believed to be inappropriate since the Forest has been in a "de facto" departure mode during most of the 1970's and early 80's. This was the result of not being able to harvest timber from roadless areas but basing harvest levels as though those areas would eventually become available.

After considering all factors, it is my decision to implement the selected alternative with a 1st-decade ASQ of 22 4 MMCF (108 MMBF) annually. Tree species offered for sale will be mixed conifer and hardwoods. The selected alternative manages timber on a nondeclining flow harvest schedule I selected this harvest level because it reflects a balance between jobs, demand for wood products, income to the Treasury, and protection of the various nonmarket values desired by Forest users

ASQ will be monitored and controlled on the basis of cubic-foot measure for the Forest Plan. Board-foot volume associated with the cubic-foot volume (i.e., board foot/cubic foot conversion ratio) varies from stand to stand depending on the size and form of the trees. Both board-foot and cubic-foot measure are displayed here, since board-foot has been and continues to be the customary unit of measure. The stands expected to be harvested in the plan period will yield approximately 108 MMBF per year associated with the ASQ of 22.4 MMCF. This will be used as a goal in the early part of the plan period; the transition from use of board-foot measure to use of cubic-foot measure should be made during this plan period.

The annual ASQ of 22.4 MMCF (108 MMBF) of timber under this plan is the average upper limit of chargeable wood to be sold from suitable Forest land during the first decade of the planning period. It is not an actual proposal for timber sale offerings. The annual timber sale offerings also include non-chargeable material and depend on budget appropriations, multiple-use objectives and market conditions

Chargeable volume, ASQ, is comprised of categories of timber which were used in making growth and yield predictions during development of the plan. Chargeable volume, ASQ, is from those lands designated as being suitable for timber production. Other non-chargeable volume, not used in yield calculations because it did not meet Regional utilization standards, or standards for soundness, or is mortality salvage, or because it is harvested from lands not suitable for timber production, may also be sold as part of the annual Timber Sale Program Quantity (TSPQ). TSPQ is made up of the ASQ plus those non-chargeable items listed above. Standards and Guidelines for the Management Areas allow for limited situations (such as catastrophic loss) when volume will be removed from lands not suitable for timber production (e.g. salvage from a Special Area). Generally, this is only done when removal of the timber would promote the goals and desired future condition of the management area.

To achieve the TSPQ, yearly targets are developed. These yearly timber targets can be higher or lower than the average annual ASQ, provided the chargeable volume does not cumulatively exceed the ASQ level set by the Plan over the first decade.

In addition to the ASQ, I estimate that 3.1 MMCF (14 MMBF) of mortality salvage and material unsuitable for sawlogs will be offered annually during the 1st decade. This material includes the approximate historic level of salvage, firewood, posts and poles, as well as a small amount of cull logs and chips.

Timber will be managed on about 346,000 acres, of which about 49% will be managed on long rotations of 100 years or more, to meet nontimber resource objectives. Approximately 2,865 acres are projected to be clearcut annually. Precommercial thinning is scheduled to occur on approximately 1,000 acres annually. Commercial thinning is scheduled to occur on about 200 acres annually to improve stand density and species mix. These terms are defined in the final EIS, Glossary. Approximately 6.1 MMCF (29 MMBF), or 27 percent of the average annual ASQ depends on the application of projected intensive management practices, including thinning, fertilization, and planting of genetically superior seedlings. If these intensive management practices are not carried out, because of inadequate funding or other scheduling priorities, the ASQ will be reduced and the Plan will be amended. The ASQ includes volume scheduled from inventoried roadless areas and from elsewhere on the Forest. If the volume scheduled from the inventoried roadless areas cannot be achieved, that volume will not be replaced by volume scheduled elsewhere. Average annual volume scheduled from inventoried roadless areas is estimated to be 6.3 MMCF (30 MMBF), which accounts for 28 percent of the total ASQ. A full discussion of the timber management program for the selected alternative is presented in the Forest Plan, Chapter 4, page 4-48

In the selected alternative, approximately 32,000 acres are allocated to the mountain hemlock zone management area. It is my decision to conduct a study in that management area to determine what portion, if any, of the mountain hemlock zone can be successfully reforested and thus returned to the tentatively suitable land base. To carry out this study, a total of 250 acres of this management area will be harvested (in 25 plots of approximately equal size) to test various silvicultural systems. This study will be completed within 15 years.

Even-aged management will be the primary silvicultural system, because it is well suited, ecologically and economically, for timber management of the commercial tree species found in the major species zones of the Forest. Those zones are: 1) Western hemlock; 2) Pacific silver fir; and 3) Mountain hemlock and subalpine fir. All of the ASQ assumes the use of even-aged silvicultural practices (Final EIS, Appendix F, Selection of Harvest Cutting Method). Uneven-aged silviculture practices will be considered in the project planning process as individual stands are investigated for harvest opportunities. Actual selection of harvest methods-- clearcut, selection or shelterwood-- will be made at the project level, based on site-specific conditions and Management Area objectives. Factors to be considered in choosing logging methods

include cost effectiveness, protecting inherent site productivity, and satisfying management objectives for a stand.

The Forest is in the midst of completing an updated vegetation inventory. Preliminary data for old growth is expected to be available for use in late 1990 or early 1991. Final data and information for managed stands, mature and over-mature stands, and the vegetative resource inventory is scheduled to be available in 1995. A comparison will be made of the timber stand information used in the forest planning process (based on a 1976 inventory) and the information from the new inventory including the preliminary data to determine if the Plan's ASQ can be achieved. If differences between the inventories are judged to be significant by the Forest Supervisor, adjustments may be made to the projected ASQ and a Plan amendment issued.

ISSUE 3: Old-Growth Ecosystems and Diversity of Plant and Animal Communities

This issue can be addressed by answering the question:

> **What management direction is needed and where should action be taken that will maintain and/or enhance old growth and diversity to meet multiple use objectives?**

The response to this question is broken into two separate sections: Old Growth Ecosystems and Diversity of Plant and Animal Communities.

Old Growth Ecosystems

The future of old-growth is a major issue on the Mt. Baker-Snoqualmie National Forest and there is growing national interest. In the past, much of the focus for this issue has been spotted-owl habitat; it now has a much wider scope. Its value in providing biological diversity, wildlife and fisheries habitat, recreation, aesthetics, water quality, as well as industrial raw material received considerable public comment in response to the draft EIS.

Environmental groups, wildlife societies and organizations, many individuals, Indian Tribes, and State wildlife agencies want the remaining old-growth forests protected. Old growth is also important to American Indians for religious and cultural purposes.

Timber company representatives, industry trade associations, some State and local agencies, and many individuals feel these resources are an important contribution to timber production and maintaining local economies. Some feel that converting these stands into second growth timber is important for increasing long-term forest productivity.

The issue is more complex because of the lack of a widely accepted definition of old growth. Old-growth stands can be defined by age, by stand condition, by diameter, by ecological characteristics, by a combination of some or all of these factors. The most recent timber inventory completed on the Mt. Baker-Snoqualmie in 1976 was based on tree type and size.

Recently, the public and scientific community have focused on a definition of old growth based on the structural components of the stand. Several of the structural components are of key importance in an old-growth forest, including: individual, live, large, dead, down logs in streams; standing dead trees or snags; large, dead, down logs on the land; and multi-storied canopy of mixed species. These structural features are unique to an old-growth forest ecosystem, setting it apart from young growth and, especially from managed stands. Most of the distinctive compositional and functional features of old-growth forests can be related to these structural features. These structural components make possible much of the uniqueness of the old-growth forest in terms of flora and fauna (composition) and the way in which energy and nutrients are cycled (function).

There are a number of definitions of old growth. Franklin et al. (1986)[1] establishes numerous characteristics to define old growth; the stand characteristics vary by species. The Pacific Northwest Regional Guide (1984) defines old growth, also varying by species. Neither of these definitions could be used on this Forest when the planning process began; the 1976 inventory did not include enough information about understory and dead and down logs to allow a direct translation into either the definition from the Regional Guide or Franklin et al. (1986).

For the purpose of the draft and final EIS, the definition of old growth on the Mt. Baker-Snoqualmie National Forest is designed to use the tree type and size information available in the 1976 vegetation inventory. The definition is, "stands containing mature and large sawtimber, with trees that are at least 21 inches in diameter at breast height (4-1/2 feet from the ground)." The mean age for mature large sawtimber on the Mt. Baker National Forest is 241 years; on the Snoqualmie National Forest it averages 257 years.

The most recent (1976) vegetation inventory for the Forest, updated to reflect harvest through 1988, indicates there are about 643,500 acres of old growth as defined above within the Forest. Approximately 232,500 acres (36%) are located in wilderness and not available for harvest. An additional 134,400 acres (21%) outside wilderness are considered unsuited for timber production. These lands are either withdrawn from timber production or are unsuited for timber production because of highly unstable soils and difficulty in reforesting the area.

In the final EIS, the Forest considered alternatives that protected from 411,000 to 563,000 acres of the inventoried old-growth acres, with 1st-decade harvests of old-growth ranging from approximately 42,000 acres to 12,000 acres. The amount of protected old growth includes the 232,500 acres of old growth in wilderness, and the 134,400 acres not suitable for timber production because of potential irretrievable or irreversible resource damage (a total of 366,900 acres). The remaining protected old growth includes that needed to meet wildlife and riparian management requirements (MR's) and allocations for other resource objectives that do not allow timber production.

In the selected alternative, about 503,000 acres of old growth are maintained in allocations not suitable for timber production, including 232,500 acres in designated wilderness, and 134,400 acres not suitable for timber production because of potential irretrievable or irreversible resource damage. Approximately 135,800 acres (21%) of old growth are not suited for timber production because of resource allocations such as wildlife habitat and riparian MR's, and unroaded recreation allocations. The remaining 140,800 acres (22%) are allocated to prescriptions allowing timber production.

