United States
Department of
Agriculture

Forest Service

Pacific
Northwest
Region

**Deschutes
National Forest**

Final Environmental Impact Statement

Land and Resource Management Plan

Deschutes National Forest

FINAL ENVIRONMENTAL IMPACT STATEMENT
LAND AND RESOURCE MANAGEMENT PLAN

Deschutes National Forest
Deschutes, Jefferson, Kalamath and Lake Counties, Oregon

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ABSTRACT

The Final Environmental Impact Statement documents, issues, data and information, analysis, processes for preparation, and potential environmental consequences of management alternatives are presented. The Plan for management of the the Deschutes National Forest is presented also.

Twelve alternatives were analyzed in the process; Six of them are described in detail in the FEIS. Each alternative responds differently to the issues and concerns identified.

Alternative NC, No Change, continues management under the 1979 Timber Management Plan without the full requirements of the National Forest Management Act of 1976 (NFMA)

Alternative A, No Action, continues management of the Forest under existing plans and policies, but has been updated to include NFMA requirements An effort was made to balance timber management, dispersed recreation, visual quality, and wildlife habitat management

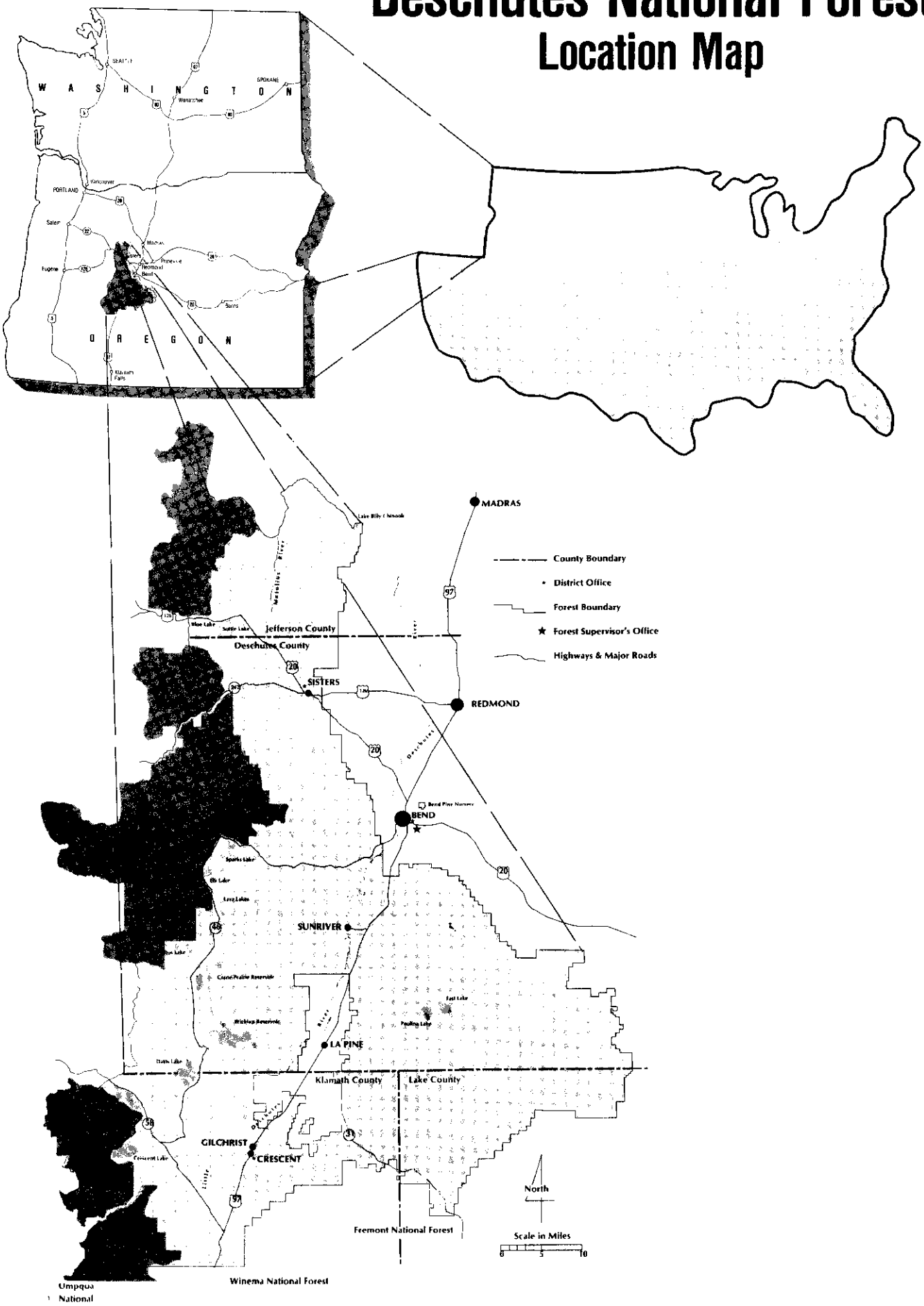
Alternative B, (Resource Planning Act), meets the goals established for the Deschutes NF under RPA Timber harvest would accelerate to meet RPA targets An annual limit could be set on the amount of personal use firewood to assume a long-term supply Intensive and dispersed recreation would be both be managed to meet long-term demands Some areas with high potential for geothermal energy would be available for leasing

Alternative C, Commodities and other resources which contribute to the local and regional economy are emphasized in this alternative A significant portion of the Forest would be intensively managed for timber production Intensive recreation would be favored.

Alternative E, Preferred Alternative, A significant portion of the Forest would be intensively managed for timber production Some of this production would be set aside for personal use firewood Both intensive and dispersed recreation would be emphasized. Geothermal leasing would be permitted Habitat for threatened and endangered wildlife species would be increased Scenic quality would be protected along heavily used roads, developed recreation areas, and some roads to trailheads Significant stands of old growth would be retained

Alternative G, The preservation of natural ecosystems is stressed in this alternative Land available for timber management would be reduced Significant portions of the roadless areas would remain undeveloped Recreation management would favor dispersed activities Motorized recreation would be de-emphasized Threatened and endangered plant and animal species and habitat would be maintained at high levels Scenic quality would be maintained along major roads, trails, recreation areas, and undeveloped landscapes A considerable amount of old-growth forest would be retained.

Deschutes National Forest
Location Map



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Chapter 1

Need and Purpose

Changes from DEIS to FEIS for Chapter 1

Added a new issue addressing uneven-aged timber management because of public concern

Dropped the issue having to do with meeting the Resource Planning Act because of slight interest expressed by the public

Information regarding planning records and aid to readers was added at the end of this Chapter

Additional information about public involvement and the dropping of alternatives D, F, and H has been included

Chapter 1

Need and Purpose

Introduction

The reason for preparing these documents is to provide for the use and protection of all resources on the Deschutes National Forest for the next 10 to 15 years. The "need and purpose", a required title for this Chapter, are explained below in a discussion of the National Environmental Policy Act and the National Forest Management Act.

This Final Environmental Impact Statement (FEIS) describes six alternatives for managing the Forest according to the principles of multiple-use and sustained yield. It is a revised edition of the Draft Environmental Impact Statement, published by the Forest in January of 1986.

The demands and expectations of people with an interest in this Forest can be addressed in many different ways This requires the evaluation of a range of reasonable approaches to forest management. The kinds and levels of activity in each alternative are determined by a particular theme or emphasis

Each alternative produces a different combination of goods and services and includes explicit requirements for protecting the environment. Alternatives were evaluated on the basis of how well they addressed the issues, concerns, and opportunities (ICOs), which were identified early in the planning process.

The objective of Forest Planning is to achieve the highest level of long-term net public benefit consistent with sound environmental protection. Net public benefit is defined as the overall value to the nation of all goods and services from the Forest after subtracting all costs and adverse environmental effects. Benefits include both commodities which have a monetary value and amenities, like a spectacular view, which do not. Alternative E has been selected for implementation; it is "the proposed action."

While the production of goods and services and the environmental effects of activities are projected 150 years into the future, the Forest Plan will be revised in 10 to 15 years Management of the Forest for this period is considered a federal action which will have a significant effect on the quality of the environment. The National Environmental Policy Act of 1969 (NEPA) requires preparation of an environmental impact statement (EIS) for actions of this magnitude. Regulations for complying with NEPA (40 CFR 1500) were promulgated by the Council of Environmental Quality. The EIS includes, in addition to a description and comparison of management alternatives, information about the physical, biological, and social attributes of the Forest (the Affected Environment) It also discloses the costs and environmental consequences of implementing each alternative.

One purpose of the environmental impact statement was to provide decision makers with an environmental disclosure sufficiently detailed to make a selection from the range of management alternatives. Of equal importance, the compilation of information about the Forest facilitated broad and active public participation in the planning process.

Comment on the Draft Environmental Impact Statement was a primary vehicle for public involvement More than 1,600 responses were received. Changes in the Preferred Alternative attributable to this exchange of ideas are indicated throughout this document.

An account of how the Forest proposes to implement the preferred alternative is given in the Deschutes National Forest Land and Resource Management Plan, which accompanies this FEIS. It is required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) as amended by the National Forest Management Act of 1976 (NFMA) and in compliance with National

Forest System Land and Resource Planning Regulations (36 CFR 219)

How This Document Is Organized

A general outline of the document and a brief summary of the chapters follow·

Chapter I, "Purpose and Need", identifies (1) the laws and regulations used to direct the planning and environmental analysis process and (2) the public issues and management concerns about the land and resource management of the Deschutes National Forest

Chapter II, "Alternatives, including the Proposed Action", describes the Alternatives, explains their formulation, and compares them

Chapter III, "Affected Environment", presents the biological, physical, social, and economic setting of the Deschutes National Forest

Chapter IV, "Environmental Consequences", discusses environmental consequences, including unavoidable adverse impacts, and irreversible or irretrievable effects

Following these four Chapters are the: List of Preparers, List of Recipients of the FEIS and Forest Plan, Glossary of Terms, a list of the References, and Index

The Appendices contain technical discussions about various aspects of the Planning Process. They contain more detailed descriptions of some environments, analyses, and effects

The Forest Plan contains information about how the Forest land and resources will be managed as the Preferred Alternative is implemented. Found here are the detailed standards and guidelines for management practices

The *map packet* contains maps of land management areas on the Forest for each of the alternatives

In addition to the material included in the FEIS, Proposed Forest Plan, and supporting Appendices, other process records are on file at the Supervisor's Office, Deschutes National Forest, 1645 Highway 20 East, Bend, Oregon, 97701. These include records documenting the Timber Land Suitability Determination; process record material for recreation, wildlife, range, diversity; and yield table development This information is available upon request. Regional direction for topics such as management requirements (MR's) is available at the USDA, Forest Service, Regional Office in Portland, Oregon.

The Planning Process

Planning has always been an important element in National Forest management In 1898, Gifford Pinchot, soon to become the first Chief of the Forest Service, conducted a "thorough study of ..local questions of lumbering, grazing, and fire, and of those conditions generally which must determine the best management of the (Black Hills Forest) Reserve "

Recreation and wilderness planning became important soon after World War I when the advent of the automobiles greatly increased visits to National Forests Conflict between recreation and timber management were a consequence of increased demand for timber following World War II. The Forest Service responded with a land allocation approach to management, which is essentially a zoning system.

Road construction, required by the increase in timber harvest, opened the Forest to an increasing number of motorists This process was accelerated on the Deschutes NF, much of which was acquired from private logging companies after it had been logged by railroad. Railroad grades quickly became roads into popular recreation areas and the Forest was Mecca for early Northwestern motorists.

The Multiple Use Sustained Yield Act of 1960 made outdoor recreation, range, wildlife, and fish statutorily equal to timber and watersheds. The requirement to give equal consideration to all resources resulted in a significant increase in Forest planning. The collection of better inventory data and solicitation of public involvement were required.

During the 1970s, increasing controversy over Forest Service timber management led to the

creation by Congress of an elaborate national and local planning structure for the National Forest system

Regulations for the National Forest Management Act, discussed above were developed under the aegis of a Committee of Scientists While these regulations established the framework for implementing the law, each National Forest was charged with developing standards and guidelines for forest management.

The three stages of Forest planning are: (1) the establishment of resource goals through the Resource Planning Act process; (2) the allocation of those goals to each National Forest by Regional Offices, (3) the preparation of a Regional Guide, and the development of Forest Plans by each National Forest. Conflicts between objectives set by RPA (top down planning) and Forest Plans (bottom up) will be mediated by Regional Foresters and the Washington Office of the Forest Service

In addition to allocating the land (determining what activities will occur, where they will occur, and at what level), the Forest Plan projects levels of production (both goods and services), and establishes standards/guidelines for the conduct of all activities.

The planning process used to prepare this Final Environmental Impact Statement and Forest Plan involved these steps

1. The identification of issues, concerns, and opportunities (ICOs), a consolidation of Forest management problems submitted by the public, the timber industry, environmentalists, government agencies and federal land managers

2. Development of planning criteria.

3. Collection of inventory data and information

4 Analysis of the Management Situation (AMS) This study enabled planners to assess the need for changes in Forest management

5. Development of a range of management alternatives, different ways of addressing the issues, concerns, and opportunities

6. An estimation of the environmental, economic, and social effects of implementing each alternative.

7. Comparison and evaluation of alternatives

8. Selection of the preferred alternative and approval of the Forest Plan will be completed by the Regional Forester and his decision documented in the Record of Decision and made available to the public along with the FEIS and Forest Plan

9 Implementation of the Forest Plan

10. Monitoring and evaluation of implementation activities. These processes provide a way for the Forest planners to determine if the goals and objectives are being met and project implementation is in compliance with direction and standards/guidelines

Chronology

Year	Process
1978	Notice of Intent Published in the Federal Register
1978	Preliminary Identification of Issues and Concerns
1980	Final List of Issues and Concerns
1982	Draft Environmental Impact Statement Published
1985	Analysis of Management Situation
1985	Formulation and Analysis of Alternatives
	Evaluation of Alternatives
	Draft Preferred Alternative Selection
1986	Second Draft Environmental Statement Published
	Public Comment Period
1988	Supplement to DEIS Published
1989	Public Comment Period for DEIS
	Evaluation of Public Comment
	Formulation, Analysis and Modification of Final Alternative
1990	Final Plan, FEIS and Record of Decision Published
	Plan Implementation, Monitoring and Evaluation

This Final Environmental Impact Statement displays the results of the environmental analysis It ensures that environmental information is available to public officials and the public before decisions are made It was used by the Regional Forester in arriving at the position set forth in his Record of Decision.

Upon implementation, other planning activities on the Forest will be "tiered" to the FEIS and in conformance with the Forest Plan This means that environmental assessments for individual projects can refer to the FEIS and associated documents rather than repeat information

The Forest Plan supersedes or incorporates all previous land management and resource management plans prepared for the Deschutes National Forest Upon implementation, all activities on the Forest must comply with the Forest Plan Appropriated budgets may alter this schedule of activities, in addition, all permits, contracts, and other instruments for the use and occupancy of National Forest system land and resources must be in conformance with the Forest Plan. Such documents will be revised where needed as soon as practical, subject to valid existing rights. This updating will generally be done within 3 years.

Plans for special areas such as Wilderness and national trails were developed under this planning process and are included in the Forest Plan Interim direction for Wild and Scenic Rivers is established in this Forest Plan and will be amended or revised as a result of the current rivers planning process which is underway. If a Newberry National Monument is established this Forest Plan will be amended or revised to include management for it within the framework of the established legislation and existing laws.

Forest Overview

The 1 6 million acre Deschutes National Forest extends from the eastern crest of the Cascade Mountains into high desert country east of Bend, Oregon It is best known for one of the most spectacular panoramas in the Northwest From Bend, the westward view encompasses eight mountain peaks, from southern-most Mt Bachelor, to the South Sister, Brokentop, Middle Sister, North Sister, Mt Washington, Three Finger Jack, and Mt Jefferson. The strikingly varied terrain, testifies to the tumultuous force which shaped the area, volcanism. The array of volcanic features on and around the Forest has attracted viewers and naturalists for years

Another distinguishing feature is a lavish, spring-fed system of lakes and streams which refresh an arid, verging into desert country These waterways support one of the most renown fisheries in the nation The Forest is occupied by 350 species of fish and wildlife. It is particularly noted as a refuge for two greatly valued and beleaguered birds, the bald eagle and osprey

Elevations range from 2,000 feet at Lake Billy Chinook to 10,497 feet at Mt Jefferson, the second tallest peak in Oregon The Diamond Peak, Mt Washington, Mt Jefferson, Three Sisters, and Mt. Thielsen Wildernesses occupy 182,506 acres of the Forest, which also contains 42,656 acres of the Oregon Cascade Recreation Area

In addition to providing a celebrated scenic skyline, the Cascades empty incessant storms which dominate the climate in the western Northwest Weather on the Deschutes NF is predominantly sunny, which is another powerful attraction to people living in the Willamette Valley, Portland, and Seattle

River rafting, canoeing, hiking, camping, and mountain climbing are summertime recreational pursuits In the winter, skiers converge on Mt Bachelor, the most popular downhill skiing area in the Northwest, and negotiate hundreds of miles of cross country skiing trails. Open and level terrain on much of the Forest is prized by snowmobile operators

More than two and a half million people seek an encounter with the outdoors on the Forest each year

Timber remains a major component in the Central Oregon economy The Forest contributed 79,973.62 MMBF to area mills and elsewhere in calendar year 1988. Stands of ponderosa pine, lodgepole pine, mountain hemlock, Douglas fir, white fir, grand fir, and Shasta red fir grow on 71 percent of the Forest

Much of the current Forest was previously industrial forestland which was harvested between 1916 and 1955

A mountain pine beetle epidemic in lodgepole pine stands on the Forest began in the 1960s. By 1988, 60 percent of all lodgepole trees larger than 6 inches diameter at breast height (d.b.h) in untreated stands had been killed The timber management program was adjusted to minimize the environmental and economic impact of the development.

Rangeland provided by the Forest is also economically significant. The 719,000 acres of rangeland provided 29,000 animal unit months of cattle and sheep grazing in 1984.

Volcanism, particularly the explosion of Mt. Mazama 6,000 years ago, is the most important single factor in the areas soil profile Ash ejected by the explosion which created Crater Lake was deposited across almost all of the Forest Spectacular geological events have occurred as recently as 1,300 years ago, when obsidian flowed from Newberry Volcano Newberry, 500 square miles in size, is the product of volcanic activity during the last ice age.

Other geological features include Lava Lands, an interpretation of the Lava Butte Volcano, the Lava Cast Forest, where tree molds or casts were formed by molten lava flowing through a timber stand, and Lava River Cave, one of the longest lava tube caves in the Northwest.

The developers of geothermal energy have expressed keen interest in the potential of the area around Newberry Crater. Such development may be constrained inside the crater and elsewhere by the proposed Newberry Crater National Monument.

Most of the Forest is in Deschutes County but the northern portions is in Jefferson County and there are southern portions in Klamath and Lake Counties

The archaeological record in the Forest is particularly rich, containing evidence of ancient human uses such as hunting and food gathering camps, obsidian quarries, and travel. Scientific excavations have revealed dates as early as 8000 BC Some of the more recent sites are within traditional use areas of the present-day American Indian groups in this area Historic sites contain remnants of early settlement, wagon roads, and railroad logging. The extensive human use of this area, despite its harsh volcanic nature, is of extreme interest to the scientific community as well as the general public.

The largest cities in the area are Bend and Redmond Madras, Sister, LaPine, Crescent, Sunriver, and Gilchrist are other important population centers Forest headquarters and two Ranger Districts offices are in Bend and there are also Ranger Districts in Crescent and Sisters. The Redmond Air Center, located at the Redmond Airport, and the Bend Pine Nursery are administered by the Deschutes NF Supervisor.

Principal highways serving the area are U S. Highway 97, a north-south route, and U S. Highway 20, an east-west route. The principal communities in the area are served by a bus line and commercial airline service is available at Roberts Air Field near Redmond. The only access to passenger railroad travel is in Chemult, 70 miles south of Bend.

Issues, Concerns, & Opportunities

The range of issues, concerns, and opportunities considered in this document was determined by expressions from the public and land managers (Forest Service and other) and by laws, regulations, and policies for public land management. Response to these demands and requirements can vary widely but must acknowledge the physical, biological, budgetary, and legal limits of Forest management.

Identification of ICOs

The opinions of individuals, governmental agencies, private industry, Native Americans, and environmental and recreation organizations were actively solicited. Public meetings, newsletters, contacts with the news media, and personal contacts between Forest Service employees and individuals and groups were some of the methods used

Public Involvement Between the Draft Environmental Impact Statement and the Final Environmental Impact Statement

The Proposed Deschutes National Forest Land and Resource Management Plan, and the Draft Environmental Impact Statement for the Proposed Plan, showing the Preferred Alternative, were published and released for public review and comment on January 10, 1986 The public comment period closed May 9, 1986

The purpose of the public comment period was to gather all the public concerns for resource management issues contained in the Proposed Plan and DEIS. To be certain that as wide an audience as possible was exposed to the Proposed Plan and DEIS, Deschutes National Forest personnel held press conferences, issued news releases and mailed information to concerned groups and individuals

The Forest planning staff put together a presentation which explained the major resource issues in the Proposed Plan, and outlined how each resource was to be managed under the Preferred Alternative. Forest Service personnel then traveled throughout Oregon to present the program to groups ranging from local church groups to Congressional delegations, and from timber industry groups to environmental organizations Presentations were made to County Commissioners and Chambers of Commerce throughout Central Oregon regarding potential economic effects of the Proposed Plan

A 30-minute program was taped by the Oregon Public Broadcasting System which covered all the material in the Forest Service presentation Forest Supervisor Dave Mohla and Forest Planning Staff Officer Larry Mullen were interviewed for the program The program was broadcast by PBS three times during the public comment period A similar 30-minute program was taped and aired by a Portland-based television station

Each of the presentations, news releases, letters, newspaper articles and programs encouraged the public to address their written concerns for particular resource issues to the Forest Service by May 9, 1986. Forest Service planning personnel also practiced an "open door" policy throughout the public comment period, making themselves available on the telephone and for meetings in the Forest Supervisor's Office

The results of this concentrated effort to involve the public in the planning process were impressive The Deschutes National Forest received over 1600 written comments to the Proposed Plan and Draft Environmental Impact Statement. The comments were carefully analyzed by planning personnel and entered into a special computer program according to the resource issue addressed Comments and questions received showed that the public was well-informed concerning the planning process in general and the elements of the Proposed Plan and DEIS in particular.

Three alternatives included in the Draft EIS, Alternatives D, F and H, gained essentially no public support during the public comment period. As a result, they were dropped from detailed analysis in the Final EIS They will be discussed as alternatives which were considered, but not displayed in detail in the Final EIS

There were also several changes in the Preferred Alternative between the Draft EIS and the Final EIS which can be attributed to the high level of public involvement during the public comment period The proposed departure schedule for timber harvest was dropped due to an overwhelming rejection of the schedule by the public, including the timber industry and environmental groups, based on the written responses received Opposition to clearcutting was expressed by approximately 60% of the written comments, and was expressed verbally by concerned private citizens, environmental groups and the timber industry at the numerous presentations and open houses held to outline the Proposed Plan. As a result, Forest Service silviculturalists developed an uneven-aged management system for Ponderosa pine stands

Other key issues which arose during the public comment period, and resulted in revisions to standards/guidelines for the Final Land and Resource Management Plan, or changes in Management Area Allocations, included: visual resource management (particularly for the area on and around Black Butte and in the Metolius River Basin area), fisheries management, management of riparian areas, water quality in the Deschutes River, roadless area management,

Wild and Scenic River designations, old growth timber management and "big trees", snag levels, elk habitat management, mule deer habitat management, management for other wildlife species such as Thompson's big-earred bat, the great grey owl, and spotted owl, and a comparison of economic effects of management for timber versus management for other resources (wildlife, recreation, etc.).

Changes in the Management Area Allocations also occurred as a result of the Omnibus Oregon Wild and Scenic Rivers Act of 1988 and the Final Supplement for the Spotted Owl Management Environmental Impact Statement in 1988.

The four year-plus period between the Draft and Final Plan has permitted extensive discussion to continue with our publics over the main issues which arose during the public comment period. Some issues have been refined to such a degree by public comment and input that they should present little further concern after the release of the Final Environmental Impact Statement and Final Land and Resource Management Plan We have had considerable time to talk with the public and to modify our position in the draft. In addition, we have kept the public and the Oregon delegation informed through periodic newsletters (Forest Plan Reports), press releases and articles in the newspaper.

Public involvement has been a key part of the planning process since it began in 1978, and has continued through to the upcoming release of the Final EIS. The result of this public commitment to the Deschutes Land and Resource Management Plan has been a combined Forest Service/public effort in the determination of major issues for the Proposed Plan, the development of the Alternatives, and the refinement of standards/guidelines in the Final Plan and of the Preferred Alternative presented in the Final EIS (See Appendix J of the EIS for a chronology of public involvement activities.)

Interactions

Just as every element in a natural environment is embedded in a web of connection, so are issues and concerns about Forest management. The satisfaction of one set of expectations for resources and opportunities can compliment or conflict with other demands Rarely is there an activity which has no effect on other activities or environmental conditions.

The treatment of beetle killed lodgepole pine can benefit producers of wood pulp and chips and collectors of fuelwood, for example, at the expense of visual quality It can also create conditions favorable to the production of forage for livestock, deer, and elk.

More controversially, the harvest of old growth Ponderosa pine is extremely important to the economic well-being of Central Oregon mills. But the retention of a representative amount of these impressive old trees is at the top of the agenda of environmentalists and the developers of recreational properties.

One of the most complicated areas of give and take is the accommodation of different kinds of recreation. Hikers, horseback riders, off-highway-vehicle operators, mountain bikers, snowmobilers, and cross country skiers strongly defend their prerogatives and must often be separated. Decisions about where and how much must be based on careful consideration of physical impacts on the trail system, riparian areas, and wildlife.

Roading areas which are currently roadless could permit wider distribution of timber harvest and increase the amount of land available for geothermal development It would also reduce the amount of semi-primitive recreation on the Forest and could conflict with the habitat requirements of sensitive wildlife species

Thirty-one issues were identified during the preparation of a Draft Environmental Impact Statement which was released in November of 1982. Due to the imposition of new planning requirements, that DEIS was withdrawn and another prepared

During the DEIS revision, each of the 31 issues was reevaluated These three questions were asked: 1) Is there high or long-term public interest? 2) Are future options being foreclosed? 3) Are large parcels of land involved?

Using this criteria, issues such as those dealing with electronic sites, cinder pits, coordination with

private landowners, and recreational residences were dropped

Eighteen ICOs were included in the 1986 Draft Environmental Impact Statement Following an extensive review of comments from the public, one was eliminated and one added to the version presented below An ICO having to do with meeting Resource Planning Act targets was dropped because of slight interest expressed by the public

Because of a very large number of requests, an ICO addressing uneven-aged timber management was added.

How the ICOs Are Used

Forest planning involves the analysis of different alternatives. A central test of an alternatives adequacy is how well it addresses the most important planning problems. One criteria for the inclusion of an ICO is that it is treated differently by management alternatives The degree to which each alternative responds to the ICOs is indicated in Figure 2-76. A detailed description of the development of ICOs is given in Appendix A

Selected ICOs

* How should the Forest consider local and regional economies, lifestyles, and population levels in managing Forest lands?

The economy and lifestyles of many local and regional citizens and businesses are tied to the Forest in many ways. Both tourists and permanent residents are attracted to the wide variety of recreation opportunities available on the Forest Most often they come to hunt, fish, ski, camp, or engage in water sports

The Forest also provides a significant portion of raw material for the timber products industry in Central Oregon and elsewhere The livelihood of a considerable portion of the local population is dependent of this resource Many people in the area use wood as their primary source of home heating and gathering firewood has become part of the Central Oregon lifestyle.

Most of the more specific issues and concerns below are related to this overall question about economics and the quality of life

Measure of Responsiveness· Degree to which the Forest contributes to both the timber products and tourism industries in the influence area.

Concerned Interest Groups Both industries mentioned above, environmental groups, recreation associations, school districts and education associations, local and state government, and many individuals.

* How much timber should be harvested and on what schedule?

There is strong concern about management which would seriously reduce the Forests timber base, diminishing an important element in the local economy.
The timing of timber harvest is also of concern. How rapidly should remaining stands of mature and old-growth timber be harvested and converted to younger managed stands?

Payments to counties from timber sale receipts are also contingent on the level of timber harvest

Measure of Responsiveness: Volume of timber offered for sale

Possible Conflicts. Visual quality, dispersed and intensive recreation, wildlife habitat, water quality, soil productivity

Concerned Interest Groups. Timber products industry and businesses served by the multiplier effect of timber product employment, local and State governments, and school districts.

* What role should uneven-aged timber management play in future harvest plans?

An even-aged stand is occupied by trees which are similar in size and age They can occur naturally, as with lodgepole pine and mountain hemlock, or as a result of fire or clearcutting.

Uneven-aged stands have trees of various sizes and ages. They occur naturally but can also be

the result of removing individual and small groups of trees instead of clearcutting.

There are obvious differences in the appearance of even and uneven-aged stands A considerable number of responses to the DEIS favored emphasis on uneven-age management to enhance recreation, visual quality, and wildlife habitat. On this Forest, such management would primarily occur in stands of ponderosa pine and mixed conifers. Because of numerous requests for an emphasis on uneven-aged management, this issue was added to the earlier list

The advantages of moving in the direction of uneven-age management are weighed against costs in Chapters 2 and 4 of this document. Measure of Responsiveness: Number of acres upon which uneven-aged timber harvest methods are used

Possible Conflicts: Soil productivity, economic efficiency

Concerned Interest Groups. Timber products industry, recreation associations, and environmental groups

* How should the Deschutes, Winema, and Fremont National Forests manage the lodgepole pine stands which are infested with mountain pine beetles and stands which are susceptible to infestations?

The management of approximately 500,000 acres of timberland affected by the mountain pine beetle epidemic is being coordinated between the three National Forests. Timber on most of these lands is dead, dying, or susceptible to attack. Timber on approximately 225,000 acres on the Deschutes NF is expected to be killed by 1995 (Dolp, Robert E. and Filip, Gregory M Forest Insect and Disease Activity on the Deschutes National Forest and Guidelines for Preventing and/or Reducing Their Losses. Pacific Northwest Region, 1980.)

The beetle epidemic has created an abundance of firewood and has been a catalyst in the conversion to wood stoves for home heating Questions raised by the infestation include. 1) How rapidly should beetle killed lodgepole be harvested? 2) How much should be made available to personal and commercial firewood gatherers and how much to the timber industry? 3) How will the effort to treat and salvage lodgepole affect the amount of Ponderosa pine scheduled for harvest? 4) How will the management of big game habitat be affected by reductions in hiding cover resulting from the removal of dead and dying trees? 5) How will visual quality and recreation be affected by the treatment of stands of dead and dying trees along heavily used roads and around campgrounds?

Measures of Responsiveness Acres of beetle kill stands salvage harvested Acres of threatened stands thinned.

Possible Conflicts Visual quality.

Concerned Interest Groups: Forest Service silviculturists and fire control officers, timber products industry, recreation associations, particularly hunters, and environmental groups.

* How should the Forest meet future demands for fuelwood?

Nearly 60 percent of Central Oregon dwellings use woodstoves for heating. An estimated 40,000 cords of firewood were consumed for personal use annually in 1985, and commercial fuelwood operators collected another 10,000. The 50,000 cords would fill 4,100 logging trucks.

Most of this fuelwood is lodgepole pine. Given current consumption of firewood, regular timber sales, and the mountain pine beetle epidemic, easily accessible fuelwood may be gone by the late 1990s In addressing this issue, it was assumed that demand will remain at about the current level and that firewood cutters will be willing to substitute other tree species for lodgepole.

The management of fuelwood has implications for wildlife. In addition to the question of big game hiding cover, mentioned above, firewood collection can also jeopardize dead trees providing habitat for cavity nesting species.

Measure of Responsiveness: Cords of wood available to individuals and commercial fuelwood operators.

Possible Conflicts: Wildlife.

Concerned Interest Groups: People heating homes with woodstoves, commercial fuelwood operators, environmental groups, state Department of Environmental Quality.

* How should the Forest provide for intensive recreation, now and in the future?

There are many types of recreation which require established sites or facilities. Developed sites on this Forest range from the Mt. Bachelor Ski Area to small isolated picnic grounds The demand for sites to accommodate camping, boating, and other outdoor activities continues to grow. An unusually large number of destination resorts are located adjacent to the Deschutes NF and attract many people to the Forest

Addressing this issue involves deciding which portions of the Forest should be developed for recreation and how large they should be

Many recreationists are drawn to lakes, rivers, and streams, where developments can result in water pollution and a reduction in the quality of riparian wildlife habitat Bald eagles and osprey are often drawn to these areas and conflicts can occur. Recreational facilities can also reduce visual quality Appropriately designed and managed development, however, permits enjoyment of these sites by many more people

This issue is strongly related to both the lifestyle and the economy of Central Oregon The economic implications are complex Tourism is a mainstay of the local economy, but so is the timber products industry, which can be affected by the amount of land allocated to developed recreation.

Measure of Responsiveness: Degree to which the demand for intensive recreation is met

Possible Conflict: Wildlife, visual quality.

Concerned Interest Groups: Recreation and tourism associations, local and state government.

* How should the Forest meet an expanding demand for dispersed recreation?

Hiking, rafting, fishing, snowmobiling, sailing, hunting, driving for pleasure, caving, and mountain climbing are all popular dispersed recreational activities

Some dispersed recreation occurs almost exclusively in Wildernesses. Cross country skiers and snowmobilers often use the same areas and conflicts occur Addressing this issue involves accommodating the full range of dispersed recreation while minimizing conflict

Dispersed recreation away from roads, campgrounds, and other facilities, is called undeveloped. It occurs primarily in Wildernesses, the Oregon Cascades Recreation Area and roadless areas. The amount of undeveloped recreational opportunities available on the Forest will depend on how ICO No. 9 (roadless areas) is addressed

Measure of Responsiveness Acres of the Forest allocated to Primitive and Semi-Primitive Recreation.

Possible Conflict Timber production.

Concerned Interest Groups: Recreation and environmental organizations

* How can scenic beauty on the Forest be maintained?

The scenic beauty of lands in and around this Forest is highly valued. Views of volcanic peaks along the Cascade Crest, large Ponderosa pine trees along travel routes, lakes and free flowing rivers attract hundreds of thousands of people annually

Most people prefer to view natural appearing landscapes rather than those dominated by the sight of timber harvest. Of particular importance are views from main travelways, lakes, and major campgrounds

Identifying areas of high scenic value and determining how they should be managed is the planning problem this issue poses

Measure of Responsiveness. Number of acres where inventoried Visual Quality Objectives are met.

Possible Conflict: Timber production.

Concerned Interest Groups: Recreation and tourism associations, environmental groups, local and state government.

* How should roadless areas be managed?

Passage of the Oregon Wilderness Act in 1984 released 145,142 roadless acres on the Forest from Wilderness consideration during this Forest Planning period These areas can be managed in a variety of ways, including some which involve road construction.

Numerous people, citing the unique values of some of these areas, have strongly favored leaving them roadless Portions of these areas have timber, geothermal, and motorized recreation potential which would require road construction to develop

Measure of Responsiveness. Number of acres available for roadless recreation.

Possible Conflicts: Timber production, motorized recreation.

Concerned Interest Groups: Recreation and environmental groups.

* How should the Forest identify and protect cultural resources?

The Forest's cultural resource inventory program has located and recorded more than 1,000 sites, most of which are prehistoric Indian campsites. Each year, more than 50 sites are added to this inventory. Records indicate that approximately 200 sites are destroyed each year by illegal excavators Significant sites are either protected from project impacts or the data is scientifically recovered prior to those impacts. Increasingly, interpretive efforts center on cultural prehistoric and historic sites

Forest visitors as well as residents of Central Oregon have expressed strong interest in the area's human past. The volcanic landscape and evidence that humans were here immediately following the last ice age, almost 13,000 years ago, have attracted considerable attention. This creates opportunities for increased interpretive facilities to enhance recreation experiences and for further research into the prehistory of Central Oregon. It also attracts those interested in the resource for its commercial value, thus artifact theft is a constant and serious concern.

Protection of the resource is an issue because this record of human history is vulnerable and non-renewable. Much has already been destroyed and the loss cannot be permitted to continue.

Measure of Responsiveness: Degree to which public demand for information is met through developed, interpretive sites. Degree to which education and law enforcement decrease the number of sites damaged through looting.

Possible Conflict: Timber production, road construction, the siting of developed recreation facilities

Concerned Interested Groups: Scientific and educational institutions, recreation groups, Native Americans.

* How should the Forest manage habitat for threatened, endangered, or sensitive species?

Twenty-five pairs of bald eagles, which are listed by the USDI Fish and Wildlife Service as a threatened species in Oregon, have been found on this Forest. The habitat could potentially support 45 pairs. Nesting and feeding areas are important habitat for eagles

The Forest is also occupied by 15 pairs of spotted owls, listed as threatened by the State of Oregon Addressing this issue involves determining how many acres of old growth must be provided as habitat for eagles and owls

The Peregrine falcon, listed as an endangered species by USDI Fish and Wildlife Service, has been sighted on the Forest but no recent nesting sites have been found.

Eleven plants classified by the Regional Forester as sensitive species are known to exist on the Forest. The presence of nine others is expected

Measure of Responsiveness: Amount of habitat meeting the requirements of sensitive wildlife species

Possible Conflict. Timber production, intensive recreation

Concerned Interest Groups: Wildlife agencies, recreation and environmental groups.

* What should wildlife populations be?

The public, Forest managers, and the Oregon Department of Fish and Wildlife are concerned about the population of several wildlife species. They include mule deer, which number approximately 20,300, elk, 1,000 to 1,500, and osprey, 125 pairs Other species of concern are goshawks, pine marten, and woodpeckers.

The issue is addressed by placing different emphasis on maintaining or improving required habitat. Measures taken to improve habitat include timber management but can also result in a reduction in potential timber production. Wildlife is an important element in Forest recreation but wildlife protection can restrict recreational activities in some areas

Measure of Responsiveness. Amount of suitable habitat provided for targeted wildlife species

Possible Conflict Timber production, intensive and dispersed recreation, mineral and energy development.

Concerned Interest Groups Wildlife agencies, recreation and environmental groups

* How much old growth should be retained on the Forest?

Old growth is important to many people for reasons including concern about wildlife, the Forests gene pool, scenic quality, and aesthetics. The intrinsic value of large old trees is stressed, as well as the need to protect future timber management options In addition to the amount of old growth, this issue deals with its distribution

Some old growth is retained by the need to provide habitat for spotted owls and the bald eagle It will also be retained in undeveloped recreation where natural processes are allowed to operate. The preservation of old growth can reduce timber production

Measure of Responsiveness. Acres of old growth retained Degree to which distribution of old growth accommodates the needs of dependent wildlife species.

Possible Conflict: Timber production

Concerned Interest Groups Wildlife agencies, recreation and environmental groups

* What areas on the Forest should be made available for geothermal leasing and development?

The Forest is thought to contain some of the highest potential for geothermal development of any area in the Western United States. Approximately 350,000 acres have already been leased.

The Newberry Crater is designated as a Known Geothermal Resource Area (KGRA) Hot fluids have been located near the surface within the Crater. The Crater is also a National Natural Landmark and an important recreation area, with two large lakes known for quality fishing Campgrounds and resorts are located adjacent to the lakes and the area is also a popular winter sports area for snowmobiles and cross country skiing.

There is an active bald eagle nesting territory within the Crater There are also a number of unique geological features in the Crater, including world famous obsidian flows.

Other portions of the Forest which have not been leased may have geothermal potential. Addressing this issue involves determining where and under what conditions leases should be issued and how recreational, visual, wildlife, water quality, and other resource values are to be protected.

Geothermal development is also related to the roadless area issue because some land with high geothermal potential is located in portions of the Forest without roads.

Measure of Responsiveness· Acres made available for geothermal exploration
Possible Conflict: Primitive recreation, visual quality.

Concerned Interest Groups· Energy industry, utilities, local and state government.

* How should the Forest manage key roads, particularly lower standard roads that cross the Cascade Crest?

Proposed improvements to the Windigo Pass, Waldo Lake-Charlton Lake, Irish-Taylor, and Todd Lake-Three Creek Lake roads have been the center of controversy in the past

All of these roads, which could provide more direct routes to points west of the Cascades, are adjacent to Wildernesses, the Oregon Cascade Recreation Area, and roadless areas. The issue addresses a conflict between advocates of improved access and those favoring the existing, remote character of these areas.

Measure of Responsiveness: Depends on a judgment of the merits of individual cases, including; degree to which access is improved or the remote character of an area preserved

Possible Conflict. Dispersed recreation, wildlife

Concerned Interest Groups Recreation and environmental groups, local and state government.

* How should the Forest protect vegetation from damage by pests?

Pesticides currently used on the Forest include big game repellent and strychnine alkaloid. Deer repellent is made of eggs and is used to protect newly planted trees on approximately 5,000 acres annually. Strychnine is applied underground on a similar number of acres where gophers would inflict heavy damage to new trees.

Historically, only about 800 acres have been treated annually to control vegetation.

Insecticides have not been used on the Forest in recent years, including the recent mountain pine beetle epidemic Spruce budworms exist on and around the Forest and pose a future threat.

Addressing the issue involves determining the environmental appropriateness and economic efficiency of various methods of controlling Forest pests.

* How should the Forest manage its lakes, streams, and wetlands to prevent degradation?

Surface water has been monitored for the past ten years and quality was found to be high This issue was included because of the great importance of water quality for recreation.

Guidelines and management policies for activities along streamsides and lakes have prevented significant damage and riparian areas are in good condition. Some streams have small, localized instability problems
Addressing this issue will involve remedial measures in these areas and maintaining water quality elsewhere on the Forest

Measure of Responsiveness. Water quality and the condition of riparian areas.

Possible Conflict. Timber production, road construction, intensive recreation, minerals and energy development.

Concerned Interest Groups Fish and wildlife agencies, recreation and environmental groups

* To what extent should the Forest enhance or maintain soil productivity and control erosion?

Protecting long-term soil productivity is a very important part of any management of the Forest. Many of the equipment activities that are associated with forest management cause changes within the soil These can include compaction, displacement, severe burning or erosion and can be negative depending upon the size of change as well as the extent of area affected In general, the soils within the Deschutes National Forest are resilient to change because of their sandy nature. The soils do not erode easily, will compact, but only in certain areas under moist conditions and are uniform over large areas The soils are sensitive

to equipment use on slopes over 30%, in areas of seasonal high water tables, and in areas where the soils are fine in texture and easily compacted after use. Concern for soil productivity is reflected in recent changes in management as well as the increased awareness of the impacts of damaging soils. Where negative changes have been allowed to occur in the past, soil productivity and its ability to sustain yields have been reduced In most instances, its the cumulative effect of repeated entries on the same piece of land that has the greatest potential to reduce long term soil productivity.

Measure of Responsiveness: Acres of land with soil productivity problems which are rehabilitated.

Possible Conflict. Timber production, road construction, intensive and dispersed recreation, energy and minerals development.

Concerned Interest Groups: Soil scientists, timber products industry, recreation and environmental groups.

Planning Records

All of the documents and files which chronicle this Forest planning process are available for review at the Supervisors Office, 1645 Highway 20 East, Bend, Oregon 97701.

These planning records contain the detailed information used and decisions which were made during the process of developing the FEIS and Forest Plan Records are incorporated by reference in various portions of the documents

Readers Aid

Because of the number and interconnectedness of resources on the Forest and the legal requirements for preparing this document, simplicity was impossible. An effort was made to explain technical terms when they are used A Glossary defining terms, acronyms, and abbreviations has been provided and a list of references cited in the FEIS is included

To understand what is being proposed in each alternative, and where on the Forest it will occur, maps of each alternative are included in a separate envelope accompanying this document

Chapter 2

Alternatives, Including the Proposed Action

Summary of Changes Between the DEIS and FEIS for Chapter 2

Based on public comment the most up to date vegetative inventory was incorporated and new empirical and managed yield tables were developed Because of these changes most of the data pertaining to outputs of goods and services may have changed The FORPLAN model was changed to use the latest version, Version II A model titled PROGNOSIS with model extensions for mountain pine beetles and root rot was used to develop the managed and empirical yield tables, this model with these extensions is the latest state of the art in including insect and disease consideration in developing empirical yield tables. As a result of using the up to date vegetative inventory, the new FORPLAN model and new managed and empirical yield tables it was necessary to rerun all of the Alternatives through the FORPLAN model This was done so that the Alternatives could easily be compared to each other

Based on public comment uneven-age verses even-age management of tree stands (including selection cutting and clearcutting) was analyzed in more depth between the DEIS and FEIS The modified Alternatives reflect more uneven-age management and the Preferred Alternative was changed from a departure using even-age management to non-declining even flow using more uneven-age management More detailed analysis was conducted to determine the effects of leaving more 18", 24", and 30" trees growing on the Forest rather than eventually reducing future tree size to 18"

More detailed analysis was conducted to determine the effects of meeting 20%, 40%, 60% or 80% of habitat potential for cavity excavator species Also additional analysis was conducted to determine the effects of meeting 30% hiding cover for deer and elk, and thermal cover for deer in the Deer Habitat Management Area.

All Alternatives were revised to reflect the decision related the Spotted Owls which was an amendment to the Regional Guides and the passage of the Oregon Omnibus Wild and Scenic Rivers Act No changes have been made to this EIS as a result of the Jack Ward Thomas Report on Spotted Owls or as a result of the Owl being listed as threatened

A No Change Alternative has been developed and presented in detail Management requirements are also presented and discussed in this Chapter.

Alternatives D, F and H were considered in detail in the DEIS and are not considered in detail in this FEIS The reason for not considering them in detail are discussed in Chapter two of this EIS Public comments were in favor in some parts of these alternatives and those comments were considered in developing the Preferred Alternative All other alternatives will retain the same identification which was used in the DEIS This is being done for the sake of continuity and easy comparison between the DEIS and the FEIS

Alternative E has been greatly modified as a result of public input to the 1986 Draft and additional input since the 1986 DEIS.

The section Comparison Of Alternatives was rewritten and reformatted almost completely. Most of the information that was in Chapter 4 of the DEIS has been moved to this Chapter and much more information has been added

Management area summaries have been updated to include Wild and Scenic Rivers, Front Country, and the ten management areas that make up the Metolius Conservation Area

Chapter 2

Alternatives, Including the Proposed Action

Introduction

This Chapter is the heart of the Environmental Impact Statement It summarizes the process used to develop alternative ways of managing the Deschutes National Forest, presents the Alternatives considered including Current Direction and No Change and then compares the Alternatives to provide an opportunity for objective evaluation (40 CFR 1502.14)

Chapter 2 is divided into three main parts The first is the summary of the analysis process conducted in developing the full range of Alternatives Appendix B contains a detailed presentation of this analysis Second it describes each alternative in terms of its resource management goals, objectives and management emphasis Third it compares the different alternatives to each other and to other information. This comparison shows the response to issues, emphasized land uses, resource outputs, environmental effects, and economic costs and benefits which would occur with each alternative

This Chapter draws on material from other sections of the Environmental Impact Statement and, particularly, from Appendix B Chapter 3 describes the Affected Environment and Chapter 4 presents the Environmental Consequences.

Alternatives

Forest management can vary by what is done, where it is done, and when it is done. These varying combinations of what (management activities); where (management areas), and when (activity schedules) result in different resource output and environmental conditions, while meeting the unique objectives of each alternative.

Each alternative is a unique combination of these three elements of management activities, management areas and activity schedules. As a result, each alternative generates a different mix of goods and services for the public, and a different combination of resource outputs, land uses, and environmental effects.

The basis for alternatives are public issues, management concerns, and resource uses and development opportunities Laws or regulations require certain alternatives, which are based on national or regional issues and concerns. Given those alternatives required by law or regulation, and based on the issues, concerns, and opportunities identified in Chapter 1 of this FEIS, the Interdisciplinary Team formulated alternatives covering a broad range of possible actions The alternatives represent a variety of ways to respond to issues, concerns, and opportunities

"Benchmarks" are presented and discussed in this Chapter. Benchmarks are the analytical bases from which the alternatives were developed They were used to analyze and determine the maximum potential output, production, or economic opportunities for the forest. They are used to define the decision space, or range of alternatives that can be developed for a particular resource Their character and use will be discussed later in this Chapter.

This EIS displays six different alternative ways of managing Deschutes National Forest lands and resources. Because of the appeal discussed in Chapter 1, it was agreed to develop the sixth alternative The No Change Alternative represents management on the Forest according to the 1974 Timber Management Plan as amended To develop this alternative a different set of criteria, acres of lands suitable for timber harvest, was used than for the other alternatives This difference is discussed in the No Change Alternative description in greater detail Alternative No Change has different management requirements

The Alternatives explore a variety of ways to respond to public issues, management concerns,

and development opportunities (ICO's) identified throughout the planning process

Alternative Development Process

Overview

The purpose of forest planning is to identify and select the alternative that most nearly maximizes net public benefits Net public benefits are defined as the " overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not consistant with the principals of multiple use and sustained yield" (36 CFR 219 3). Net public benefits include both priced and nonpriced benefits Priced benefits are those which are sold or could be sold in a marketplace These include outputs such as timber, forage, and recreational opportunities Nonpriced benefits are those for which there is no reasonable market evidence for estimating a dollar value These include outputs such as environmental amenities, and threatened and endangered species The alternative which has the greatest amount of benefits over costs maximizes net public benefit

Priced benefits are further divided into market and nonmarket outputs Market outputs are routinely traded in an established market, or they return dollars to the United States Treasury These outputs include timber, livestock grazing, and developed recreation opportunities.

Nonmarket outputs are generally not sold in an established market and do not return dollars to the United States Treasury However, these outputs could be sold in a market, and can be assigned a dollar value representing what a user would be willing to pay These outputs include hunting, fishing, and other dispersed recreation opportunities.

A major component of net public benefits is present net value (PNV), which is defined as the difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs associated with an alternative.

Basis for Development of Alternatives

Formulating a broad range of reasonable management alternatives for a National Forest is an extensive and complex process. Each alternative is a combination of land uses, Forest management activities, and schedule of activities Alternatives must consider the resource capabilities (both the limitations and the potentials) of the many different areas and resources of the Forest Each alternative is designed to manage the land to achieve specific goals and objectives Some of these objectives, such as maintaining air and water quality, are common to all alternatives, other objectives, such as the mix and amount of resource outputs, vary among the alternatives.

The primary goal in formulating alternatives is to "provide an adequate basis for identifying the alternative that comes nearest to maximizing net public benefits while responding effectively to the public issues" (36 CFR 219 12(f)) One alternative ("No-Action") reflects current resource outputs, while another alternative (RPA) reflects the objectives of the Forest Service National program This broad range of Alternatives provides the basis for analyzing and comparing outputs, effects, goods and services and economic efficiency. It also facilitates the identification of the Preferred Alternative

By managing the Forest lands and resources in different ways, varied objectives can be achieved which respond to different issues in different ways, thus providing different combinations of public benefits. These varying combinations of management activities, management areas, and schedules will result in different resource outputs and environmental effects while meeting the unique goals of the Alternatives

The formulation of Alternatives was based upon information gathered during earlier steps of the planning process (Appendix B contains more complete detail pertaining to the formulation of alternatives)

* Identification of issues, concerns, and opportunities (ICO's).

* Development of planning criteria.

* Resource inventories and data collection

* Analysis of the Management Situation

Information gathered during these steps was assimilated and analyzed to guide the formulation of alternatives Alternatives were designed to reflect a range of future resource management options for the Forest Each major issue, concern, and opportunity was addressed in one or more of the alternatives. Benchmarks which establish maximum and minimum resource potentials were also a factor in developing alternatives. The need to satisfy legal and regulatory mandates was an additional factor in the development of the alternatives Finally, cost efficiency was a consideration throughout the process. The following discussion is a summary of the planning actions involved in the formulation and analysis of the alternatives The focus will be upon the roles which the ICO's and the benchmarks played in their development.

Issues, Concerns and Opportunities

Public issues and management concerns are the basis of forest planning It is these issues and concerns that drive the planning process To develop alternative ways of managing the land and resources, it is necessary to determine what is important to the public who benefit from the Forest. To do this, the Forest requested the public's opinion. This resulted in formulation of public issues Appendix A contains more detailed discussion on this process.

The mixture of alternatives formulated and analyzed were basically designed to address the different ways in which people prefer to use the forest. Most of these preferences are reflected in the issues, concerns, and opportunities which were identified in Chapter 1 of this EIS.

Issues and concerns were used to develop a general theme for each alternative. They reflected a broad spectrum of concerns, not just isolated local issues. Included also were concerns from adjacent National Forests, State and Federal Government Agencies, and the Confederated Tribes of the Warm Springs Reservation The Forest Service grouped them into categories that represented differing viewpoints about how the Forest could be managed Most reflected timber, recreation and scenic quality, and wildlife-related questions.

Eight alternatives were drafted for public review in a DEIS in January 1986 One of these alternatives (Alternative E was identified as the Preferred Alternative by the Forest and was fully developed into a proposed Land and Resource Management Plan. The Proposed Plan included standards/ guidelines for managing Forest resources.

During the 110 day comment period, over 1600 written responses were received by the Forest concerning the environmental effects of the Alternatives. The letters included comments about the analysis methods used to determine effects, recommendations for changing and improving the preferred Alternative, and proposed alternatives and direction for strengthening standards/ guidelines Between the DEIS and this FEIS, the Forest has worked with many organizations and individuals to strengthen the weaknesses in analysis and data presented in the written response.

The Forest considered this public input and modified the issues and alternatives including the Preferred Alternative, for consideration in this FEIS The changes in analysis methods, data and modeling between the DEIS and the FEIS are discussed earlier in this Chapter

Analysis of the Management Situation

The document titled "Analysis of the Management Situation" AMS, filed in the planning records, is a description of the Forest's environment and an analysis of the Forest's potential to provide both market and non-market resources and services. An important part of the AMS was the analysis of benchmarks (a more in-depth presentation of the process and results is provided in Appendix B of this EIS) Information from the AMS was used to·

Define the maximum potentials of the Forest to produce both economic benefits and resource output levels for market and non-market goods.

Evaluate the complementary and conflicting production relationships (tradeoffs) between pertinent market and non-market goods which the Forest can provide to the public

Analyze the relative efficiencies and implications of constraints used to meet legal, policy, and discretionary resource management requirements

Identify the range within which alternatives can be developed

Help analyze the implications of continuing on with Current Management Direction, and if necessary to identify a need to change.

Upon completion of the AMS, it was established that there were several areas that needed new or different direction. The major points follow and were used in developing alternatives.

Inadequate integration for existing resource plans

Current Direction was not effectively treating the mountain pine beetle situation in lodgepole pine stands

Current Direction did not provide for the long-term needs of bald eagles or spotted owls.

Recreation use projections showed a need to shift some emphasis from visual to recreation management

Long-term management direction needs to be established for roadless areas.

A long-term program for firewood needs to be established

Supply and Demand Potentials

Resource and land use demand estimates reflect future output/effects levels anticipated by the Forest Service Potential resource supplies for the Forest have been estimated through the benchmark process. The demand/supply projections are discussed in Chapters 3 and 4

The Draft Environmental Impact Statement for the 1985 Resources Planning Act (RPA) Program estimates that future demands for all National Forest outputs will rise Supplies will increase, but at a much slower rate At the same time, a strong demand exists to protect and enhance the quality of the environment Some key findings of the RPA Program are.

By 2030, timber consumption in the U S is expected to increase 74 percent from the level in the late 1970s, due to increases in population and economic activity.

Recreation use is expected to increase as populations increase and its characteristics change Demand for hunting and sport fishing is expected to increase by one-third between 1985 and 2000 Recreational use of wilderness will continue to grow

Demands for nonconsumptive uses of water related to wildlife and fish habitat, hydroelectric development, recreation, and maintenance of wetlands will increase Demand to maintain or improve water quality to allow for a greater variety of uses is expected.

Land Use Patterns

Constants Throughout All Alternatives

Because of legislative or administrative requirements, some areas of the Forest were basically "fixed" Changing these situations through Forest planning was not within our authority Thus, one formulation criterion required that these areas be carried as constants in all Alternatives Although the locations of these areas could not be changed, in some cases existing management direction was changed (e.g., the Oregon Cascade Recreation Area and the Bend Municipal Watershed) Affected areas included Wilderness, Wild, Scenic and Recreational Rivers, two Research Natural Areas, one Experimental Forest and the Bend Municipal Watershed and account for about 259 M acres of the total 1,620 9 M acres on the Forest The Bend Municipal Watershed was held as a constant because of an agreement between the Secretary of Agriculture and the City of Bend. There is also little variation in habitat provided for bald eagle and northern spotted owls. This is

because of the interim recovery plan for bald eagles and the management requirements for spotted owls. There is only limited spotted owl habitat present on the Deschutes Forest Roadless areas were not considered for Wilderness under any Alternative

Mapping

The Forest was mapped and inventoried to determine the capability of geographic areas to produce desired conditions Data was assembled regarding resource capabilities, conditions, trends, existing supplies and demand, and expected outputs, benefits and costs. The various inventories helped to define the character, potentials, and limitations of the Forest This ensured that management direction was appropriate and could actually be achieved

Prescriptions

Prescriptions were developed for each management emphasis. Each prescription emphasized a particular resource but not necessarily to the exclusion of others. All prescriptions meet all minimum resource standards. Each prescription was available for use in alternatives where the area was capable of producing the desired conditions Then alternatives were developed by selecting from among the numerous available prescriptions.

During this process a determination had to be made about whether even-aged or uneven-aged management would be used The principals of even-aged management were used where prescriptions emphasized wood production. The principals of uneven-aged management were applied when emphasizing prescriptions associated with wildlife, visual quality, and recreation. See Appendix G for more details.

FORPLAN and a Description of the Analysis Process

Forest Planning is a very complex process in which an enormous amount of information and interdependent decisions must be considered before an alternative management plan can be recommended as the one which best addresses the issues, concerns, and opportunities (ICO's) which were identified at the outset of the planning problem Because of this, several inter-related computer models and analytical tools have been developed and utilized to help determine the decision space within which alternatives can be developed and to evaluate their associated outputs and effects Appendix B of this EIS describes the entire analysis process in detail. Readers are encouraged to refer to that Appendix for technical information not presented in the more general overview in this Chapter.

As directed in the Planning Regulations (36 CFR 219.12(f)(8))

> "Each alternative shall represent to the extent practicable the most cost efficient combination of management prescriptions examined, that can meet the objectives established in the alternative."

The analysis required by 36 CFR 219 14(b), also known as the "Stage II suitability analysis," is documented in Appendix B, "Stage II Analysis". The intensities identified along with other options and timing choices are used in the modeling process to find the most efficient Forest-wide solutions.

The Planning Team, in an interdisciplinary manner, analyzed economic efficiency at several stages of the planning process in order to be reasonably ensured that the alternatives developed and displayed in the DEIS complied with the intent of this direction. The alternatives were again reviewed in the preparation of the FEIS. The analytical process and tools used to accomplish this objective will be discussed here according to the following general outline

1 Analysis prior to FORPLAN
2. How FORPLAN was used in the analysis
3. Any analysis done in addition to FORPLAN

Once the issues, concerns, and opportunities were identified, and the planning criteria were developed, the Interdisciplinary Team determined what data were necessary based on the issues and concerns Existing data were used whenever possible but were supplemented with new data to help resolve sensitive issues or management concerns The next step was a determination of supply and demand (see analysis of the management situation in working papers) and suitability

or capability of resolving issues The Interdisciplinary team then began to formulate management areas and their associated standards and guidelines. This step was probably one of the most difficult and laborious, and possibly the most important task of the interdisciplinary planning process Management areas coupled with their respective standards and guidelines provide specific direction for implementation, and serve as a framework for how to use, develop, and protect the Forest's resources in a manner consistent with the goals and objectives of the Plan

Concurrently with the formulation of management areas and the standards and guidelines, the Interdisciplinary Team also began to construct its Forest Planning Model (FORPLAN) It is a large and complex computerized linear programming model FORPLAN is used to determine the optimal solution to a problem specified by an objective function (i e , maximize present net value or maximize the production of timber) and bounded by resource management opportunities and limitations Within the limits of the FORPLAN computer software, the user is allowed a great deal of latitude in formulating the mathematical representation of the Forest planning problem to be analyzed The Deschutes FORPLAN Model was specifically designed to help the Interdisciplinary Planning Team analyze the economic and production tradeoffs associated with recreation, timber, visual, and wildlife resources FORPLAN helped evaluate the extent to which various alternative management scenarios were able to address and resolve the identified planning issues

One key step in the development of the FORPLAN Model was to divide the total Forest into "analysis areas" Analysis areas are tracts of land with relatively homogeneous characteristics in terms of the outputs and effects that are being analyzed in the FORPLAN Model Their delineations were intended to capture the significant social, biological, and economic differences in the way the land responds to alternative management strategies For this task, the R2MAP computerized grid mapping system and the Total Resource Inventory (TRI) Systems 2000 (S2K) Forest data base were used extensively to analyze different analysis area combinations, used to model and evaluate the production and economic tradeoffs between recreation, timber, visual, and wildlife resources on the Forest

In the FORPLAN model, analysis areas were allocated to management emphases in order to achieve the resource management objectives of a particular benchmark or alternative "Management emphasis" is a FORPLAN term and is directly related to the "management areas" which are described later in this chapter Each management area contains a set of standards and guidelines concerning how the resources within that allocation are to be managed in order to meet the multiple use objectives of that management area. One to eight different management emphases were available to each analysis area depending upon its resource production opportunities.

Once the final analysis area delineation was settled upon, the next step was to develop the prescriptions for the FORPLAN model. In FORPLAN, prescriptions are identified in terms of combinations of management emphases and intensities. Prescriptions serve as the basis for choice of what can be done on a specific analysis area They are combinations of scheduled activities and practices, and their associated outputs and effects. The management prescriptions and their range of timing choices are represented as decision variables in FORPLAN The outputs and effects associated with the prescription choices are represented as numerical coefficients in the respective decision variables FORPLAN had from one to six prescriptions to choose from for each management emphasis for each analysis area In general, each analysis area contained from 1 to 21 prescription choices The average was over 10

The process of developing FORPLAN prescriptions included the development of timber yield tables, other resource yield coefficients, and the economic costs and benefits associated with each FORPLAN prescription. These prescriptions were designed to enable FORPLAN to analyze the production and economic tradeoffs between the recreation, timber, visual, and wildlife resources on the Forest The model was utilized to analyze the most economically efficient timber-related outputs and effects associated with the achievement of the multiple use objectives of an alternative

Which prescriptions FORPLAN selected depended upon the objective function and the set of constraints used to represent a particular benchmark or land management plan alternative. The objective function was usually to maximize present net value or maximize the production of timber. These were subject to first satisfying all the specified constraints The constraints were designed to guarantee the spatial and temporal feasibility of land allocation and harvest scheduling choices in order to achieve the multiple use objectives of a benchmark or alternative The following is a list of some of the types of constraints used.

* constraints on harvest flow, rotation length, and ending inventory;

* dispersion and wildlife management requirement constraints;

* constraints on the amount of analysis areas available to certain management area prescription sets;

* opening constraints in scenic view and intensive recreation allocations;

* constraints for thermal or thermal cover in deer summer and winter range and key elk areas; and

* constraints for 20, 40, 60 or 100 percent of maximum population potential for cavity excavators,

* constraints on target tree sizes in d.b.h. of 18" 24" or 30" and larger;

* constraints on prescription and acres for uneven age management in the Ponderosa pine and mixed conifer type, and

* other miscellaneous constraints such as accelerated lodgepole pine harvesting, species mix, and budget levels

Once the model had determined that a feasible solution existed by satisfying all of the constraints, it would then search for the set of prescriptions and timing choices which permitted it to optimize the solution according to the specified objective function.

Several other steps in the analysis process were implemented before the evaluation of a benchmark or alternative were considered complete. The outputs and effects associated with the recreation and range programs for the respective benchmark or alternative were analyzed outside of FORPLAN with the use of electronic spreadsheets. During this step, alternative capital investment, and operations and maintenance strategies were examined to determine which resulted in the most efficient prescriptions to meet the objectives of the particular benchmark or alternative.

Another step in the analysis process consisted of loading the FORPLAN solution onto the transportation network model (Transship) in order to determine the most cost efficient capital investment, operations and maintenance program, and the associated transportation system needed to move the projected timber and recreation traffic around the Forest

Next, an electronic spreadsheet was used to determine the total forest budget required to implement each alternative or benchmark The budget estimates were based on the various resource output levels, capital investment, and operation and maintenance programs that were developed in the previous analysis steps. The budget levels were tracked by resource, appropriated versus allocated funds, and capital investment versus operations and maintenance costs.

Finally, all market plus assigned priced benefits associated with the timber, recreation, range, and special use outputs, and the associated forest budget for the first five decades were entered into a spreadsheet which calculated the total present net value of the particular benchmark or alternative being evaluated Even though a Plan is for 10-15 years, five decades were used to have a meaningful way of calculating present net value.

Which land allocation and resource management investment options resulted in the most economically efficient solution was determined through iterative model and spreadsheet analyses. For example, the Maximum Present Net Value (PNV) Benchmark (market plus assigned values) was arrived at by first examining the solution to the Maximum PNV Benchmark (market values only) and adding the associated recreation and range present net values to it A per acre PNV analysis

indicated that the total Forest PNV could be increased by allocating intensive recreation management areas in the FORPLAN model, this was done in the DEIS but not in the FEIS. These allocations resulted in higher combined timber and recreation discounted values than if they had been managed for timber alone The other recreation allocations excluded the harvesting of timber and their discounted values were less than if they had been allocated to timber production. FORPLAN was run again with the appropriate intensive recreation allocations added in and the resulting timber PNV was added to the PNV for the recreation and range resources to arrive at the maximum present net value (market plus assigned) for the Forest

The other Benchmarks were analyzed with FORPLAN through combinations of different objective functions (maximize timber or maximize present net value) and constraints on harvest flow, rotation length, management requirements (MRs), and discretionary constraints needed to achieve the respective multiple resource objectives. Again, the FORPLAN analyses were augmented with spreadsheet analyses of the recreation, range, and forest budget outputs and effects.

Once the Benchmark analyses were completed, the Interdisciplinary Team proceeded to evaluate the range of alternatives that were developed to address the issues, concerns, and opportunities. Each issue, concern and opportunity was addressed in the alternatives either through land allocations, harvest scheduling, standards/guidelines, or policy statements Alternatives were modeled through the specification of an objective function and a set of constraints that were necessary to achieve the intent of a particular alternative

The economic analysis of each alternative with FORPLAN, Transship, and the various spreadsheets was followed up by several other analytical steps before the evaluation of an alternative was considered complete Three of these additional analytical tools were software programs developed by the Interdisciplinary Team to generate custom reports from the FORPLAN solution. One converted the cubic foot harvest schedule from FORPLAN to board feet by working group and diameter class for five decades This was used to facilitate communications both internally and externally with people who understand boards better than cubes. Another program interpreted the dynamics of the FORPLAN forest inventory in terms of the seven successional stages by working group for fifteen decades. This better enabled the wildlife biologists to evaluate the effects of the harvest schedule solution on the habitat requirements of certain key indicator species

Sometimes the results from any one of these additional analyses indicated the need to do more FORPLAN runs in order to improve upon the overall evaluation of the outputs and effects of a particular alternative. Sometimes the need was apparent to develop another alternative and proceed through the analysis process with it. Once the Team was satisfied with the outputs and effects of the alternatives, their implications with regard to income and jobs in the local economy were analyzed with the IMPLAN input/output model After all of this was done to satisfaction, the Interdisciplinary Team along with the Forest Management Team and District personnel evaluated how well each alternative addressed the issues, concerns, and opportunities that were identified at the outset of the planning process Based on this analysis, a Preferred Alternative was selected

Management Requirements (MRs)

All Alternatives must comply with requirements of applicable laws and regulations Regulations pursuant to NFMA (36 CFR 219 27) include most of the direction applicable to the planning process for the following: resource protection, vegetative manipulation, silvicultural practices, even-aged management, riparian areas, soil and water, and diversity The Pacific Northwest Region developed direction to ensure that management requirements were applied consistently across all Forests within the Region This direction was incorporated into a matrix and distributed under a letter dated February 9, 1983, Land and Resource Management Planning (1920). The subject of the letter was "Regional Guidelines for Incorporating Management Requirements in Forest Planning"

The Forest IDT defined specific MRs applicable to the Forest from the national and regional direction. Four requirements have been identified because of their applicability to the Forest, and their effects on management of forest resources. The Forest

has discretion in the methods used to meet them. The requirements are as follows:

-- Wildlife - Provide wildlife habitat sufficient to maintain viable populations of all vertebrate species (requirements apply to old growth and snags)

-- Riparian Areas - Use management practices that will not result in detrimental changes to water conditions or fish habitat.

-- Soil and Water - All streams must meet state water quality standards All management practices will maintain long term site productivity

-- Timber Harvest Dispersion - Timber harvest will be dispersed to meet harvest requirements, state water quality standards, and avoid any permanent impairment of productivity of the land.

In each case, the Forest evaluated alternative methods of meeting the requirement Where identical effects resulted, except old growth, the ID Team chose the method with the least negative impact on PNV Appendix B, Section VI, contains details on application of MRs in the plan

Management Requirement Analysis Since the DEIS

A Supplement was prepared in September of 1988 in response to decisions of the Chief of the Forest Service and Deputy Assistant Secretary of Agriculture regarding Appeal Number 1770, brought by the Northwest Forest Resource Council on September 18, 1986 The appeal centered on direction from the Regional Forester to incorporate management requirements (MRs) into forest plan alternatives

Appellants requested that the appropriateness of the MRs be examined through the environmental impact statement process, and a supplement the the DEIS was issued. The analysis contained in the Supplement was intended to address the issue raised by the appellants Background information on the development of MRs is presented and alternate ways of meeting the management requirements are examined and their opportunity costs are compared Additional information on the management requirements can be found in Appendix B, "Development of the Management Requirements".

To assure consistency in applying the laws and regulations to planning, Forest Service national and regional direction established those substantive requirements of the regulations which must be met in all forest plan alternatives except the newly developed No Change Alternative. The management requirements are those items identified in 36 CFR 219.27 Some requirements are procedural and not dealt with in this EIS Some were analyzed and subjected to public review in the Regional Guide Environmental Impact Statement process; those to are not dealt with in this EIS. The management requirements which have not been fully dealt with elsewhere are those for timber harvest dispersion and viable populations of existing native and desired non-native vertebrate species Each of these management requirements is described in the Supplement to the DEIS

Other MRs which have not been addressed elsewhere were determined not to cause significant opportunity costs when implemented

Where opportunity costs of meeting a management requirement exceed two percent of PNV or ASQ of the Maximum Present Net Value Benchmark, the analyses used to select the means are presented. Two percent was used because differences less than two percent would not be significant in terms of opportunity costs of alternative means. A higher threshold would preclude evaluation of many alternatives

For discussion purposes, opportunity costs are reductions in present net value (PNV) and reductions in allowable sale quantity (ASQ) that result from implementing resource protection measures (means or ways) to meet the management requirements set forth in NFMA regulations. In order to provide habitat for viable populations of wildlife on the Deschutes National Forest, some opportunities to maximize the present net value or to maximize timber production must be forgone

Dispersion of created openings is represented in the analysis through application of a constraints which assumed 10 years to grow to 4-1/2 feet in height to consider an opening "closed" or no longer an opening, with 420 foot wide uncut areas in-between openings. Uncut areas in-between

openings of 210 and 630 foot wide were also analyzed

Maintenance of viable populations of existing native and non-native vertebrate species would be achieved by:

* dedicating habitat sites for no timber harvest Also analyzed and not selected was managing habitat sites on 100 year rotations for the Northern three-toed woodpecker, pine marten and goshawk

* dedicating habitat sites for no timber harvest for the northern spotted owl. Managing habitat sites on 350 year rotations was also analyzed and not selected.

* providing snags in small clumps or providing snags in larger clumps Also analyzed and not selected was the alternative of distributing snags evenly over an area for primary cavity excavators.

In analyzing the effects of alternative means of meeting the MRs on present net value (PNV) and allowable sale quantity (ASQ), FORPLAN runs were made with and without constraints designed to simulate meeting the management requirement. The Maximum PNV Benchmark is a FORPLAN run which identifies the mix of management activities which would result in the highest level of economic efficiency (i.e , the highest PNV) in managing the resources of the Deschutes National Forest. It also identifies the ASQ associated with the most economically-efficient mix of management activities See Appendix B of the EIS for further discussion of the FORPLAN model

A benchmark was chosen to use in the with and without constraint comparison, rather than an issue based forest plan alternative, because management practices necessary to meet other objectives of the issue-based alternatives may partially or fully meet the MR, thus clouding any analysis of opportunity costs induced by the management requirement. The true effect when measured against a fully developed alternative is significantly less because the objectives of that alternative may nearly satisfy the management requirements.

Major conclusions from the MR analysis are as follows:

* Opportunity costs of providing for dispersion are insignificant in terms of PNV. Timber availability, in terms of ASQ, actually increases when the dispersion constraints are applied. This is due to the harvest of lower valued species where volumes are higher but costs are also higher Consequently, there are no timber availability opportunity costs associated with the dispersion requirement.

* Populations of northern three-toed woodpeckers, pine marten, goshawk, spotted owl and other mature and old growth forest-dependent species would not be expected to differ significantly under any of the different ways considered to meet the management requirement. There are differences in the opportunity costs. There is 1 2% difference between managed habitat (-.9% change in ASQ) and dedicated habitat (-2.1% change in ASQ) in allowable sale quantity and 1.2% in PNV.

Role and Use of Benchmarks

The first steps involved in the development and evaluation of the alternatives was the creation of "benchmarks" and the inspection of their outputs, costs, and assumptions Potential resource supplies for the Forest are estimated through the benchmark process Benchmarks are similar to alternatives in that they are a combination of land capability, management practices, and schedules to achieve certain objectives But unlike alternatives, they usually could not actually be implemented because they lack a consideration of likely budgets, specific geographic locations, environmental effects, compliance with management regulations, legal requirements, and other factors They do provide significant information about the maximum biological and economic production opportunities The benchmark runs estimate the schedule of management activities, resource outputs, effects, and total present net value (PNV) Benchmarks assist in evaluating the compatibilities and conflicts between market and nonmarket objectives. The summary of information, the Forest "decision space", defines the range within which integrated alternatives will be developed.

Some benchmarks are economically based, while others indicate the maximum physical productivity of land for various resources. Each benchmark must include meeting management requirements of 36 CFR 219.27, such as protecting the productivity of the land and meeting minimum air and water quality standards Benchmarks are described further in Appendix B, Section 7.

Description of Benchmarks

Several benchmarks are required by the Regulations [36 CFR 219.12(e)] and National direction. They include·

Minimum Level: This benchmark specifies the minimum level of management which would be needed to maintain the Deschutes National Forest as part of the National Forest System.

Maximum Present Net Value Based on Established Market Price: This benchmark specifies the management of the Deschutes National Forest which will maximize the present net value of those outputs that have an established market price

Maximum Present Net Value Including Assigned Values: This benchmark specifies the management which will maximize the present net value of those outputs that have either an established market price or assigned monetary value.

Current Level: This benchmark specifies the management of the National Forest most likely to be implemented in the future if current direction is followed This benchmark forms the basis for the "Current Direction" Alternative.