The draft Forest Plan proposed to maintain approximately 337,000 acres of the 1976 inventory of old growth in allocations not suitable for timber production (e g. wilderness, unstable land, regeneration difficulty, dispersed recreation, special areas, spotted owl habitat, mountain goat habitat, Research Natural Areas, etc.). No acres were allocated specifically for old-growth management for amenity value. Of the 196,000 acres of old growth included in the suitable land base, 43,794 acres would have been harvested in the 1st decade.

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[1] Franklin, J.F., K. Cromack, Jr., W. Denison, A. McKee, C. Maser, J. Sedell, F. Swanson, and G. Juday. 1986. Interim definitions for old-growth Douglas-fir and mixed conifer forests in the Pacific Northwest and California. USDA Forest Service, Research Note PNW-447.

After considering public comments about old-growth values, I have selected Alternative J, which maintains approximately 503,000 acres of old growth in allocations not suitable for timber production (e.g. dispersed recreation, special areas, spotted owl habitat, mountain goat habitat, Research Natural Areas, etc) No areas are specifically allocated for old-growth management for amenity values

Old-growth and mature forest inventories are being updated on the Mt. Baker-Snoqualmie as quickly as possible, to reflect new concepts of older forest values and importance The new inventory,is structured to allow the use of a variety of definitions of old growth based on a variety of vegetation characteristics (not just size of trees, as required by the current inventory) to determine the acres of old growth. With the completion of the new inventory, the Forest will use the Regional Guide definition of old growth and compare the old growth information in the Plan with the new old growth information. If necessary, adjustments to allocations and standards and guidelines related to old growth will be made by amendment to the Plan.

As more complete information about old-growth on the Mt. Baker-Snoqualmie becomes available, it will be shared with the public My current decision about the amount of old-growth to maintain for the future could be reviewed in light of the updated inventory information. At the end of the 1st decade, over 625,000 acres of the 1976 inventory old-growth is expected to remain.

Based on the information I have available today, the 503,000 acres of widely dispersed and varied old-growth stands in allocations not suited for timber production should adequately preserve representative old-growth forest types on the Mt. Baker-Snoqualmie in the future. While I have chosen to manage some areas containing old growth on extended rotations to meet a variety of resource objectives, I have not elected to "manage" old-growth stands solely for their intrinsic values by extending rotations because of the silvicultural uncertainties about this technique. Some limited trials may be conducted to determine whether silvicultural treatments can be used to hasten development of old-growth characteristics in some of the Forest's younger stands. Additional information about old growth on the Forest can be found in the final EIS, Chapter III, "Old Growth" and Chapter IV, "Diversity, Vegetation"

Diversity of Plant and Animal Communities

A public issue and management concern related to the old-growth issue is the maintenance and/or enhancement of diversity of plant and animal communities within the objectives of multiple use management. There is increasing recognition within the scientific community that ecosystem diversity is important, this issue also received considerable public comment. This issue focuses not only on the desirability of maintaining wildlife populations, but on levels of management needed to provide both the quantity and adequate balance of habitats for various species.

The Forest provides habitat for a variety of wildlife species, including four Federally listed threatened and endangered species. The variety of elevation, aspect, soil depth, climate, and vegetation create a naturally diverse mosaic of habitats within the Forest boundary. An important facet of this issue is the distribution and protection of suitable habitat to ensure species viability through genetic exchange.

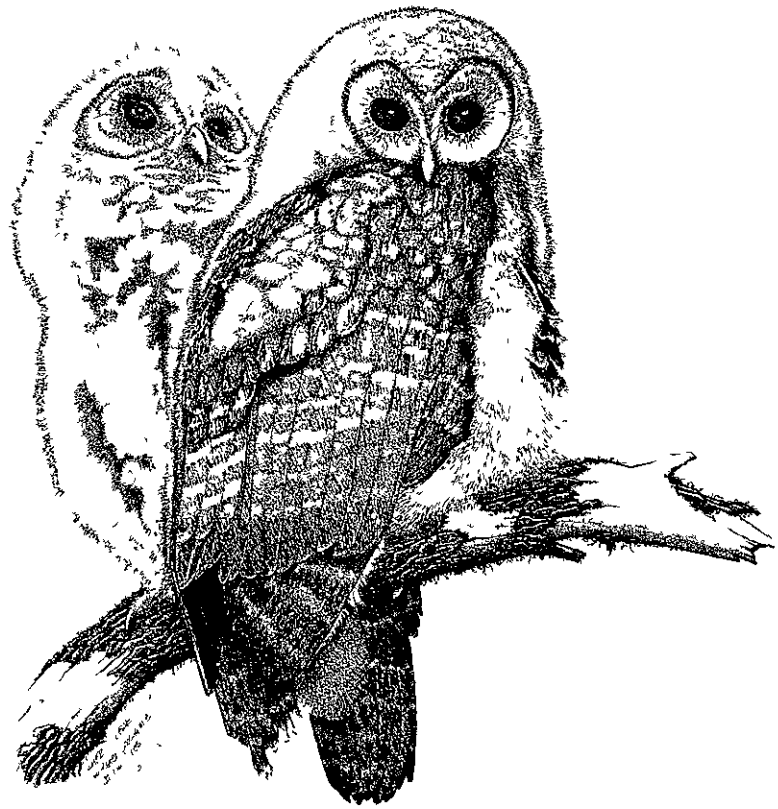
Many respondents to the draft EIS believed national forest management should focus on wildlife. State Department of Wildlife officials, individuals, environmentalists, hunters, and recreationists have expressed concern for the population and habitat needs of all wildlife species, including big game such as deer, elk, and mountain goat. Many other individuals and timber industry groups are concerned that the Forest is unnecessarily setting aside large amounts of forest land for species that

may be more adaptable than thought. Many comments received on the draft EIS expressed the feeling that those species adversely affected by timber activities would be protected in lands currently unavailable to timber production, such as wilderness and dispersed recreation areas. Numerous other comments received on the draft EIS expressed concerns that timber production activities have detrimental effects on species that are dependent on mature conifer forests. Cavity-nesting species are harmed by removal of trees that provide snags and hollow trees.

All management activities will protect habitat values for listed threatened, endangered, and sensitive species and species proposed for listing. The Forest Plan, Chapter IV, provides direction consistent with the Endangered Species Act and recovery plans for listed species.

Since the draft EIS was released, several actions have taken place regarding the northern spotted owl which influence how I will provide for the needs of this species on the Mt. Baker-Snoqualmie National Forest First, a Supplement to the EIS for an Amendment to the Pacific Northwest Regional Guide was issued in July, 1988. The December 8, 1988, Record of Decision for the Supplement identifies standards and guidelines for spotted owl habitat management The analysis in the Supplement considered the conflicting views and scientific information of others. It provided new criteria for establishing "Spotted Owl Habitat Area" (SOHA) networks on forests in Washington and Oregon, including the Mt Baker-Snoqualmie National Forest. While the draft EIS considered a total of 1,000 acres for each SOHA on the Forest, the Supplement now requires management or dedication of 2,200 acre SOHA's and a network of habitat areas to ensure distribution of spotted owls across the Forest.

Second, on April 26, 1989, the FWS announced its intention to develop a proposal to list the northern spotted owl as threatened throughout its range. On June 23, 1989, a proposal to list the northern spotted owl was published in the Federal Register. The FWS is expected to decide if the northern spotted owl will be listed as a threatened species sometime in the summer of 1990.



Finally, Section 318 of the Interior and Related Agencies Appropriations Bill for Fiscal Year 1990, Public Law 101-121 which expires September 30, 1990, directed additional interim habitat protection for the spotted owl. (A SOHA is to include 2,600 acres on the Mt. Baker-Snoqualmie National Forest.) It also provided that the December 8, 1988, Record of Decision accompanying the Final Supplement to the EIS for an Amendment to the Pacific Northwest Regional Guide, be reviewed and revised as appropriate by September 30, 1990. Any new information gathered subsequent to the issuance of the Record of Decision as well as the Interagency guidelines for conservation of northern spotted owls developed by the Interagency Scientific Committee are to be considered in this review.

This committee, chaired by Dr. Jack Ward Thomas, was appointed by the Chief of the Forest Service and the Directors of the U.S. Fish and Wildlife Service (FWS), Bureau of Land Management, and the National Park Service. Recommendations by the Committee were made on April 4, 1990. Those recommendations are under consideration by the Chief of the Forest Service and any decisions related to those recommendations that affect the Mt. Baker-Snoqualmie National Forest will be incorporated into the Forest Plan by amendment.

I have chosen not to conference with the U.S. Fish and Wildlife Service on the spotted-owl habitat provisions in the Forest Plan. Rather, I am directing the Forest Supervisor to ensure that the requisite conferencing with U.S. Fish and Wildlife Service is done on a project-by-project basis. As new information about spotted owl needs becomes available, i.e., through the Interagency Scientific Committee or through revision of the Supplement as mandated by Section 318 of the 1990 Appropriation Act, the Forest Plan may be amended to comply with new standards and guidelines to ensure population viability of the species. Listing of the owl as a threatened or endangered species may also result in an amendment to incorporate new management direction for the owl. Appropriate consultation or conferencing actions will then be taken.

After consideration of public comments and federal and state agency concerns about spotted owl population viability, I have decided to implement the selected alternative which establishes a network of 76 spotted owl habitat areas. This level of habitat protection meets Supplement guidelines. Slightly more than 40% of the network sites are known to have been occupied by spotted owl pairs in the last five years; 82% are known to have had one or more spotted owls. Each of these SOHAs has been expanded to 2,600 acres for Fiscal Year 1990 to comply with the provisions of Section 318.

The spotted owl network consists of dedicated SOHAs, habitat in wilderness, and other habitat in management areas without scheduled timber harvests. The selected alternative will maintain about 94 % of the roughly 500,000 acres of identified suitable spotted owl habitat on the Forest to the end of Decade 1. This network is distributed throughout the Forest and takes into account both suitable habitat and location of known spotted owls. Refer to the final EIS, Chapter III and the Forest Plan, Chapter IV for further discussion of spotted-owl direction.