Maximum Resource Levels for Timber, Range, Visuals, Recreation, and Wildlife: Each of these benchmarks estimates the maximum capabilities of the Forest to provide a single resource emphasis level.

Constraints Common to all Benchmarks

While many of the constraints discussed in this section were common to all of the Alternatives and the Benchmarks listed above, the amount of acres they applied to varied depending on the different objectives and resulting allocations of resources associated with each Benchmark and Alternative. The tradeoffs discussed pertaining to each set of constraints are presented in general terms rather than specific quantified measures. This is because each constraint set was not isolated and analyzed with regards to the development of each alternative Most of them were examined during the benchmark analyses performed for the AMS. The relative magnitude of tradeoffs associated with these constraint groups can be reviewed in Section 6 of Appendix B. The constraints common to all Benchmarks and Alternatives are.

* The ending inventory constraint
* The 40-acre unit size/logical leave unit dispersion constraints
* Inventory constraints for Wildlife Management Requirements (goshawks, pine martens, and three-toed woodpecker)
* Rate of Harvest constraints in Bald Eagle and Spotted Owl areas.
* Constraints on the amount of harvest created openings in Scenic Views Management Areas
* Deer Winter Range Thermal Cover Constraints.
* Nondeclining flow with a Long Run Sustained Yield link
* General Forest rotations based upon 95 percent Culmination of Mean Annual Increment
* Volume reductions in the timber yield tables to account for enough snag replacement trees left after harvest to maintain the habitat for 20 percent (the MR level) of the cavity nester population potential.

Other benchmark analysis was conducted to determine the effect of various management

requirements, discretionary constraints, and the effect of restricting timber harvest rotations to the culmination of mean annual increment (CMAI) and of nondeclining flow (NDF) of timber harvest.

Figure 2-1 displays the outputs and effects associated with the various resource maximization benchmarks. With regard to the discounted benefits, the timber resource accounts for 50 to 80 percent of the totals, while recreation contributes from 20 to 45 percent to the totals. Special use permits and range usually account for less than 10 percent The importance of the recreation values on the Forest should not be overlooked In fact the two maximum present net value benchmarks achieved their objectives by allocating 70,000 acres of forested lands to an intensive recreation emphasis due to relative tradeoffs between the recreation and timber values on those acres

Figure 2-1, OUTPUTS AND EFFECTS OF REQUIRED BENCHMARK ANALYSIS

	Minimum Level	Maximum PNV Dep. + Util (Run-4)	Maximum PNV NDF-CMAI (Run-7)	Maximum Timber	Maximum Range	Maximum Wildlife	Maximum Visual	Maximum Recreation
Discounted Benefits ($MM).								
Timber	0 0	1217 7	1053 6	1060 3	1060 3	992 1	964 7	858 1
Recreation	160 7	773 6	773 6	409 9	409 9	217 2	409 9	776 9
Range	0 0	6 8	6 8	6 8	10 5	3 7	5 6	5 6
Special Uses	0 0	20 3	20 3	20 3	20 3	20 3	20 3	20 3
Discounted Costs ($MM)	119 0	516 8	434 2	521 2	521 2	389 6	381 9	416 4
PNV ($MM)	41 7	1501 6	1420 1	976 1	979 88	843 7	1018 6	1244 5
Harvest Levels (MMCF)								
Decade 1		890 9	490 4	517 8	517 8	450 8	455 4	402 7
Decade 2		668 2	490 4	517 8	517 8	450 8	455 4	402 7
Decade 3		501 1	490 4	517 8	517 8	450 8	455 4	402 7
Decade 4		375 9	490 4	517 8	517 8	450 8	455 4	402.7
Decade 5		316 0	490 4	517 8	517 8	450 8	455 4	402 7
Long Term Sustained Yield (MMCF)		425 2	490 4	517 8	517 8	450 8	455 4	402 7
Acres With Programmed Harvesting								
Prescriptions (M Acres)		1115 3	1125 4	1150 0	1150 0	972 1	1079 8	869 2
Recreation Use (MRVD/Year)								
Developed	143 5	1449 2	1449 2	494 8	494 8	494 8	494 8	1456 6
Dispersed	1037 8	1537 7	1537 7	1067 6	1067 8	1067 6	1067 8	1586 9
Wildlife Population Levels:								
Three-Toed Woodpecker (Pairs)		110	110	110	110	600	110	110
Deer (Number of Deer)		N/A	N/A	N/A	N/A	33,500	N/A	30,500
Osprey (Pair)		N/A	N/A	N/A	N/A	180	N/A	N/A
Pine Marten (Number)		100	100	100	100	1890	100	100
Woodpeckers (% of Bio Pot) ---		20%	20%	20%	20%	80%	20%	20%
Spotted Owls (Pairs)		10	10	10	10	12	10	10
Bald Eagles (Pairs)		45	45	45	45	50	45	45
Goshawks (Pairs)		70	70	70	70	115	70	70
Old Growth (% of Ecoclass)		0	0	0	0	20%	0	0
Visual Quality								
Percent of Maximum Potential Retention, Partial Retention		0	0	0	0	4	61%	35%
Range (Permitted M AUM's/Year)		29	29	29	45	16	24	24

Figure 2-2 Table - Revision of Benchmarks Between The DEIS and FEIS

Benchmark	ASQ (MMCF/ Decade)	LTSY (MMCF/ Decade)	PNV (MM $)
Biological Potential (Run 1, 1985 DEIS)	534 0	534 0	-
Biological Potential (Run 1, 1990 FEIS)	437.9	437 9	-
Maximize PNV (Run 7, 1985 DEIS)	490 4	490.4	1420.1
Maximize PNV (Run 7, 1990 FEIS)	351.1	351.1	1260.0

For a detailed explanation of the benchmarks and a comparison of differences between the DEIS and FEIS versions, refer to Appendix B, FEIS, Analysis Prior to Development of Alternatives.

Only two benchmarks were revised between the DEIS and FEIS They are the Maximum Biological Potential (Run-1) and the Maximum Present Net Value Benchmarks (Run-7). The relationship between the DEIS and the FEIS of these benchmarks are compared in Figure 2-2 above.

If a benchmark appeared to offer a viable opportunity to respond to issues, concerns, and opportunities, further analysis is conducted to examine it as a potential alternative. Thus some benchmarks are the basis for alternatives Others display too many environmental, fiscal, legal, and practical problems in the analysis and are eliminated from detailed study

Range of Alternatives

Overview

The Interdisciplinary Team formulated a broad range of reasonable alternatives according to NEPA and NFMA procedures. The primary goal in formulating alternatives, besides complying with NEPA and NFMA procedures, is to provide and adequate basis for identifying the alternative that comes nearest to maximizing net public benefits, resolving issues, concerns and opportunities, and be consistent with the resource integration and management requirements of CFR 219 13 through 219.27. More detail on the development and analysis of alternatives is contained in Appendix B of this FEIS

Assumptions Common to all Alternatives

The minimum level of the constraints which are common to all Benchmarks are common to all Alternatives. In addition a number of assumptions are common to all Alternatives. They ensure that Alternatives meet laws, regulations, and policies that are applicable to the Forest Plan. The more significant items are listed below.

The selection of harvest systems will conform with the criteria specified in the Regional Guide and Code of Federal Regulations (Appendix G). All Alternatives, including modifications between DEIS and FEIS, will use these criteria for the selection of harvest cutting methods.

All Alternatives assume full use of vegetation management techniques, including the use of herbicides. The Regional EIS on vegetation management and the subsequent modified agree-

ment will guide vegetation management activities on the Deschutes National Forest.

Management requirements, discussed earlier in this Chapter, are met by all Alternatives, except the No Change Alternative. Most Forest-wide standards/guidelines are designed to meet resource protection or mitigation required by laws, regulations, or policies and are common to all Alternatives. Resources protected in this manner are air quality, cultural resources, soil and water, threatened and endangered plant and animal habitat, Indian rights and claims, and human resource programs (see Chapter 4 of the Forest Plan).

Best Management Practices (BMP's) are specifically designed to protect water quality, as required by section 208 of the Clean Water Act General BMP's will be selected and tailored for site-specific conditions to arrive at project-level BMP's for the protection of water quality. See BMP Appendix H, FEIS for a discussion of the process and practices

Required Alternatives

By inspecting the information generated by the benchmark analysis, and the analytic limits and reference points identified by the various benchmarks, the Interdisciplinary Team proceeded with constructing alternatives which could be implemented on the Forest Among the alternatives were several that were required by the Regulations and National and Regional direction. The range of required alternatives are listed and briefly described here

No Change Alternative

The "No Change" Alternative, Alternative NC, was developed in response to decisions made regarding appeal number 1588, brought by the Northwest Forest Resource Council on May 19, 1986 The appeal centered on a decision by the Regional Forester to "require inclusion of (MRs) in the Current Direction Alternative for each Forest Plan." The substance of the appeal was that a "true Current Direction Alternative representing current management plans" was not included in Forest Plan EIS's This alternative was developed to display the current timber management plan as amended in 1980 and 1984. It does not incorporate the requirements of the National Forest Management Act (NFMA). The 1980 amendment was done to reflect the changes resulting from the 1978 Deschutes Land Management Plan and the 1984 amendment was done to reflect the adjustments resulting from the 1984 Oregon Wilderness Act. It differs from the Current Direction (No Action) Alternative in that it does not meet requirements of NFMA such as MRs for water quality and fish and wildlife habitat

Current Direction (No Action)

Alternative A is the "No-Action" Alternative (no-action to change the current direction). This is the alternative required by NFMA [36 CFR 219.12 (F)(7)] and the Council on Environmental Quality (CEQ) regulations (40 CFR 1502 14) This alternative would (1) continue the management of the Deschutes National Forest as defined by existing direction in approved management plans, (2) continue existing policies, standards, and guidelines; (3) update the current budget to reflect changing costs over time, and, (4) to the extent possible, produce current levels and mixes of resource outputs.

Current RPA Program

Alternative B emphasizes the Current RPA Program. This alternative will determine how the Current (1980) RPA Program, adopted from the Regional Guide, can best be implemented in the Deschutes National Forest

Market Emphasis

Alternative C is the alternative which emphasizes market opportunities for the Deschutes National Forest This alternative has an emphasis on outputs that have an established market price (timber, forage, developed recreation opportunities, and minerals). Management for other resources will be at economically and environmentally feasible levels consistent with the emphasis on market-oriented outputs.

Amenity Emphasis

Alternative G is the alternative which emphasizes nonmarket opportunities This alternative puts an emphasis on water, fish and wildlife, recreation, and other amenity values. Management for other

resources will be at economically and environmentally feasible levels consistent with the emphasis on amenity values

Departure Alternatives

Alternatives B and C were "Departure" Alternatives in the DEIS and are non declining even flow alternatives in this FEIS Departure means that the amount of wood sold in any decade is less than the amount of wood sold in the previous decade as opposed to nondeclining yield which means that the wood sold in any decade is equal to or greater than the wood sold in the previous decade The Alternatives were developed by determining land use patterns and resource management prescriptions which applied. A nondeclining yield timber schedule was then developed for each departure Alternative Numerous iterations were made on the structure of departure before a final schedule was developed In many cases management under these alternatives would raise the volume of harvested timber in the near future, but lower the volume of timber available in the intermediate future

Other Alternatives

Additional alternatives, including those necessary to respond to the full range of public issues, management concerns, and resource use and development opportunities, were formulated to reflect a broad range of resource outputs and expenditure levels. Additional alternatives respond to 36 CFR 219 12(f)(1) which requires alternatives to "be distributed between the minimum resource potential and the maximum resource potential" to display the "full range" that a Forest could produce.

The Preferred Alternative

Alternative E is the Preferred Alternative The selection of the Preferred Alternative was made only after careful comparison of all the Alternatives on the basis of their resource outputs, environmental effects, implementation costs, and the "trade-offs" between them The Preferred Alternative is that alternative which was selected from all those formulated as the one which best maximized net public benefits in an environmentally sound manner. After the Forest Supervisor reviewed the Interdisciplinary Team's evaluation, and after the Regional Forester and his staff had reviewed the Alternatives, this Alternative was selected as the Preferred Alternative

Alternatives Considered, But Eliminated from Detailed Study

Six alternatives were developed at the time the DEIS was prepared, but dropped from further study.

One alternative was developed to examine extensive management and minimum agency regulation and control The land-use pattern would have emphasized providing maximum opportunities to harvest forest products

It was dropped from further analysis because

* It did not address clear or specific issues and reflected the concerns of a small, undefined segment of the public.

* It emphasized types of custodial management which are not consistent with the current need for active land management

* Low investment rates did not recognize opportunities for increases in outputs nor did they recognize capital investments already incurred

A second alternative, which was presented as Alternative D in the Draft EIS released for public comment in November 1982, was dropped It was very similar to two other alternatives and received little public comment, was not responsive to some issues, and was determined not to be needed The outputs and environmental effects were very similar to those of other alternatives The difference between D and others was a slight variation on how sensitive areas were managed These variations did not prove useful in evaluating the public's sensitivity to these areas

The third alternative which was dropped from further consideration was a variation from Alternative G presented The following comparison and discussion was made in the DEIS and the comparison are to the Alternative G presented in the Draft and not the Alternative G presented in this FEIS. For this Alternative, all forested lands with negative

soil expectation values (negative present net values of managed stands starting with bare ground) were excluded from the suitable and available forested land base for harvest scheduling purposes In the original Alternative G, 804 1 thousand acres of forested land were determined to be suitable and available for timber harvesting. Using this acreage base, the long-term sustained yield was calculated to be 32 5 MMCF per year Using the per acre negative soil expectation values to screen economically undesirable acres from being considered for harvest scheduling, the suitable and available land base was decreased by 9.4 thousand acres to 794 7 thousand acres The resulting long-term sustained yield and allowable sale quantity were estimated to be 32.1 MMCF per year, a drop of about 1 2 percent from the original harvest levels calculated for Alternative G. Since this approach for determining the economic suitability of forested lands is not consistent with current policy, this Alternative was not developed in detail

Three alternatives considered in the DEIS and not in the FEIS

Alternatives D, F and H were considered in detail in the DEIS and were dropped for detail analysis in the FEIS The reason they were not considered in detail was because of lack of significant public support. Most respondents who favored these 3 alternatives only favored some aspects of them. These aspects were taken into consideration in the development of the Preferred Alternative. These alternatives were not needed to provide an adequate array of alternatives. Resolution of issues could be adequately displayed and considered without these three alternatives They did not prove to be helpful in evaluating public sensitivity to issues.

In addition other alternatives were analyzed between the DEIS and FEIS, one was developed by the timber industry representatives and another by a group interested in saving the Metolius and a third was for the state of Oregon. The results of these analytical processes is contained in the Forest Planning Records and FORPLAN reports are available.

The timber industry representatives alternative indicated a possible allowable sale quantity of 166 8 Million board feet annually. The FORPLAN objective function for this run was maximize timber instead of maximize present net value. The harvest level for this Alternative falls between Alternative B and C and the environmental impacts can be interpalated from them This alternative was not developed in detail in the FEIS.

The alternative for the Save The Metolius group indicated an allowable sale volume of about 94 million board feet. The harvest level is less than the preferred alternative but higher than alternative G Many of the concepts from this alternative were adopted in the preferred alternative The environmental impacts can be interpalated from alt E and G. This alternative was not developed in detail in the FEIS

An alternative developed by the State of Oregon and a FORPLAN solution prepared for them. The land allocations for this alternative are very similar to the preferred alternative. This alternative was more fully developed by the State of Oregon and a public review period was provided by them.

The benchmarks are not feasible to implement, because they lack budgets and land use decisions, so were not fully developed and evaluated as alternatives

Alternatives Considered in Detail

The alternatives considered in detail demonstrate different ways of managing the land and resources of the Deschutes National Forest for the next 10-15 years. Each is a combination of land uses, management practices, and activity schedules which results in a unique combination of resource outputs, land uses, and environmental conditions Throughout Chapter 2, the tables and text display or discuss information for five decades A Plan implementing any of the alternatives would be for 10-15 years The information for decades 2 through 5 is to demonstrate the potential outputs and effects if the alternative were carried beyond the first 10-15 years

Together these alternatives present a broad range of reasonable management alternatives They were formulated through an analysis process that

explored a wide array of possibilities shown in the benchmarks and in the required alternatives

Each alternative distributes the lands of the Forest to different management areas. Acreages in the different management areas vary from one alternative to another (See Figure 2-25) A description of the management areas and the goals of land and resource management in them are presented later in this chapter in the discussion following Figure 2-25 Locations of the management areas for each alternative are shown on the maps which accompany this EIS

The management areas are subject to management according to specified standards/guidelines These ensure that potentially adverse environmental effects are mitigated through avoiding, minimizing, rectifying, or reducing them (or in some cases by compensating for them) Some of these standards/guidelines were developed to respond to environmental conditions on the Deschutes National Forest Others are adopted from the Regional Guide Standards/guidelines which apply to the Preferred Alternative are found in the Forest Plan, which accompanies this EIS

Managing the Forest according to the different alternatives will result in various land uses, resource outputs, and environmental effects. Some differences among alternatives represent the specific objectives of an alternative All of the significant land uses, environmental effects, and resource outputs are presented by alternative and by time period in Figure 2-50 and Figure 2-64. Figure 2-50 presents those uses, effects, and outputs which are quantitative. Figure 2-64 represents those which are qualitative

All of the timber related outputs in the Alternatives are based on the assumption that herbicides, pesticides and burning will be available for use even though use of pesticides on the Forest is limited. In 1989, the Pacific Northwest Region of the USDA Forest Service issued a Programmatic Final Environmental Impact Statement (FEIS) for Methods of Managing Competing Vegetation. The FEIS detailed discussions and analysis of a Preferred Alternative Use of chemicals was critically examined Alternatives to the Preferred (including no vegetation management, and no application of herbicides) and the consequences of these alternatives on the environment were documented. Based on the Preferred Alternative in the Methods of Managing Competing Vegetation Environmental Impact Statement, all Alternatives in this Forest Plan and FEIS are based on the continued use of the full range of alternative treatment methods including manual, mechanical, prescribed fire, biological, and chemical methods The selection of any particular treatment method will be made at the project level based on a site specific analysis of the the relative effectiveness, environmental effects, (including human health), and the costs of feasible alternatives. Herbicides will be selected only if their use is essential to meet management objectives The use of pesticides will be monitored.

If current policy on the use of herbicides were to change to either disallow or restrict their use, then, based on the effects outlined in the Competing Vegetation Management EIS, the outputs in the Alternatives in this FEIS for timber would decrease slightly and the costs would increase.

The relationships of management activities, resources and environmental effects are discussed in Chapter 4, Environmental Consequences. The outputs and effects are also summarized there. However, the most detailed reporting of each alternative's land uses, resource outputs, and environmental conditions are here in Chapter 2. In this way several types of outputs and effects of the alternatives can easily be compared at one time

For additional information regarding the analysis process, cost efficiency and constraints common to all Alternatives, please refer to Appendix B, Section 7.

The following Alternatives were selected for detailed study. They represent a broad range within the decision space defined by the benchmarks. The Alternative descriptions are preceded by an illustration of how the Forest would look in the long-term under that alternative.

Description of Alternatives

No Change Alternative

The No Change Alternative has been developed in response to direction by the Chief of the Forest Service and Deputy Assistant Secretary Douglas MacCleery regarding appeal number 1588, brought by the Northwest Forest Resource Council on May 19, 1986. The appeal focused on a decision by the Regional Forester to require inclusion of Management Requirements (MRs) in the No Action Alternative for each forest plan. The substance of the appeal was that a "true no-action alternative" representing current management plans was not included in forest plan environmental impact statements. The No Change Alternative is designed to represent the existing timber management plan, and consequently does not incorporate the provisions of NFMA and the regulations promulgated by the Secretary of Agriculture to implement NFMA Refer to Chapter 4 for more specific information on the sections that are not partially or fully complied with

The No Change Alternative could not be implemented or used in future management of the Forest under the Forest Plan without Congressional and/or Secretary of Agriculture action to change the laws or regulations If a new Forest Plan were not implemented, the current management plans would have to be amended or revised to comply with the laws and regulations (NFMA regulations [CFR 219 29] - "As soon as practicable, existing plans shall be amended or revised to incorporate standards/guidelines in this subpart ")

The timber output level stated for the No Change Alternative is based upon "potential yield" and is not comparable to the allowable sale quantity (ASQ) stated for the other alternatives. The basic difference between "potential yield" and ASQ is that ASQ does not include such things as marginal lands or lands that are not economically feasible and "potential Yield" did. However they both represented the uppper limits on harvest levels The ASQ for the other alternatives was developed through an integrated resource process whereas *potential yield is based on maximizing timber* yield under a specified management intensity level recognizing reductions for the constraints of key resources other than timber. The potential yield was the basis for developing associated outputs and effects for the No Change Alternative

Sources of information used to develop the No Change Alternative were the Final Environmental Impact Statement for the Proposed Timber Management Plan for the Deschutes National Forest dated July 26, 1974, and the Timber Management Plan for the Deschutes National Forest approved September 20, 1974. The Timber Management Plan was amended in 1980 to incorporate the 1978 Deschutes Land Management Plan and again in 1984 to reflect the 1984 Oregon Wilderness Bill Alternative A from the DEIS was the source of some of the outputs not directly available from the documents described above

Vegetation

Timber

Timber harvesting is scheduled on a nondeclining yield basis The potential yield is 219 million board feet (37.1 MMCF) of chargeable volume Mature *and overmature lodgepole pine is scheduled to* be harvested over the next 40 years.

Old Growth

Old growth was identified and special attention taken to designate stands of old growth that meet the Region 6 definition. Old growth will be retained in all management areas. There are 348,000 acres of old growth included in the inventory Of this amount, 27,900 are in the old growth management area. There will be 245,400 acres of old growth timber remaining after the fifth decade. This does not include old growth in non-commercial forest types such as juniper, nor does it account for stands which are of size and age now which will become old growth after the fifth decade

Range

The No Change Alternative has no specific direction *for the management of the range resources. It will* be based on demand which is low and the Forest's ability to support a range program

Recreation

Developed Recreation

Developed recreation would depend on the annual budgeting process Primary focus would be on maintaining and expanding existing campgrounds

Dispersed Recreation

Forty-five percent of the unroaded lands will remain undeveloped.

The summer trail system for horses and hikers will be maintained at the current level. Missing sections of trails will be constructed and substandard sections will be reconstructed. Most of the Forest's low standard roads (those not maintained for passenger cars) will be open to off-highway vehicles

For winter recreation, the existing nordic and snowmobile trail system will be maintained and expanded Snow parks will be constructed to meet increases in demand.

Oregon Cascade Recreation Area (OCRA)

All existing roads in the OCRA would remain open to motorized use and be maintained at current standards Wildlife and fish habitat could be improved in the Big Marsh and Little Deschutes drainages Dead and dying trees could be salvaged where roads exist. All trails would be open to motorized vehicles and the remainder of the area would be closed Over-the-snow vehicles would be permitted in the winter

Scenic Views

All State, County, and most major Forest Service roads will be considered for scenic values when timber sales are planned Extended rotations will be used. Special consideration will be given to some of the more prominent buttes.

Special Areas

Newberry Crater is currently designated as a National Natural Landmark under the Historic Sites Act of 1935

Three existing Special Interest Areas, Lava Butte, Lava Cast Forest and Lavacicle Cave have been established.

Wildlife Habitat

Big Game Habitat

Improvement of mule deer habitat would be limited and timber sales would be coordinated to reduce impacts on elk and mule deer habitat.

Other Wildlife

Snag habitat for woodpeckers will be provided for 60% of the potential population in Ponderosa pine and mixed conifer forest-types, and 40% of the potential population in the lodgepole pine forest-type.

Energy

Geothermal

Geothermal leasing would take place under provisions outlined in existing environmental assessments A new analysis under NEPA would need to be completed for the Known Geothermal Resource Area (KGRA) prior to leasing within the area.

Firewood

There would be no special provisions for personal use firewood

Research Natural Areas

There are two Research Natural Areas The Pringle Falls Research Natural Area, is located within the Pringle Falls Experimental Forest. The Metolius Research Natural Area, is located east of the Metolius River on the west slopes of Green Ridge. No additional ones are proposed.

Transportation

Roads necessary to support the timber program would be developed. Coordination with other

resources such as recreation will be evaluated Temporary roads would be closed upon completion of timber sales Some seasonal restrictions would apply to reduce disturbance to wildlife.

The Todd Lake-Three Creeks Lake road, the Irish-Taylor road, the road to Waldo Lake and the road over Windigo Pass would be maintained in their current condition

Roadless Areas

The following display indicates the possible status for each roadless area.

Figure 2-3 Table - Alternative "No Change" Roadless Area Status

Roadless Area	Partly Developed	Undeveloped
Mt. Jefferson	X	
Metolius Breaks	X	
Three Sisters		X
West/South Bachelor	X	
Bearwallows		X
Bend Watershed	X	
Waldo	X	
Charlton	X	
North Paulina	X	
South Paulina		X
Maiden Peak	X	

Figure 2-4 Table - Alternative "No Change" Summary of Results Related to Key Issues

ISSUE	RESULT
Timber	
Million cubic feet of potential yield annually	37 1
Million board feet of potential yield annually	219
Recreation	
Average annual MRVD's of developed recreation	995
Average annual MRVD's of dispersed recreation	1597
Planned campground construction Some	
Wildlife	
Potential mule deer population.	20,300
Potential bald eagle population (Pairs)	20
Potential osprey population (Pairs)	180
Potential spotted owl population (Pairs)	3
Energy	
M Acres of high potential geothermal areas available for leasing	102 9
Amount of personal use firewood provided	No Specific Amount
Social/Economic	
Present net value	No Data
First decade average revenues to the Government	36 Million
First decade average annual returns to the counties	9 Million

Figure 2-5

Alternative A (No Action)

Alternative A is the "No Action" Alternative required by the National Forest Management Act (NFMA) regulations The intent of Alternative A is to provide an estimate of activities and outputs likely to occur under current management direction It is also developed to form a basis for comparison with other alternatives, as directed by the National Environmental Protection Act (NEPA). The Management Requirements (MR's) are also incorporated.

The "No-Action" Alternative, under the 1978 Land Management Plan, features a blend of land uses intended to balance resource uses Dispersed recreation, visual quality, and deer habitat management are emphasized along with timber and range management. Some emphasis is placed on developed recreation, old growth, and threatened and endangered species

Recreation

Developed Recreation

Campgrounds where a fee is charged will receive maintenance and services that reflect the fees collected These sites will contain the large investments in facilities Nonfee campgrounds and day use sites, other than those associated with fee campgrounds, will receive minimum services and maintenance. Very few sites will be closed.

Some new campgrounds and day use facilities such as picnic areas and boat launch sites will be built but this will not meet the projected demand Some sites may be built and operated by private developers.

Dispersed Recreation

Sixty-nine percent of the unroaded lands will have an undeveloped prescription and all of the unroaded lands should remain undeveloped at the end of the second decade based on the timber harvest schedule

The summer trail system for horses and hikers will be maintained at the current level Missing sections will be constructed and substandard sections will be reconstructed A mountain bicycle trail system will be developed. Trails for motorcycles and all terrain vehicles (ATV's) will also be developed Most of the Forest's low standard roads (those not maintained for passenger cars) will be open to off-highway vehicles

For winter recreation the existing nordic and snowmobile trail system will be maintained and expanded. Snow parks will be constructed to meet increases in demand

Oregon Cascade Recreation Area (OCRA)

In the OCRA all existing roads would remain open to motorized use and be maintained at their current standards. Wildlife and fish habitat could be improved in the Big Marsh and Little Deschutes drainages. Dead and dying trees could be salvaged where roads exist All trails would be open to motorized vehicles and the remainder of the area would be closed Over the snow vehicles will be permitted in the winter.

Roadless Areas

The following display indicates the proposal for each roadless area. For more details refer to Figure 2-83 and Appendix C.

Figure 2-6 Table - Alternative A "No Action" Roadless Area Status

Roadless Area	Partly Developed	Undevel.
Mt. Jefferson	X	
Metolius Breaks	X	
Three Sisters		X
West/South Bachelor	X	
Bearwallows		X
Bend Watershed	X	
Waldo	X	
Charlton	X	
North Paulina	X	
South Paulina		X
Maiden Peak	X	

Visual Resources

All State, County, and most major Forest Service roads are protected. The same is true for all major buttes and many of the minor or less prominent buttes.

It is important to review the Alternative Maps to identify the differences between various alternatives

Vegetation

Timber

Trees will be managed to provide cover for big game, habitat for bald eagles, to meet recreation and visual quality objectives, and to produce wood fiber and firewood Timber would be harvested on both a chargeable (fixed amount on an annual basis) and nonchargeable (variable amount depending on the need to manipulate stands to meet objectives) basis

Timber harvesting is scheduled on a nondeclining yield basis. The annual allowable harvest is about 142.1 million board feet (24.8 MMCF) of chargeable and 15 to 20 million board feet (3 2 MMCF) of nonchargeable timber (excluding firewood). Mature and overmature lodgepole pine is scheduled to be converted to managed stands in 80 years, beginning heavily in about 4 years.

Old Growth

Old growth will be present on 245,000 acres of the current 348,100 inventoried acres on the Deschutes National Forest after the fifth decade This represents 17 percent of the timbered acres on the Forest and includes old growth stands in the Ponderosa pine, lodgepole pine, mixed conifer, and mountain hemlock working groups It does not include old growth is non-commercial forest types such as juniper, nor does it account for stands which are of size and age now that will become old growth after the fifth decade

Wildlife

Big Game Habitat

Ninety-three percent of the important deer habitat is allocated to the Game Species Management Option Timber harvesting will be managed to provide thermal cover for big game species Habitat improvement is limited due to low funding levels The current mule deer population is 30,400 (this number represents the deer population on hjerd winter ranges that include some lands outside of the Forest The proportion of wintering deer actually using Forest range is dependent on annual winter weather conditions)

Other Wildlife

Habitat for cavity dwelling species would provide for 60 percent of the maximum potential populations in Ponderosa pine and mixed conifer and 40 percent in lodgepole pine.

Range

Full use of forage available to livestock is emphasized Cost effective management systems and techniques, including fencing and water development, are designed and applied to obtain relatively uniform livestock distribution and use of forage, and to maintain plant vigor.

Special Areas

Newberry Crater is currently designated as a National Natural Landmark under the Historic Sites Act of 1935

Research Natural Areas

There are two Research Natural Areas, one at Pringle Falls and the other near the Metolius River

Special Interest Areas

Some Special Interest Areas have been established and others were recommended for designation. No action has been taken on them. The existing and proposed areas are listed below

Figure 2-7 Table Alternative A "No Action" Special Interest Areas

Name	Status
Lava Butte	Existing
Lava Cast Forest	Existing
Lavacicle Cave	Existing
Katati Butte	Proposed
Big Hole	Proposed
Hole-in-the-Ground	Proposed
Newberry Crater	Proposed
Castle Rocks	Proposed
Balancing Rocks	Proposed
Horn-of-the-Metolius	Proposed
Wake Butte	Proposed

Transportation

Roads necessary to support the timber program would be developed. Coordination with other resources, such as recreation, will be evaluated Temporary roads would be closed upon completion of timber sales. Some seasonal restrictions would apply to reduce disturbance to wildlife.

Specific issues and concerns are associated with Todd Lake-Three Creeks Lake road, the Irish-Taylor road, the road to Waldo Lake and the road over Windigo Pass. They would be maintained in their current condition.

Energy

Geothermal

Geothermal leasing would take place under provisions outlined in existing environmental assessments. A new analysis under NEPA would need to be completed for the Known Geothermal Resource Area (KGRA) prior to leasing within the area.

Firewood

Personal use firewood is available on a permit basis. No upper or lower limits on the total amount of firewood devoted to personal use have been established. The estimated amount of firewood used for personal use is 40,000 cords.

Figure 2-8 Table - Alternative A "No Action" Summary of Results Related to Key Issues

Issue	Result
Recreation	
Average annual MRVD's of developed recreation.	995
Average annual MRVD's of dispersed recreation.	1597
Planned Campground Construction	Some
Timber	
Million cubic feet average annual allowable sale quantity (ASQ) for the first decade	24.8
Million board feet average annual ASQ for the first decade	142 1
Wildlife	
Potential mule deer population	20,300
Potential bald eagle population (Pairs)	20
Potential osprey population (Pairs)	180
Energy	
M Acres of high potential geothermal areas available for leasing.	102.9
Amount of personal use firewood provided.	No Specific Amount
Social/Economic	
Present net value	$383.7 Million
First decade average revenues to the government.	$17.8 Million
First decade average annual returns to the counties.	$4.5 Million

Figure 2-9

Figure VIII

Alternative B (RPA)

The goal of this Alternative is to meet the 1980 RPA program as identified for the Deschutes National Forest in the Regional Guide. You will need to refer to the maps of the Alternatives to fully understand the differences between Alternatives B and E

Alternative B provides moderate levels of resource outputs The Forest would be intensively used and developed, but options for maintaining undeveloped lands and old-growth ecosystems would be retained

A mix of developed and undeveloped recreation opportunities would be provided This Alternative would provide for increases in deer and bald eagle populations Some of the higher potential geothermal areas would be available for leasing

Scenic quality would be emphasized along heavily used roads, developed recreation areas, and some roads to trailheads

Recreation

Developed Recreation

Campgrounds where a fee is charged will receive maintenance and services that reflect the fees collected These sites will contain the large investments in facilities. Nonfee campgrounds and day use sites, other than those associated with fee campgrounds, will receive minimum services and maintenance Very few sites will be closed.

New campgrounds and day use facilities such as picnic areas and boat launch sites will be built to meet the projected demand. Some sites may be built and operated by private developers.

Dispersed Recreation

Sixty-two percent of the unroaded lands will have an undeveloped prescription and 86 percent of the undeveloped lands could remain undeveloped at the end of the second decade based on the timber harvest schedule. However, roads may be developed in some areas to treat the mountain pine beetle epidemic and for geothermal exploration

The summer trail system for horses and hikers will be maintained at the current level Missing sections will be constructed and substandard sections will be reconstructed. A mountain bicycle trail system will be developed Trails for motorcycles and all terrain vehicles (ATV's) will also be developed Most of the Forest's low standard roads (those not maintained for passenger cars) will be open to off-road vehicles

For winter recreation the existing nordic and snowmobile trail system will be maintained and expanded Snow parks will be constructed to meet increases in demand

Oregon Cascade Recreation Area (OCRA)

In the OCRA all existing roads would remain open to motorized use and be maintained at their current standards Wildlife and fish habitat could be improved in the Big Marsh and Little Deschutes drainages Dead and dying trees could be salvaged where roads exist All trails would be open to motorized vehicles and the remainder of the area would be closed, except for over the snow vehicles.

Roadless Areas

The following display indicates the proposal for each roadless area. For more details refer to Figure 2-83 and Appendix C

Figure 2-10 Table - Alternative "B" Roadless Area Status

Roadless Area	Partly Developed	Undevel.
Mt. Jefferson	X	
Metolius Breaks	X	
Three Sisters		X
West/South Bachelor	X	
Bearwallows	X	
Bend Watershed	X	
Waldo	X	
Charlton	X	
North Paulina	X	
South Paulina	X	
Maiden Peak	X	

Visual Resources

This Alternative has a heavy emphasis on the visual resource. All State and County highways and many Forest Service roads including those to major trailheads, are protected. Most major buttes are also protected, but only part of the areas seen west of Davis Lake are protected. The area south of Mt. Bachelor and most of Pine Mountain are also protected.

It is important to review the Alternative Maps to identify the major differences between Alternatives B, E, and F.

Vegetation

Timber

Trees will be managed to provide cover for big game and habitat for bald eagles, to meet recreation and visual quality objectives and to produce wood fiber and firewood Timber would be harvested on both a chargeable (a fixed amount on an annual basis) and nonchargeable (a variable amount depending on the need to manipulate stands to meet objectives) basis Areas managed with a recreation emphasis would be nonchargeable.

The timber harvest levels would be based on a nondeclining yield For the first decade (or 10-15 year life of a Plan) the annual harvest level is 25.9 million cubic feet or 146 5 million board feet

Generally mature and overmature lodgepole pine would be converted to managed stands in about 50 years, beginning heavily in the second decade.

Of the lands that are available for timber production, 95 percent of them are used in the development of the timber program.

During the first decade, 2 percent of the cubic foot volume is from lodgepole pine stands and 14 percent is from Ponderosa pine stands. In the second decade this shifts to 21 percent lodgepole and 17 percent Ponderosa pine. Mixed conifer species make up 81 percent of the volume in the first decade and 58 percent in the second. The remaining volume is from Mountain Hemlock

During the first decade, 15 percent of the harvesting is in clearcuts and shelterwoods. Approximately 9,100 acres would be reforested annually

Old Growth

Old growth will be present on 238,000 acres of the Forest after the fifth decade This represents 17 percent of the timbered acres and includes all commercial timber types. It does not include old growth in juniper or other non-commercial species, nor does it account for stands which are of size and age now that will become old growth in the 50 year period

Wildlife Habitat

Big Game Habitat

Thirty to 50 percent of the important deer habitat would be maintained in thermal cover Approximately 25 percent of the shrub communities would be regenerated to younger shrub classes by prescribed burns each decade. The amount and condition of habitat could increase the mule deer population to 27,100 animals.