I have decided to provide habitat for a wide range of species, not limited to those proposed or listed by the U.S. Fish and Wildlife Service as threatened or endangered. I will accomplish this through utilization of the best current information on habitat needs of Management Indicator Species. This decision meets requirements of laws and regulations that govern protection of wildlife habitats.

In both the draft EIS and final EIS, allocation of lands were made to emphasize the protection, maintenance, and/or improvement of wildlife habitat. Specific allocations were made for 1) habitat for old-growth dependent species such as the northern spotted owl; 2) habitat for mature and old-growth forest dependent species such as the pine martin and pileated woodpecker; 3) riparian dependent species and

fish habitats; 4) deer and elk habitat; 5) mountain goat habitat; and 6) threatened and endangered species habitat (specifically the northern bald eagle). The acres allocated for these habitats are in addition to habitat that exists within other allocations that do not specifically emphasize wildlife or wildlife habitat.

In the draft EIS, the range of acres allocated specifically for wildlife habitat ranged from about 84,000 acres to 313,000 acres. The preferred alternative in the draft EIS allocated 104,000 to wildlife habitat emphases. The final EIS had alternative allocations for wildlife habitat ranging from approximately 115,000 acres to 345,000 acres. The increased acres in all alternatives in the final EIS reflect changes in spotted owl habitat requirements discussed above as well as changes brought about in response to public comments on the draft EIS.

After considering the public comments concerning all aspects of wildlife and wildlife habitat, I have selected Alternative J which allocates 174,000 acres specifically to the protection, maintenance, and/or improvement of wildlife habitat above and beyond that provided in other allocations. In the selected alternative, the following wildlife habitat allocations are made:

54,200 acres	for northern spotted owl and associated species;
19,300 acres	for pine martin, pileated woodpecker and associated species;
47,000 acres	for riparian dependent species and fish habitats;
34,000 acres	for deer and elk habitat;
17,100 acres	for mountain goat habitat; and
2,800 acres	for northern bald eagle habitat.

The marbled murrelet, a small robin-sized sea bird that nests in mature and old-growth habitat within 30-40 miles of the coast, has recently become a species of interest. However, little information about its habitat needs is available. For the plan period (10-15 years) I believe the mature conifer areas, the SOHA's and other areas that contain mature and old-growth habitat such as riparian areas, dispersed recreation areas, and Special Areas will provide sufficient habitat for the marbled murrelet. As additional information about the habitat needs of this species becomes available, the Forest Plan can be modified to incorporate it.

ISSUE 4: American Indian Religious and Cultural Use

Questions surrounding this issue include:

- **What policy and management direction is needed to comply with the Native American Religious Freedom Act and various treaties?**

- **How can Inventoried religious and cultural use areas be protected within the objectives of multiple use management?**

In 1981, an inventory of religious use, practices, and localities on the Mt. Baker-Snoqualmie National Forest was completed. Over 300 cultural use areas and sites were identified, totaling nearly 450,000 acres or 26 percent of the net Forest acres. About 34 percent of these areas are in designated wilderness. Some sites cover less than one acre; other larger areas average between 3,000 and 15,000 acres. Use-areas and sites are located throughout the Forest but are concentrated in the northern half.

The inventoried use areas can be placed in five broad categories: cedar sites, ceremonial flora, spirit sites, legendary sites, and cemeteries and archaeological sites. There is a wide variation in compatibility between types of management activities and categories of religious, ceremonial, and cultural use.

Since the completion of the 1981 inventory, the Forest has initiated a consultation process with the Tribes. When proposed projects fall within an inventoried use-areas, the proposed activity is reviewed in detail with representatives of the Tribe(s) which may be affected. As more management activities are proposed, there is the potential for increased conflict.

It is my decision to implement the selected alternative which ensures the availability of sites and areas within the Forest for religious and ceremonial use by American Indians. This availability is assured by including allocations in the selected alternative that prevent development and limit access in some parts of the Forest. For religious and cultural sites and areas that occur in allocations where development may occur, the Plan requires consultation with affected tribal groups to develop protection and mitigation measures when development threatens those sites and areas.

ISSUE 5: Recreation Opportunities

The two major questions raised about this issue included:

- **To what extent can the Mt. Baker-Snoqualmie National Forest provide recreation opportunities and how should they be managed?**

- **How many miles of trails should be provided and in what locations?**

The Mt. Baker-Snoqualmie National Forest contains some of the most scenic areas in the Region Its proximity to the major metropolitan areas along Puget Sound and the variety of opportunities available is reflected in the continual growth of recreation use. Use exceeds 5 million RVD's (1989). It is expected that the demand for recreation on the Forest will grow through the end of the century.

The Recreation Opportunities issue includes several sub-issues or facets The more significant ones are: developed recreation needs and opportunities; dispersed recreation needs and opportunities including roadless and undeveloped areas; trail needs and opportunities; and wilderness use and management.

Public comment on the draft EIS reconfirmed that recreation use - of all types - is a major public issue on the Mt Baker-Snoqualmie. One of the few areas of consensus, respondents agreed that recreation is a vitally important function of the Forest, and that more trails are needed. Opinion is divided on what types of recreation opportunities should be provided.

Many groups and individuals - including hikers, horse users, some off-road vehicle users, naturalists, wildlife advocates, and environmentalists - want to preserve the opportunities for unroaded dispersed recreation outside of wilderness. They prefer more remote, natural appearing recreation settings. National Forest lands are the major supplier of non-motorized dispersed recreation in the Puget Sound area Many other recreationists spoke to the need for better recreation access for young families and the elderly, more ORV areas, more snowmobile opportunities, and more campgrounds.

A majority of people commenting on the draft EIS want more trails. There was support from environmentalists and many recreation/commodity groups for the "Trails 2000" proposal, which included both new trail construction and reconstruction of existing trails. ORV and horse users want more trails open for their use. Many hikers feel that trails should be closed to motorized use.

Conflicts between recreation and other Forest resources are frequently mentioned. For example, the effects of clearcutting are generally not compatible with the values of many recreation users. Some users dislike the expanding road system needed for

timber harvest, while others feel roads are important for their activities and access.

Many of the recreation attractions and opportunities are found within eight wildernesses; wilderness totals nearly 42% of the net Forest acres. A key issue is the level of management required to accommodate the high recreation demand within these areas, while protecting the wilderness resource. Some recreation and environmental groups, who fought for years to gain wilderness status for favorite areas, now find themselves debating the need for management actions within the wilderness, including limiting use Important aspects of this issue are· should additional trails be built and/or relocated to disperse recreation use away from heavily used areas; should roads that provide easy access to popular areas remain open to public use?

Some recreation uses are incompatible with each other; others cause resource damage because of the level or type of use. There is little public consensus regarding the quantity and type of recreation experiences the Forest should provide. The ability of the Forest to supply opportunities for all types of recreation and to resolve the problems of incompatible uses is a major issue to be addressed.

Developed Recreation

Developed recreation will continue to be an important program on the Forest. By the end of Decade 1, demand for developed recreation will likely range from 2.8 to 3.5 million RVD's; this range is still below the existing practical developed capacity of the Forest. The Forest does experience overuse at some campgrounds on heavy-use weekends. By the end of the fifth decade, the demand range will be 6.7 to 8.2 million RVD's. New construction to meet this demand is described below.

The emphasis for the first decade will be placed on improving existing popular campgrounds. Also, those campgrounds that are non-fee and capable of a favorable cost/revenue ratio will be converted to fee status by the installation of facilities required to meet the criteria as fee sites. This is not expected to have a substantial displacement on the users of non-fee facilities.

A top priority will be rehabilitation of existing sites that currently need heavy maintenance. In Decade 1, an average of 10% of the existing units per year will be reconstructed, rebuilding most of the sites within the next 10 years. This equates to about 170 units, or four campgrounds per year on the Forest. After the first decade, it is expected the facilities would be in good enough condition that reconstructive maintenance could be reduced to 5% per year.

As early as the latter years of Decade 1, some new construction of developed campgrounds is anticipated, as more capacity may be needed. As many as 100 units (500 PAOT's) may be added This will most likely be expansion of existing campgrounds rather than new site development, but several new sites are proposed late in the first decade.

An additional emphasis will be construction/reconstruction of developed recreation facilities for the day user. Picnic sites, vistas, interpretation and nature walks are the types of recreation experiences anticipated to be in the highest demand. Recreation management will emphasize day-use facilities located in the Mountain Loop Scenic Byway, Mt. Baker Scenic Byway, Mather Memorial Parkway, and Stevens Pass Historic District. Planned construction for Decade 1 includes the completion of: Heather Meadows, Dalles Discovery Trail, Gold Basin Mill Pond, and Gold Creek Pond day-use sites. To increase day-use capacity, 8 to 12 day-use sites averaging 20 units each will be added in the next few decades. This will result in an 800-1200 PAOT increase in capacity.

All ski areas that have expansion capacity under approved Ski Area Master Plans are expected to add development facilities. Expansion should be commensurate with expected improvements in service, and permitted on the basis of actual public need. It is anticipated that some ski areas will have base-area expansion, particularly to enhance overnight and mid-week resort opportunities.

Public information and interpretative services will be expanded in the first decade of the Plan and thereafter to respond to public demand. Expansion will encompass staffing as well as facilities, displays, equipment, and published materials. Emphasis will continue towards sharing of information services with other agencies and partnerships with private outlets where possible. Emphasis will also be given to intensifying the Forest's public outreach programs to allow certain segments of the public to become more familiar with recreation opportunities on the National Forest.

Dispersed Recreation

The assignment of land in the Plan will result in 16% of the total Forest acres (273,400 acres) being available for nonwilderness, unroaded dispersed recreation. These acres will provide the opportunity for 165,105 RVD's The majority of these opportunities will be in the semi-primitive nonmotorized recreation opportunity spectrum (ROS) class.

An additional 93,100 acres will remain unroaded during the first decade, although assigned to management prescriptions that project future development. This will result in an additional 51,205 RVD's of unroaded recreation, available through the first decade.