Other Wildlife Habitat

Habitat for cavity dwelling species would be retained at 60 percent of the maximum biological potential

Range

Use of vacant grazing allotments would be encouraged. Full use of forage available for livestock would be emphasized. Range investments would be increased above current levels. Cost effective management systems and techniques, including fencing and water development, would be designed and applied to obtain relatively uniform livestock distribution and use of forage, and to maintain plant vigor

Special Areas

Research Natural Areas

Cache Mountain, Cultus River, Katsuk Butte, Torrey-Charlton, Many Lakes, Wechee Butte, Mokst Butte would be recommended for inclusion in the Research Natural Area program

Special Interest Areas

Additional Special Interest Areas would be included because of unusual geological or botanical values. They are listed below:

Figure 2-11 Table - Alternative "B" Special Interest Areas

Name	Status

Figure 2-11 Table - Alternative "B" Special Interest Areas (continued)

Lava Butte	Existing
Lava Cast Forest	Existing
Lavacicle Cave	Existing
Wake Butte	Proposed
Castle Rock	Proposed
Katati Butte	Proposed
Hole in the Ground	Proposed
Big Hole	Proposed
Balancing Rock	Proposed
Moffit Butte	Proposed
Lava River Cave	Proposed
Davis Lake	Proposed

Transportation

Roads necessary to support the timber program would be developed Coordination with other resources, such as recreation, will be evaluated. Temporary roads would be closed upon completion of timber sales. Some seasonal restrictions would apply to reduce disturbance to wildlife.

The Todd Lake to Three Creek Lake Road and the Irish-Taylor Road would be maintained at their current standard. The Waldo Lake Road and Windigo Pass Road would be improved some to allow for increased traffic.

Energy

Geothermal

The number of acres open to or allowing few restrictions to geothermal leasing varies by alternative, depending upon the number of acres within different managmenet area allocations. Altenatives with an amenity emphasis have fewer acres open and more restrictions than do alternatives with a commodity emphasis.

Geothermal leasing could be permitted in the Newberry Crater Known Geothermal Resource Area (KGRA) only after an environmental analysis under NEPA is conducted.

The interior of Newberry Crater would not be open to leasing, nor would designated Wilderness

areas, the Bend Watershed, or the Oregon Cascades Recreation Area

All post-lease geothermal activities (exploration, development, or production) would require completion of environmental analysis under NEPA.

Firewood

Twenty million board feet (40,000 cords) would be made available annually for personal use firewood Until 1995, mature dead and dying lodgepole pine would comprise a large part of this wood. Beyond that, the type of material would shift to other products and species The amount available per individual permit would be adjusted based upon demand If demand continues to increase, the amount per permit may be decreased Demand could reach a point where the number of permits issued is limited. The price of personal use firewood would trend upward and be re-evaluated each year. Areas where personal use firewood cutting would be emphasized could also be determined on an annual basis. The trend, however, would be that cutting areas would be located further and further from Bend and LaPine as time passed. During the first 10 years, much of the emphasis would be on the Fort Rock and Crescent Districts.

Figure 2-12 Table - Alternative "B" Summary of Results Related To Key Issues

Issue	Result
Recreation	
Average annual MRVD's of developed recreation.	2369
Average annual MRVD's of dispersed recreation.	2278
Planned Campground Construction	Meet demand
Timber	
Million cubic feet average annual ASQ for the first decade	25 9
Million board feet average annual ASQ for the first decade	146.5
Wildlife	
Potential mule deer population	28,600
Potential bald eagle population (Pairs)	45
Potential osprey population (Pairs)	80
Energy	
Thousands of acres of high potential geothermal areas available for leasing.	100 0
Amount of personal use firewood provided.	60,000 cords
Social/Economic	
Present net value	$585 97 Million
First decade average revenues to the government	$15.6 Million
First decade average annual returns to the counties.	$3.9 Million

Figure 2-13

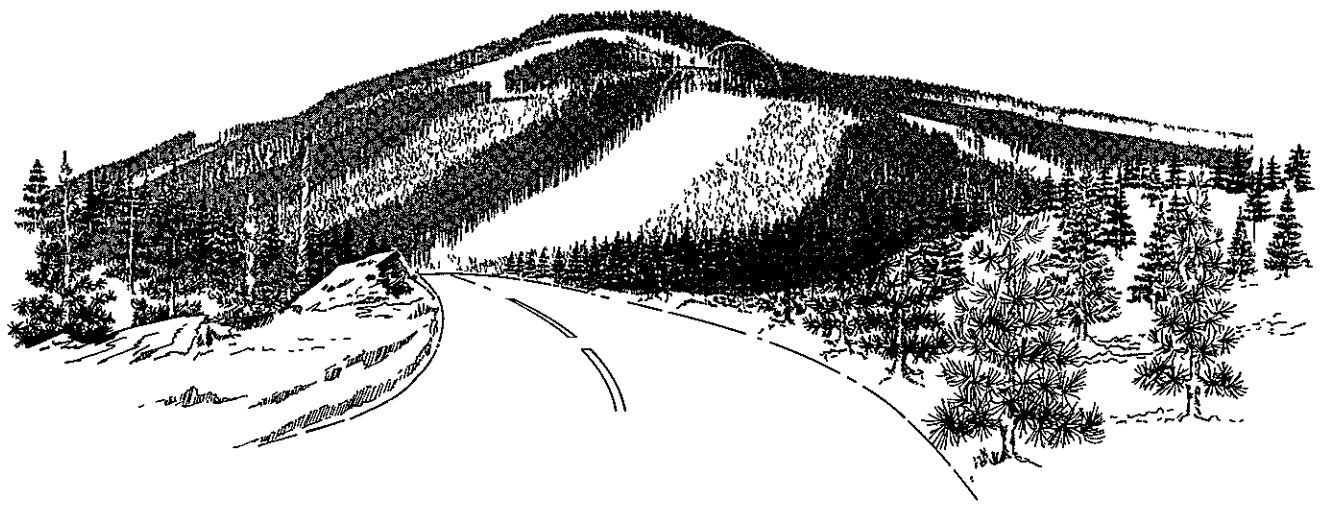


Figure III

Alternative C

The goal of this Alternative is to maximize present net value and provide increased use of commodity resources and other resources which have potential to increase contributions to the local economy

Much of the Forest would be used for producing commercial timber. This Alternative would permit the maximum amount of geothermal leasing. Recreation management would focus on providing access and facilities for large numbers of people, such as developed recreation sites, vehicle use in the summer, downhill skiing and snowmobiling in the winter, deer hunting, and fishing. The Forest would be heavily roaded. Scenic resources would be protected or enhanced along heavily traveled roads.

Recreation

Developed Recreation

Campgrounds where a fee is charged will receive maintenance and services that reflect the fees collected. These sites will contain the large investments in facilities Nonfee campgrounds and day use sites, other than those associated with fee campgrounds, will receive minimum services and maintenance. No campgrounds will be closed.

New campgrounds and day use facilities associated with motorized use will be built to meet the projected public demand. Some of these sites may be built and operated by private developers

Dispersed Recreation

Thirty-eight percent of the unroaded lands will have an undeveloped prescription and 77 percent of the unroaded lands could remain undeveloped at the end of the second decade based on the timber harvest schedule. However, roads may be developed in some areas to treat the mountain pine beetle epidemic and for geothermal exploration

The nonmotorized trail system for horses, hikers, and nordic skiers will be maintained at or below the current standard. No new construction or reconstruction would be planned for this system.

The trail system for motorized use which would include motorcycles, all terrain vehicles (ATV's), and snowmobiles would be maintained at or above the current standard and this system would be expanded. Most of the low standard road systems (those not maintained for passenger cars) would be open to off-highway vehicles.

Wild and Scenic Rivers

No rivers will be recommended for classification under the Wild and Scenic Rivers Act of 1968. Low-head hydropower facilities would be compatible with this Alternative.

Oregon Cascade Recreation Area (OCRA)

In the OCRA all existing roads would be open to motorized use Recreation facilities could be developed at Summit Lake, Big Marsh, and along the Little Deschutes. Additional trails for snowmobiles would be developed Fish habitat improvements could be developed for Big Marsh and the Little Deschutes River Tree stands that are dying or in imminent danger of insect attack could be harvested. Motorized vehicles would be restricted to the existing and planned trails and roads in summer. In winter, over the snow vehicles would be permitted.

Roadless Areas

The following display indicates the proposal for each roadless area. For more details refer to Figure 2-83 and Appendix C

Figure 2-14 Table - Alternative "C" Roadless Area Status

Roadless Area	Partly Developed	Undev-el.
Mt. Jefferson	X	
Metolius Breaks	X	
Three Sisters	X	
West/South Bachelor	X	
Bearwallows	X	
Bend Watershed	X	
Waldo	X	
Charlton	X	
North Paulina	X	
South Paulina	X	
Maiden Peak	X	

Visual Resources

All major State and County highways and Black Butte would be protected.

Review the Alternative Maps to identify the differences between various alternatives.

Vegetation

Timber

Trees will be managed to provide cover for big game and habitat for bald eagles, to meet recreation and visual quality objectives, and to produce wood fiber and firewood. Timber would be harvested on both a chargeable (fixed amount on an annual basis) and nonchargeable (not a fixed amount but can vary depending on the need to manipulate a stand to meet some objective) basis. Lands managed with an emphasis on developed recreation would be chargeable

From the lands available for timber production, timber harvesting is programmed on most of them Lands not programmed are generally those with lower timber values and higher management costs.

High levels of timber would be produced This Alternative would respond to the Forestry Program for Oregon, as defined for the Deschutes National Forest by the Oregon State Forester. First decade harvest is 34.0 million cubic feet or 191.2 million board feet annually.

During the first decade, 3 percent of the cubic foot volume is from lodgepole pine while 21 percent is from Ponderosa pine stands In the second decade lodgepole pine shifts to 11 percent and Ponderosa pine shifts to 45 percent Mixed conifer species comprise 75 percent of the harvest in the first dicade and 30 percent in the second. The remaining volume is from Mountain Hemlock. Mature and overmature lodgepole pine stands would be converted to managed stands over the next 60 years.

During the first decade, 30 percent of the acres scheduled for harvesting will be clearcuts or shelterwood cuts and approximately 13,500 acres would be reforested annually.

Old Growth

Old growth will be present on 182,000 acres after the fifth decade. This represents approximately 13 percent of the Forest's forested acres and includes all commercial timber types. It does not include non-commercial timber types, nor does it account for timber stands which are of size and age now that will become old growth in fifty years

Wildlife

Big Game Habitat

Thirty to 50 percent of the important deer habitat would be in thermal cover. Twenty-five percent of the shrublands would be regenerated by burning each decade. Trees would be managed on a 70 year rotation to achieve a better quality thermal

cover in those areas where deer habitat is emphasized. The habitat conditions provided could potentially support 32,300 mule deer.

Other Wildlife Habitat

Habitat for species of wildlife which use mature and old-growth forests will be at minimum levels. Habitat for cavity dwelling species would be retained at 20 percent of the maximum biological potential

Range

Forage for livestock and big game would be produced and used at maximum levels. Cost effective methods for achieving improved forage supplies would be developed and practiced. Heavy investments in range improvements such as brush disposal, fertilization, and seeding would be used to improve the quality and quantity of forage.

Special Areas

Research Natural Areas

The Torrey-Charlton Research Natural Area would be recommended for inclusion in the Research Natural Area program

Special Interest Areas

Special Interest Areas are established to protect, preserve and interpret unique, scenic, biological and geological features Existing and proposed areas are listed below.

Figure 2-15 Table - Alternative "C" Special Interest Areas

Name	Status
Lava Butte	Existing
Lava Cast Forest	Existing
Lavacicle Cave	Existing
Wake Butte	Proposed
Lava River Cave	Proposed

Transportation

Roads necessary to support the timber and recreation program would be developed Temporary roads would be closed upon completion of timber sales Extensive seasonal restrictions would apply to reduce disturbance to deer

The Todd Lake-Three Creek Lake road would be improved for increased traffic volume and to a standard where passenger cars could use it. The Irish-Taylor road would also be improved and upgraded The Waldo Lake road could be improved to a two lane paved highway The Windigo Pass road would be improved and upgraded. These improvements would require NEPA documentation.

Energy

Geothermal

The number of acres open to or allowing few restrictions to geothermal leasing varies by alternative, depending upon the number of acres within different managmenet area allocations. Altenatives with an amenity emphasis have fewer acres open and more restrictions than do alternatives with a commodity emphasis

Geothermal leasing could be permitted in the Newberry Crater Known Geothermal Resource Area (KGRA) only after an environmental analysis under NEPA is conducted

The interior of Newberry Crater would not be open to leasing, nor would designated Wilderness areas, the Bend Watershed, or the Oregon Cascades Recreation Area

All post-lease geothermal activities (exploration, development, or production) would require completion of environmental analysis under NEPA

Firewood

No special provisions would be made to ensure that personal use firewood will be available Personal use of firewood would have to compete with other markets for the wood and prices could be based primarily on market value so prices could increase significantly. The dead lodgepole which currently is the main source of firewood

would become more limited with time. Residues resulting from treatment of tree stands would then become the primary source of personal use firewood

Figure 2-16 Table - Alternative "C" Summary of Results Related To Key Issues

Issue	Result
Recreation	
Average annual MRVD's of developed recreation.	3392
Average annual MRVD's of dispersed recreation	2476
Planned Campground Construction (campground units)	75
Timber	
Million cubic feet average annual ASQ for the first decade	34 o
Million board feet average annual ASQ for the first decade	191.2
Wildlife	
Potential mule deer population.	32,300
Potential bald eagle population (Pairs)	45
Potential osprey population (Pairs)	80
Energy	
M Acres of high potential geothermal areas available for leasing.	126.1
Amount of personal use firewood provided.	Competitively Sold
Social/Economic	
Present net value	$681.54 Million
First decade average revenues to the Government.	$19 9 Million
First decade average annual returns to the counties.	$5.0 Million

Figure 2-21

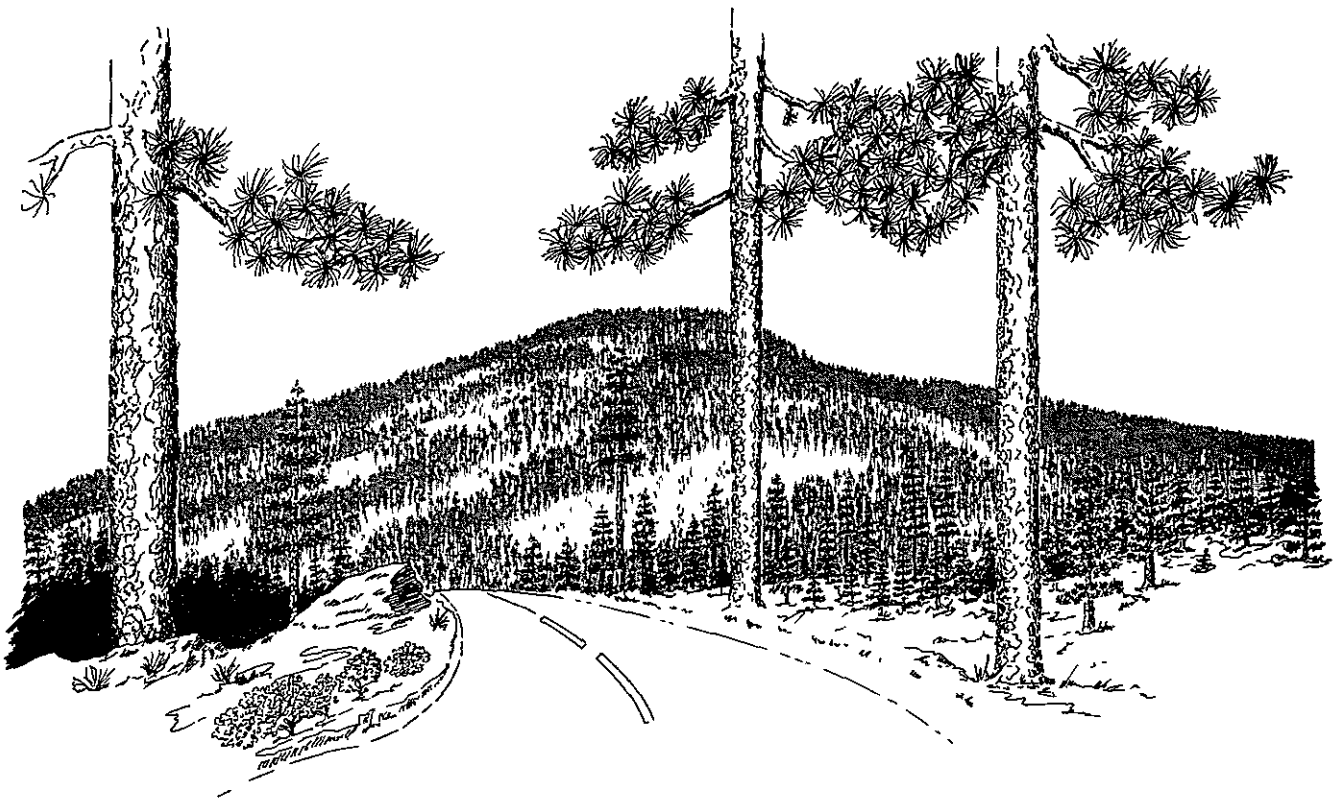


Figure II

Alternative E (Preferred)

This Alternative is similar to Alternative B, but different prescriptions have been applied to specific areas of the Forest You will need to consult the maps to fully understand the differences between these alternatives.

Alternative E provides for moderately high levels of timber outputs. The Forest would be intensively used and developed, but options for maintaining undeveloped lands and old-growth ecosystems would be retained

A mix of developed and undeveloped recreation opportunities would be provided Alternative E would provide for increases in deer and bald eagle populations. Some of the higher potential geothermal areas are available for leasing and others are not.

Scenic quality would be provided along heavily used roads, developed recreation areas, and some roads to trailheads.

Recreation

Developed Recreation

Campgrounds where a fee is charged will receive maintenance and services that reflect the fees collected These sites will contain the large investments in facilities Nonfee campgrounds and day use sites, other than those associated with fee capmgrounds, will receive minimum services and maintenance. Very few sites will be closed.

New campgrounds will be constructed to meet increasing demand Additional day use facilities such as picnic areas and boat launch sites will be built but this will not meet the projected demand Some sites may be built and operated by private developers.

Dispersed Recreation

Sixty-seven percent of the unroaded lands will have an undeveloped prescription and 99.6 percent of the unroaded lands could remain undeveloped at the end of the second decade based on the timber harvest schedule However, roads may be developed in some areas for geothermal exploration.

The summer trail system for horses and hikers will be maintained at the current level. Missing sections will be constructed and substandard sections will be reconstructed A mountain bicycle trail system will be developed Trails for motorcycles and all-terrain vehicles (ATV's) will also be developed Many of the Forest's low standard roads (those not maintained for passenger cars) will be managed for off-highway vehicles.

For winter recreation the existing nordic and snowmobile trail system will be maintained and expanded. Snow parks will be constructed to meet increases in demand.

Oregon Cascade Recreation Area (OCRA)

In the OCRA, some existing roads would remain open for motorized use and would be maintained in the current condition. Other roads would be closed to protect wildlife. Wildlife and fish habitat could be improved in the Big Marsh drainage. Tree stand damage by insect or fire could be harvested and any new roads would be closed following harvest. Motorized vehicle use would be limited to existing roads and trails in the summer with no restrictions to over-the-snow vehicles in winter. Domestic livestock grazing is permitted where compatible with wildlife and recreation values.

Roadless Areas

The following display indicates the proposal for each roadless area. For more details refer to Figure 2-83 and Appendix C.

Figure 2-18 Table - Alternative "E" Roadless Area Status

Roadless Area	Partly Devel.	Undev.
Mt. Jefferson		X
Metolius Breaks		X
Three Sisters	X	
West/South Bachelor	X	
Bearwallows		X
Bend Watershed	X	
Waldo	X	
Charlton	X	
North Paulina	X	
South Paulina	X	
Maiden Peak	X	

Visual Resources

All State and County highways and many Forest Service roads including those to major trailheads, are protected Most major buttes are also protected, but only part of the areas seen west of Davis Lake are protected. The area south of Mt. Bachelor and most of Pine Mountain are also protected.

It is important to review the Alternative Maps to identify the major differences between Alternatives B and E

Vegetation

Timber

Trees will be managed to provide cover for big game and habitat for bald eagles, to meet recreation and visual quality objectives, and to produce wood fiber and firewood. Timber would be harvested on both a chargeable (a fixed amount on an annual basis) and nonchargeable (variable amount depending on the need to manipulate stands to meet objectives) basis Lands on which recreation is emphasized would be classed as nonchargeable.

Of the lands suitable for timber production, timber harvesting is scheduled on 98 percent of the area. The relatively few acres of lands not programmed for timber harvesting are generally of lower timber value and higher management costs.

Timber harvest scheduling would be based on a nondeclining even flow. Mature and overmature lodgepole pine stands would be treated heavily in the first decade and then only minimally treated until the fourth decade.

The average annual wood output is 17.9 cubic feet or 99.8 million board feet in the first decade Thirty three percent of the cubic foot volume is from lodgepole pine stands and 31 percent is from Ponderosa pine stands This shifts to 6 percent lodgepole pine in the second decade and 23 percent Ponderosa pine Mixed conifer is 36 percent of the volume in the first decade and shifts to 71 percent in the second

In the first decade 53 percent of the acres programmed for harvest would be clearcuts or shelterwood cuts. Approximately 9,600 acres would be reforested annually

Old Growth

Old growth will be present on 262,500 acres after the fifth decade. This represents 18 percent of the forested acreage It does not include non commercial species nor does it account for timber stands which are of size and age now that will become old growth in fifty years. This alternative contains 32,800 acres in the old growth management area and 219,900 acres of old growth in management areas with no timber harvest Old growth will be maintained under these management guidelines

Wildlife Habitat

Big Game Habitat

Thirty to 50 percent of the important deer habitat would be maintained in thermal cover. Approximately 25 percent of the shrub communities would be regenerated to younger shrub classes by prescribed burns each decade. The amount and condition of habitat could provide for increases in the mule deer population to 29,000 animals

Other Wildlife Habitat

Habitat for cavity dwelling species would be provided at 40 percent of the maximum biological potential in even-aged harvest units and 60 percent in uneven-aged units Habitat for osprey would remain about the same except at Crane Prairie Reservoir where nest-trees are toppling from age

Range

Use of vacant grazing allotments would be encouraged Full utilization of forage available for livestock would be emphasized Range investments would be increased above current levels Cost effective management systems and techniques, including fencing and water development, would be designed and applied to obtain relatively uniform livestock distribution and use of forage, and to maintain plant vigor

Special Areas

Research Natural Areas

The following areas would be recommended for inclusion in the Research Natural Area program: Cache Mountain, Cultus River, Katsuk Butte, Torrey-Charlton, Many Lakes, Wechee Butte and Mokst Butte

Special Interest Areas

Additional Special Interest Areas would be included because of unusual geological or botanical features. They are shown below.

Figure 2-19 Table - Alternative "E" Special Interest Areas

Name	Status
Lava Butte	Existing
Lava Cast Forest	Existing
Lavacicle Cave	Existing
Wake Butte	Proposed
Castle Rock	Proposed
Katati Butte	Proposed
Hole in the Ground	Proposed
Big Hole	Proposed
Balancing Rock	Proposed
Moffit Butte	Proposed
Lava River Cave	Proposed
Davis Lake	Proposed
Hosmer Lake	Proposed

Transportation

Roads necessary to support the timber program would be developed. Coordination with other resources, such as recreation, will be evaluated. Temporary roads would be closed upon completion of timber sales Some seasonal restrictions would apply to reduce disturbance to wildlife.

The Todd Lake to Three Creek Lake road would be maintained to its current condition The same would apply to the Irish-Taylor road. The Windigo Pass Road and Waldo Lake Road could be improved some for increased traffic volume and both roads could be upgraded to a two lane standard with NEPA documentation

Energy

Geothermal

The number of acres open to or allowing few restrictions to geothermal leasing varies by alternative, depending upon the number of acres within different managmenet area allocations Altenatives with an amenity emphasis have fewer acres open and more restrictions than do alternatives with a commodity emphasis
Geothermal leasing could be permitted in the Newberry Crater Known Geothermal Resource

Area (KGRA) only after an environmental analysis under NEPA is conducted

The interior of Newberry Crater would not be open to leasing, nor would designated Wilderness areas, the Bend Watershed, or the Oregon Cascades Recreation Area.

All post-lease geothermal activities (exploration, development, or production) would require completion of environmental analysis under NEPA.

Firewood

Twenty million board feet (40,000 cords) would be made available annually for personal use firewood This matches the current level of demand. If demand should increase, up to 60,000 cords could be made available to meet demand. Until 1995, mature dead and dying lodgepole pine would comprise a large part of this wood. Beyond that, the type of material would shift to other products and species. The amount available per individual permit would be adjusted based upon demand. Should demand continue to increase, the amount per permit could be decreased. Demand could reach a point where it may be necessary to limit the number of permits issued. The price of personal use firewood would trend upward and be re-evaluated each year. Areas where personal use firewood cutting would be emphasized could also be determined on an annual basis. The trend, however, would be that cutting areas would be located further and further from Bend and LaPine as time passed. By 1995, much of the emphasis would be on the Fort Rock and Crescent Districts.

Figure 2-20 Table - Alternative "E" Summary Of Results Related to Key Issues

Issue	Result
Recreation	
Average annual MRVD's of developed recreation.	2432
Average annual MRVD's of dispersed recreation.	2278
Planned Campground Construction	Meet Demand
Timber	
Million cubic feet average annual ASQ for the first decade	17 9
Million board feet average annual ASQ for the first decade.	99.8
Wildlife	
Potential mule deer population.	29,800
Potential bald eagle population (pairs)	45
Potential osprey population (pairs)	80
Energy	
M Acres of high potential geothermal areas available for leasing	108.3
Amount of personal use firewood provided.	60,000 cords
Social/Economic	
Present net value	$631.05Million
First decade average revenues to the Government.	$10.6 Million
First decade average annual returns to the counties.	$2.6 Million

Figure 2-21

Figure VII

Alternative G

The goal of this Alternative is to provide for high levels of amenity values

Alternative G provides for ecosystem preservation by having significant acres of the roadless areas remain unroaded Areas available for timber production would be reduced

A wide range and large amount of recreation opportunities would be provided but emphasis would be on activities not requiring large or sophisticated developed sites such as fishing, tent camping, cross-country skiing, and hiking Scenic resources would be emphasized along heavily traveled roads and other roads and areas receiving high amounts of recreation use.

Habitat for threatened and endangered plants and wildlife species and old-growth ecosystems would be provided at high levels

Vegetation

Trees

Trees will be managed to provide cover for big game and habitat for bald eagles, to meet recreation and visual quality objectives, and to produce wood fiber and firewood Timber is harvested on both a chargeable (a fixed amount on an annual basis) and nonchargeable (not a fixed amount but can vary depending on the need to manipulate a stand to meet some objective) basis On lands where recreation and visual quality are emphasized, the lands would be classed as nonchargeable.

Of the lands available for timber production, timber harvesting is scheduled on 98 percent of them Lands not programmed were unroaded or generally had low value species and high management costs.

The timber harvest level would be based on nondeclining yield. The average annual first decade harvest would be 15 6 million cubic feet or 86 million board feet. Mature and overmature lodgepole pine would be converted to, managed stands slowly starting in the second decade. During the first decade, less than 1 percent of the total cubic foot volume is from lodgepole pine stands and 47 percent is from Ponderosa pine stands This shifts to 14 percent lodgepole pine in the second decade with 17 percent being Ponderosa pine. Mixed conifer is 53 percent of the harvest in the first decade and 66 percent in the second. The remaining volume is from mountain hemlock

During the first decade there would be no areas scheduled for harvest by clearcuts and shelterwoods. Approximately 4,100 acres would be reforested annually

Old Growth

Old growth will be present on 242,400 acres after the fifth decade. This represents 17 percent of the forested acreage It does not include noncommercial species nor does it account for timber stands which are of size and age that will become old growth in fifty years. There is a total of 49,000 acres in the old growth management area and 211,100 acres in management areas with no timber harvest These stands will be managed essentially as old growth

Range

Livestock levels would be maintained at current levels. Cost effective management systems and techniques, including fencing and water development, would be designed and applied (1) to obtain relatively uniform livestock distribution and use of forage and (2) to maintain plant vigor.

Recreation

Developed Recreation

All campgrounds where a fee is charged will receive a minimum standard of cleaning and maintenance All nonfee campgrounds will be closed. All day use sites will also receive the minimum standard of maintenance

No new campgrounds will be constructed. Some new day use sites associated with nonmotorized activities such as trailheads leading into the Wilderness will be constructed.

Dispersed Recreation

Sixty-seven percent of the unroaded lands will have an undeveloped prescription and 99.7 percent of the unroaded lands will remain undeveloped at the end of the second decade because of the timber harvest schedule.

The summer trail system for horses and hikers will be maintained at the current level Missing sections will be constructed and substandard sections will be reconstructed A mountain bicycle trail system will be developed The nordic trail system will also be maintained and expanded. The motorized trail system for snowmobiles, motorcycles, and all-terrain vehicles will be deemphasized

Oregon Cascade Recreation Area (OCRA)

In the OCRA the road up the Little Deschutes River would be closed to motorized use The road up Big Marsh above Otter Creek would also be closed to motorized use The Summit Lake Road would remain open and be maintained at its current condition No timber would be harvested unless it was a direct hazard to the users of the area. Motorized vehicles would not be permitted on trails or in any other part of the area in the summer Over-the-snow vehicles would be permitted in the winter.

Visual Resources

Major acreages in this allocation remain undeveloped. In those areas available for development, the major State and County highways and the major Forest Service roads are protected The major buttes are also protected.

Please review the Alternative Maps to identify the differences between alternatives.

Special Areas

Special Interest Areas

All areas with identified special botanical or geological features not protected would be given protection or interpretation under this Alternative.

Figure 2-22 Table - Alternative "G" Special Interest Areas

Name	Status
Lava Butte	Existing
Lava Cast Forest	Existing
Lavacicle Cave	Existing
Wake Butte	Proposed
Castle Rock	Proposed
Katati Butte	Proposed
Hole in the Ground	Proposed
Big Hole	Proposed
Balancing Rock	Proposed
Moffit Butte	Proposed
Lava River Cave	Proposed
Hosmer Lake	Proposed

Research Natural Areas

The following areas would be recommended for inclusion in the Research Natural Area program: Cache Mountain, Cultus River, Katsuk Butte, Torrey-Charlton, Many Lakes, Wechee Butte and Mokst Butte

Wildlife Habitat

Big Game Habitat

At least 30 percent of the important deer habitat would be maintained in thermal cover. Prescribed burning would not be emphasized. The mule deer population could decline below current levels to 16,700.

Other Wildlife Habitat

Habitat for cavity dwelling species would be provided for at 80 percent of maximum biological potential Osprey and Bald eagle populations could increase

Energy

Geothermal

The number of acres open to or allowing few restrictions to geothermal leasing varies by

alternative, depending upon the number of acres within different managmenet area allocations Altenatives with an amenity emphasis have fewer acres open and more restrictions than do alternatives with a commodity emphasis.
Geothermal leasing could be permitted in the Newberry Crater Known Geothermal Resource Area (KGRA) only after an environmental analysis under NEPA is conducted.

The interior of Newberry Crater would not be open to leasing, nor would designated Wilderness areas, the Bend Watershed, or the Oregon Cascades Recreation Area

All post-lease geothermal activities (exploration, development, or production) would require completion of environmental analysis under NEPA.

Firewood

Initially 20 million board feet (40,000 cords) would be made available for personal use firewood This matches the current level of demand If demand should increase, up to 75,000 cords could be made available to meet demand Some adjustment in the amount available per individual permit might also be necessary The price of personal use firewood would trend upward very gradually Areas where personal use firewood cutting is emphasized would be determined on an annual basis The trend, however, would be that cutting areas would be located further and further from Bend and LaPine as time passed. By 1995, much of the emphasis would be on the Fort Rock and Crescent Districts By 2005, mature dead and dying lodgepole pine would comprise a large part of this wood. Beyond that, the type of material would shift to other products and species.

Transportation

Some roads necessary to support the timber program would be developed, with fewer miles than other alternatives. Coordination with other resources will be evaluated. Temporary roads would be closed upon completion of timber sales. Considerable seasonal restrictions would apply to reduce disturbance to wildlife.

The Todd Lake to Three Creek Lake and Irish-Taylor roads would be closed. The Waldo Lake road, would be maintained in its present condition as well as the Windigo Pass road.

Roadless Areas

The following display indicates the proposal for each roadless area. For more details refer to Figure 2-83 and/or Appendix C. None of the roadless areas are developed in the first decade.

Figure 2-23 Table - Alternative "G" Roadless Area Status

Roadless Area	Partly Developed
Mt. Jefferson	X
Metolius Breaks	X
Three Sisters	X
West/South Bachelor	X
Bearwallows	X
Bend Watershed	X
Waldo	X
Charlton	X
North Paulina	X
South Paulina	X
Maiden Peak	X

Figure 2-24 Alternative "G" Summary of Results Related To Key Issues

Issue	Result
Timber	
Million cubic feet average annual ASQ for the first decade	15 6
Million board feet average annual ASQ for the first decade	86.0
Recreation	
Average annual MRVD's of developed recreation	1926
Average annual MRVD's of dispersed recreation.	1180
Planned Campground Construction	None
Wildlife	
Potential mule deer population.	16,700
Potential bald eagle population (pairs).	50
Potential osprey population (pairs).	180
Energy	
M Acres of high potential geothermal areas available for leasing.	59.8
Amount of personal use firewood provided.	75,000 cords
Social/Economic	
Present net value	$274.52 Million
First decade average revenues to the Government.	$9.1 Million
First decade average annual returns to the counties.	$2.2 Million

Comparison of Alternatives Considered in Detail

Overview

This section will present the Alternatives in a way that they can be easily compared. The aspects of the Alternatives that will be presented for comparison include

Management areas, including acre allocations and descriptions of each management strategy,

Quantitative resource outputs by alternative,

Qualitative resource outputs and environmental effects,

Response to issues and concerns,

Discounted costs and benefits (PNV) in a way that defines tradeoffs.

In addition to tables presenting information, there are narrative sections describing differences between the alternatives Throughout the tables and text, reference is made to decades A Plan covers a 10 to 15-year period so the first decade outputs and effects are those that would occur during the life of the Plan The outputs and effects for the remaining decades are potential outputs and effects that might occur if an alternative were carried beyond the first 10 to 15 years.

Implementation of any alternative would result in the production of certain outputs and effects which have environmental consequences Some of the consequences are short-term while others are long-term or cumulative. Chapter 4 presents a detailed discussion of the interrelationships between the outputs and their environmental consequences In the following section of this Chapter, management areas and the specific outputs and effects for each alternative are presented for comparison Appendix B contains a detailed description of the analysis used to develop these outputs and effects Chapter 4 and Appendix B describe environmental consequences associated with each alternative

The display of outputs in this section is useful in making comparisons among the Alternatives

There is no assurance that the outputs will actually occur at the project level The outputs are estimates and projections based on available inventory data and assumptions, subject to annual budgets, on the ground conditions, changes in laws and regulations, national and local economic conditions In the event of unpredicted changes, new data, the Forest may adjust projected accomplishments by amendments or revisions to the Forest Plan

The purpose of forest planning is to identify and select for implementation the alternative that most nearly maximizes net public benefits Net public benefits are defined as the " overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not . . consistent with the principles of multiple use and sustained yield" (36 CFR 219.3)

There is no mathematical formula available to define the Preferred Alternative Indeed, there are differences of opinion about whether particular effects of alternatives are positive or negative Therefore, it is necessary to separately identify all the major effects of each alternative as the basis for review, judgment, and an eventual selection.

The following tables summarize the outputs and effects that differ between Alternatives Timber management activities have a direct effect on Forest resource outputs, effects, activities and costs The tables have the Alternatives arranged in alphabetical order

Figure 2-25	Acreages in Management Areas by Alternative.
Figure 2-50	Average Quantifiable Resource Outputs and Environmental Effects by Alternative
Figure 2-64	Qualitative Resource Outputs and Environmental Effects by Alternative
Figure 2-65	Comparison of Issue and Concern Resolution by Alternative.

Figure 2-73 Summary of Roadless Area Development by Alternative.

Management Areas

A management area is a unit of land where a prescription or set of prescriptions is applied. Prescriptions are management practices, direction, standards/guidelines, and activities selected and scheduled for application on a specific geographic area to attain multiple use and other goals and objectives (36 CFR 219 3). Chapter 4 of the Forest Plan contains details on management area prescriptions.

The Management Areas are to be managed according to the management prescriptions (which include direction, standards/guidelines). One of the principal functions of these management prescriptions is to ensure that potentially adverse environmental effects are mitigated and/or avoided. Some of the standards/guidelines were developed by the Interdisciplinary Team specifically to respond to environmental conditions on the Deschutes National Forest, while others were adopted from the standards/guidelines in the Regional Guide[1].

Each alternative distributes the lands of the Forest to different management areas. The acres in the different management areas vary from one alternative to another. These acres are presented in Figure 2-25. The land and resource management goals for each management area follow Figure 2-25. Figures 2-26 through Figure 2-37 are bar graphs which compares alternatives for each management area. The Management Areas for each alternative are shown on the maps which accompany this FEIS.

The No Change Alternative is very similar to Alternative A (No Action) because the 1974 Timber Management Plan was amended to take the 1978 Land Management Plan into account. The primary difference is that timber outputs associated with Alternative A incorporated the requirements of the National Forest Management Act while the No Change Alternative shows timber output based on the potential yield in the 1974 amended Timber Management Plan and does not include any of the requirements of NFMA. Because of this the same management options (areas) apply to the Alternative A "No Action" and the No Change Alternatives. The standards/guidelines apply to all the Alternatives in the EIS except the No Change Alternative However such laws as Endangered Species Acts and Cultural Resources, would apply while requirements to cave management and energy may not. The source documents for the No Change Alternative contain some specific management direction that is incorporated from other documents. They contain such things as streamside management, avian nesting needs, fuel treatment methods, and priorities for stand treatment.

Due to public comment, ten new management areas were developed, between the DEIS and this FEIS The Eagle, Owl and Osprey Management Area was separated, thus 28 Management Areas are displayed in this FEIS. Some management area allocations were modified to respond to public comment and incorporate the New Wild and Scenic Rivers Bill which was passed in October of 1988.

The Metolius Basin is truly unique in the quality and diversity of its natural resource and spiritual values. The River's headwaters well from the ground in scenic springs, ensuring pristine water quality and excellent fisheries Abundant rainfall and rich soils have combined to produce luxuriant forests of fir, cedar, larch and Ponderosa pine which have contributed greatly to the demand for forest products locally and regionally. Big, yellow-barked Ponderosa pine trees are a highlight of the Basin. The Metolius ecosystem provides habitat for a wide variety of plant and animal species

The upper basin of the Metolius River is an inspiring forest setting. For decades people have found the Metolius to be a special place where they are relieved from the stresses of everyday life amidst a unique natural beauty that exists in few other places. In many families, a tradition of recreation use and love of the Metolius has been handed down over several generations

[1]Refer to the more complete description of the standards/guidelines in the Forest Plan which contain direction for the enhancement, protection, and mitigation of resources.

Outstanding natural scenery exists throughout the Basin and attracts visitors who seek a variety of recreation pursuits. Black Butte has been a landmark since the first settlers arrived and continues today as a scenic beacon to travelers and residents. The Metolius is outstanding in the abundance of its resources and depth of feeling with which they are held by all who visit this special place

Recognizing these special qualities of the Metolius, and wishing to preserve its outstanding values for future generations, the Metolius Conservation Area is established in this plan. This 86,000 acre *area encompasses Black Butte, the Metolius Basin* between the wilderness boundary on the west and Green Ridge on the east, and the "Horn of the Metolius"

This part of the Deschutes National Forest is set apart and will be managed differently from other lands. The Metolius Conservation Area contains ten management areas, many of which are unique, each having a specific goal and theme which describes the direction for management in the foreseeable future. Detailed standards and guidelines written for each management area support the goal and theme. Any project or initiative undertaken in the Metolius Conservation Area *must conform in design and application to the* appropriate standards and guidelines.

Figure 2-25 Acreages in Management Areas By Alternative

Management Areas	No Change	(No Action) A	(RPA) B	C	Pref. E	G
1 Special Interest	36,100	36,100	17,300	12,100	16,900	14,400
2 Research Natural	7,200	7,200	6,500	2,900	5,700	7,200
3 Eagle	3,500	3,500	18,900	14,500	19,100	19,700
4 Owl	17,300	17,300	17,300	17,300	12,000	17,300
5 Osprey	9,600	9,600	8,200	0	8,100	30,000
6 Wilderness[1]	181,300	181,300	181,300	181,300	181,300	181,300
7 Deer Habitat	193,200	193,200	189,100	227,000	208,900	116,800
8 General Forest	648,900	648,900	718,900	913,100	626,300	786,200
9 Scenic Views	321,300	321,300	220,700	42,200	171,700	133,100
10 Bend M. Watershed	3,700	3,700	3,700	3,700	3,700	3,700
11 Intensive Rec	2,200	2,200	64,100	97,100	67,100	52,800
12 Dispersed Rec	63,500	63,500	59,200	1,400	48,400	138,000
13 Winter Recreation	0	0	26,200	26,000	32,200	0
14 OCRA	42,700	42,700	42,700	42,700	42,700	42,700
15 Old Growth	27,900	27,900	19,000	11,800	32,800	49,900
16 Experimental Forest	9,000	9,000	9,000	9,000	9,000	9,000
17 Wild & Scenic Rivers[2]	24,400	24,400	24,400	24,400	19,800	24,400
18 Front Country					34,700	
19 Metolius Heritage					24,300	
20 Metolius Wildlife -Primitive					13,100	
21 Metolius Black Butte Scenic					10,600	
22 Met. Special For					18,400	
23 Met. Special Interest					1,700	
24 Metolius RNA					1,300	
25 Met Spotted Owl					5,400	
26 Met Scenic Views					4,800	
27 Met Old Growth					1,800	
28 Met W&S Rivers					4,600	
Protection Mgmt	31,300	31,300				
Mining Claims	3,400	3,400				
Net Forest Land Acre	1,621,000					
Private/Other	247,300					
Gross for All Alts.	**1,868,300**					

[1]Acres from Forest GIS mapping system

[2]Contains 5,500 acres that are duplicated in the OCRA Mgmt Area

Figure 2-26 Compares Special Interest Areas by Alternative

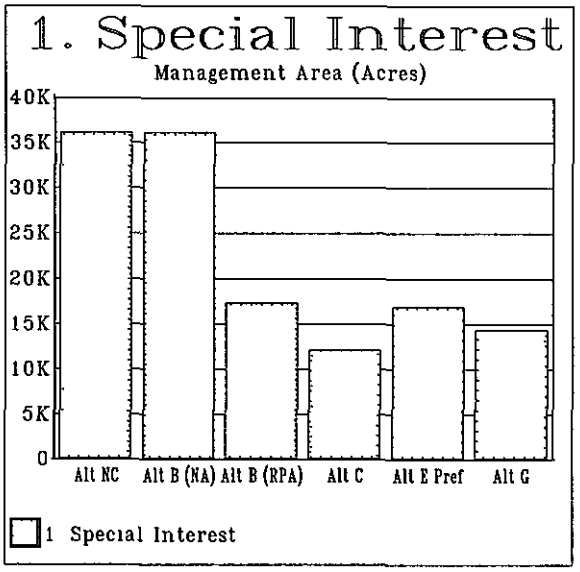


Figure 2-27 Compares Research Natural Areas by Alternative

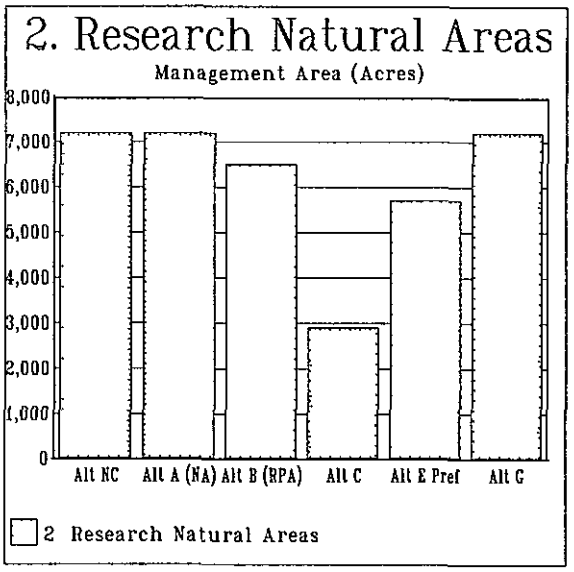


Figure 2-28 Compares Bald Eagle Habitat by Alternative

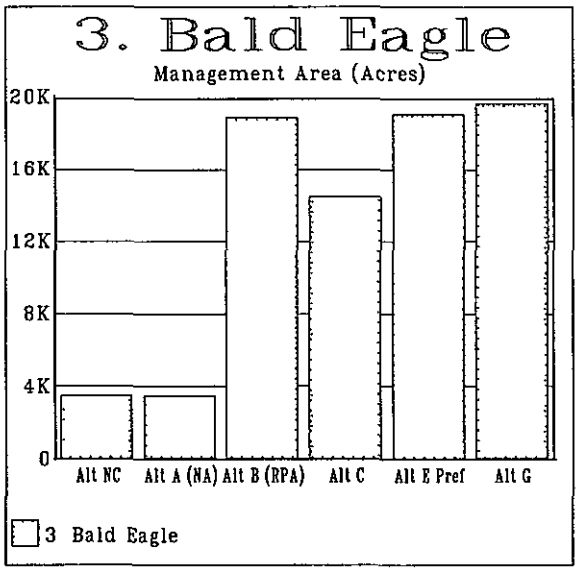


Figure 2-29 Compares Spotted Owl Habitat by Alternative

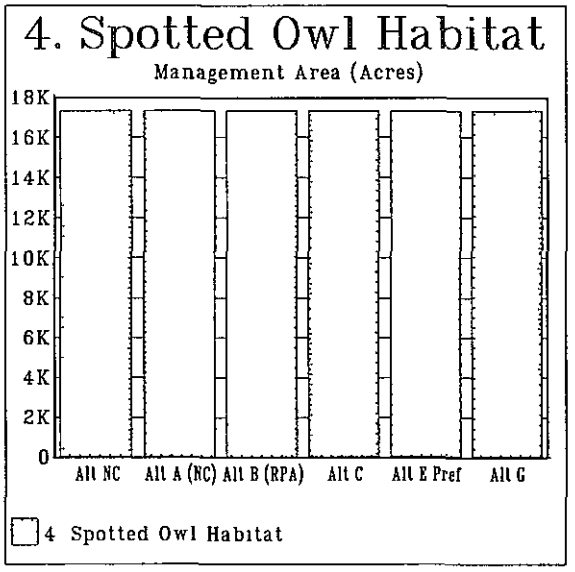


Figure 2-30 Compares Osprey Habitat by Alternative

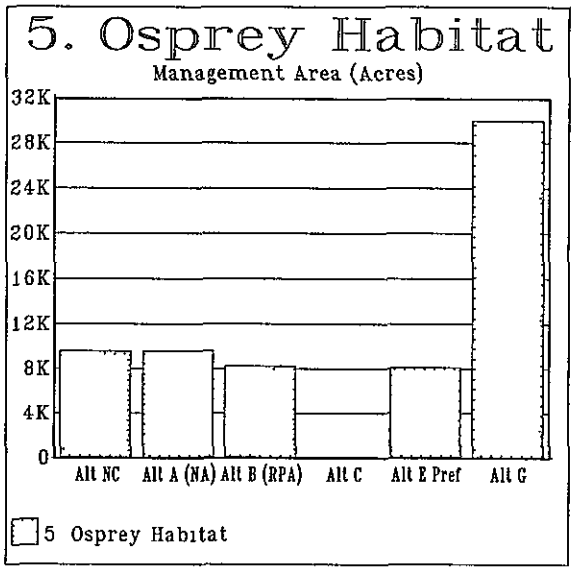


Figure 2-31 Compares Deer Habitat by Alternative

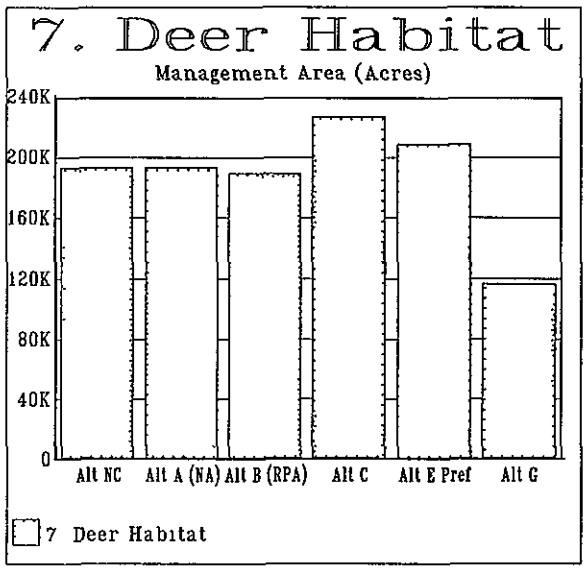


Figure 2-32 Compares General Forest by Alternative

Alternative E includes 16,000 acres of Front Country area not seen from identified points which will be managed as General Forest

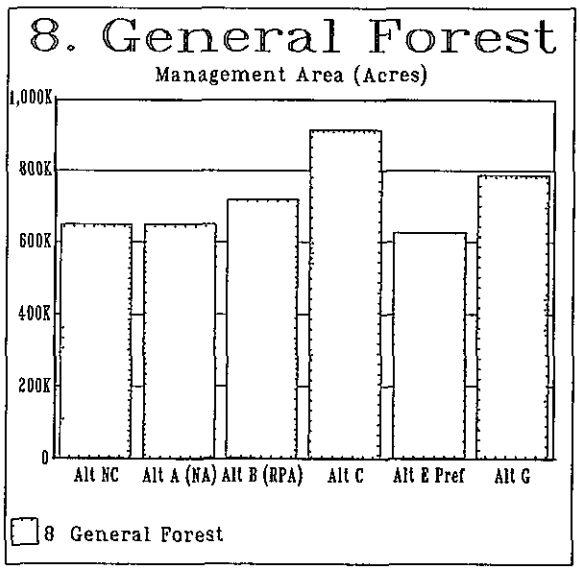


Figure 2-33 Compares Scenic Views by Alternative

Alternative E includes 18,700 acres of the seen area in the Front Country Management Area, 18,400 acres of the Metolius Special Forest Management Area, and 10,600 acres of the Metolius Black Butte Management Area, all of which will be managed similar to the Scenic Views Management Area

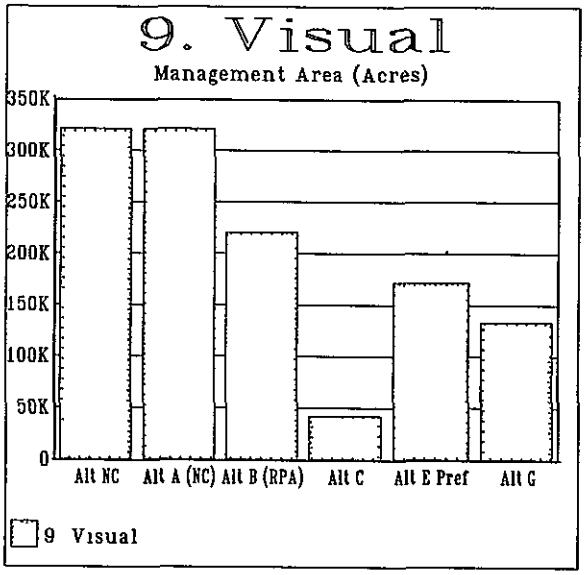


Figure 2-34 Compares Intensive Recreation by Alternative

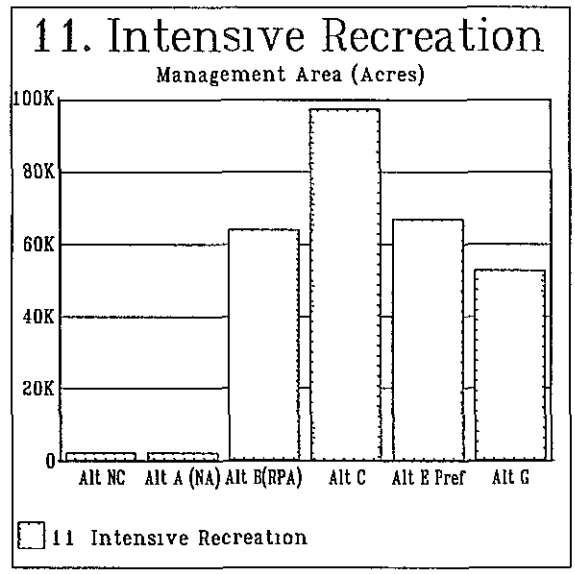


Figure 2-35 Compares Undeveloped Recreation by Alternative

Alternative E includes 12,300 acres of Metolius Wildlife/Primitive Management Area which will be managed similar to undeveloped recreation.

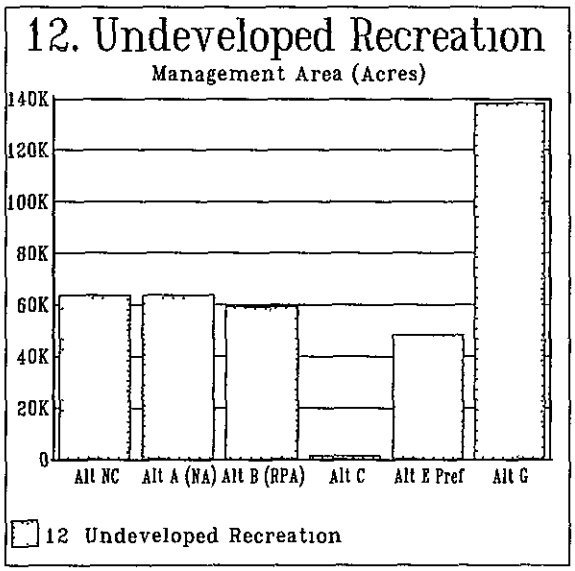


Figure 2-36 Compares Winter Recreation by Alternative

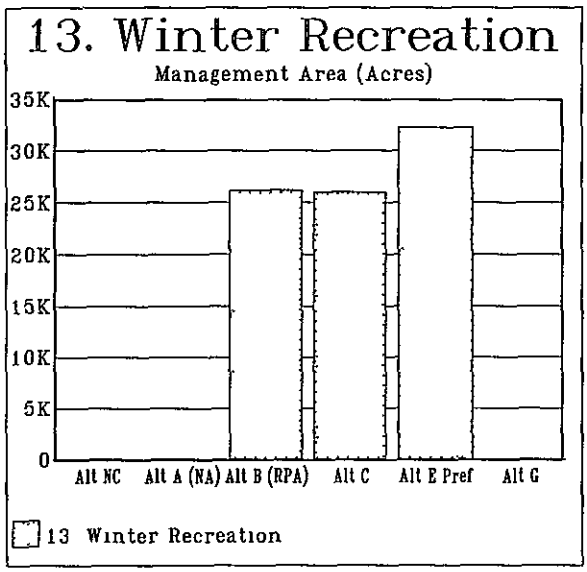
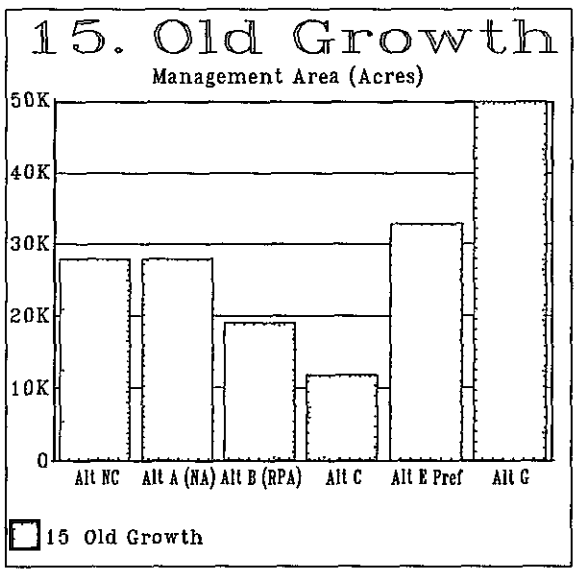


Figure 2-37 Compares Old Growth by Alternative

Alternative E includes 24,300 acres of Metolius Heritage Management Area, which will be managed essentially as old growth.



Description of Management Areas

Brief descriptions of each of the management areas follow. They are described by a goal statement and desired future condition. They are described here to aid in the understanding of the Alternatives.

Management Area 1 Special Interest Areas

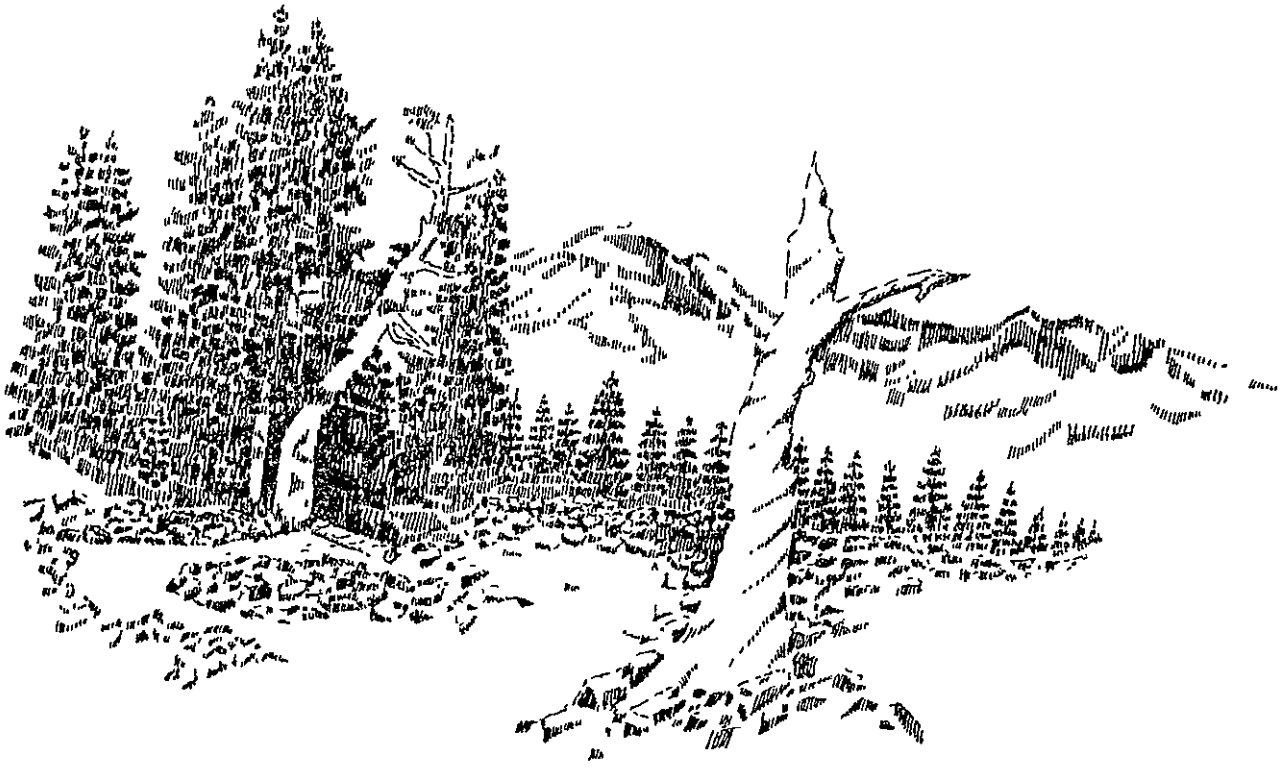
Goal

To preserve and provide interpretations of unique geological, biological, zoological, and cultural areas for education, scientific, and public enjoyment purposes

General Theme and Objectives

Unusual geological or biological sites and areas are preserved and managed for education, research, and to protect their unique character. Facilities and opportunities may be provided for public interpretation and enjoyment of the unique values of these sites and areas. The primary benefiting uses of these areas will be for developed and dispersed recreation, research, and educational opportunities. These areas will be designated by Regional Forester authority.

Figure 2-38 Management Area 1



Management Area 2 Research Natural Areas

Goal

To preserve examples of naturally occurring ecosystems in an unmodified condition for research and education

General Theme and Objectives

Research Natural Areas (RNAs) are managed to preserve the natural ecological succession All Establishment Reports for these areas must be approved by the Chief of the Forest Service

Research on Research Natural Areas must be essentially nondestructive in character; destructive analysis of vegetation is generally not allowed nor are studies requiring extensive forest floor modification or extensive soil excavation Collection of plant and animal specimens should be restricted to the minimum necessary for provision of vouchers and other research needs and in no case to a degree which significantly reduces species population levels Such collection must also be carried out in accordance with applicable State and Federal agency regulations. In consultation with Forest Supervisors and District Rangers, the Director of the Pacific Northwest Forest and Range Experiment Station is responsible for approving management implementation plans and for overseeing and coordinating approved research on all research natural areas District Rangers administer, protect, and manage established research natural areas and report through the Forest Supervisors to the Station Director any planned activities on, or immediately adjacent to, research natural areas

The purpose of RNAs is to provide:

1 Baseline areas against which effects of human activities can be measured.

2. Sites for study of natural processes in undisturbed ecosystems

3. Gene pool preserves for all types of organisms.

Management Area 3 Bald Eagles

Goal

To protect and manage habitat to enhance the carrying capacity of bald eagles.

General Theme and Objectives

Nesting habitat and foraging areas will be protected and enhanced Suitable nesting sites will be provided on a continuing basis. Old-growth stands with large trees will be emphasized for bald eagles Stands will be managed so that suitable nesting sites are available on a continuing basis and spaced to minimize territorial competition. Human disturbance will be minimal during the nesting season.

Management Area 4 Spotted Owls

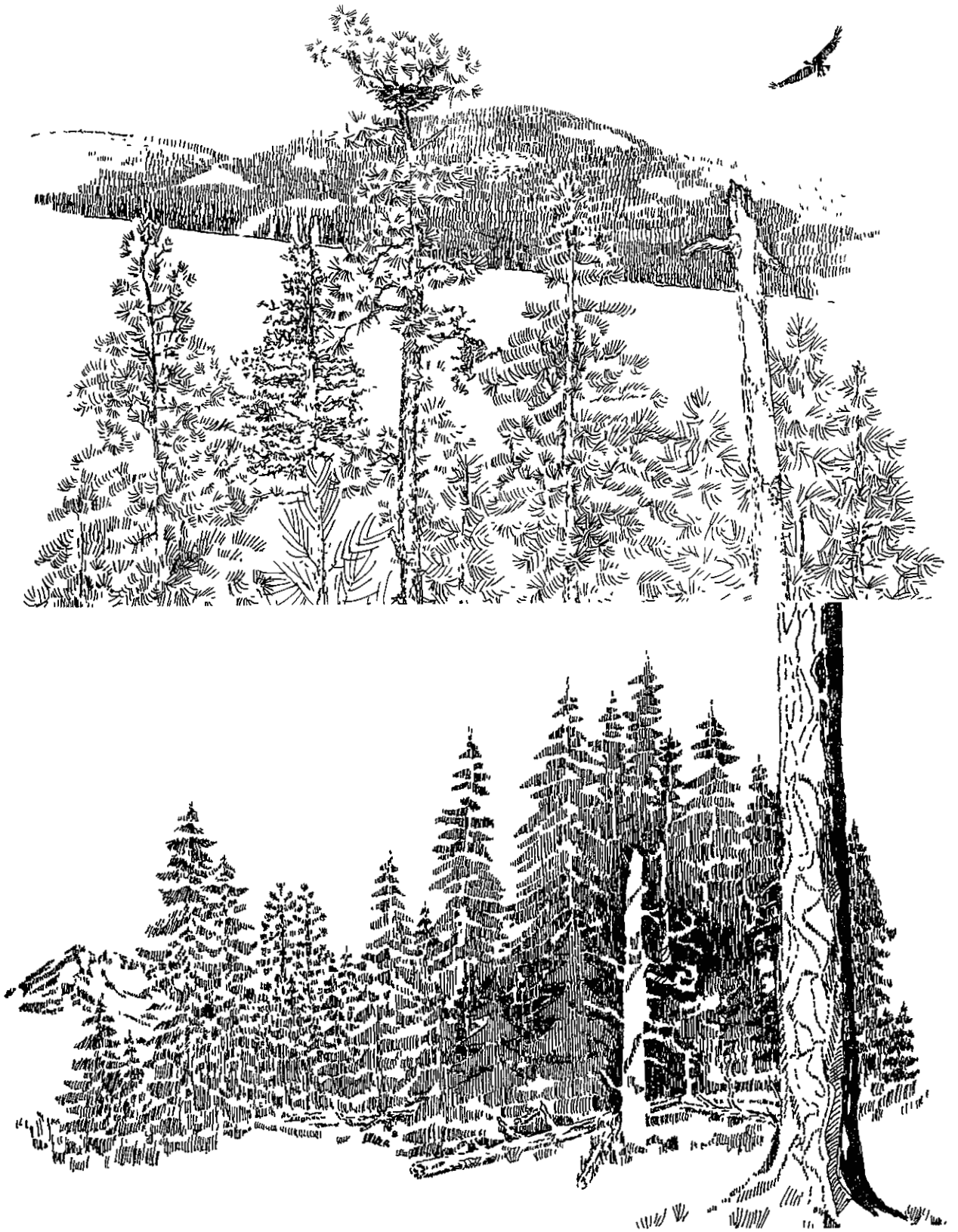
Goal

Manage habitat to enhance the carrying capacity for Northern Spotted Owls

General Theme and Objectives

Nesting habitat and foraging areas will be protected and enhanced Suitable nesting sites will be provided on a continuing basis Old-growth stands with large trees will be emphasized for northern spotted owls Stands will be managed so that suitable nesting sites are available on a continuing basis and spaced to minimize territorial competition Human disturbance will be minimal during the nesting season

Figure 2-39 & 40 Management Areas 3 & 4



Management Areas 5 Osprey

Goal

Manage the habitat to enhance the carrying capacity for osprey.

General Theme and Objectives

Nesting habitat and foraging areas will be protected and enhanced Suitable nesting sites will be provided on a continuing basis. Osprey habitat will contain numerous trees and snags suitable for nesting. Stands will be managed so that suitable nesting sites are available on a continuing basis and spaced to minimize territorial competition Human disturbance will be minimal during the nesting season

Management Area 6 Wilderness

Goal

To feature naturalness, opportunities for solitude, challenge, and inspiration, and within these constraints to provide for recreational, scenic, scientific, educational, conservation and historical uses

Permitted but nonconforming uses specified in the Wilderness Act of 1964, will be carried out under restrictions designed to minimize their impact on the Wilderness. The decisive criteria in all conflicts will be to preserve and protect the Wilderness character of the resource

General Theme and Objectives

Wilderness exemplifies freedom, but is defined more by the absence of human impact than by an absence of human control. Management therefore will seek to minimize the impact of use A high priority, however, will be placed on permitting as much freedom from regimentation as possible while preserving the naturalness of the Wilderness resource and the opportunity for solitude, primitive recreation, scenic, scientific, and historical values.

In working towards this goal, a nondegradation policy of management shall be followed. The nondegradation policy recognizes that in Wilderness one can find a range of natural and social settings from the most pristine to those where naturalness and opportunities for solitude have been diminished by established uses. It is the intent of this policy to assure that appropriate diversity and existing Wilderness character are maintained. Furthermore, the wildest areas of a Wilderness will not be allowed to deteriorate to a lesser standard of naturalness to disperse and accommodate more use. Management will seek to maintain each Wilderness in at least as wild a condition as it was at the time of its classification. Certain areas may need rehabilitation to reestablish basic wilderness values.

Wilderness areas shall be managed to enhance the Wilderness resource This includes the opportunity for solitude, physical and mental challenge, inspiration, experiencing a distinctive environment, and maintaining the Wilderness characteristics of the lands including wildlife habitat for species preferring isolation from human disturbance (e g wolverine), or undisturbed mature forest for old growth associated species (e.g. spotted owl).

The Deschutes National Forest manages the eastern portions of the Mt. Jefferson, Mt Washington, Three Sisters, and Diamond Peak Wildernesses, and the northern portion of the Mt Thielsen Wilderness Management jurisdiction of the remaining portions of these wilderness areas is held by the Willamette, Mt. Hood, Umpqua, and Winema National Forests

Management Area 7 Deer Habitat

Goal

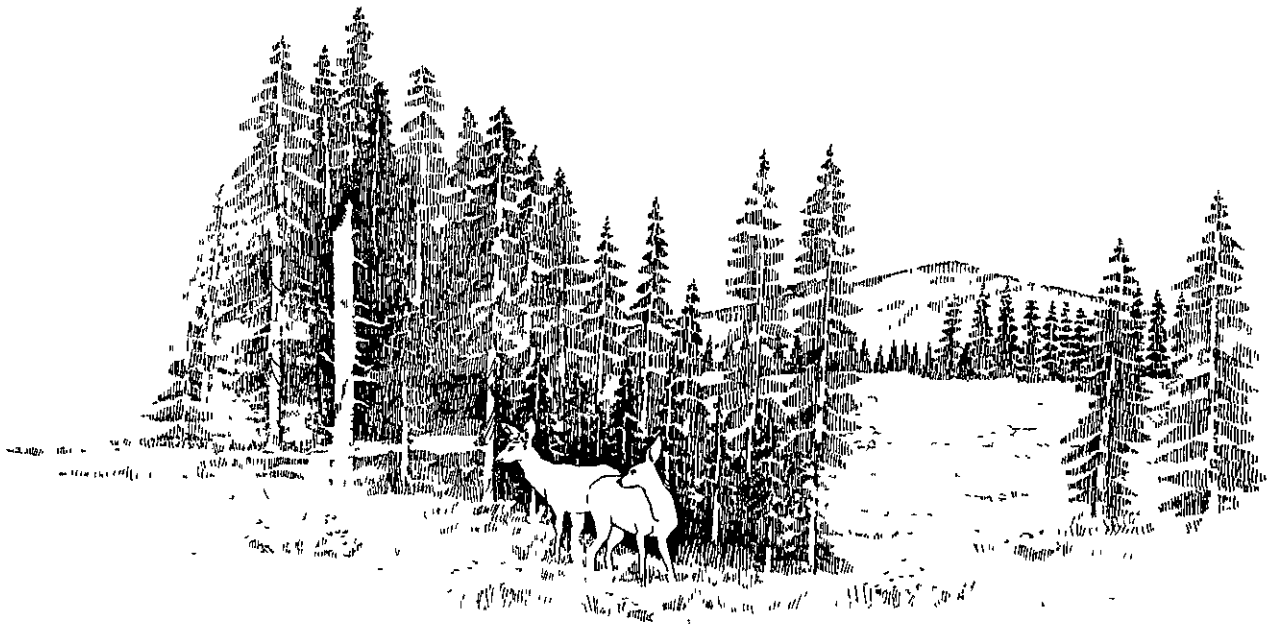
To manage vegetation to provide optimum habitat conditions on deer transition ranges while providing some domestic livestock forage, wood products, visual quality and recreation opportunities

General Theme and Objectives

Vegetation will be managed to provide optimum habitat considering the inherent productivity of the land. Herbaceous vegetation will be managed to provide a vigorous forage base with a variety of forage species available. Forage conditions will be improved where conditions are poor Foraging areas will be created where forage is lacking. Cover will be developed where lacking, maintained when in proper balance, or reduced when overabundant and more foraging areas are needed.

Livestock grazing, both sheep and cattle, will be permitted with associated range improvements such as fences and water developments

Figure 2-41 Management Area 7



Management Area 8 General Forest

Goal

To emphasize timber production while providing forage production, visual quality, wildlife habitat, and recreational opportunities for public use and enjoyment

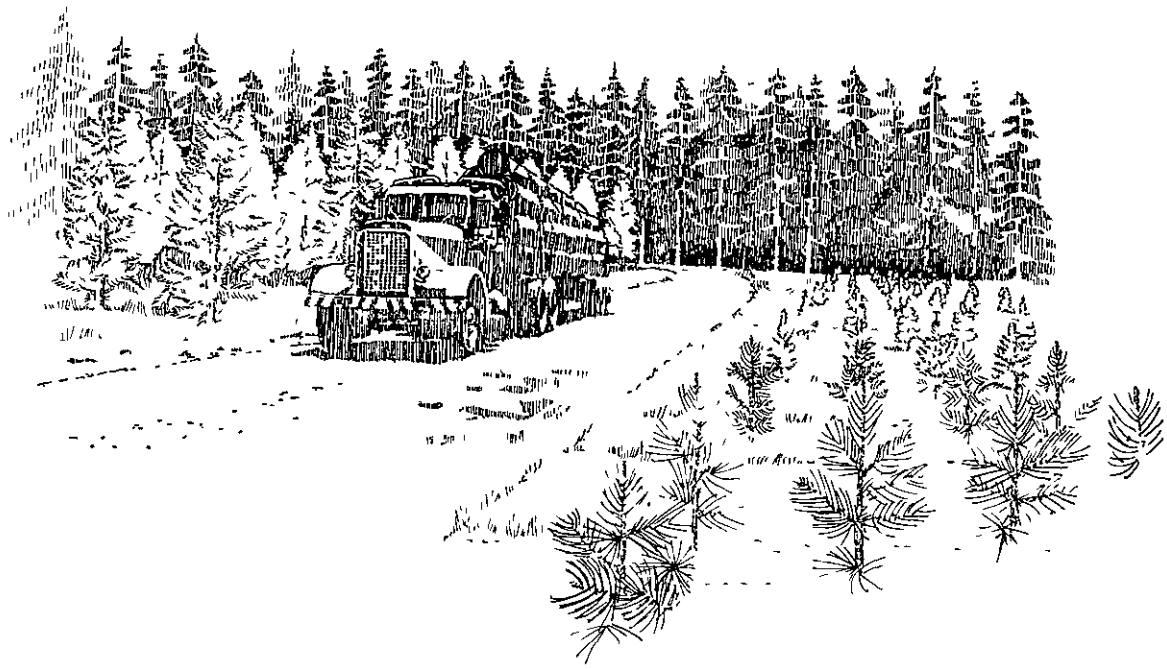
General Theme and Objectives

The objective of timber management in this Management Area is to continue to convert unmanaged stands to managed stands. The aim of a managed forest is to have stands in a variety of age classes with all stands utilizing the site growth potential This is achieved through stand treatments which include (but are not limited to) controlling stocking levels, maintaining satisfactory growth rates, protecting stands from insects, disease, and damage; controlling species composition; and regenerating stands that are no longer capable of optimum growth performance

Forage within this Management Area will be available for use by cattle, sheep, and big game. Some lands have no available forage so there will be no grazing On other lands there will be need for coordination between timber and range management. On some areas grazing will be an emphasized use. Range structural improvements such as fences and water troughs may be constructed and maintained to meet range and timber management objectives Range improvement projects such as prescribed burning or seeding may be utilized to improve the forage base.

There are opportunities for dispersed recreation activities, particularly those associated with roads. Informal camping and hunter camps are important uses of the area Developed site recreation opportunities such as camping or picnicking occur on a limited basis throughout the area.

Figure 2-42 Management Area 8



Management Area 9 Scenic Views

Goal

To provide Forest visitors with high quality scenery that represents the natural character of Central Oregon.