The primary management activities in the assigned unroaded recreation areas over the next decade will provide alternatives to impacting wilderness, and help reduce conflict between different recreation user groups in other areas. Increased trail construction, greatly increased reconstruction, and maintenance will aid in accomplishing this goal. Approximately 200 miles of new nonwilderness trail will be constructed in the first decade. Twenty miles of wilderness trail will be constructed. Another 493 trail miles will be reconstructed during the first decade.

Dispersed winter sports activities, such as cross-country skiing and snowmobiling, will continue to be encouraged. Where opportunities exists, both winter and summer dispersed recreation will be enhanced through timber sale activity by providing use sites, parking, trail access, and vegetative improvement. Additional Sno-Park facilities will be encouraged where the need is demonstrated.

Roaded recreation will occur on 37% of the Forest (630,550 acres). These figures represent the roaded natural and roaded modified ROS classes combined. This will provide the opportunity for 3,277,000 RVD's of recreational opportunities in a roaded environment in Decade 1. The capacity for roaded recreation well exceeds demand until Decade 4.

Commercial outfitters and guides will continue to be utilized as a method of meeting public demand, but new permits will be limited to a level that permits a balance between the individual non-guided user and those availing themselves of guide services.

Trails

The "Trail Management Plan" in Forest Plan Appendix E provides direction for the management of the Forest's approximately 1,384 miles of system trails. The direction for trail management attempts to reduce recreational conflicts between user groups. Whenever practical, these different uses (trail bikes, horses, hikers and mountain bikes) will be separated if conflicts cannot be avoided or minimized through public information and education.

Generally, trails will be constructed or reconstructed as needed for resource protection and to complement the objectives of the management prescriptions. When possible, through-trails will be routed away from areas of concentrated use, such as lakes and popular focal-points, to avoid unnecessary visitor encounters and environmental impacts.

Each trail will have a "primary objective" for management. While there may be other users allowed on any given trail, the trail standards and maintenance activities will reflect the standards for that primary objective and difficulty level that the trail is to be managed for.

The Forest policy is to restore trail mileage disrupted by management activities or to replace them with equal miles in the same general location. The intent is to not diminish the trail miles in the local area. The cost of this will be charged to the management program causing the dislocation. Loop trails will be favored. Special emphasis will be given to the planning and construction of low-elevation, snow-free trails. The presence of a trail will not limit the management options.

The reconstruction of existing trails will be emphasized over the construction of new trails, if budgetary constraints force prioritization.

The following types and amounts of trails are provided for in the Forest Plan.

- Pacific Crest National Scenic Trail: There are 96 miles of this trail located within the Mt. Baker-Snoqualmie National Forest, along the crest of the Cascade Mountains.

- National Recreation Trails: The Forest has four trails totaling about 10 miles that have received national recognition for outstanding recreational values. An additional 13 trails, totaling about 37 miles, are proposed for National Recreation Trail status.

- Wilderness Trails: There are currently 580 miles of system trails in wilderness; this represents 42 percent of the total trail mileage on the Forest. Approximately 20 miles of new trail will be constructed within wilderness during the first decade of the Plan.

- Nonwilderness Trails: There are 803 miles of nonwilderness trails on the Forest. Of these, 425 miles are closed to motorized use. The current emphasis on hiker-only and horse trails will remain in effect. The Plan calls for the construction of 134 miles of new trail outside of wilderness to provide alternative recreation opportunities to relieve overuse of wilderness trails.

- Cross-country Ski Trails: There are approximately 129 miles of these trails. Many additional miles of skiing opportunities exist on snow-covered Forest roads. Expansion of ski touring trails is anticipated in the first decade. Groomed trails (with a pre-set track) will also expand as demand grows and funds become available.

- Snowmobile Routes: The miles of roads and trails available for snowmobile use will vary from year to year based on weather conditions, wildlife habitat management, and logging activities Over 200 miles of Forest roads and trails will be available for this use. In addition, certain areas of the Forest, such as Easton Glacier, have been identified as unroaded snowmobile areas.

- Off-road Vehicle and 4x4 Routes: Four-wheel driveways are very low standard travel-ways to be used by short wheelbase vehicles. There are approximately 25 7 miles of this type of route available on the Forest. The most popular areas for this type of use are Naches Pass Wagon Road, Evans Creek ORV Area, and the Greenwater Drainage.

I have decided to implement the selected alternative which rehabilitates all existing campgrounds in the next 10 years and emphasizes construction of day-use facilities, including: Heather Meadows, Dalles Discovery Trail, Gold Basin Mill Pond, and Gold Creek Pond day-use sites. Unroaded dispersed recreation opportunities will be increased through the allocation of 273,400 acres to unroaded recreation emphasis. Complementing the unroaded recreation allocation will be the construction of approximately 200 miles of trails outside wilderness in the next 10 years.

Wilderness

The 721,718 acres of wilderness on the Mt. Baker-Snoqualmie National Forest will be managed to preserve the areas' wilderness character for the use and enjoyment of visitors, and administered in a manner consistent with the Wilderness Act of 1964.

The physical, social, and managerial settings within wilderness will be managed to meet standards set under Limits of Acceptable Change (LAC's) in the wilderness recreation spectrum (WRS). Five zones are established under the WRS, listed in the table below.

Wilderness Recreation Spectrum

Zone	Acres	RVD's
Transition	15,078	226,170
Trailed	49,015	183,806
General Trailless	457,000	114,250
Dedicated Trailless	207,930	14,945
Special Area	9,017	Not Estimated
Total	**721,716**	**539,171**

The overall wilderness management goal will be to reduce or eliminate the adverse effects associated with human use, when use approaches or exceeds the established LAC. Specific management actions will be undertaken at overused sites where LAC's are now exceeded, or where the level of use or impacts is approaching levels specified for that WRS class.

Several areas within wilderness presenting unique management problems, such as the existence of structures, RNA's, and a popular climbing route, are assigned to the special area WRS class. The intent of this class is to allow changes in management guidelines for unique situations; areas do not qualify for this class for administrative convenience in dealing with overuse. The historic lookouts at Winchester Mountain, Park Butte, Miners Ridge, Three Fingers, Green Mountain, and Granite Mountain will be allowed to remain as non-conforming uses. The Coleman Glacier Climbing Route on Mt. Baker will have special LAC's in recognition of the unique opportunities present. An interdisciplinary team will examine the recreational use of Mt. Baker and recommend further refinements in these guidelines. The USGS Glacial Research Station in the Glacier Peak Wilderness and authorized electronic sites in wilderness will continue to operate under special use permit.

There are several large areas without trail access where cross-country trips, as long as a week, are possible. They provide for a pristine wilderness experience but generally occur in extremely fragile alpine areas that are vulnerable to overuse The intent is to manage these dedicated trailless areas to prevent overuse.

Standards and Guidelines permit using some naturally occurring fires (i.e. lightning caused) to accomplish wilderness vegetation management objectives such as maintaining vegetation diversity and allowing natural processes to prevail. The parameters under which these fires will be permitted to burn will be closely monitored and suppression actions will be taken immediately on those fires that exceed prescriptions. Under these guidelines, it is expected that most fires will be less than 10 acres in size, though it is possible that once every 20 years or so, an individual fire may approach 1000 acres in size. It is expected that approximately 75 acres per year will be burned where naturally occurring fires are used to accomplish wilderness vegetation management objectives No areas have been identified where planned, human-induced

prescribed burning is needed to modify fuel accumulations to meet wilderness fire protection needs.

I have decided to implement the selected alternative. Under the direction of the selected alternative, the 721,718 acres of wilderness will be managed to reduce or eliminate the adverse effects of human use

ISSUE 6: Wild and Scenic Rivers

- **How should the potential wild and scenic rivers of the Forest be managed and their values protected?**

There is one federally designated Wild and Scenic River on the Forest (the Skagit, designated in 1978) In the draft EIS, the results of an eligibility study of other rivers for inclusion in the National Wild and Scenic Rivers System were presented. That study found five of 47 studied rivers to be eligible for designation. The preferred alternative in the draft EIS further directed the study of those five rivers to determine if they were suited for designation.

There was considerable public comment on the DEIS eligibility study, plus support for many more miles of wild and scenic rivers than recommended for suitability study in the draft EIS. There was also some opposition to more designation

Between draft and final plans, eligibility criteria were re-evaluated which resulted in additional rivers being found eligible. A total of 51 rivers were identified and studied for their eligibility and 47 of these were determined to be eligible. There was public and other agency involvement in this process. Suitability studies for all 47 rivers were also completed, again in response to public comment on the draft.

As a result of these studies, it is my decision to implement the selected alternative which found 30 rivers suitable for inclusion in the National Wild and Scenic River System. The rivers or portions of rivers listed on the next page will be recommended to Congress for designation. Chapter 4 of the Forest Plan describes the segments recommended and the recommended classification (Wild, Scenic, or Recreational). This recommendation is a preliminary administrative recommendation that will receive further review and possible modification by the Chief of the Forest Service, Secretary of Agriculture, and the President of the United States. The Congress has reserved the authority to make final decisions on designation of rivers to be included in the National Wild and Scenic Rivers System. Until Congressional action, the values contributing to a rivers' particular classification will be protected on National Forest lands. Forest lands in the 1/4 mile corridor on each side of the 30 *suitable rivers will be managed to maintain the rivers' eligibility. Standards and* guidelines for managing suitable rivers are provided in the Forest Plan, Chapter IV.

Included in my recommendation for Wild and Scenic River designation is the North Fork Nooksack River. Located on the North Fork Nooksack, studied under Section 5(d) of the Wild and Scenic Rivers Act, and recommended for Recreational designation, is a segment of river on private land that contains a hydroelectric facility owned and operated by Puget Sound Power and Light. The Forest's suitability study found the continued presence and operation of this facility would not have a direct and adverse effect on the values for which the river would be established as part of the National Wild and Scenic Rivers System. This facility has been in place since the early 1900's and has never been licensed by the Federal Energy Regulatory Commission (FERC). This project is currently being considered for licensing by FERC. It is our opinion that FERC is not precluded from licensing this project prior to Congressional action on this recommendation because the river is being evaluated by the Forest Service under authority of Section 5(d) of the Act and the project is on private land.