General Theme and Objectives

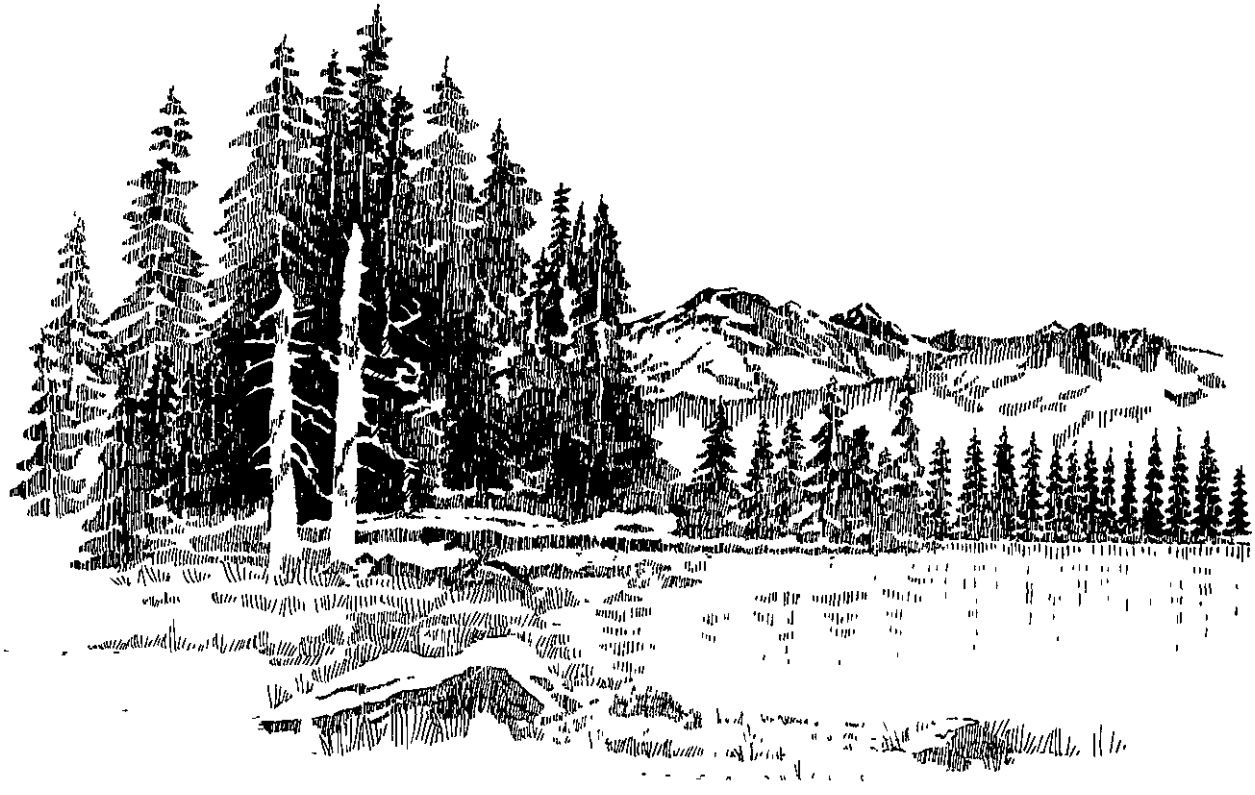
Landscapes seen from selected travel routes and use areas will be managed to maintain or enhance their appearance. To the casual observer, results of activities either will not be evident or will be visually subordinate to the natural landscape.

Landscapes will be enhanced by opening views to distant peaks, unique rock forms, unusual vegetation, or other features of interest Timber harvest is permitted, but only to protect and improve the visual quality of the stands both now and in the future. Timber stands, which have remained unmanaged in the past because of their visual sensitivity, will begin receiving treatment to avoid loss of the stand to natural causes Landscapes containing negative visual elements, such as skid roads, activity residue, or cable corridors, will be rehabilitated.

The desired condition for Ponderosa pine is to achieve and maintain visual diversity through variations of stand densities and size classes Large, old-growth pine will remain an important constituent, with individual specimen trees exceeding 30 inches in diameter and having deeply furrowed, yellowbark characteristics

For other species, the desired condition requires obtaining visual variety through either spatial distribution of age classes and species mixes, through density manipulation, or through a mixture of age classes within a stand.

Figure 2-43 Management Area 9



Management Area 10 Bend Watershed

Goal

To provide water at a level of quantity and quality which will, with adequate treatment, result in a satisfactory and safe domestic water supply.

To manage the Bend Municipal Watershed for multiple uses by balancing present and future resource use with domestic water supply needs.

General Theme and Objectives

The Bend Municipal Watershed will be managed to provide healthy timber stands that are growing at a moderate rate. Stands will be in a condition which provides a minimum threat for catastrophic fire and which will retard insect infestation. Existing water quality will be maintained Stream channels will be in stable conditions throughout the watershed. Access into the watershed for administrative and dispersed recreational activities will be allowed at a level which is compatible with the water quality goals of the Management Area

Management Area 11 Intensive Recreation

Goal

To provide a wide variety of quality outdoor recreation opportunities within a forest environment where the localized settings may be modified to accommodate large numbers of visitors.

General Theme and Objectives

This Management Area will provide a wide variety of recreation opportunities including, but not limited to, activities dependent on various intensities of development. Sophisticated facilities and sights and sounds of humans will be evident and often essential to provide the desired recreation experience Generally, high concentrations of visitors will occur around developments. Fewer numbers will occur outside developments, but encounters between visitors can be frequent. Visitors with little knowledge of outdoor skills will be able to enjoy the area

Opportunities for participation in a broad range of outdoor recreation activities will be available. Activities will often require support facilities and often, but not always, involve widespread use of motorized vehicles and boats.

Figure 2-44 Management Area 11

Management Area 12 Dispersed Recreation

Goal

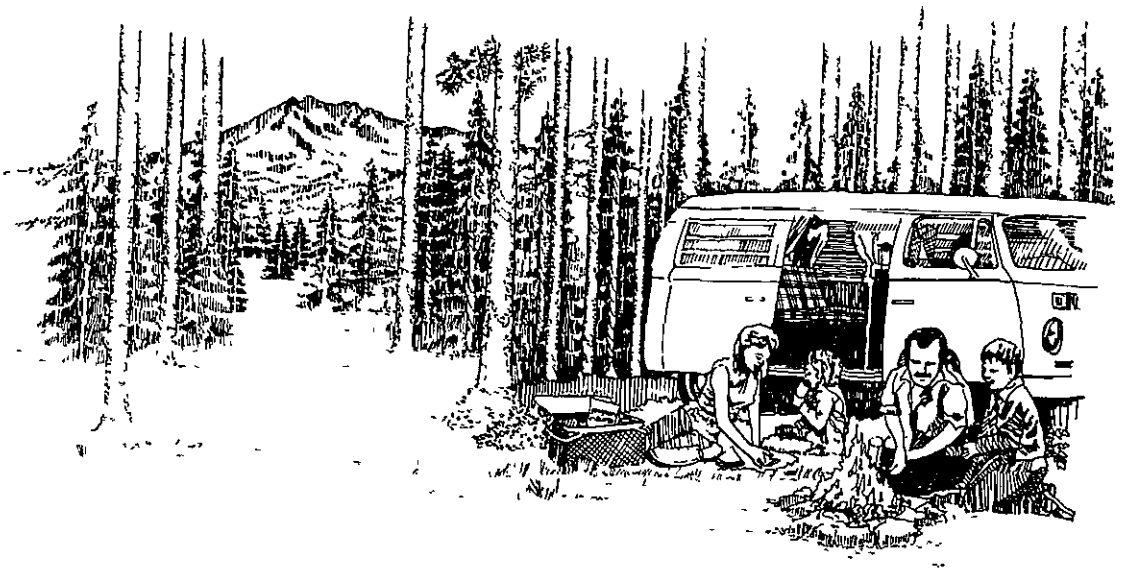
To provide a range of quality recreation opportunities in an undeveloped forest environment.

General Theme and Objectives

This Management Area will provide an environmental setting producing the kinds of recreation experiences that are attainable in large undeveloped areas. It will provide a feeling of vastness and remoteness and will have no irreversible evidence of humans. It will be in a predominantly unmodified or natural state. The environmental setting will often include a wide diversification of vegetation, terrain, and visible landform

It will be managed to provide limited social contact and interaction among visitors. Primitive facilities, such as shelters and small camps, signing, and a transportation system for visitor access and use may be established Management will provide recreation opportunities that occur in a primitive environment, but restrictions will be less than in Wilderness areas Motorized activities could be permitted in some areas. Low-standard roads and trails could be utilized for motorized activities.

Figure 2-45 Management Area 12



Management Area 13 Winter Recreation

Goal

To provide quality winter recreation opportunities within a forest environment that can be modified for visitor use and satisfaction.

General Theme and Objectives

This Management Area will provide opportunities for winter recreation activities. Facilities and evidence of man will be present. Roads, vegetation management, and other development activities are permitted but only as necessary to enhance the winter recreation opportunities. Social contact will vary but high social contact could be expected in some areas and during some portions of the winter use season. Facilities for tubing and sledding can be developed. Some areas will be closed to motorized use This area is available for geothermal leasing.

Figure 2-46 Management Area 13

Management Area 14 Oregon Cascade Recreation Area

Goal

To conserve, protect, and manage, in a substantially unmodified condition, areas for their unique character and values associated with the Oregon Cascade Recreation Area (OCRA)

To feature dispersed recreation opportunities and wildlife, fish, and scenic resources. including nesting habitat for spotted owls

General Theme and Objectives

The emphasis of this Management Area will be to provide opportunity to enjoy scenic, wildlife recreation values in a setting that is not dominated by human activities but where some motorized use could be permitted along with some recreation related facilities

Management Area 15 Old Growth

Goal

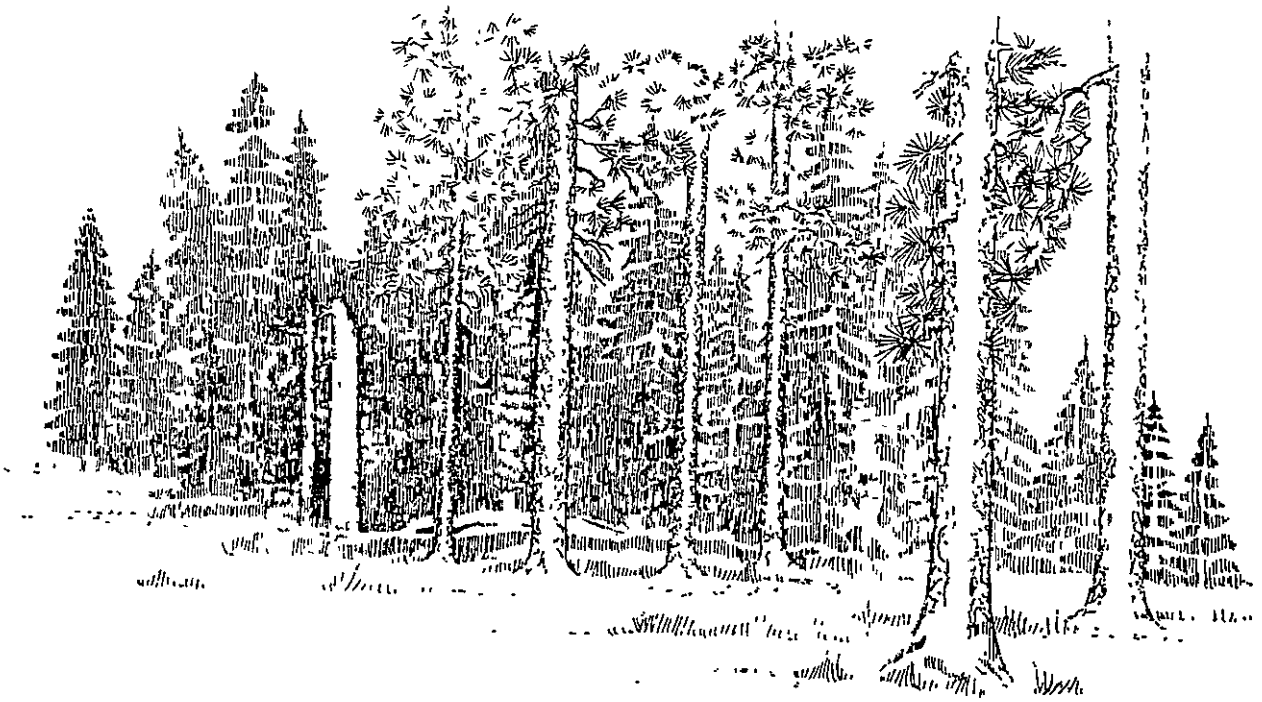
To provide naturally evolved old growth forest ecosystems for (1) habitat for plant and animal species associated with old growth forest ecosystems, (2) representations of landscape ecology, (3) public enjoyment of large, old-tree environments, and (4) the needs of the public from an aesthetic spiritual sense

Old growth areas will also contribute to the biodiversity of the Forest

General Theme and Objectives

An old growth forest will be managed to provide (1) large trees, (2) abundant standing and downed dead trees, and (3) vertical structure (multiple vegetative canopy heights), except in lodgepole pine types where a single canopy level is common Such stands would vary in size and be located so that a wide variety of conditions are represented.

Figure 2-47 Management Area 15



Management Area 16 Experimental Forest

Goal

To provide an area where field research activities are conducted while considering other resource values. Administrative coordination between the National Forest System and Research within the Forest Service will provide for long-term protection of the Forest Environment to assure future research needs are met Lands within one quarter mile of the Deschutes Wild and Scenic River will be managed according to Wild and Scenic River standards/guidelines.

General Theme and Objectives

The Pringle Falls Experimental Forest is within the Forest boundary and is administered by the Pacific Northwest Research Station. The Experimental Forest serves as a field laboratory for research. Experiments are conducted to evaluate the effects of silvicultural practices on growths and yield of Ponderosa and lodgepole pine. The effects of harvesting on soil moisture and other resources are also being evaluated The role of fire in natural ecosystems is being investigated.

Management Area 17 Wild and Scenic Rivers

Goal

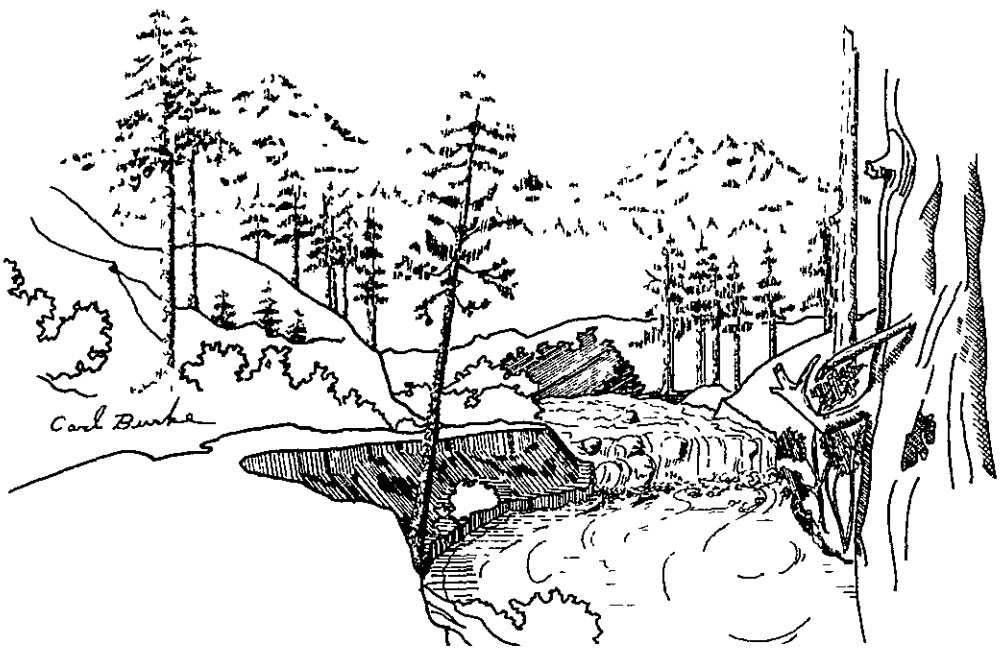
To protect and enhance those outstandingly remarkable values that qualified segments of the Deschutes, Little Deschutes, and Metolius Rivers and Big Marsh, Crescent, and Squaw Creeks for inclusion in the National Wild and Scenic Rivers System.

General Theme and Objectives

The primary objectives for managing waterways which are components of the National Wild and Scenic Rivers System will be to protect the outstandingly remarkable values identifies for each and for maintaining the free-flowing nature of the river The difference between a wild, scenic, or recreational section of river is measured by the degree of development, appropriate types of land use and ease of accessibility by roads and trails.

An important objective of management for the Deschutes River is to provide recreation settings close to Bend that feature a relatively natural environment emphasizing day use and minimal development

Figure 2-48 Management Area 17



Management Area 18 Front Country

Goal

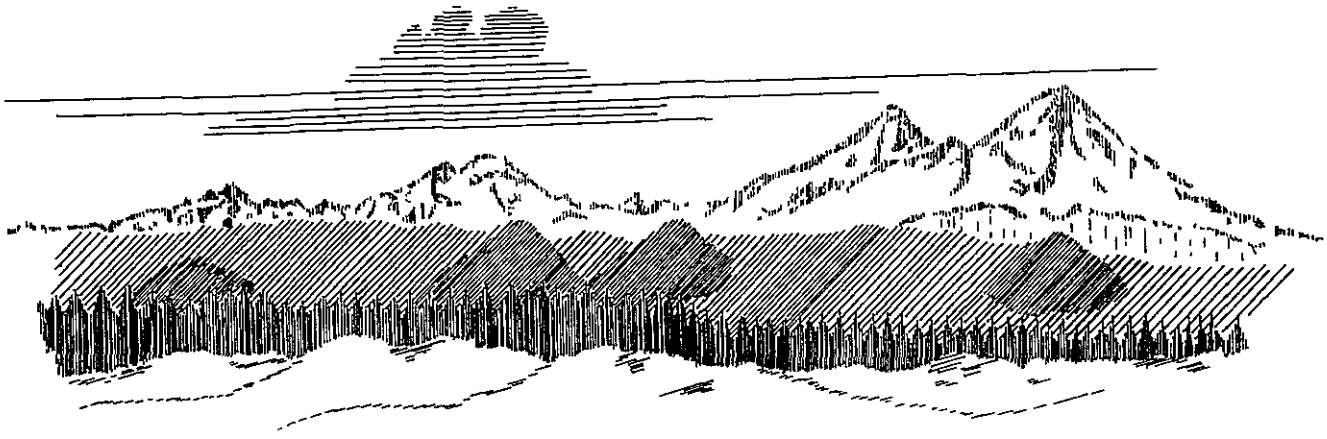
To provide and maintain a natural appearing forested landscape on the slopes northeast of the Three Sisters and Tam MacArthur Rim while providing high and sustainable levels of timber production

General Theme and Objectives

This Management Area occupies a place between Scenic Views and General Forest. While it calls for a greater emphasis on timber production than the former, the Visual Quality Objective is Partial Retention for view areas, compared with Modification in General Forest. Modification may apply to areas which cannot be seen from the viewing locations discussed in the next paragraph.

Certain viewer locations are considered important towards maintaining the desired visual appearance of this Management Area. The significant viewer locations are along the Three Creek Road, west from Hwy. 20 between Bend and Sisters, Awbrey Butte, the Redmond-Sisters Highways (126), and to the south *from the Old Mckenzie Hwy (242) just west of* Sisters.

Figure 2-49 Management Area 18



Management Area 19 Metolius Heritage Area

Goal

To perpetuate a unique ecosystem represented by large yellow-belly Ponderosa pine and spring-fed streams, one that is part of Oregon's heritage Significant historical character is found in this area and should be perpetuated. This ecosystem is an integral part of the Metolius Basin as a whole, and should be managed with that consideration.

General Theme and Objectives

The goal of this Management Area is to provide peaceful, park-like forests of Ponderosa pine and western larch in a sustained, healthy condition. Generations of families have come here in search of the peace and solitude afforded by the forest beauty, to watch wildlife, and to participate in recreation activities. This historical experience will be perpetuated.

The visitor will see mature and overmature forests having large trees, snags, and dead downed material. Stands with two or more canopy levels will be seen, but will highlight the largest trees in the stands

Recreational activities have generally been of a dispersed nature. Opportunities for participation in a broad range of outdoor recreation activities will be available. Support facilities for dispersed recreation activities, such as developed campgrounds and day use areas, may be located here in order to sustain the overall integrity of the basin.

Management Area 20 Metolius Wildlife - Primitive

Goal

To protect and perpetuate a predominantly unmodified natural environment where natural ecological process can continue. To provide habitat for a wild variety of wildlife species, and to specifically maintain or enhance habitat for bald eagle and deer. To provide an opportunity for primitive dispersed recreation within this undeveloped forest environment.

General Theme and Objectives

This Management Area will provide nesting and foraging areas for a variety of wildlife species. Bald eagles are known to inhabit a portion of this Management Area Suitable nesting and foraging habitat for this species will be provided on a continuing basis. Portions of the Management Area are identified as key deer and elk habitat. Cover and forage will be emphasized in areas significant to these species Species which require large expansive home ranges, such as cougar and bear are also known to inhabit the area. The predominantly unmodified character of the majority of this Management Area will provide habitat for these species.

This environmental setting will provide an opportunity for primitive recreational opportunities that are attainable in large undeveloped areas It will provide a feeling of vastness and remoteness and will have no irreversible evidence of humans. It will be in a predominantly unmodified or natural state. The environmental setting will often include a wide diversification of vegetation, terrain, and visible landform.

This area will be managed to provide limited social contact and interaction among visitors. Primitive facilities, such as shelters and small camps, signing, and a transportation system for visitor access and use may be established. Management will provide recreation opportunities that occur in a primitive environment, but restrictions will be less than in Wilderness areas. Low standard roads and trails could be utilized for motorized activities.

Management Area 21 Metolius Black Butte Scenic

Goal

To perpetuate the unique scenic quality of Black Butte

General Theme and Objectives

Black Butte is a unique and dominant landform in the Central Oregon landscape. The Butte is seen from many travel routes and from many residential areas throughout Central Oregon It's dominant shape and color have been recognized by travelers and local inhabitants, dating back to pre-historic times Landscapes in this Management Area will be managed to protect and perpetuate the unique and widely recognized appearance of Black Butte To the casual observer, results of activities will not be evident or will be visually subordinate to the natural landscape.

Vegetation will be managed to maintain or create a continuous forest canopy of mature or overmature tree stands having large trees, and in many cases two or more canopy levels to provide for replacement trees. Where possible, the emphasis will be on perpetuating or increasing the component of Ponderosa pine. Areas in which white-fir and other coniferous species are replacing Ponderosa pine due to the elimination of fire, will be managed to emphasize Ponderosa pine Areas that are true mixed conifer stands will be maintained in that species composition

A range of recreational and interpretive opportunities will be available within this Management Area.

Management Area 22 Metolius Special Forest

Goal

To rehabilitate and sustain a healthy forest with an emphasis on timber production, while maintaining a near-natural appearance, and providing a range of recreational opportunities for public use and enjoyment.

General Theme and Objectives

Promoting healthy and vigorous forest stand conditions will be the highest priority management goal Timber management activities will be conducted in a manner which provides a sustained yield of wood products, while minimizing disruption of a continuous forest canopy The aim of a managed forest is to have stands in a variety of age classes with all stands utilizing the site growth potential. This is achieved through stand treatments which address forest health issues, emphasizes uneven-aged management as a preferred silvicultural treatment where appropriate, emphasizes stocking sites with Ponderosa pine either by planting openings or utilizing existing large trees, and requiring reduced size of created openings

Opportunities for dispersed recreation activities will be emphasized, particularly those associated with roads, trails, and streams Dispersed camping is an important use of this area. Developed site recreation opportunities such as camping or picnicking occur on a limited basis throughout the area Several roads within the management area provide access to the Mt. Jefferson Wilderness trailheads.

Management Area 23 Metolius Special Interest

Goal

To preserve and provide interpretation of unique geological, biological, and cultural areas for education, scientific, and public enjoyment purposes.

General Theme and Objectives

Unusual geological or biological sites and areas are preserved and managed for education, research, and to protect their unique character. Facilities and opportunities may be provided for public interpretation and enjoyment of the unique values of these sites and areas. The primary benefiting uses of these areas will be for developed and dispersed recreation, research, and educational opportunities. These areas will be designated by Regional Forester authority.

The Black Butte Special Interest Area and the Castle/Cathedral Rocks Special Interest Area are included in this Management Area

Management Area 24 Metolius Research Natural Area

Goal

To preserve an example of a naturally occurring ecosystem in an unmodified condition for nonmanipulative research and education.

General Theme and Objectives

Research Natural Areas (RNAs) are managed to preserve the natural ecological succession. All Establishment Reports for these areas must be approved by the Chief of the Forest Service

Research on the Metolius Research Natural Area must be essentially nondestructive in character, destructive analysis of vegetation is generally not allowed nor are studies requiring extensive forest floor modification or extensive soil excavation. Collection of plant and animal specimens should be restricted to the minimum necessary for provision of vouchers and other research needs and in no case to a degree which significantly reduces species population levels. Such collection must also be carried out in accordance with applicable State and Federal agency regulations In consultation with the Forest Supervisor and District Ranger, the Director of the Pacific Northwest Forest and Range Experiment Station is responsible for approving management implementation plans and for overseeing and coordinating approved research on all research natural areas. The District Ranger administers, protects, and manages the Metolius Research Natural Area and reports through the Forest Supervisor to the Station Director any planned activities on, or immediately adjacent to, Metolius Research Natural Area.

The purpose of the Metolius RNA is to provide:

1. Baseline areas against which effects of human activities can be measured

2. Sites for study of natural processes in undisturbed ecosystems.

3. Gene pool preserves for all types of organisms.

Management Area 25 Metolius Spotted Owl

Goal

Manage habitat to enhance the carrying capacity for Northern Spotted Owls.

General Theme and Objectives

Nesting habitat and foraging areas will be protected and enhanced. Suitable nesting sites will be provided on a continuing basis and spaced to prevent territorial competition. Old growth stands with large trees will be emphasized Human disturbance will be minimal during the nesting season.

This Management Area contains 4 spotted owl habitat areas. Ten SOHAs, which are also part of the Forest Network, are addressed in Management Area 4, Spotted Owls.

Management Area 26 Metolius Scenic Views

Goal

To provide Forest visitors with high quality scenery that represents the natural character of the Metolius Basin

General Theme and Objectives

Landscapes seen from selected travel routes, such as Forest Roads 12, 1230, 1234, and 1292, and visitor use areas will be managed to maintain or enhance their appearance. To the casual observer, results of activities either will not be evident or will be visually subordinate to the natural landscape.

Landscapes will be enhanced by opening views to distant peaks, unique rock forms, unusual vegetation, or other features of interest Timber harvest is permitted, but only to protect and improve the visual quality of the stands both now and in the future Landscapes containing negative visual elements, such as

skid roads, activity residue, or cable corridors, will be rehabilitated

The desired condition for Ponderosa pine is to achieve and maintain visual diversity through variations of stand densities and size classes. Large, old-growth pine will remain an important constituent, with trees achieving 30 inches in diameter or larger and having deeply furrowed, yellow bark characteristics.

For other species, the desired condition requires obtaining visual variety through either spatial distribution of age classes and species mixes, through density manipulation, or through a mixture of age classes within a stand

Management Area 27 Metolius Old Growth

Goal

To provide naturally evolved old growth forest ecosystems for (1) habitat for plant and animal species associated with old growth forest ecosystems, (2) representations of landscape ecology, and (3) public enjoyment of large, old-tree environments.

This Management Area will also contribute to the biodiversity of the Forest.

General Theme and Objectives

This old growth forest will be managed to provide (1) large trees, (2) abundant standing and downed dead trees, (3) single canopy old growth stands, and where appropriate (4) vertical structure (multiple vegetative canopy heights).

Two old growth stands are included in this Management Area. The Lower Black Butte Old Growth Area will emphasize the scenic and social value of Ponderosa pine old growth. The Glaze Meadow Old Growth Area is identified as part of the Forest-wide network of old growth areas designated to be managed for the habitat requirements of indicator species, and will therefore emphasize the wildlife values associated with Ponderosa pine old growth as a primary objective. Because the Glaze Meadow Old Growth area is larger than required for the indicator species network, a secondary objective will be management for the scenic and social values of Ponderosa pine old growth, where they do not conflict or interfere with the wildlife values.

Management Area 28 Metolius Wild and Scenic River

Goal

To protect and enhance those outstandingly remarkable values that qualified segments of the Metolius River for inclusion in the National Wild and Scenic Rivers system.

General Theme and Objectives

The following S&Gs will ensure that the values which qualified the river for inclusion in the National Wild and Scenic River System are preserved until the management planning is completed for the Metolius River. These S&Gs will serve as interim management direction, in conjunction with current interim management direction provided through Regional Policy, until the formal river corridor management plan is completed and the Forest Land and Resource Management Plan is amended to include the appropriate direction.

The primary objectives for managing waterways which are components of the National Wild and Scenic Rivers System will be to protect the outstandingly remarkable values identified for the river and maintaining the free-flowing nature of the river. The difference between a wild, scenic, or recreational section of river is measured by the degree of development, appropriate types of land use and ease of accessibility by roads and trails.

Resource Outputs, Environmental Effects, Activities, and Costs

The implementation of any of the Alternatives will result in the production of certain outputs and effects and their associated environmental consequences. Some of the consequences are direct while others are indirect. Some of the consequences are short-term while others are cumulative or long-term. Chapter 4 presents a detailed discussion of the general inter-relationships between the outputs and effects and their associated environmental consequences. In the following section of Chapter 2, the specific outputs and effects for each alternative are presented for comparison purposes Much of the analysis performed to develop these outputs and effects is quite complex and is described in detail in Appendix B Therefore, in order to fully understand the environmental consequences associated with each alternative and their derivation, we recommend reading Chapters 2 and 4 and Appendix B.

The following four Figures (2-50, 2-64, 2-65, and 2-84) present the direct, indirect, and cummulative resource outputs and effects associated with each alternative and certain selected benchmarks. By examining Figure 2-65 (Comparison of Issue and Concern Resolution by Alternative) in conjunction with these tables, a better understanding of the relationship between issue resolution and the resulting outputs and effects for each alternative can be obtained. While many of the following displays are self explanatory, to facilitate the reading and understanding of these tables and other portions of this document, it may be necessary to refer to the Glossary for definitions and explanations of abbreviations and units of measure

Figure 2-50 displays the average annual quantifiable resource outputs and effects by alternative The table is quite comprehensive and will be referred to time and again throughout the remainder of this document. The figures following Figure 2-50 help to graphically summarize some of the information in this table which pertains to key issues.

Most of the outputs and effects for each alternative are displayed for decade 1-(1990-1999), decade 2-(2000-2009) and decade 5-(2030-2039). These can be interpreted as the average annual outputs for the decadal planning periods they represent The year 1990 is the first year of the first decade of the plan (1990-1999). These decades are displayed for their coverage of both short and long-term outputs and effects. Also, a Forest Plan based on any of the Alternatives remains in effect for 10-15 years, so the outputs and effects for the fifth decade are potentials as if the alternative were continued beyond the life of the Plan and into the future.

Note that the output levels for some resources during the first two decades are similar across all of the alternatives. This makes it appear as though there is no difference between the alternatives. However, there usually is The Developed Recreation outputs at the top of the table are a good example for this discussion The consumption levels across all alternatives during the first decade varies from 546 MRVDs for Alternative A to 1439 MRVDs for Alternative C, a relatively narrow range. However, there is quite a wide range of differences between these Alternatives in the amount and location of lands managed for recreation purposes (Refer to Figure 2-25 Acres In Each Management Area by Alternative). The future projections of recreation use for each alternative are based largely on the projected population levels for the State of Oregon and its resulting effects on demand for recreation use on the Forest. Consequently, the short-term differences in the amount of recreation use between the Alternatives is relatively small. The differences become greater over time as the different carrying capacities and recreation emphases between the Alternatives begin to effect the recreation use levels and patterns on the Forest. In essence, many of the consequences resulting from decisions made in the Alternatives will not be apparent in the short-term, but will become more noticeable in the long-term outputs and effects The same is true for the projections of range use and wildlife population changes where response to land use management decisions is often more gradual than abrupt

Figure 2-50 Estimated Average Annual Quantifiable Resource Outputs and Environmental Effects by Alternative

Outputs/Effects	Unit of Measure	No Change	No Act. A	RPA B	C	Preferred E	G
Developed Recreation Use							
Decade 1	MRVDs[1]	546	546	1421	1439	1421	1408
Decade 2		652	652	1725	1812	1727	1662
Decade 5		995	995	2369	3392	2432	1926
Non-Wilderness Dispersed Recreation Use							
Roaded	MRVDs[1]						
Decade 1		1117	1117	1548	1515	1493	1124
Decade 2		1348	1348	1853	1853	1772	1237
Decade 5		1476	1476	2157	2472	2138	1237
Unroaded							
Decade 1		55	55	55	4 3	55	56
Decade 2		67	67	67	4 3	67	71
Decade 5		121	121	121	4.3	121	143
Wilderness Use							
Decade 1	MRVDs[1]	77	77	77	77	77	79
Decade 2		77	77	77	77	94	101
Decade 5		77	77	77	77	171	212
Trail Construction/Reconstruction (Summer & Winter)							
Decade 1	Miles	5	5	5	0	5	10
Decade 2		5	5	5	0	5	10
Decade 5		5	5	5	0	5	10
Developed Site Construction/Reconstruction							
Decade 1	Camp	75	75	65	75	65	0
Decade 2	Ground	75	75	65	75	65	0
Decade 5	Units	75	75	65	75	65	0

[1]MRVDs--Thousands of recreation visitor days All projection based on growth in demand

Figure 2-50 Estimated Average Annual Quantifiable Resource Outputs and Environmental Effects by Alternative

Outputs/Effects	Unit of Measure	No Change	No Act. A	RPA B	C	Preferred E	G
Visual Quality Objectives							
Preservation	Acres						
Decade 1		232,389	232,389	231,727	228,101	232,137	232,538
Retention	Acres						
Decade 1		222,541	222,541	160,030	28,693	126,462	240,421
Partial Retention	Acres						
Decade 1		179,273	179,273	204,998	178,724	218,090	185,558
Modification/Max Mod	Acres						
Decade 1		986,209	986,209	1,023,657	1,184,894	1,043,722	961,895
Unroaded Areas Total Including Wilderness and OCRA	M Acres	357 6	357 6	357 6	357 6	357 6	357 6
Unroaded Areas existing outside of Wilderness and OCRA	M Acres	145.1	145 1	145 1	145 1	145.1	145 1
Unroaded Assigned to a Harvest Prescription	M Acres	27 8	27.8	42.8	78 7	47 4	23.4
Unroaded Planned for Harvest in First Decade	M Acres	No Data	0	7.1	8.1	0	0
Wildlife and Fish Use	Thousands						
Decade 1	Wildlife	24 5	24 5	24.5	24 5	24 5	24 5
Decade 2	and Fish	29 9	29 9	29 9	29 9	29.9	29 9
Decade 5	User Days	54 2	54 2	54 2	54 2	54 2	54.2
Management Indicator Species							
Bald Eagles	Pairs						
Decade 1		35-45	35-45	35-45	35-45	35-45	35-45
Decade 2		35-45	35-45	35-45	35-45	35-45	35-45
Decade 5		35-45	35-45	35-45	35-45	35-45	35-45
Northern Spotted Owls	Pairs						
Decade 1		10	14	14	10	14	14
Decade 2		10	14	14	10	14	14
Decade 5		3	14	14	14	14	17

Figure 2-50 Estimated Average Annual Quantifiable Resource Outputs and Environmental Effects by Alternative (continued)

Outputs/Effects	Unit of Measure	No Change	No Act. A	RPA B	C	Preferred E	G
Osprey	Pairs						
Decade 1		125	125	125	125	125	125
Decade 2		140	140	125	125	125	125
Decade 5		180	180	80	80	125	180
Goshawk	Pairs						
Decade 1		No Data	47	43	41	43	47
Decade 2		No Data	50	43	39	45	50
Decade 5		No Data	46	43	42	46	48
Northern 3-Toed Woodpecker	Pairs						
Decade 1		No Data	70-1020	70-1020	70-1020	70-1020	70-1020
Decade 2		No Data	60-880	30-430	20-320	30-420	50-700
Decade 5		No Data	35-510	40-610	30-470	40-600	45-680
Pine Marten	Pairs						
Decade 1		No Data	450-1285	450-1285	450-1285	450-1285	450-1285
Decade 2		No Data	390-1120	375-1075	310-885	375-1065	425-1220
Decade 5		No Data	280-810	405-1150	280-805	450-1285	400-1150
Mule Deer	Numbers						
Decade 1		20,300	20,300	20,300	20,300	24,900	20,300
Decade 2		20,300	20,300	23,300	23,300	24,900	16,700
Decade 5		20,300	20,300	28,600	32,300	24,900	16,700
Woodpeckers	% of Potential Population	40%	40-60%	40%	20%	40-60%[4]	80%
Elk	Numbers	600 summer	1000	1000	600	1500	2000
Resident Trout		Quantative habitat capacity outputs will be determined for each stream and river reach and lake based on the analysis of habitat survey information collected during the implementation of this Plan An overall increase is expected to result from each alternative due to the implementation of standards and guidelines					
Wolverine & Peregrine Falcon		Occasional sightings of these species S & Gs developed to continue to protect fish habitat.					
Great Blue Heron		Approximately 40-50 pairs are present Rookeries (nest trees) are protected by S&Gs					

[4]Percent is for even age management, 60% will be available in uneven age management.