Rivers Recommended for Inclusion in the National Wild And Scenic River System

North Fork Nooksack	West Cady Creek
South Fork Nooksack	South Fork Skykomish
Bell Creek	Tye River
Baker River	Miller River (to fork)
Noisy Creek	West Fork Miller River
Diobsud Creek	East Fork Miller River
Illabot Creek	Foss River (to fork)
Buck Creek	West Fork Foss River
Downey Creek	East Fork Foss River
White Chuck River	Deception Creek
North Fork Sauk River	North Fork Snoqualmie River
Boulder River	Middle Fork Snoqualmie River
South Fork Stillaguamish	Taylor River
North Fork Skykomish	Pratt River
Troublesome Creek	White River

ISSUE 7: Management of Municipal Watersheds

- What activities should be permitted within municipal watersheds?

- What measures should be taken that will maintain or enhance water quality?

Maintaining high quality water is an objective of many people and agencies, including: state and federal agencies, municipalities, fish and some wildlife interests (Indian tribes, sports groups, and some recreation and environmental groups), and the State fisheries agency. These interests believe that timber harvest, road construction, mining, and some recreation activities are detrimental to water quality, primarily due to sedimentation and pollution. Most of the above interests support actions to limit, restrict, or prohibit developmental activities in the watersheds.

Municipalities are concerned that increased access and recreation use will result in the need to install filtration facilities to assure potable water to the consumer.

Timber and energy industries, rockhounders, plus a number of hunters feel that development can occur and any adverse impacts to water supply and quality can be mitigated. They believe that limiting or prohibiting activities unduly restricts the industry's ability to maintain or increase supplies of timber, electric power, and minerals. Hunters feel that big game populations could actually be enhanced with controlled hunts in the watersheds.

Significant portions of the watersheds supplying the cities of Seattle, Bellingham, Everett, and Tacoma are located on the Mt. Baker-Snoqualmie National Forest. Water is also provided for a number of smaller municipalities, ski areas, and other recreation sites. About 136,400 acres, (7.9 percent of the Forest) supplies municipal water to 1.4 million people. Water quality is high; only one municipality filters water, others use only disinfectant.

Currently, a wide range of activities occur within the municipal watersheds. Some watersheds have not been accessed by roads and remain primarily in a natural condition. Other watersheds have been developed, with extensive timber harvesting and road construction. Recreation is permitted or encouraged in some watersheds; in others, poor access and municipal opposition has limited recreation opportunities.

It is my decision to implement Alternative J which continues the Memorandum of Understanding and Cooperative Agreements in effect for these watersheds. In the case

of the Cedar River Watershed, the existing Cooperative Agreement will be renegotiated to reestablish the goals and objectives for that watershed. Until a new agreement is established, no new land exchanges affecting national forest land will occur. Pending the new agreement, the 1962 Cooperative Agreement remains in effect.

ISSUE 8: Effects of Timber Management and Related Activities

- **What management direction is needed for timber harvest and road construction activities to benefit or maintain the quality of other resources?**

Environmentalists, Indian Tribes, State Fish and Wildlife agencies and some recreationists are concerned about the effects of timber harvest and related road construction on other resource outputs and uses, such as fish and wildlife habitat, water quality, scenery, and dispersed unroaded recreation. There are approximately 1,500 stream miles and over 12,000 acres of lakes on the Forest that serve as both seasonal and year-round spawning and rearing habitat for anadromous and resident species.

The timber industry and businesses who depend on these industries believe that Forest Service management is too responsive to these other resource needs and place unnecessary limitations on timber harvest activities that reduce supplies and/or increase costs. Concern for the hydrologic cumulative effects of management activities has increased since the DEIS was released.

Management for the commercial production of timber includes a number of activities: road construction and/or reconstruction, timber harvest, preparation of the land for planting seedlings, possible thinning, fire, insect and disease control, et cetera. These activities have direct and indirect effects on other resources, including: fish and wildlife habitat, recreation uses, cultural values, and soil and water. Also, recreation opportunities are changed, and the visual condition of the Forest changes. The visual impact of clear-cutting and loss of habitat for some wildlife species is a major concern of environmentalists, wildlife advocates, and some hunting interests.

Each step in the process of timber harvesting, including road construction, may have a number of short-term and long-term impacts. Timber harvesting may enhance elk habitat (there is increased forage in clearcuts), but reduce the visual quality and the amount of wildlife habitat available for species dependent on mature conifer forests.

The Forest Plan establishes allocations and standards and guidelines that ensure the scenic values of the forest are protected through the use of the Visual Resource Management program. The Plan also provides for necessary habitat for wildlife through allocations and standards and guidelines to protect habitat values and the establishment of means to meet wildlife management requirements.

In preparing the draft EIS, the Forest recognized the need to develop ways to meet the riparian area and water quality management requirements set forth in 36 CFR 219.23(d) and 219.27(f).

For forest planning, riparian areas were evaluated and modeled as average widths by stream class. For Class I and II streams, the average width of riparian areas is considered to be 200 feet on each side of the stream. For Class III streams, the average width on each side of the stream is generally 100 feet. Riparian areas for lightly incised Class III streams were determined to be approximately 10 feet on each side of the stream. The determination of these average widths was made based on an evaluation of past management practices in streamside zones and the effects of those activities. Actual widths and boundaries of riparian areas will be determined during

project planning. Those boundaries may be greater or lesser that the averages shown above.

During preparation of the DEIS, the Forest developed allocations and standards and guidelines that addressed the riparian area management requirements. The Forest also recognized the need for a process to address hydrologic cumulative effects in a way that was responsive to the riparian and water quality management requirements. However, no methodology was identified that could be directly adopted to develop such a process for the Forest. As a result, in the draft EIS, while standards and guidelines were developed to respond to riparian area management requirements, consideration of hydrologic cumulative effects on water quality management requirements were limited to focusing on: 1) identifying the major causes of adverse cumulative effects on water quality and/or quantity; and 2) identifying watershed potentials for unacceptable adverse cumulative effects.

In response to the draft EIS, the management of riparian areas and fish habitat, and the cumulative effects of management activities on fish/fish habitat were raised as major concerns by individuals, Indian Tribes, and State and Federal agencies. There were a total of 117 substantive comments from the public on fishery resources; 66 of these comments directly or indirectly addressed cumulative effects of forest practices on fishery and water quality values. In addition, 60 of the 75 substantive comments regarding the management of riparian areas were directed to impacts or effects to riparian values from forest management activities over space and time. The general public comments also included a number of comments in this area, including: "cumulative effects analysis for fish is inadequate;" "cumulative effects of forest activities on watersheds and water resources are not addressed;" "need more MMR's for soils, watershed;" and "protect vital watersheds."

There were two predominant areas of concern: the relationship between timber management activities (harvesting, road construction) and the viability of fish and fish habitat. (For example, what are the effects of sedimentation and bedload movement generated by Forest management activities to on- and off-Forest fishery resources, over space and time?) A second area of concern was the effectiveness of Best Management Practices to protect and maintain fish habitat and riparian areas, and the effectiveness of fish habitat restoration/improvement as a measure to mitigate the effects of forest management activities, over space and time. In one section of their input, The State strongly recommended, in place of BMP's, the need for MR's be developed for fish, in order to provide strengthened Forest-wide requirements for the protection of habitat.

In the analysis and evaluation of comments on the draft EIS, the Forest reconfirmed that the standards and guidelines developed in the draft EIS to meet the riparian management requirements were appropriate. The Forest also identified the need to develop, prior to issuing the FEIS and Forest Plan, ways to ensure that hydrologic cumulative effects did not violate the water quality management requirements.

In development of the Forest's hydrologic cumulative effects analysis process, various strategies and actions were employed to insure that adequate ways of meeting

the riparian and water quality management requirements were the end result of that analysis. Included were additional public consultation, a literature search and work to determine if predictive models to determine hydrologic effects on westside Cascade watersheds were available. No suitable model was found, and the Forest proceeded to develop a Forest-specific process (discussed in detail in Appendix H of the final EIS). Because no predictive model was found to tie sediment production to fish habitat capability, fisheries were included as a major component of hydrologic cumulative effects analysis. The procedure to address hydrologic cumulative effects considered all watersheds, and was applied in all alternatives (except Alternative NC). It's intent, again, was to insure that effects of management activities prescribed by the Forest Plan meet the water quality and riparian management requirements established in 36 CFR 219.

During the development and application of the process in the summer and fall of 1989, meetings were held with State and Federal agencies, timber industry representatives, members of the academic and scientific communities, and representatives of environmental groups. The purposes of the meetings were to describe the process being used, solicit reactions to the process, and identify opportunities to improve the process.

The meeting with timber industry representatives created considerable interest and apprehension on their part as expected. In a letter dated October 6, 1989, they stated their understanding of the issues that were presented at the meeting and requested additional information that has been subsequently given to them. They also stated in their letter that they would submit written comments in the near future. No additional comments were received as of the date this Record of Decision was signed.

The meeting with members of the scientific community resulted in several useful comments. Comments made by the scientists at the meeting and subsequent written comments indicate they had a favorable impression of the procedure.

As a result of the various public meetings and reviews, the Forest concluded (and I concur) that the procedure (resulting from the hydrologic cumulative effects analysis) used to insure forest management activities do not violate water quality and riparian area management requirements is the best process available for this Forest at this time.

I have decided to adopt the selected alternative which will: 1) emphasize maintenance and/or improvement of water quality; 2) maintain adequate sources of large woody debris along streamsides and provide areas for future recruitment of material; and 3) emphasize improving and/or enhancing both anadromous and resident fish habitat. Management of the riparian areas in allocations suited for timber production will allow for timber harvest when riparian area objectives can be met. In addition to the previous riparian area standards and guidelines, the selected alternative also provides new standards and guidelines that incorporate limits on final harvest acres by watershed to meet the water quality and riparian management requirements.

Research in the area of hydrologic cumulative effects of forest management activities is receiving considerable attention by the scientific and academic community, industry, and State and County agencies. Any new research findings concerning hydrologic cumulative effects and forest management will be reviewed and if appropriate, incorporated into the process used by the Forest. The Forest will continue to work with the scientific and academic community to refine and further validate the hydrologic cumulative effects analysis process used in the Forest Plan. As additional experience and knowledge is gained in the area of hydrologic cumulative effects analysis, the Forest will review, evaluate, and if necessary amend the standards and guidelines developed as a result of that analysis.

My decision to implement Alternative J was made with full consideration for the concerns expressed about the effects of timber management and related activities. I believe that unacceptable adverse effects will be prevented or mitigated through a number of actions discussed earlier in this Record of Decision. Included in these actions are the direction for management of roadless areas, old growth, fish and wildlife habitat, and application of the hydrologic cumulative effects analysis constraint.

ISSUE 9: Adjacent and Intermingled Lands

- **How should National Forest lands adjacent to lands of non-federal owners be managed?**

- **What management activities should be conducted on National Forest lands that are located near private developments?**

The land ownership pattern within and adjacent to the National Forest boundary and the management of intermingled Federal and Private lands is a major public issue.

A few environmental groups have proposed legislative land exchanges that would exchange high elevation, low timber site class private lands for low elevation, high site federal lands. Some of the major industrial timber land owners are supportive of these types of exchanges Independent mill operators and loggers who depend on National Forest timber and some public interest groups are strongly opposed to such exchanges, as the exchanges would further reduce timber supplies available to them.

Environmentalists, State Fish and Wildlife agencies, Indian Tribes and some sporting groups believe that management activities, such as timber harvest, should be delayed or deferred on National Forest lands to mitigate the cumulative effects of large-scale timber harvest on private lands that are intermingled with Federal lands. Independent mill operators and loggers are opposed to any delays or deferrals that would reduce timber supplies available to them

In many areas of checkerboard ownership, adjacent land owners have completely removed the old-growth timber (in approximately 640 acre blocks), leaving the timber present on National Forest land more vulnerable to wind-throw. Removing these blocks of old growth has also had the effect of reducing the amount of habitat available for wildlife species dependent on old-growth habitat. In areas of intermingled lands, the objectives and subsequent land practices of all owners affect the management of adjacent lands. Management of National Forest land affects adjacent lands of non-Federal landowners, and activities on non-Federal lands affect management of National Forest land.

Urban growth is steadily moving east toward the Forest boundary. Forest lands, regardless of ownership, are affected by this growth. Resources such as wildlife, water, and air do not recognize ownership boundaries, but they are directly impacted as shopping centers, subdivisions, and residences - plus an increased network of roads - spread closer to the Forest boundary. A question to be addressed: should National Forest land management practices be altered to compensate for these encroachments? Timber industry, adjacent land owners, County planners, and environmentalists are all involved in this concern.

A land ownership adjustment plan for the Forest was developed and included in the Forest Plan (Appendix G) to establish guidance for exchange, purchase, donation and transfer of land.

It is my decision to implement the selected alternative which incorporates standards and guidelines to maintain and protect resource values on national forest lands.

While the Forest Plan cannot address the management of off-Forest resources, it was developed with the recognition of the inter-relationships of the Forest lands and adjacent lands.

My decision to proceed with the Forest Plan will not affect the land purchase program, which is authorized and funded annually by Congress. Land exchange opportunities are not expected to change. The exchange program will be utilized, where possible, to help attain desired future conditions in the Forest Plan

ALTERNATIVES CONSIDERED

Eleven alternatives were analyzed in detail in the draft EIS. The final EIS analyzes eight alternatives in detail. They include five from the draft EIS, one modified alternative from the draft, and two new alternatives (one of which is based on the Preferred alternative in the draft EIS). The final EIS eliminated five draft EIS alternatives from detailed study because few public comments supporting those alternative were received and the issues were better resolved in other alternatives. (See the final EIS, Chapter II). A new alternative is the Forest Service selected alternative, Alternative J, which falls within the decision space described in the draft EIS. Tradeoff analysis and environmental consequences are presented in the final EIS, Chapters II and IV.

Alternative NC (No Change)

The No Change Alternative has been developed in response to decisions made regarding an appeal, brought by the Northwest Forest Resource Council on May 19, 1986. The appeal centered on a decision by the Regional Forester to "require inclusion of minimum management requirements (MR's) in the Current Direction Alternative for each Forest Plan." The substance of the appeal was that a "true no-action alternative representing current management plans" was not included in Forest Plan draft EIS's

The No Change Alternative is designed to represent the 1963 Timber Management Plans as amended, and consequently does not comply with all provisions of the National Forest Management Act (NFMA) and regulations promulgated by the Secretary of Agriculture to implement NFMA.

The purpose of the Timber Management Plans was to determine potential yield for harvestable timber on the Forest and not to be an integrated resource management plan. Alternative NC would optimize timber production from suitable timber land determined by pre-NFMA criteria ASQ for Alternative NC would average 41.7 MMCF (203.8 MMBF) annually in the first decade. It is estimated that about 50% of existing roadless areas would be developed under this alternative Management practices to protect water quality would be insufficient to meet state water quality standards. A PNV for this alternative was not estimated, as the Timber Management Plans did not include nontimber resources and would not be comparable to the other alternatives.

Alternative A (No Action)

Alternative A was developed to continue management of the Forest under the direction of previously existing plans (including the amended 1963 Timber Management Plans), policies and direction, updated to incorporate the requirements of the National Forest Management Act of 1976. This is the "No Action" alternative required by the Council on Environmental Quality Regulations for implementing the National Environmental Policy Act (NEPA). The goal of Alternative A is to provide maximum timber outputs while maintaining or exceeding current recreation, wildlife, fisheries, and visual resource outputs.

Annual ASQ for this alternative would be 31.0 MMCF (152 MMBF) in the first decade. Approximately 30% of the 403,000 acres of roadless areas would be assigned to development in this alternative. The remaining 70% would be retained for a variety of undeveloped uses including wildlife habitat, special areas, and unroaded dispersed recreation. Spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Habitat capability would be provided for 108 pairs of spotted owls in Decade 1. Approximately 36,000 acres of land otherwise suited for timber production are in designated Spotted Owl Habitat Areas. Fifteen rivers totaling 287 miles (215 within the Forest) would be recommended for addition to the Wild and Scenic Rivers System.

Alternative B (RPA)

The goal of Alternative B is to simultaneously produce high levels of timber, anadromous fish, commonly hunted species of big game, and dispersed unroaded recreation, as specified in the 1980 RPA Program.

Annual ASQ for this alternative would be 26.3 MMCF (128 MMBF) in the first decade. Approximately 34% of the 403,000 acres of roadless areas would be assigned to development in this alternative. The remaining 66% would be retained for a variety of undeveloped uses including wildlife habitat, special areas, and unroaded dispersed recreation. Spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Habitat capability would be provided for 108 pairs of spotted owls in Decade 1 Approximately 79,000 acres of land otherwise suited for timber production are in designated Spotted Owl Habitat Areas. High timber goals preclude recommending any additions to the Wild and Scenic Rivers System.

Alternative C

The goal of Alternative C is to emphasize primitive and semi-primitive nonmotorized recreation (accomplished through retention of existing roadless areas and, over time, reversion of some roaded areas to unroaded condition); protect scenery, fish, and wildlife habitat; and protect sites and areas important to American Indians for religious and cultural use

Annual ASQ for this alternative would be 13 7 MMCF (67 MMBF) in the first decade. Approximately 7% of the 403,000 acres of roadless areas would be assigned to development in this alternative. The remaining 93% would be retained for a variety of undeveloped uses including wildlife habitat, special areas, and unroaded dispersed recreation Spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Habitat capability would be provided for 115 pairs of spotted owls in Decade 1. Approximately 36,000 acres of land otherwise suited for timber production are in designated Spotted Owl Habitat Areas. All 47 eligible rivers totaling 606 miles (441 within the Forest) would be recommended for addition to the Wild and Scenic Rivers System. Five potential Research Natural Area additions are recommended - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge.

Alternative G-Modified

The goal of Alternative G-Modified is to emphasize maintenance of natural ecosystems and diversity of native plants and animals, emphasize providing uses not found on private lands, and produce timber in a way that is consistent with the other goals and is non-damaging to soils.

Annual ASQ for this alternative would be 18.3 MMCF (89 MMBF) in the first decade. Approximately 9% of the 403,000 acres of roadless areas would be assigned to development in this alternative. The remaining 91% would be retained for a variety

of undeveloped uses including wildlife habitat, special areas, and unroaded dispersed recreation. Spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Habitat capability would be provided for 115 pairs of spotted owls in Decade 1. Approximately 113,000 acres of land otherwise suited for timber production are in designated Spotted Owl Habitat Areas. All 47 eligible rivers totaling 796 miles (441 within the Forest) would be recommended for addition to the Wild and Scenic Rivers System. Five potential Research Natural Area additions are recommended - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge. Special Area designation is recommended for areas at Twin Sisters, Monte Cristo, Baker Lake, and Naches Pass.

Alternative H

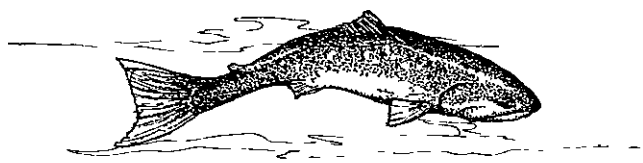
The goal of Alternative H is to provide an increased emphasis on unroaded recreation; protection of scenic values in the foreground and middleground of heavily traveled highway corridors; increasing big game populations; plus emphasis on timber production on tentatively suitable acres not assigned to other objectives.