Figure 2-50 Estimated Average Annual Quantifiable Resource Outputs and Environmental Effects by Alternative

Outputs/Effects	Unit of Measure	No Change	No Act A	RPA B	C	Preferred E	G
Wildlife Habitat Improv	Acre						
Decade 1	Equiva-	6 2	6 2	6.4	30 0	27.0	16 0
Decade 2	lents	6 2	6 2	4 4	30 0	27 0	16 0
Decade 5		6 2	6 2	2 7	30 0	27 0	16 0
Range-Permitted Grazing Capacity	Thousands						
Decade 1	of Animal	35	35	35	35	35	30
Decade 2	Unit	35	35	45	45	45	30
Decade 5	Months	35	35	45	60	45	30
Timber Offered							
Allowable Sale Quantity	Million						
Decade 1	Board Ft.	219	142 1	146 5	191 2	99.8	86 0
Total Sale Program Quantity							
Decade 1		219	177 1	188.5	216.2	141 8	126.0
Timber Offered							
Allowable Sale Quantity	Million						
Decade 1	Cubic	37.1	24.8	25.9	34.0	17 9	15 6
Decade 2	Feet	-	24 8	25 9	34 0	17 9	15 6
Decade 5		-	24 8	25 9	34 0	17 9	15 6
Total Sale Program Quantity							
Decade 1		37 1	31 6	34 2	39 4	25.4	23 5
Decade 2		-	32 4	33 5	38 4	23.5	22 8
Decade 5		-	31 9	34.0	38.7	24 5	23 5
Allowable Sale Quantity Timber Offered by Species Mix							
Ponderosa Pine	Million						
Decade 1	Cubic	28 2	14 4	3 7	7 3	7.9	7 3
Decade 2	Feet	-	11.9	4 4	15 4	6 6	2 7
Decade 5		-	9.1	16.6	15.5	5 6	0 5
Lodgepole Pine	Million						
Decade 1	Cubic	8 9	0.5	0 6	1 1	5.0	0 1
Decade 2	Feet	-	1.0	5 3	3 8	2.6	2 2
Decade 5		-	10.1	6 4	14.2	8 5	6 6

Figure 2-50 Estimated Average Annual Quantifiable Resource Outputs and Environmental Effects by Alternative

Outputs/Effects	Unit of Measure	No Change	No Act. A	RPA B	C	Preferred E	G
Mixed Conifer	Million	In					
Decade 1	Cubic	Pond	9 9	20.9	25 6	3 5	8 3
Decade 2	Feet	Pine	11 9	15.1	10 2	5.8	10.2
Decade 5		above	5 1	2.6	2 3	2 7	8 3
Mountain Hemlock	Million						
Decade 1	Cubic	-	0	0.7	0 1	1.5	0
Decade 2	Feet	-	0 1	1.1	4 6	2 9	0 5
Decade 5		-	0 5	3	2 0	1.1	0 2
Personal Use Fuel Wood	M Cords	No Data	40	40	?	40	40
Reforestation	M Acres						
Decade 1	per year	No	1	9 1	13 5	9 6	4 1
Decade 2		Data	3	9 2	13 1	8 4	2 0
Decade 5		-	7 7	9.3	8 9	9 5	6 5
Timber Stand Improvement	M Acres						
Decade 1	per year	9 6	10 4	8.7	18 3	11 9	6 7
Decade 2		-	8 7	1.9	13 2	8 6	4 5
Decade 5		-	7 5	9 3	7 7	9 8	3 1
Long-Run Sustained Yield	Million Cubic Ft	37 1	24 8	25.9	34 0	20 7	15 5
Timber Growth In Decade 5	Million Cubic Ft	No Data	29 8	31.8	40 3	26 9	18 3
Reforestation Backlog							
Decade 1	Acres	0	0	0	0	0	0
Decade 2		0	0	0	0	0	0
Decade 5		0	0	0	0	0	0
Reforestation Backlog							
Decade 1	Dollars	0	0	0	0	0	0
Decade 2		0	0	0	0	0	0
Decade 5		0	0	0	0	0	0

Figure 2-50 Estimated Average Annual Quantifiable Resource Outputs and Environmental Effects by Alternative

Outputs/Effects	Unit of Measure	No Change	No Act. A	RPA B	C	Preferred E	G
Soil							
Decade 1	Risk	No	9 0	14 7	20 7	15 0	10 2
Decade 2	Index	Data	13 9	10 5	13 5	11 0	9 4
Decade 5		-	45 2	10 6	10 4	10 5	8.6
Available Geothermal Leasable Acres							
High Potential	M Acres	85	85	90	125	100	50
Moderate Potential		485	485	460	485	470	435
Low Potential		400	400	400	410	400	400
Fire Management Effectiveness Index							
Decade 1	$ M	No	2881	2676	2594	2696	2764
Decade 2	Protected	Data	2910	2799	2696	2764	2943
Decade 5	Acres	-	2820	2553	2512	2594	2758
Forest Road Program							
Road Construction							
Decade 1	Miles	5	5	4	8	5	3
Decade 2		4	4	4	9	5	3
Decade 5		2	2	3	6	3	2
Road Reconstruction							
Decade 1	Miles	10	10	10	12	11	9
Decade 2		9	9	9	14	11	8
Decade 5		6	6	8	10	9	5
Timber Purchaser							
Road Construction							
Decade 1	Miles	11	11	10	17	10	9
Decade 2		6	6	10	18	9	6
Decade 5		3	3	6	10	5	3
Road Reconstruction							
Decade 1	Miles	40	40	36	53	43	31
Decade 2		34	34	37	55	40	26
Decade 5		20	20	28	43	32	18
Roads Available for Passenger Car Use							
Decade 1	Miles	800	800	800	1100	850	650
Decade 2		850	850	900	1200	950	650
Decade 5		900	900	950	1300	1000	650

Figure 2-50 Estimated Average Annual Quantifiable Resource Outputs and Environmental Effects by Alternative

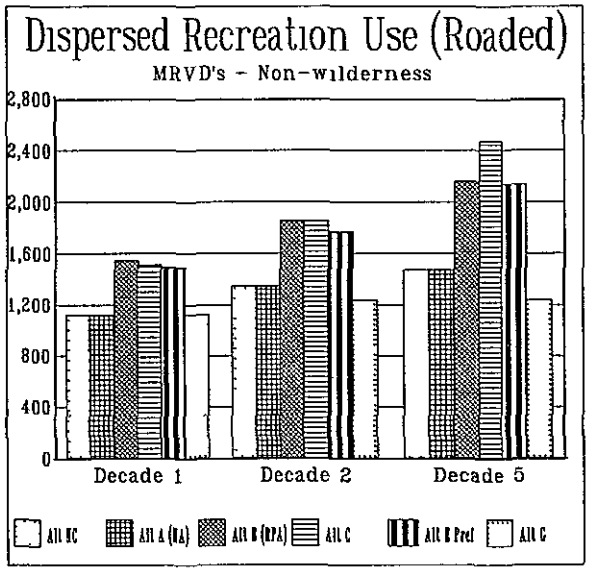
Outputs/Effects	Unit of Measure	No Change	No Act. A	RPA B	C	Preferred E	G
Roads Available for High Clearance Vehicles & Closed Roads							
Decade 1	Miles	7700	7700	7700	7400	7650	6850
Decade 2		7150	7150	7100	7100	7050	5850
Decade 5		6100	6100	6050	6700	6000	4350
Fuel Treatment	Thousands						
Decade 1	of Acres	10 5	10 5	17 8	31.8	7 1	4.6
Decade 2		16 8	16 8	11 1	26.3	5 8	4.8
Decade 5		15 2	15 2	18.6	16 6	13.4	4 2
Operational Costs	Million $						
Decade 1		No	9.4	12 8	15.1	12.2	8 1
Decade 2		Data	10.0	11.9	13.9	11.1	8.0
Decade 5		-	9.5	11.8	14.0	13.0	8 5
Capital Investment Costs	Million $						
Decade 1		No	5.3	7.7	9.1	5.2	4.9
Decade 2		Data	5.89	7.1	8 4	5.0	4 8
Decade 5		-	5.8	7.1	8.5	5.5	5.1
Planned Budget	Million $						
Decade 1		No	14.2	20 5	24.2	17.4	13 0
Decade 2		Data	15 0	19 0	22 3	16.1	12.8
Decade 5		-	15 3	18.9	22 5	18 5	13.6
Returns to Government	Million $						
Decade 1		No	17 8	15 6	19 9	10.6	9 1
Decade 2		Data	19 4	12 0	20.7	14.1	10 9
Decade 5		-	25 2	29 9	29 5	21 6	18.7
Changes in Jobs	Number						
Decade 1	of MM$	No Data	248	338	667	219	41
Changes in Income	Change in						
Decade 1	Total MM$	No Data	- 534	- 468	4 693	-2 674	-5 124
Payments to Counties	Million $						
Decade 1		9.0	4 5	3 9	5.0	2 2	2 2
Decade 2		No	4 9	3 0	5 2	3 1	2.7
Decade 5		Data	6 3	7 5	7 4	5 5	4 7

Figure 2-50 Estimated Average Annual Quantifiable Resource Outputs and Environmental Effects by Alternative

Outputs/Effects	Unit of Measure	No Change	No Act. A	RPA B	C	Preferred E	G
Lands Tentatively Suitable for Timber Production	M Acres	1,272 0	1,150 9	1,150 9	1,150 9	1,150 9	1,150 9
Lands Suitable & Appropriate for Regulated Programmed Timber Harvesting	M Acres	1272 0	867 7	877 9	1,022 6	841 1	635.1
Lands Suitable & Appropriate for Regulated Programmed Timber Harvesting by Yield Category							
Full Yield	M Acres	No	593 5	642 2	823 2	573 3	495 3
50-99% of Full Yield		Data	274 2	235 7	199 4	267 8	139 8
1-49% of Full Yield		-	0 0	0 0	0.0	0 0	0 0
Tentatively Scheduled Timber Harvest							
Decade 1	M Acres						
Clearcut		No	0	1.7	5 1	1.5	0
Shelterwood		Data	0	1 0	1 5	5 9	.0
Selection (uneven-age)			0	6.4	6 9	4.4	12.2
Overstory Removal			10 4	.6	3	2.2	3 6
Commercial Thin			1 9	8 4	8 0	4	0
TOTAL		**23.1**	**12.3**	**18.1**	**21.8**	**14.1**	**15.8**
Decade 2							
Clearcut	M Acres	No	1	9	6 2	3 5	.0
Shelterwood		Data	.2	5 3	6.4	0.1	.2
Selection (uneven-age)			0	3 6	2.0	5.3	1.3
Overstory Removal			8.3	6	.2	0.4	4.2
Commercial Thin			5.7	7 1	8.2	4.7	6.6
TOTAL			**14.3**	**17.5**	**23.0**	**14.0**	**12.3**
Decade 5							
Clearcut	M Acres	No	2 8	4 3	4 0	1 7	1 3
Shelterwood		Data	6 1	10.5	14 4	4.2	3.8
Selection (uneven-age)			2	2 0	0 2	5 6	1.1
Overstory			.0	0	.0	0	0
Commercial Thin			15.6	13 2	14.4	6 6	7 7
TOTAL		**24.7**	**24.7**	**30.0**	**33.0**	**18.1**	**13.9**
Wild and Scenic Rivers*							
Wild (W)	Miles	N A	91 9	91.9	91 9	91.9	91.9
Scenic (S)	Miles	N A	36 9	36 9	36 9	36.9	36.9
Recreation (R)	Miles	N A	6 6	6.6	6 6	6 6	6.6
Eligible (R)	Miles	N A				34.2	

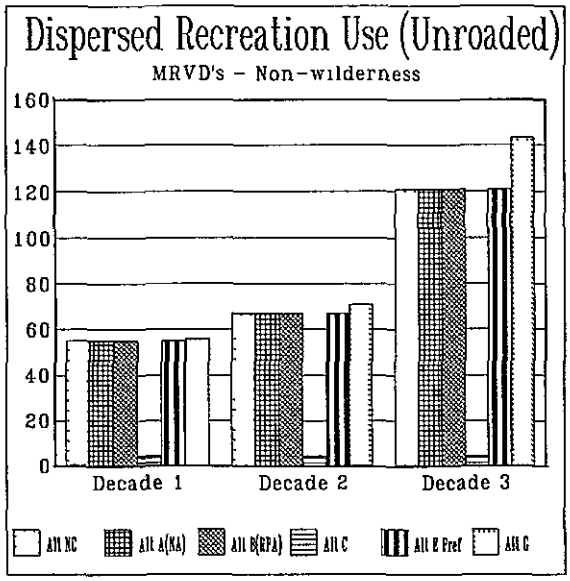
The following Bar Graphs depict the same information that is contained in Figure 2-50 Average Annual Quantifiable Outputs and Effects by Alternative

Figure 2-51 - Dispersed Recreation Use (Roaded)



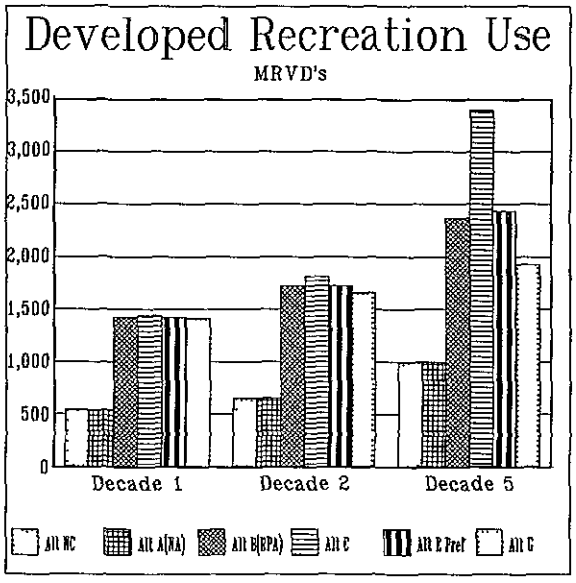
Dispersed recreation use (Roaded) would be expected to increase to the highest level in Alternative C, with Alternative E and B the next highest in that order

Figure 2-52 - Dispersed Recreation Use (Unroaded)



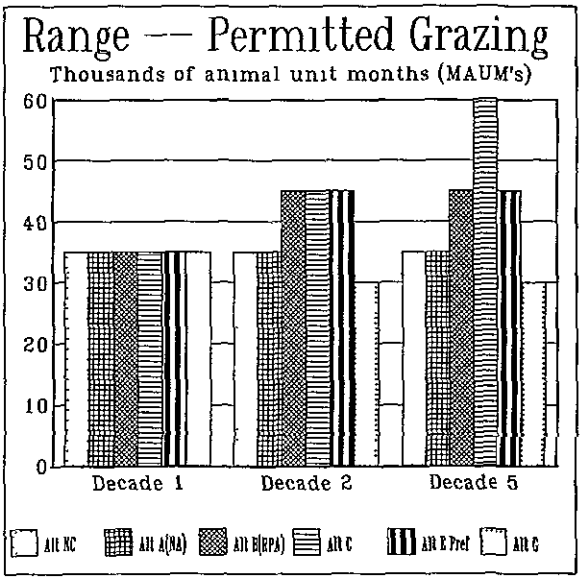
Dispersed recreation use (unroaded will be lower in the Alternative that are highest in dispersed recreation (roaded), that is Alternative C will be the lowest with Alternative NC, A, B, and E at about the same by the year 2030 Alternative G is expected to produce the highest.

Figure 2-53 - Developed Recreation Use



Developed recreation use will be the highest in Alternative C, with Alternative E and B the next in descending order of amount

Figure 2-54 - Range Permitted Grazing



Permitted Grazing is expected to be at the highest level in alternatives B, C, & E, and Alternative G is the lowest

Figure 2-55 - Wilderness Use

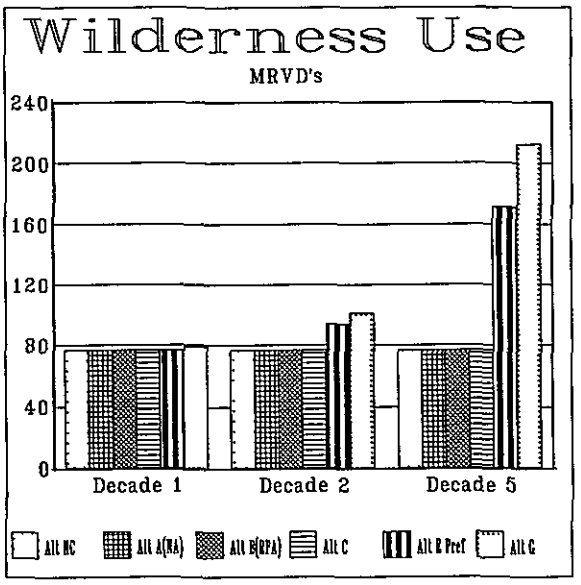
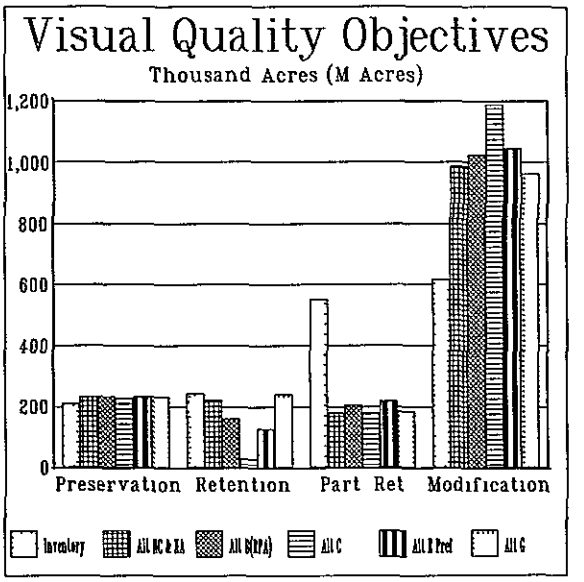


Figure 2-56 - Visual Quality Objectives



Alternative E will produce the highest amount of Wilderness use by the year 2030 while the other alternatives will remain about the same.

Visual Quality Objectives show significant changes from the existing inventory which is shown as Alternative NC There is not much change for Preservation between any of the alternatives, while Retention shows a modest decrease from the existing in all alternatives The amount of acres *in Partial Retention shows significant decrease* from the existing inventory for all Alternatives, while the acres in Modification will increase significantly for all Alternatives.

Figure 2-57 - Timber Offered (MMBF)

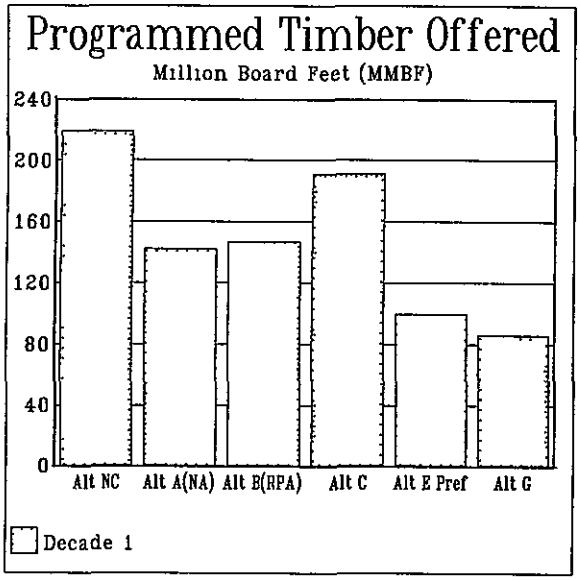
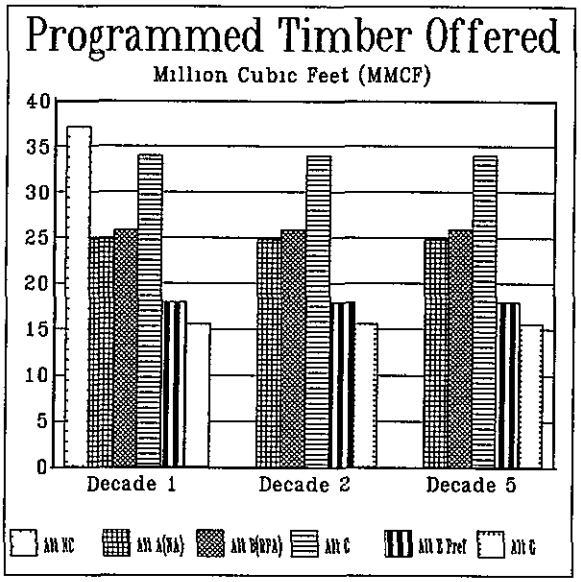
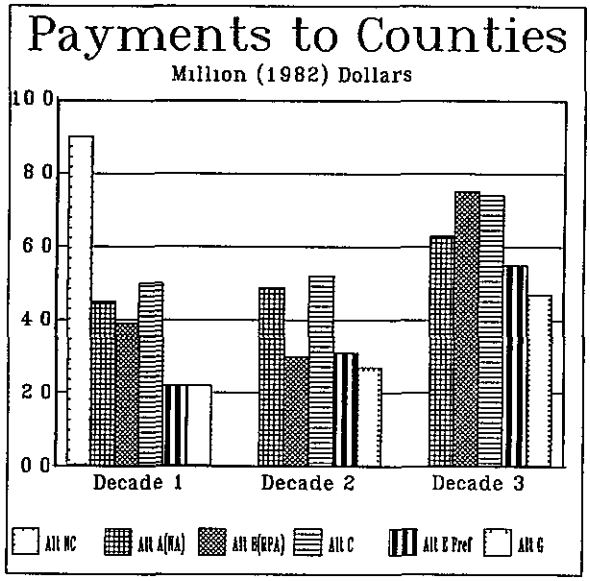


Figure 2-58 - Timber Offered (MMBF)



The above two bar graphs show timber offered in MMBF and MMCF and have similiar charactistics. Alternative C displays a declining yield with the earlier decades high and decreasing until the 5th decade. By the 5th decade, alternatives NC, A, B, and E show the same graph charactistics except for alternative B which rises higher in C when compared to NC, A, and E

Figure 2-59 - Payments To Counties



Payments to the Counties are expected to be the highest in alternative C and the year 1990 and 2000 , while payments would be the highest in 2030 in alternatives NC and A

Figure 2-60 - Returns To The Treasury

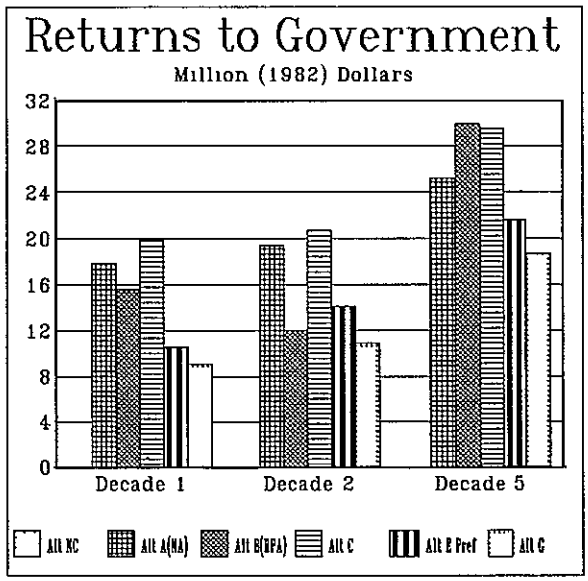
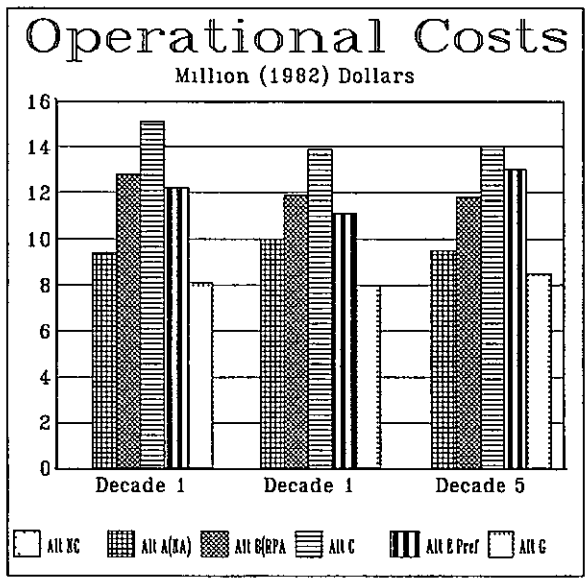


Figure 2-61 - Operation Costs



Alternative C will have the highest operational costs with Alternative B, and E close behind by the year 2030.

Figure 2-62 - Capitol Investment Costs

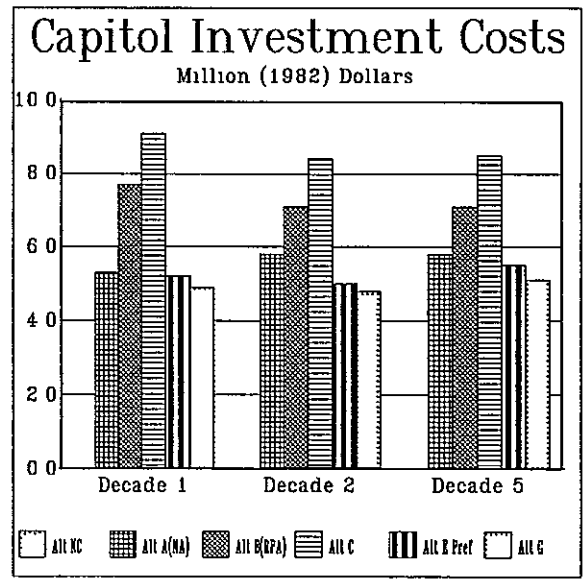
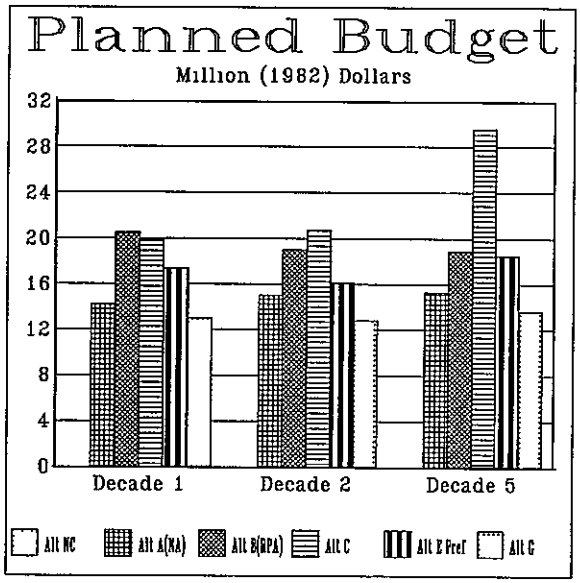


Figure 2-63 - Total Planned Budget



Many of the outputs and effects that would result from the implementation of an alternative can not be easily expressed in quantitative terms. For these cases, qualitative statements are necessary to summarize the respective consequences of each alternative. Figure 2-64 compare the qualitative outputs and effects associated with each of the Alternatives.

Figure 2-64 Qualitative Resource Outputs and Environmental Effects

Resource Outputs & Environmental Effects	No Change & A	(RPA) B	C	Preferred E	G
Air Quality	Temporary and localized reductions in quality due to dust from roads and smoke from burning	Slight increase in dust and smoke but temporary and localized	Increase in dust and smoke which could be more continuous and affect more area	Some increase in dust and smoke but temporary and mostly localized	Some decrease in dust and smoke
Visual Character of the Forest	Subtle changes would occur in areas commonly seen by people Exception would be areas being treated because of pine beetle epidemic	Changes would not be apparent in areas commonly seen except where treatment of pine beetle is occurring	The Forest would not appear natural and man's activities would be apparent.	Most areas seen by people would appear natural except in areas treated for pine beetles	Much of the Forest would appear natural Changes would be gradual
Changes in Recreational use Patterns	A wide variety of recreation opportunity available	A wide variety of recreation opportunity available	Opportunity oriented at developed and motorized	A wide variety of recreation opportunity available	Opportunity oriented at undeveloped and non-motorized
Social Effects:					
A. Community Cohesion	Few problems but conflicts arise	Could result in polarization	Would polarize some communities	Conflicts should be localized Cohesion would not be affected.	Could cause polarization
B. Lifestyles	Provides for lifestyles but with increasing restrictions	Provides for lifestyles but with increased regulation	Increases jobs but restricts use of the Forest for recreation and firewood gathering	Maintains jobs and provides for broad recreation opportunity	Reduces jobs and limits recreation opportunity
C. Expectations about change	Does not result in rapid change	Some change but not much different than No Change	Change would be viewed as dramatic	Some change would occur but much different than No Change	Little change would occur
Mountain Pine Beetle					
A. Losses	Much lodgepole would be destroyed *since some areas* would not be treated	Some lodgepole would be lost and *not treated*	Little lodgepole would be lost.	Some lodgepole would be lost.	Much lodgepole would be lost
B Future Risk of Epidemic	Could repeat in future	Risk is minimized.	Risk would be minimal	Risk would be minimal	Risk high in many areas
C. Wood and Forage Production	Would not be increased to its *full* potential	Some increase would occur	High production *levels would occur*	Some increase would *occur*	Slight increase *would occur*

Figure 2-64 Qualitative Resource Outputs and Environmental Effects (continued)

Resource Outputs & Environmental Effects	No Change A	(RPA) B	C	Preferred E	G
Wildlife in General	Habitat provided by mature lodgepole pine would be reduced gradually	Habitat provided by mature lodgepole pine would be reduced fairly rapidly	Habitat provided by mature lodgepole and other mature stands would be reduced rapidly	Habitat provided by mature lodgepole would be reduced fairly rapidly	Much habitat provided by mature lodgepole will become dead stands
Native Americans	Is compatible with Warm Springs Reservations Comprehensive Plan	Is compatible with Warm Springs Reservation Comprehensive Plan	Is not compatible with Warm Springs Reservation Comprehensive Plan	Is compatible with Warm Springs Reservation Comprehensive Plan	Is compatible with Warm Springs Reservation Comprehensive Plan

Comparison of Issues and Concerns

Alternatives are different ways of responding to issues and concerns Figure 2-65 presents the ways that each alternative responds to each of the issues and concerns. Since benchmarks are analytic bases rather than attempts to respond to all issues, they do not appear in this table

Each alternative has goals and output objectives. These are designed to respond to public issues and management concerns Figure 2-64 presents the response of each alternative to the issues and concerns which are addressed differently in each alternative.

Narrative descriptions of the Alternatives include a section on roads of issue. The issues relating to these four roads are briefly outlined below:

Todd Lake-Three Creek Lake, No. 4600370. The issue is whether to close the road, maintain it in its present condition, or improve it to a higher standard.

Irish-Taylor, No. 4630600. The issue is whether to retain the road in its current primitive condition or to upgrade it

Waldo Lake-Charlton Lake Road No. 4290. The issue is whether to improve and develop a new major highway crossing the Cascade Crest or to maintain it at its current standard

Windigo Pass, No. 60. The road follows the eastern boundary of the Oregon Cascade Recreation Area The issue is whether to retain it as a low-standard road or to upgrade it to some higher level.

The land adjustment program is keyed to the management areas. Even though it was not mapped for each alternative, it is possible to portray it by reviewing the Alternative maps For the most part, any area other than Management Area 8 would be retained in public ownership. Also areas in Management Area 8 could be dropped from public ownership It would be more practical to dispose of some of the isolated small parcels of land, regardless of the management areas in the Alternatives.

Figure 2-65 describes the issues and concerns which are associated with the various alternatives. Figures 26 through 37 illustrate the variations between selected key issues as shown by the amount of land distributed to the resources being emphasized.

Each alternative addresses the potential for geothermal leasing. It must be recognized that leasing has already occurred on a significant portion of the Forest The leasing already allowed was done through the Environ-

mental Assessment process tied to the 1978 Land Management Plan Most existing leases cannot be modified by the various alternatives The exception is, where leasing stipulations are restrictive based upon the 1978 Land Management Plan and an alternative proposes less restrictive land allocations. In these areas stipulations can be modified with the lessee's consent. Where the opposite may occur, more restrictive allocations over nonrestrictive leases, the stipulations cannot be changed unless the lessee is willing. Where leasing was denied, based upon the 1978 Plan, and an alternative proposes that leasing would be compatible, if that alternative were selected as the Preferred Alternative, then leases could be issued where they were denied under the 1978 Plan The alternatives discuss leasing potential but do not make specific recommendations regarding leasing. The specific decision regarding leasing of a specific area will be made through a subsequent Environmental Analysis process.

Figure 2-65 Comparison of Issue and Concern Resolution by Alternative

Issues and Concerns	Outputs or Effects to be Measured	No Change (NC) and Alt. A (Cur.Dir.)	Alt. B (RPA)	Alt. C	Alt. E (Pref)	Alt. G
Local and Regional Economies, Lifestyles, and Population levels.	N/A	Is in harmony with local and Regional economies & lifestyles in the short term.	Emphasizes mix of commodity and amenity. Maintains lifestyles near present conditions.	Emphasizes commodity outputs and growing economic conditions and possibly populations.	Emphasizes fairly high commodity outputs, primarily timber in short term with mixed emphasis on commodity and amenity.	Emphasizes amenity values with reduced emphasis on commodity values
Timber Harvest Level and Schedule	MMBF	Continue with current level for Alt. A and increase to potential yield for Alt. NC	Meets RPA 80 Program.	Increase to meet Forestry Program for Oregon and treat lodgepole.	Maintains a mix of products while accelerating harvest of lodgepole.	Harvest level will be determined based upon meeting goals for amenity values
Management of LP & PP Stands Infested with MPB and susceptible to infestations on Deschutes, Fremont, Winema.	Acres Treated and Time frame	Limits amount of area treated. Extends treatment over a 40-year period.		Maximizes amount of area treated in a short time period (10 years).		Extends treatment over long time period (30 years).

Figure 2-65 Comparison of Issue and Concern Resolution by Alternative (continued)

Future Demands for Use of Firewood.	M Cords	No Specific long term plans	60,000 cords provided annually	No special provisions for personal use firewood. All wood sold on competitive basis except slash	60,000 cords provided annually	75,000 cords annually or meet the demand
Issues and Concerns	**Outputs or Effects to be Measured**	**No Change (NC) and Alt A (Cur Dir)**	**Alt. B (RPA)**	**Alt. C**	**Alt. E (Pref)**	**Alt. G**
Provisions for Present and Future Developed Recreation	MRVDS	Limits the potential	Increases the potential	Significantly increases the potential	Same as C	Limits the potential
Expanding Demands for Dispersed Recreation.	MRVDS	Limits motorized Maintains nonmotorized	Emphasizes a mix of motorized recreation	Significantly increases motorized, reduces non-motorized.	Emphasizes a mix of motor-ized and non-motorized	De-emphasizes motorized with heavy emphasis on nonmotorized
Goods and Services Provided While Maintaining Visual Quality		Heavy emphasis on visual	Moderate emphasis on visual in different areas	Heavy emphasis on goods and services Little emphasis on visual	Same as B except visual emphasized in different areas	Low emphasis on visual and goods and services.
Non Wilderness Roadless Areas		Mixed developed & not developed	Same as F except there is a variation in the areas which remain undeveloped	All developed	Same as B with a different variation on what is developed	None of the areas are developed

Figure 2-65 Comparison of Issue and Concern Resolution by Alternative (continued)

T, E, AND S Wildlife and Botanical Species Habitat.	No of Pairs	1978 Plan not amended to incorporate Recovery Plan goals Spotted Owl mgmt. areas provided in Alt A, but not in NC	Habitat provided for bald eagle plan and spotted owl mgmt areas	Bald Eagle Recovery Plan goals met Spotted owl mgmt areas provided	Same as C	Exceeds Recovery Plan goals Provides for all spotted owl habitat
Wildlife Population Levels.		Maintains current levels of deer and osprey Some others decrease	Increases deer and eagles Maintains others near current	Maximizes deer All others at minimum levels	Same as F except some species decrease more rapidly.	Decreases deer while increasing some other species

Issues and Concerns	Outputs or *Effects to* be Measured	No Change (NC) and Alt. A (Cur.Dir)	Alt. B (RPA)	Alt. C	Alt E (Pref)	*Alt. G*
Level of Old Growth	% Old Growth	17% in (A) 0% in (NC)	17%	13%	18%	17%
Resource Planning Act Targets	Mrvd's MMCF Maum's Ac Eq	Below RPA	Meets RPA	Exceeds RPA	*Below some* RPA goals but exceeds others.	Will not meet RPA
Areas Available *For* Geothermal Development	Acres by potential	Does not address Newberry Crater	Increases opportunity. Some sensi- tive areas available.	Maximizes *leasing* opportunity	*Increases* opportunity except in *certain sen-* sitive areas.	*Limits* leasing opportunity to non- sensitive *areas only*
How should the Forest identify and protect *its cultural resources?*	SEE STANDARDS AND GUIDELINES FOR ALL ALTERNATIVES					
Should the Forest continue to *use man made* chemicals?	WOULD BE USED IN COMPLIANCE WITH REGIONAL POLICY					
How should the Forest manage its lakes, streams, and wetlands to prevent degrada- tion?	SET STANDARDS AND GUIDELINES FOR ALTERNATIVES A-H POLICY FOR STREAMSIDE MANAGEMENT UNITS FOR ALT. NC					
To what extent should the Forest enhance or maintain soil productivity?	SET STANDARDS AND GUIDELINES FOR ALTERNATIVES A-H NO SPECIFIC STANDARDS AND *GUIDELINED FOR ALT* NC					

Outputs for and Effects Upon Individual Resources

Assumptions Used To Predict Changes

The following environmental variables are addressed because of NFMA direction, Regional Guide direction, and a need to respond to the issues and concerns.

The analysis considers effects during the first two decades to be short-term and those during the third through fifth decades to be long-term. Some assumptions used to predict outputs and activities, and their associated effects, follow

Timber

The Forest Planning Model (FORPLAN) was used to analyze and develop alternative timber harvest schedules The harvest levels and their associated schedule of timber management activities are a function of the following:

1. An objective function of maximizing the present net value of the timber resource

2. The assignment of forested acres to alternative management prescriptions and their associated timber yield tables which reasonably reflect the volume and growth of stands of trees. Rotation lengths for the range of prescriptions available to the model are based on 95 percent of culmination of mean annual increment, or extended rotation lengths needed to achieve other multiple use objectives other than the growing and harvesting of timber

3. Temporal and spatial harvest flow constraints used to help achieve various multiple use goals associated with each alternative.

4. Economic costs and values based on recent observations and transactions regarding timber management on the Forest.

5. An assumption that the mountain pine beetle epidemic in the lodgepole pine working group will continue at current levels until the period of 1995 to 2000.