Annual ASQ for this alternative would be 24.1 MMCF (118 MMBF) in the first decade. Approximately 24% of the 403,000 acres of roadless areas would be assigned to development in this alternative. The remaining 76% would be retained for a variety of undeveloped uses including wildlife habitat, special areas, and unroaded dispersed recreation. Spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Habitat capability would be provided for 111 pairs of spotted owls in Decade 1 Approximately 61,000 acres of land otherwise suited for timber production are in designated Spotted Owl Habitat Areas. Five rivers totaling 154 miles (71 within the Forest) would be recommended for addition to the Wild and Scenic Rivers System Five potential Research Natural Area additions are recommended - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge

Alternative I

Alternative I is a new alternative and was not displayed in the draft EIS. The goal of Alternative I is to emphasize those resources with an established price in the market place: timber production, anadromous fish, developed recreation, and minerals. In addition, emphasis is placed on enhancement of game wildlife and fish habitat and the development and maintenance of an extensive trail system to accommodate a wide variety of users on a year-round basis. Other resources are managed at levels that do not reduce the outputs from the market resources.

Annual ASQ for this alternative would be 26.6 MMCF (130 MMBF) in the first decade Approximately 36% of the 403,000 acres of roadless areas would be assigned to development in this alternative. The remaining 64% would be retained for a variety of undeveloped uses including wildlife habitat, special areas, and unroaded dispersed recreation. Spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Habitat capability would be provided for 108 pairs of spotted owls in Decade 1. Approximately 93,000 acres of land otherwise suited for timber production are in designated Spotted Owl Habitat Areas High timber goals preclude recommending any additions to the Wild and Scenic Rivers System.



Alternative J (Preferred)

This is the Preferred Alternative. It is a new alternative and was not displayed in the DEIS. Beginning with the draft EIS Preferred Alternative (H), Alternative J was developed to respond to public comment and updated information. Differences between the draft and this Preferred Alternative include a considerable increase in trail mileage, an increase in the number of rivers recommended for addition to the National Wild and Scenic Rivers System; allocation of three Special Areas (Botanic, Scenic, and Recreation/Education); an increased emphasis on unroaded recreation; and greater protection of scenic values on travel corridors. Timber production is emphasized on suitable acres assigned to a timber harvest prescription; other resources will be managed at levels commensurate with the objectives of the alternative.

Annual ASQ for this alternative would be 22.4 MMCF (108 MMBF) in the first decade. Approximately 23% of the 403,000 acres of roadless areas would be assigned to development in this alternative. The remaining 77% would be retained for a variety of undeveloped uses including wildlife habitat, special areas, and unroaded dispersed recreation. Spotted owl habitat is inventoried, identified, and protected following the direction in the SFEIS amending the Regional Guide. Habitat capability would be provided for 111 pairs of spotted owls in Decade 1. Approximately 54,000 acres of land otherwise suited for timber production are in designated Spotted Owl Habitat Areas. Thirty rivers totaling 452 miles (276 within the Forest) would be recommended for addition to the Wild and Scenic Rivers System. Five potential Research Natural Area additions are recommended - North Fork Nooksack Addition, Lily Lake, Perry Creek, Green Mountain, and Chowder Ridge. Special Area designation is recommended for areas at Mather Memorial Parkway, Heather Meadows, and Sulphur Creek.

ALTERNATIVES WITH A HIGHER PRESENT NET VALUE

Present net value (PNV) is used to measure the economic efficiency of each alternative. PNV is the difference between the sum of the total discounted benefits of a course of action over some time period, and the total discounted costs of carrying out that course of action over the same time period. Benefits and costs used to calculate PNV are those which have a market price or which can be assigned a market price equivalent, and therefore PNV does not measure all factors that differ between alternatives.

The selected alternative has a PNV of $2258.8 million The following four alternatives have higher PNV's·

Alternative	PNV (MM$)
B (RPA)	2343.2
I	2342.9
A	2283.5
H	2260 0

Alternative B has the highest PNV, because of its combined emphasis on both timber production and recreation. Noncash benefits are the major contributor to PNV on the Mt. Baker-Snoqualmie National Forest. Although recreation levels remain relatively constant over the span of alternatives, the type and value of recreation does vary. In Alternative B, timber benefits are increased by 15% over Alternative J and increased emphasis on roaded recreation make it's PNV just slightly higher than that of Alternative I. The tradeoff in PNV among Alternatives I, A, and H is more directly related to ASQ, and although A has the highest ASQ, PNV is decreased due to the intensive silvicultural activities associated with timber maximization.

Alternative B has a high emphasis on managing all tentatively suitable lands for timber production As a consequence scenic quality will deteriorate for almost all

lands accessible by road. Other non-market amenities will be allocated only in areas not suitable for timber production.

Similar comparisons can be made for the other alternatives with higher PNV's. Alternative J strikes a more realistic balance between environmental concerns and economic returns. It provides better biological stability and provides greater overall benefits recognizing the importance of non-priced values such as visual resources, wildlife habitat, fish, and more primitive recreation activities.

Spatially, the selected alternative better addresses public concerns about recreation, wildlife and logging activities. These concerns will often mean forgoing timber opportunities for a more balanced activity, like reduced harvest rates in scenic viewshed, middleground, or deer and elk habitat.

These added resource provisions in the selected alternative either remove land from timber production or reduce the intensity of timber management on some lands, and this lowers PNV. For detailed comparisons of the alternatives, see the final EIS, Chapter II, "Comparisons of the Alternatives".

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The environmentally preferable alternative causes the least change to the biological and physical environments and protects, preserves, and enhances historic, cultural, and natural resources. All alternatives considered in detail satisfy legal and environmental standards, except the No Change Alternative does not meet NFMA management requirements.

The environmentally preferable alternative is Alternative C. This alternative schedules less intense development activity, retains more acres in an unroaded and undeveloped condition, and programs less ground-disturbing activity during the next 10 to 15 years than in the Forest Plan.

Additional information on the environmentally preferable alternative and other alternatives considered is in the final EIS, Chapter II.

Alternative C emphasizes old growth, wildlife, fish habitat, and undeveloped, dispersed and unroaded recreation on the Forest. These are largely nonmonetary resources which generally do not have established market values. This alternative has an annual ASQ of 67 MMBF (13.7 MMCF), and a road construction program of 7 miles during the 1st decade. About 93% of roadless areas would be maintained in unroaded condition.

I did not select the environmentally preferable alternative because:

- **It does not achieve a reasonable balance between concerns for maintaining environmental quality and satisfying demands of society for commodity and non-commodity outputs from the Mt. Baker-Snoqualmie National Forest.**

- ***The Forest Plan has a more balanced response to issues and concerns.* It recognizes the needs for protection of old-growth habitats and values, unroaded dispersed recreation, and protection of water quality while still providing for commodity uses (e.g. timber production) at a higher level than is provided by the environmentally preferable alternative.**

Alternative J, the Forest Plan, recognized and provides for landscape, resource, vegetation and animal diversity through land use allocations and management areas identified and displayed in the final EIS, Alternative J Map

Alternative J provides appropriate environmental safeguards at an acceptable direct economic cost. This alternative incorporates the perspective that the Forest Service is the trustee of the environment for succeeding generations All practicable means to avoid or minimize environmental harm have been adopted. I believe Alternative J provides for the proper and continued use and development of Mt. Baker-Snoqualmie National Forest resources in a manner that maintains economic stability, yet retains local natural and cultural heritages, such as fish and wildlife habitat, water quality and quantity, outdoor recreation opportunities, scenic quality, and American Indian religious and cultural use sites and areas.

This Forest Plan has been developed with public participation, which included involvement, coordination, and comments from federal, state and local agencies including the State of Washington; the affected Indian Tribes; the U S. Fish and Wildlife Service; representatives of county and city governments; industry groups; other special interest groups; and individuals.

Numerous efforts were made to ensure that the selected alternative considered the goals of other public agencies. Comments and letters from agencies were reviewed and analyzed extensively; numerous meetings and field trips were conducted with officials from other agencies and actions were taken to address their concerns.

I believe Alternative J is compatible with and complementary to the goals of other agencies and American Indian tribes. Coordination with many agencies, groups, and individuals will continue as projects are implemented.

I select Alternative J because, in my judgment, it maximizes net public benefit. The term "net public benefit" is necessarily subjective. Many people may disagree with this evaluation, and in fact, therein lie the controversies surrounding these decisions Due to the controversial nature of the decisions I am making, I have shared with you, the reader, the factors I considered. I compared the selected alternative to the "environmentally preferable alternative" and to alternatives with higher present net values. I recognized that "environmentally preferable" is also a subjective term, and explained the basis for that subjective conclusion.

In arriving at these decisions, I have been thoroughly briefed on the Plan and alternatives presented in the FEIS. I gave particular attention to how the selected alternative responded to public issues and management concerns. In my judgement, Alternative J maximizes net public benefits and best responds to the issues. It balances adequate protection of the environment with production of both monetary and non-monetary resource outputs.

SECTION IV

IMPLEMENTATION

SCHEDULES

The Forest Plan will be implemented through identification, selection, and scheduling of projects to meet its management goals and objectives. These projects are displayed in the Forest Plan, Appendices A through K.

Project schedules will be available for review at the Ranger District Offices and Supervisor's Office. Schedules of possible projects will routinely change as projects are implemented or removed from the lists for other reasons, and as new projects take their place. Adjustments to schedules may occur based on results of monitoring, budgets, and unforeseen events

The Forest Plan provides direction in the form of goals and objectives, standards and guidelines, monitoring requirements, and probable scheduling of management practices. It does not cover projects on specific sites except in a broad manner. Each proposed project will be subject to site-specific analysis in compliance with NEPA. This process may result in a decision not to proceed with the proposed project, even though the project is compatible with the Forest Plan.

The Forest Plan's scheduled projects are translated into multi-year program budget proposals. The schedule is used for requesting and allocating funds needed to carry out planned management direction. Upon approval of a final budget for the Forest, the annual work program will be updated and carried out.

The Forest program of work will implement management direction of the Forest Plan Outputs and activities in individual years may differ significantly from those shown in Forest Plan, Chapter IV, depending on final budgets, new information derived from updated inventories and monitoring, and any future amendments or revisions of the Forest Plan.

All timber sales offered after issuance of the Forest Plan will comply with direction contained in it. Timber Sales now under contract will be administered under provisions of existing contracts. Changes to existing timber sale contracts may be proposed on a case-by-case basis where overriding resource considerations are present.

The Forest Plan incorporates the Pacific Northwest Region's FEIS for Managing Competing and Unwanted Vegetation. In implementing the Forest Plan through project activities, the Forest will comply with the Record of Decision issued by the Regional Forester dated December 8, 1988, and the Mediated Agreement of May, 1989. Use of all vegetation management techniques is allowed only when other methods are ineffective or will unreasonably increase project costs. Emphasis must be on prevention and early treatment of unwanted vegetation and full public involvement in all aspects of project planning and implementation. Information about the vegetation management FEIS, ROD, and Mediated Agreement are available at the Forest Supervisor's Office.

The Forest Plan will be implemented 30 days after the Notice of Availability of the Forest Plan, EIS, and Record of Decision appears in the Federal Register.

MONITORING AND EVALUATION

The Monitoring and Evaluation Program is the management control system for the Forest Plan. It will be used to provide information on progress and results of implementation. One result of monitoring will be an assessment of needs for amending

or revising the Plan. Monitoring and evaluation are discussed in more detail in the Forest Plan, Chapter 5.

Monitoring is intended to keep the Forest Plan current and responsive to change. Monitoring and evaluation each have a distinctly different purpose and scope. Monitoring consists of gathering data, observations, and information. During evaluation, the data and information are analyzed and interpreted. This process allows determination of whether conditions are within the bounds and intent of Plan direction. Forest Plan monitoring is not a substitute for existing monitoring activities. Many activities are currently being monitored on the Forest to comply with administrative and legal responsibilities. (FSM - Admin. Review Procedures).

Monitoring and evaluation will provide information to:

- Compare planned to applied management standards and guidelines to determine if objectives are achieved [36 CFR 219.12(k)].

- Quantitatively compare planned versus actual outputs and services [36 CFR 219.12(k)(1)].

- Measure effects of prescriptions, including significant changes in land productivity [36 CFR 219.12(k)(2)].

- Determine planned costs versus actual costs associated with carrying out prescriptions [36 CFR 219.12(k)(3)].

- Determine population trends of the management indicator species and relationship to habitat changes [36 CFR 219.19(a)(6)].

- Evaluate effects of National Forest management on adjacent land, resources, and communities [36 CFR 219.7(f)].

- Identify research needs to support or improve National Forest management [36 CFR 219.28].

- Determine if lands are adequately restocked [36 CFR 219.12(k)(5)(i)].

- Determine, at least every 10 years, if lands identified as unsuitable for timber production have become suitable [36 CFR 219.12(k)(5)(ii)].

- Determine whether maximum size limits for harvest areas should be continued [36 CFR 219.12(k)(5)(iii)].

- Ensure that destructive insects and disease organisms do not increase to potentially damaging levels following management activities [36 CFR 219.12(k)(5)(iv)].

Results of evaluations will lead to the following types of decisions:

- Continue practice, no change necessary.

- Refer the problem to the appropriate Forest officer for corrective action.

- Modify the management practice through Plan amendments.

- Modify land designation through Plan amendments.

- Revise output schedules.

- Revise unit output costs.

- Revise the Plan.

Three types of monitoring and evaluation will be conducted:

- IMPLEMENTATION MONITORING - Implementation monitoring will determine if plans, prescriptions, projects, and activities are implemented as designed and in compliance with Forest Plan objectives and Standards and Guidelines.

- EFFECTIVENESS MONITORING - Effectiveness monitoring will determine if plans, prescriptions, projects, and activities are effective in meeting management direction, objectives, and the Standards and Guidelines.

- VALIDATION MONITORING - Validation monitoring will determine whether initial data, assumptions, and coefficients used to develop the Plan are correct; or if there is a better way to meet forest planning regulations, policies, goals, and objectives.

Evaluation of results of the site-specific monitoring program will be documented in an annual evaluation by the Forest Interdisciplinary Team. Any need for further action is recommended to the Forest Supervisor.

Actions directed by the Forest Supervisor could include one or more of the following:

- A determination that no action is needed.
- District Ranger(s) may be directed to improve application of management direction.
- Management direction for a particular piece of land may be modified as a Forest Plan amendment.
- The Standards and Guidelines may be modified as a Forest Plan amendment.
- The projected schedule of outputs may be modified as a Forest Plan amendment.
- The needed action may singly or cumulatively be so significant as to cause the Forest Supervisor to initiate revision of the Forest Plan.

If, through monitoring and evaluation, it is determined that management objectives cannot be achieved without violating the Standards and Guidelines, the plan will be amended. In amending the plan, one or more of the following can be changed: allocations, management prescriptions, projected outputs, or standards and guidelines.

MITIGATION

Mitigation measures will minimize or eliminate potential conflicts or adverse effects of implementation. Mitigation measures have been developed through interdisciplinary efforts and incorporated into the Forest Plan at different levels in several different ways.

The *Standards and Guidelines and Management Area prescriptions in the Forest Plan*, Chapter 4 are a fundamental and integral part of these measures, and as such they are a basic and essential part of the Forest Plan.

All practicable means to avoid or minimize environmental harm from the selected alternative have been adopted (40 CFR 1505.2(c)).

The land use allocations play an important role in mitigation through separation of incompatible uses.

National Forest Management Act requirements were incorporated into the planning process and are reflected in land use allocations and Standards and Guidelines.

"General Water Quality Best Management Practices" (USDA 1988) are incorporated by reference under requirements of Section 319 of the Clean Water Act.

Additional mitigation measures are developed and implemented at the project level, tiered to and consistent with the measures listed above.

AMENDMENT AND REVISION PROCESS

This Forest Plan may be changed either by an amendment or a revision. Such changes may be made as a result of monitoring or project analysis (see Forest Plan, Chapter 5). An amendment may become necessary as a result of situations such as:

- Recommendations of the Interdisciplinary Team based on their review of monitoring results.

- Determination that an existing or proposed permit, contract, cooperative agreement, or other instrument authorizing occupancy and use is not consistent with the Forest Plan, but should be approved, based on project level analysis.

- Adjustment of management area boundaries or prescriptions.

- Changes necessitated by resolution of administrative appeals.

- Changes needed to improve monitoring plans or information and assumptions used in the Plan.

- Changes made necessary by altered physical, biological, social, or economic conditions.

Based on an analysis of the objectives, guidelines, and other aspects of the Forest Plan, the Mt. Baker-Snoqualmie National Forest Supervisor shall determine whether a proposed amendment would result in a significant change to the Forest Plan. If the change is determined to be significant, the Forest Supervisor shall follow the same procedure as that required for development and approval of the Forest Plan. If the change is not determined to be significant, the Forest Supervisor may implement the amendment after appropriate public notice and compliance with NEPA. The procedure is described by 36 CFR 219.10(e) and (f), 36 CFR 219.12(k), FSM 1922.51-52 and FSH 1909.12.

As Regional Forester, I will approve significant amendments and the Forest Supervisor will approve "nonsignificant" amendments. The determination of significance must be documented in a decision notice and would be appealable under 36 CFR 217. A mailing list will be maintained to provide notification and invitation to comment on proposed amendments.

The amendment documentation will include as a minimum:

- A statement of why the Forest Plan is being amended (some possible reasons are mentioned above).

- The actual amendment will be described.

- Rationale for the amendment.

- A statement of significance related to FSM 1922.51. This is the NFMA significance and relates to changes to the Forest Plan.

- A statement of NEPA compliance (40 CFR 1500-1508, FSM 1950, and FSH 1909.15) regarding effects on the environment and how effects disclosed in the Plan EIS may change as a result of the amendment.

- A statement of appeal rights.

NFMA requires revision of the Forest Plan at least every 15 years. However, it may be revised sooner if physical conditions or demands on the land and resources have changed sufficiently to affect overall goals or uses for the entire Forest. If a revision becomes necessary, procedures described in 36 CFR 219.12 will be followed.

SECTION V

APPEAL RIGHTS

This decision may be appealed in accordance with the provisions of 36 CFR 217 by filing a written notice of appeal within 90 days of the date specified in the published legal notice. The appeal must be filed with the Reviewing Officer:

F. Dale Robertson, Chief
USDA Forest Service
P.O. Box 96090
Washington, D.C. 20090-6090

A copy must be sent simultaneously to the Deciding Officer:

John F. Butruille
Pacific Northwest Region
USDA Forest Service
319 S.W. Pine
P.O. Box 3623
Portland, OR 97208-3623

The notice of appeal must include sufficient narrative evidence and argument to show why this decision should be changed or reversed (36 CFR 217.9).

Requests to stay the approval of this Land and Resource Management Plan shall not be granted [36 CFR 217.10(a)].

For a period not to exceed 20 days following the filing of a first level notice of appeal, the Reviewing Officer shall accept requests to intervene in the appeal from any interested or potentially affected person or organization [36 CFR 217.14(a)].

Decisions on site-specific projects are not made in this document.

The schedule of proposed and probable projects for the first decade is included in the appendices to the plan. Final decisions on these proposed projects will be made after site-specific analysis and documentation in compliance with NEPA.

I encourage anyone concerned about the Plan or Environmental Impact Statement to contact Doug MacWilliams, Forest Supervisor, in Seattle, Washington, 206-442-5400, before submitting an appeal. It may be possible to resolve the concern or misunderstanding in a less formal manner.

John F Butruille

6/8/90

JOHN F. BUTRUILLE
Regional Forester - USDA Forest Service
Pacific Northwest Region
319 SW Pine, P.O. Box 3623
Portland, OR 97204-3623

Date

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