Appendix B provides a much more detailed discussion of the FORPLAN model and the timber harvest scheduling process

Recreation

Capacity varies by management area Acres of various management areas describe recreation opportunity. Recreation visitor days (RVD's) per year by management area are a measure of recreation use levels. The projected use levels are a function of the carrying capacity of a specific type of management area, estimated season of use, day and overnight use pattern, length of stay pattern, and projected population trends for the State of Oregon

Wildlife

Population estimates for the management indicator species assume that the amount of habitat available is the limiting factor for a species. If amounts of habitat change, population levels will change The habitat available is assumed to be suitable. Management indicator species are discussed throughout this Chapter. The indicator species are bald eagles, spotted owls, osprey, goshawk, northern three-toed woodpeckers, pine marten, mule deer, woodpeckers, resident trout, wolverine, peregrine falcon, elk, and the great blue heron.

Fire

The fire management effectiveness index (FMEI) evaluates how the Alternatives would affect fire, assuming that we have a stable fire organization The formula is: Fire Organization plus Fire Suppression Dollars plus Net Value Change Dollars equals FMEI divided by M Acres Protected.

Water Quality and Fish Habitat

Traditionally, the effects of alternative land management activities on water are expressed by projecting changes in sediment rates or streamflow over time. Topographic and other physical characteristics of the Deschutes National Forest are such that, problems resulting from sedimentation and runoff are minimal.

Since the Forest does not exhibit the traditional sediment, temperature and flooding problems which are common on other forests, it was

determined that assessing the overall change in total annual water yield would be sufficient to show the effects of the Alternatives

Water quality and fish habitat will be protected or enhanced in all Alternatives. High quality water will be available for the Bend and Sisters municipal water supplies Riparian management direction, cumulative effects evaluations, site specific best management practices, monitoring, and enhancement projects are included in all alternatives to accomplish these objectives.

Riparian areas will be managed to feature water quality and fish habitat. Outputs for resources such as timber, recreation, and livestock grazing may be pursued only if they are compatible with water quality and fish habitat objectives. Prescriptions for riparian vegetation management will be developed to enhance fish habitat objectives.

Fish habitat enhancement will occur with all Alternatives. Habitat surveys and management plans will be prepared for streams and lakes supporting a fishery resource. The plans will identify habitat improvement opportunities Each alternative calls for an increase in fish habitat improvements.

Soil Risk

Soils in areas where there are frost pockets, droughty conditions, rockiness, or wetness are more sensitive to management than soils without these conditions. These limitations are important during timber harvesting and reforestation.

Other Activities

Certain other activities do not significantly affect the environment They include many forms of recreation (such as hiking, fishing, cross country skiing), fence construction, wildlife and livestock water developments, and installation of small microwave and electronic sites

Comparison of Alternatives by Resource

Recreation

General Activities:

Recreation management includes activities such as operation and expansion of existing recreation facilities (campgrounds, boat ramps, trails, signs, ski areas, and parking lots and interpretive centers), construction of new facilities, providing access to National Forest land and water, and protecting visual resources.

Opportunities to enjoy various types of developed and dispersed recreation vary significantly among alternatives.

Developed recreation

Opportunities would increase in some alternatives due to the construction of new recreation facilities. Day use facilities are emphasized in some alternatives while more overnight campgrounds would be developed in others Alternative C provides the most new overnight campgrounds and encourages growth and demand. Alternatives B and E (Pref.) would develop enough campgrounds to meet long-term demands Alternatives G would not meet this long-term demand for developed recreation because it does not provide for enough new developed recreation sites and facilities. See Figure 2-26.

Figure 2-66 Number of Campground Units Constructed Per Year (Decade 1)

	Alt NC	NA A	RPA B	Pref C	Alt E	Alt G
Units	75	75	65	75	65	0

The following Figure 2-67, Intensive Recreation - Comparison of Supply and Demand, shows the relationship of projected use to the supply of intensive recreation opportunities. This Figure does not include all of the developed recreation on the Forest but it is the management area allocated for this purpose and will contain the

major portion of the developed recreation on the Forest.

Figure 2-67 shows that projected use will reach supply potential during the 1st decade for the No Change and Current Direction Alternative During the 3rd decade projected use is expected to reach supply potential in Alternative B (RPA). The supply potential is expected to exceed projected use for Alternative C in the first four decades. Alternative G Projected use will reach Supply Potential sometime during the 3rd decade and Alternative E sometime during the 5th decade.

Figure 2-67 Intensive Recreation - Comparison of Supply and Demand (Includes most Developed Recreation Except Mt. Bachelor)

	No Change	Cur.Dir. Alt A	Alt B	Alt C	Alt E	Alt G
Supply						
Acres Allocated	34500	34500	55647	88647	67100	44347
Supply Capacity Coeffic (RVD/Ac/Yr)	38 49	38 49	55647	38.49	38 49	38.49
Total Supply Potential (MRVD/Yr)	1328	1328	2142	3412	2583	1707
Consumption/Use						
Current Use (MVRD/Yr)	1259	1259	1259	1259	1259	1259
Projected Use Trend (% increase/yr)	0.02	0 02	0.02	0.0234	0.02	0.0183
1st Decade Use (MRVD/Yr)	1328	1328	1390	1413	1390	1378
2nd Decade Use (MRVD/Yr)	1328	1328	1694	1781	1694	1653
3rd Decade Use (MRVD/Yr)	1328	1328	2066	2245	2066	1707
4th Decade Use (MRVD/Yr)	1328	1328	2142	2829	2517	1707
5th Decade Use (MRVD/Yr)	1328	1328	2142	3412	2583	1707

Dispersed Recreation

Opportunities would substantially exceed demand in all Alternatives. Those recreation opportunities associated with roads or those that occur in Roaded, Modified and the Roaded-Natural Recreation Opportunity Spectrum (ROS) [1] zone will be particularly plentiful. This includes hunting, hunter camps, fishing, OHV use, nordic skiing, hiking, dispersed camping, etc.

Opportunities for dispersed recreation in unroaded areas or those that occur in the semiprimitive nonmotorized ROS zone will be significantly affected by all Alternatives. Figure 2-68 displays acres of each ROS class by alternative

[1] ROS - is a system used to identify and analyze broad categories of recreation opportunity on Forest lands.

Figure 2-68 Comparison of ROS Class by Alternative (M Acres)

	No Change	No Action	Alt. B	Alt. C	Alt. E	Alt. G	
Primitive	71,532	82,184	82,184	82,184	82,184	82,184	
SPMN	124,208	146,026	145,819	143,045	145,891	149,602	
SPM	162,636	12,065	11,248	266	11,533	26,220	
RN	223,735	279,353	269,091	275,791	253,591	253,591	
RM	894,900	1,075,778	1,069,968	1,063,126	1,073,815	1,073,815	
Rural	133,513	22,206	39,302	53,200	41,462	32,200	
Urban	9,888	2,800	2,800	2,800	2,800	2,800	

Alternative C would restrict such recreation opportunities to existing Wilderness and parts of the Oregon Cascade Recreation Area (OCRA) Alternative C, however, would not meet long-term needs for Semiprimitive Nonmotorized recreation. Alternatives B (RPA), and E (Pref.) provide more opportunities than C, due to the larger amount of land that would remain roadless. Alternatives G provide the most opportunities for dispersed recreation in unroaded areas.

When comparing projected use, for the first 5 decades, by ROS class to the maximum theoretical capacity we find that for Primitive, Roaded Modified, Roaded Natural, Rural, Semi-Primitive Non Motorized and Urban, the projected use will not reach Maximum Theoretical Capacity However, for Semi-Primitive Motorized Projected is expected to exceed the Maximum Capacity in the first decade, except Alternative G which would be in the 2nd decade.

Figure 2-69 shows the relationship of the Projected use to the supply of undeveloped recreation opportunities. This figure does not include all of the undeveloped recreation on the Forest but it is the management area allocated for this purpose and will contain the major portion of the undeveloped recreation on the Forest

Figure 2-69 Undeveloped Recreation - Comparison of Supply and Demand (includes most undeveloped recreation)

	No Change	No Action Alt A	Alt B	Alt C	Alt E	Alt G
Supply						
Acres Allocated	63500	63500	59200	1400	60700	138000
Supply Capacity Coeffic (RVD/Ac/Yr)	3.05	3.05	3.05	3.05	3 05	3.05
Total Supply Potential (% increase/yr)	194	194	181	4	185	421
Consumption/Use	50	50	50	50	50	50
Current Use (MVRD/Yr)	0 02	0.02	0.02	0 0207	0.02	0 0237
Projected Use Trend (% increase/yr)						
1st Decade Use (MRVD/Yr)	55	55	55	4	55	56
2nd Decade Use (MRVD/Yr)	67	67	67	4	67	71
3rd Decade Use (MRVD/Yr)	82	82	82	4	82	90
4th Decade Use (MRVD/Yr)	100	100	100	4	100	114
5th Decade Use (MRVD/Yr)	122	122	122	4	122	143

Figure 2-69 shows that the supply potential is reached in the first decade in Alternative C, however supply potential is not expected to be reached until sometime after the 5th decade for all other alternatives.

A look at Supply and demand for recreation in all management areas other than Wilderness, Intensive Recreation, Undeveloped Recreation and special interest areas is shown in Figure 2-70 which follows.

Figure 2-70 indicates that projected use will be reached in all Alternatives during the 2nd decade. At that time the RVD's per acre per year will increase or use will have to be curtailed In either case conflict between uses will intensify.

Figure 2-70 Recreation - Comparison of Supply and Demand For All Management Area Allocation (except Wilderness, Intensive Recreation, Undeveloped Recreation and Special Areas).

	No Change	No Action	Alt B	Alt C	Alt E	Alt G
Supply						
Acres Allocated	1252697	1252697	1254650	1284650	1240397	1190050
Supply Capacity Coeffic (RVD/Ac/Yr)	1.04	1.04	1 04	1.04	1.04	1 04
Total Supply Potential (% increase/yr)	1303	1303	1305	1336	1290	1238
Consumption/Use						
Current Use (MVRD/Yr)	1000	1000	1000	1000	1000	1000
Projected Use Trend (% increase/yr)	0.02	0.02	0.02	0.0207	0.02	0.0237
1st Decade Use (MRVD/Yr)	1104	1104	1104	1108	1104	1124
2nd Decade Use (MRVD/Yr)	1303	1303	1305	1336	1290	1238
3rd Decade Use (MRVD/Yr)	1303	1303	1305	1336	1290	1238
4th Decade Use (MRVD/Yr)	1303	1303	1305	1336	1290	1238
5th Decade Use (MRVD/Yr)	1303	1303	1305	1338	1290	1238

Hunting and Fishing

The following figure displays the projected wildlife and fish user days for each of the Alternatives

The projected use is not expected to vary between alternatives. However Figure 2-71 does show the different amounts of pressure which can be expected to be put on the deer or deer populations. As can be seen in the figure, Alternative C would have the least pressure and Alternative E the next least amount of pressure.

Figure 2-71 shows a comparison of Wildlife and Fish User Days (WFUD's) per projected Deer. This implies that the number of WFUD's per deer will more than double for all Alternatives and that the success ratios will probably decline.

Figure 2-71 Comparison of Projected Wildlife and Fish User Days.

	1985 No Change	Current Direction	Alt B	Alt C	Alt E	Alt G
Fishing Use 1985	146000					
1st Decade	161196	161196	161196	161196	161196	161196
2nd Decade	196497	196497	196497	196497	196497	196497
5th Decade	355927	355927	355927	355927	355927	355927
Big Game Use 1985	53900					
1st Decade	59510	59510	59510	59510	59510	59510
2nd Decade	72542	72542	72542	72542	72542	72542
5th Decade	131400	131400	131400	131400	131400	131400
Non-Game Use 1985	6900					
1st Decade	7618	7618	7618	7618	7618	7618
2nd Decade	9286	9286	9286	9286	9286	9286
5th Decade	16821	16821	16821	16821	16821	16821
Other Game Use 85	15600					
1st Decade	17224	17224	17224	17224	17224	17224
2nd Decade	20996	20996	20996	20996	20996	20996
5th Decade	38031	38031	38031	38031	38031	38031
Total Use						
1st Decade	245548	245548	245548	254548	245548	245548
2nd Decade	299321	299321	299321	299321	299321	299321
5th Decade	542179	542179	542179	542179	542179	542179

Figure 2-72 Comparison of Wildlife and Fish User Days Per Deer by Alternative

	No Change	Current Direction	Alt B	Alt C	Alt E	Alt G
Deer Population	20300	20300	27100	32300	29800	16700
1st Decade	2.9	2.9	2.2	1 8	2.0	3.6
2nd Decade	3.6	3.6	2.7	2 2	2.4	4.3
5th Decade	6 5	6.5	4.8	4.1	4.4	7.9

Wild and Scenic Rivers

There is no difference between alternatives for acres allocated to wild and Scenic Rivers in the FEIS. In October of 1988 the Oregon Wild and Scenic Rivers Act was passed and six rivers were designated on the Deschutes National Forest. The DEIS displayed a different amount of acres/ miles for each alternative which would have been proposed for Wild and Scenic River designation.

Rivers added to the Wild & Scenic Rivers System in 1988 were:

Squaw Creek	27.0 miles
Big Marsh	15.0
Crescent Creek	10 0
Deschutes River	54.0
Little Deschutes	12.0
Metolius River	28.6

Rivers/Streams identified as being eligible for consideration for the Wild & Scenic River System in this planning process are·

Paulina Creek	8.0 miles
Deschutes River	8.0
Browns Creek	2.0
Fall River	11.2
Jack Creek	5.0

Additional detail on these rivers and streams is contained in Chapter 4 of this EIS.

Unroaded Areas

Figure 2-73 summarizes the development of inventoried roadless areas that would result from the implementation of each of the Alternatives. This figure does not identify the individual roadless areas. For more information regarding the planned development of individual roadless areas by alternative, refer to Tables C-2 through C-12 in Appendix C.

During the development of the Alternatives, various management strategies were applied to the different roadless areas. A schedule of activities is coupled with these strategies. Some of these strategies such as undeveloped recreation, Research Natural Areas, or old growth, do not permit timber harvesting which is chargeable or road construction. However, other management strategies do involve the scheduling of timber harvesting and its associated road construction activities (i.e , general forest, scenic views, deer winter range, etc.). The consequences of applying these management strategies to the roadless areas which are displayed in Figure 2-22 and the respective individual roadless area figures in Chapter 4. A Forest Plan for any of the Alternatives would be for 10-15 years As the Forest Plan is revised or redone at the end of 15 years, roadless areas would be evaluated for Wilderness

Where timber production is part of the strategies applied to a roadless area, the schedule of harvesting was developed with a complex computer model (FORPLAN). The model and its role in the analysis of Alternatives is described in detail in Appendix B. Upon examining Figure 2-73, it is apparent that the model did not schedule timber harvesting or road construction during the first decade in any of the Alternatives in any roadless areas.

However, in certain situations there may need to be exceptions to the planned development of these roadless areas as displayed in Figure 2-73. Many of the roadless areas contain mature and overmature stands of lodgepole pine which is dead and dying as a result of the mountain pine beetle epidemic Consequently, it may be appropriate to enter portions of the areas for the following reasons 1) to provide firewood in areas where supplies are becoming limited, 2) to reduce fire hazards to protect adjacent areas or reduce the chance of catastrophic fires, and 3) to salvage material which has a commercial value. Since it is difficult to model this catastrophic situation, the schedule of timber harvesting and road construction activities displayed for these roadless areas may need to be adjusted to reflect the rapidly changing conditions that exist in the mature lodgepole pine stands In Alternative G, no unscheduled entry into roadless areas would be permitted and the epidemic would be allowed to run its natural course In Alternatives NC through E, unscheduled entries may need to be made in order to treat the lodgepole situation This is most likely to occur in the North and South Paulina and Bearwallows roadless areas since they are already heavily infested with the mountain pine beetle and are predominantly lodgepole pine.

Figure 2-73 Summary of Roadless Area Development by Alternative

	No Change	No Action Alt. A	RPA Alt. B	Alt. C	Pref. Alt. E	Alt. G
Total Unroaded Acres (Roadless areas, Wilderness & OCRA)	357,600	357,600	357,600	357,600	357,600	357,600
Total Roadless Area Acres	145,142	145,142	145,142	145,142	145,142	145,142
Roadless Area Acres Available for Timber Development	44,842	44,842	54,174	89,961	47,422	47,653
Roadless Area Acres Unavailable for Timber Development[1]	100,300	100,300	90,968,	55,181	97,720	97,489
Acres of Timber Harvest [3]						
Decade 1[4]		0	7,066	8,082	0	0
Decade 2		0	18,429	32,392	255	397
Decade 5[5]		12,434	30,159	69,927	6547	9,262
Cumulative Miles of Road Construction by:[6]						
Decade 1		0	70.7	80.8	.0	0
Decade 2		0	184.3	323.9	2.6	4.0
Decade 5		124.3	301.6	699.3	65.5	92.6
Acres Remaining Undeveloped After:[7]						
Decade 1		145,142	138,076	137,060	145,142	145,142
Decade 2		145,142	126,713	112,750	144,887	144,745
Decade 5		132,708	114,983	75,215	138,595	135,880

Acres Used For Geothermal Development--Depends on demand for Geothermal Development

NARRATIVE for the No Change Alternative: No specific schedule was developed as to when the portions of the roadless areas that are available would be roaded and harvested It could be expected that roading in portions of them would occur in the first decade.

[1]Includes management strategies which primarily exclude roading such as Research Natural Areas, some forms of undeveloped recreation, and the Bend Municipal Watershed

[2]The acres assigned to the winter recreation and geothermal strategy are available for roading but it is difficult to predict when that would occur since it is dependent upon leasing and exploration Some exploration could be expected in the first decade but it is impossible to say how much and where.

[3]The acres scheduled for timber harvest would also have associated roads so that total acres impacted would be somewhat higher than shown above

[4]First decade basically represents the life of a Plan for any alternative

[5]The fifth decade represents the potential if an alternative were continued for 5 decades

[6]Based on an estimate of 0 01 miles of collector and local roads per acre harvested The unpredictable impacts of geothermal exploration and development are not included

[7]Includes only the impacts of scheduled timber harvesting Does not consider geothermal exploration or some development that might occur because of the mountain pine beetle epidemic in lodgepole pine

Wilderness

Wilderness is specifically designated by Congress, therefor the number of acres remains the same in all Alternatives. Portions of five different Wildernesses are part of the Deschutes National Forest. A description of each can be found in Chapter 3 of this FEIS The five Wildernesses and their total acres are; Diamond Peak (52,337 acres), Mt. Jefferson (111,177 acres), Mt. Thielsen (55,100 acres), Mt. Washington (52,516 acres), Three Sisters (283,402). There are 177,878 (see Chapter 3 for acres in each Wilderness) acres of the above Wildernesses located on the Deschutes National Forest The estimated capacity is about 400,800 visitor days for all of the Alternatives. The projected use for Alternative G is estimated to be about 212,000 RVDs and for all other alternatives projected use is estimated to be about 171,000 RVDs. Supply will exceed demand for the short and long-term.

Visual Quality

Scenic quality is managed differently in various alternatives In Alternative C, only the major highways and buttes would be managed for visual quality Views of human activity, including logging, would dominate the landscape Logging areas and roads would be visible from some viewer locations, including recreation sites. Due to the accelerated treatment of mature lodgepole pine, some large clearcuts would be visible.

Alternatives B (RPA), and E (Pref.) provide different levels of emphasis on visual quality but the majority of the roads, buttes, and recreation areas would be managed to protect or enhance visual quality. Treatment of lodgepole pine would be evident over the short-term along major roads and in some recreation areas Stumps and small amounts of logging slash would be visible until new trees grow

Alternative G protects most roads and trails to enhance visual quality Treatment of the lodgepole pine would be less noticeable since treatment would extend over a 30-year period.

Figure 2-74 Retention and Partial Retention Visual Quality Objectives (in Percent)

	No Change	No Action	(RPA) Alt.B	Alt C	Pref. Alt.E	Alt G
Retention Partial Retention	14 11	14 11	10 13	2 11	8 13	15 11
Total	**25**	**25**	**23**	**13**	**21**	**26**

Research Natural Areas

Chapter 3 "Research Natural Areas" discusses the two existing Research Natural Areas and lists in Figure 3-36 the Potential Research Natural Areas. The following figure displays which RNAs would be recommended for establishment by each Alternative. Metolius and Pringle Falls are established Research Natural Areas and are therefor included in all Alternatives as such.

Figure 2-75 Recommended Research Natural Areas by Alternative

Area	Acres	No Chg.	Alt. A	Alt. B	Alt. C	Alt. E	Alt. G
Metolius	1318	E	E	E	E	E	E
Pringle Falls	1318	E	E	E	E	E	E
Little Cache Mtn	660			R		R	R
Cultus River	300			R		R	R
Katsuk	990			R		R	R
Many Lakes	1075			R		R	R
Torrey-Charleton	1350			R	R	R	R
Mokst Butte	890			R		R	R
Wechee Butte	425			R		R	R

E = Established Areas
R = Recommend for Establishment

Old Growth Forests

The following Figures 2-76 and 2-77 show the existing old growth by working groups and the old growth remaining in each of three vegetative groups at the end of the 1st, 2nd, and 5th decades. Timber harvest influences the amount of old growth in all three time periods. By the 5th decade, mature stands in management areas not allowing timber harvest will have acquired old growth characteristics

Figure 2-76 Table - Existing Old Growth by Harvest Restriction and Working Group, which meet the R-6 Regional Guide definition.

	No Change & Alt A	Alt. B	Alt C	Alt. E	Alt. G
Acres of Old Growth in management areas with no programed harvest					
Wilderness & OCRA (6 & 14)					
Ponderosa Pine	0	0	0	0	0
Lodgepole Pine	16300	16300	16300	16300	16300
Mixed Conifer	41000	41000	41000	41000	41000
Mtn Hemlock	41200	41200	41200	41200	41200
Unsuitable	0	0	0	0	0
SUB-TOTAL	98500	98500	98500	98500	98500
Non-Wilderness/OCRA Mgmt areas, 1, 2, 4, 10, 11, 12, 13, 15, 16, 17, 19, 20, 23, 24, 25, 27, 28.					
Ponderosa Pine	9300	10900	6300	18500	10800
Lodgepole Pine	14600	16000	9600	18000	22700
Mixed Conifer	37500	42400	25000	51700	48400
Mtn Hemlock	34800	27300	13000	29600	36900
Unsuitable	5200	4000	2500	5000	4600
SUB-TOTAL	101400	100600	56400	122800	123400
Acres of old Growth in management areas with programmed timber harvest Mgmt areas 7, 8, and unseen portion of 18.					
Ponderosa Pine	24200	25300	32900	17400	27100
Lodgepole Pine	21000	24000	36700	20400	17700
Mixed Conifer	39300	38500	69900	26200	38600
Mtn Hemlock	800	4500	25100	1900	800
Unsuitable	2200	3100	5000	2400	2900
SUB-TOTAL	87500	95400	169600	68300	87100
Acres of old Growth in management areas with reduced programmed timber harvest Mgmt Areas 3, 5, 9, 21, 22, 26, and seen portion of 18.					
Ponderosa Pine	16700	14000	11000	14300	12300
Lodgepole Pine	12500	8100	1800	9700	7700
Mixed Conifer	28200	24100	10100	27100	18000
Mtn Hemlock	2800	6600	300	6900	700
Unsuitable	500	800	400	500	400
SUB-TOTAL	60700	53600	23600	58500	39100
Total acres of old Growth in all management areas.					
Ponderosa Pine	50200	50200	50200	50200	50200
Lodgepole Pine	64400	64400	64400	64400	64400
Mixed Conifer	146000	146000	146000	146000	146000
Mtn Hemlock	79600	79600	79600	79600	79600
Unsuitable	7900	7900	7900	7900	7900
GRAND TOTAL	**348100**	**348100**	**348100**	**348100**	**348100**

Figure 2-77 Table - Old Growth, meeting the R-6 Regional Guide definition, Remaining After Each Decade Harvest by Working Group

	No Change & Alt. A	Alt. B	Alt. C	Alt. E	Alt. G
DECADE 1					
Ponderosa Pine	43500	44500	43600	46800	44200
Lodgepole Pine	52600	51400	46000	52700	51900
Mixed Conifer	138600	138600	132300	139400	138400
Mtn Hemlock	79600	79600	79600	79600	79600
Unsuitable	7900	7900	7900	7900	7900
SUB-TOTAL	322200	322000	309400	326400	322000
DECADE 2					
Ponderosa Pine	36800	38800	37000	43200	38100
Lodgepole Pine	40900	38600	27700	40800	39300
Mixed Conifer	131100	131300	118600	132900	130700
Mtn Hemlock	79600	79600	79600	79600	79600
Unsuitable	7900	7900	7900	7900	7900
SUB-TOTAL	296300	296200	270800	304400	295600
DECADE 5					
Ponderosa Pine	16700	21600	17200	32700	20000
Lodgepole Pine	36800	35600	27200	36500	28200
Mixed Conifer	105200	98100	77400	113500	107500
Mtn Hemlock	78800	75100	55500	71900	78800
Unsuitable	7900	7900	7900	7900	7900
SUB-TOTAL	245400	238400	182200	262500	242400

Wildlife

Big Game

The effects of the Alternatives on big game habitat could determine the long-term population levels for deer No Change and Current Direction (Alternative A) provides for 20,300 deer. Alternatives B (RPA), C, and E (Pref.) could increase mule deer populations. Alternatives G would reduce deer populations below current levels The population predictions are based on the amount of transition and winter ranges on which optimum habitat conditions are provided

Thermal cover, which is provided by dense stands of trees, would improve in Alternatives C, and E (Pref) in the long-term on winter and transition ranges but would not under Current Direction (A) or in Alternative G The relationship of thermal cover and feeding areas would be optimized in Alternatives B (RPA), C, and E (Pref), but not in Alternatives G and. Feeding areas would be improved in the short and long-term in Alternatives B (RPA), C, and E (Pref), by burning the older shrubs and replacing them with grasses and forbs.

Figure 2-78 shows the potential long-term deer populations, based on the amount and condition of habitat provided by the Alternatives.

Figure 2-78 Potential Long-term Deer Populations (for Decades 3 & 5)

	No Change	No Action	RPA B	Alt C	Pref E	Alt G
Deer Pop.	20,300	20,300	28,600	32,300	24,900	16,700

Osprey Habitat

Figure 2-79 below shows the estimated osprey population levels for each Alternative. Osprey habitat falls into two basic categories: (1) good habitat which is nest trees located within 1/4 mile of water and (2) marginal habitat which is nest trees located from 1/4 to 5 miles from water. Under No Change Current Direction (Alternative A) both good and marginal habitats are being protected. This is resulting in a gradual increase in osprey numbers on the Forest. Some of the good nesting habitat is disappearing, however, due to the natural loss of nesting sites at Crane Prairie Reservoir Alternatives B (RPA), C, and E (Pref.), do not protect the marginal nesting habitat, so osprey populations could be expected to decline in the long-term. Alternative G does protect both marginal and good habitat, so osprey populations could be expected to continue to increase.

Figure 2-79 Estimated Osprey Populations (In pairs)

	NC	Cur Dir	RPA B	Alt C	Pref E	Alt G
Pairs of Osprey	180	180	80	80	125	180

Pine Marten Habitat

Pine marten habitat to a large degree will decline in the short-term in all Alternatives. They occupy mature lodgepole pine which is being reduced because of the mountain pine beetle epidemic. This habitat will be lost whether or not lodgepole pine is salvaged. Alternative C would reduce habitat, in the long-term, to the bare minimum for retaining viable populations of pine martens. Alternative NC, A (Cur.Dir), B (RPA), and E (Pref.) would have long-term reductions in habitat; while Alternative G would retain marten populations near current levels over the long-term.

Other Indicator Species

Figure 2-80 Indicator Species (Pairs)

	NC	A	B	C	E	G
Goshawk	40	65	65	50	65	80
Wood-peckers	40%	40%	40%	20%	50%	80%
Elk	600	1000	1000	600	1500	2000

Other Threatened and Endangered Species

Bald Eagle: 35-45 Pairs - Same for all Alternatives

Figure 2-81 Spotted Owl Habitat

	NC	A	B	C	E	G
Spotted Owls	3	14	14	14	14	17

Range

The estimated capacity of the Range Resource is estimated to be 24,175 Cattle and Horses and 12,537 Sheep and Goats for a total of 36,712 Animal Unit Months(AUM). With heavy capitol investments 60,000 AUMs could be produced. There are 522,073 acres of suitable range located within 719,255 total national forest acres. Approximatly 42% of the suitable range is permanent while the rest is forested. See Chapter 3 of this FEIS and the Analysis of the Management Situation (AMS) for more detailed discussion

Demand has been constant over the past several years. See Chapter 3 of this FEIS and the AMS for further details.

Alternatives B (RPA), C, and E (Pref.), meet the RPA Program and increase from current levels. Alternatives NC, and A (Cur Dir.) maintain grazing at current levels. Alternative G decreases from current levels.

Figure 2-82 Potential Animal Unit Months by Alternative and Decade (In thousands)

MAUMs	NC	NA A	RPA B	Alt C	Pref. E	G
Decade 1	29	29	30	45	32	26
Decade 2	29	29	36	45	36	26
Decade 5	29	29	38	45	45	26

Timber

General Activities:

The number of acres impacted in each alternative is primarily a function of (1) the amount of volume offered for sale in each decade, (2) the rate at which mature and overmature lodgepole pine stands are converted to young managed stands in order to alleviate future losses to the mountain pine beetle epidemic, and (3) the proportionate share of the allowable sale quantity that is comprised of thinning volumes.

Figure 2-83 displays the allowable sale quantity in board feet and average diameter by working group for each alternative. Alternative C offers the highest allowable sale quantities while Alternative G offers the least over the first two decades It is also apparent that Alternative E proposes to convert more lodgepole pine over the next two decades than any other alternative (except Alternative NC), while Alternative A converts the least. In the short-term, these two factors account for Alternative C impacting more land with timber management and road construction and maintenance activities than any other alternative, while Alternative G impacts the least. All of the other alternatives fall somewhere in between

In the long-term, (what potentially could happen if an alternative were carried beyond the life of a plan which is 10-15 years) the amount of commercial thinning that comprises the allowable sale quantity will also affect the amount of land impacted annually by timber management related activities. This begins to show up in Decade 5, but does not become a significant factor until Decades 6, 7, and 8 In Alternatives A, B, and C, the allowable sale quantity over the next four or five decades is predominantly made up of regeneration harvest volumes from mature and overmature larger diameter stands of trees (except for lodgepole pine). Beginning in the fifth decade and becoming more pronounced in the following decades, more and more of the allowable sale quantity volume will be from commercial thinnings of younger and smaller diameter stands of trees. This will require an increasing amount of acreage to be covered each year to yield equal amounts of harvest volumes. This trend is also present in Alternative E, but is less pronounced, because more acres are scheduled for selection harvest as opposed to regeneration harvest in the early decades. Alternative G schedules the highest amount of acres in selection harvest in the first decade of any of the alternatives, so the transition to commercial thinnings later results in a more constant harvest acreage over time. Selection harvests yields are more similar to commercial thinnings than they are to regeneration harvests.

Figure 2-83 Allowable Sale Quantity and Average Diameter[1] by Working Group for Each Alternative (Average Annual MMBF)

		PP		LP		MC		MH	
Alternative	**Decade**	**Vol**	**Dia**	**Vol**	**Dia**	**Vol**	**Dia**	**Vol**	**Dia**
No Change	1	28 2	Unk	8 9	Unk.	#2	Unk.	--	--
	2	Unk.	Unk	Unk	Unk.	Unk.	Unk.	Unk	Unk
	5	Unk.	Unk.	Unk.	Unk.	Unk.	Unk	Unk.	Unk.
A (Cur.Dir.)	1	14 4	14.7	0 5	9.4	9.9	14.4	--	--
	2	11.9	14.5	1.0	9.0	11 9	14.6	<0 1	17.1
	5	9.1	13.4	10.1	9.2	5 1	13.5	0.5	17.8
B (RPA)	1	3 7	14 8	0 6	8.9	20.9	14 2	0 7	17.0
	2	4 4	13 6	5 3	9 1	15 1	14 0	1.1	17 1
	5	16.6	14.2	6.4	9.3	2 6	13.7	0.3	17 8
C	1	7.3	14.6	1 1	9.06	25 6	14.2	<0.1	17 0
	2	15.4	14.2	3.8	9.29	10.2	14.3	4.6	17 1
	5	15.5	13.8	14.2	10.1	2.3	13.0	2.0	17.8
E (Pref.)	1	5 6	14 5	5 8	9 9	6.5	14 5	--	--
	2	4.1	13 9	1 0	9.1	12.8	14.6	--	--
	5	4 5	13 7	8 7	9.1	4.7	14.8	--	--
G	1	7.3	13 8	<0 1	9 4	8.3	14 3	--	--
	2	2.7	14.4	2 2	9 6	10.2	14.6	0 5	17.1
	5	0.5	14 3	6 6	9 0	8.3	14.1	0 2	17.8

[1]Represents the diameter of the tree of mean basal area (quadratic mean diameter)
[2]Included in PP volume
Unk.=Unknown

Figure 2-84 compares current and future timber outputs for all Alternatives by indicating projected allowable sale quantity (ASQ), timber sale program quantity (TSPQ), and long-term sustained yield (LTSY) capacity. This figure includes a display of lands suitable for timber production by alternative.

Figure 2-84 Allowable Sale Quantity, Timber Sale Program Quantity, Long-Term Sustained Yield

	No Change	No Action A	RPA B	Alt. C	PREF E	Alt. G
Allowable Sale Quantity						
1st Decade MMBF	219	142.1	146.5	191.2	99.8	86 0
1st Decade MMCF	37.1	24.8	25.9	34.0	17 9	15 6
2nd Decade MMCF	*	24.8	25.9	34.0	17 9	15 6
5th Decade MMCF	*	24.8	25.9	34.0	17.9	15 6
Timber Sale Program Quantity						
1st Decade MMBF	219[1]	177.1	188 5	216.2	141.8	126.0
1st Decade MMCF	37 1	31 6	34.2	39.4	25.4	23.5
2nd Decade MMCF	*	32 4	33.5	38 4	23 5	22.8
5th Decade MMCF	*	31.9	34.0	38.7	24.5	23.5
Long-Term Sustained Yield MMCF	NA	24.8	25 9	34 0	20.7	15 5
Tentatively Suitable Land (M Acres)	1272	1151	1151	1151	1151	1151
Lands Suitable for Timber Production M Acres	1272	868	878	1023	841	635
By Yield Category						
Full Yield M Acres	*	594	642	823	573	495
50-99 % of Full Yield M Acres	*	594	642	823	573	495
1-49 % of Full Yield M Acres	*	0	0	0	0	0

* Data is not available
[1]Firewood not included for Alternative NC

Figure 2-85 below displays the average annual volume sold and the average annual volume harvested for the past decade.

Figure 2-85 Average Annual Volumes Harvested and Sold (MMBF) (past decade)

Year	Sold	Harvested
1976	229	210.5
1977	186	43.5
1978	196	206.6
1979	196	178 4
1980	188	159.0
1981	215	190 0
1982	170	147.0
1983	197	234.0
1984	161	244.0
1985	162	291 0
1986	190	222.0
1987	201	226.0
1988	179.8	166.4

Figure 2-86 Timber Resource Management Information by Benchmark and Alternative

	NA A	RPA B	Alt. C	PREF E	Alt. G
Suitable Lands M Acres	867.7	877.9	1,022.6	841.1	635 1
Inventory					
Begin MMCF	1,197.3	1,238.4	1,500.4	1,126 6	981.6
Begin CF/Acre	1,379.8	1,410 6	1,467.2	1,339.5	1,545.5
End MMCF	955.5	1,297.1	1,456 3	1,427.2	782.9
1st Decade Avg. Annual ASQ					
MMCF	24.8	25.9	34.0	17.9	15.6
% of End MMCF	2.6	2.0	2 3	1.3	2.0
Decade	15	15	15	15	15
Long-term Sustained Yield Capacity					
MMCF	24.8	25.9	34.0	20 7	15 5
% of End MMCF	2.6	2.6	2.3	1 5	2 0
Decade	15	15	15	15	15
Average Annual Net Growth					
Present CF/Acre	22.0	22.3	22.3	20 3	21 6
Decade 5 CF/Acre	30.5	35.1	38.6	32 0	23.9
Decade 5 MMCF	26.5	30.8	39.5	26 9	15.2
Area & % of Suitable Land by Yield Level					
Full Yield					
M Acre	593.5	642.2	823 2	573 3	495.3
% of Suitable land	68	73	81	68	78
50-90 % Yield					
M Acre	274.2	235.7	199.4	267.8	139.8
% of Suitable land	32	27	19	32	22
Under 50 % Yield					
M Acre	0	0	0	0	0
% of Suitable land	0	0	0	0	0
First Decade					
Clearcut M Acres	0.1	16 9	51.2	15.2	0
Shelterwood/Seed Tr	0	10.4	14.6	58.9	0
Selection M Acres	0	64.0	68.7	43.7	122.5
Overstory Removal	103.9	5 7	2 9	21.9	36.1
Commercial Thin	18.8	83.5	79.8	1 2	0 3
Harvest Total	122.8	180.5	217.2	140.9	158.9
% of Suitable Lands	14	21	21	17	25

A variety of silvicultural methods are available to manage forest resources. Figure 2-87 shows the anticipated scheduling of acres by silvicultural method by alternative. The rationale used to select a particular silvicultural method is presented in Appendix G, FEIS. This includes direction for the application of clearcutting, which has become a sensitive issue. A discussion of the effect of silvicultural methods is presented in Chapter 4, Timber, FEIS.

Figure 2-87 Acres Scheduled for Harvest by Silviculture Method Average Annual for the 1st Decade

Silvilcultural Method	No Change	No Action A	RPA B	Alt. C	PREF E	Alt. G
Clearcut	2.5	0.0	1.7	5.1	1 5	0 0
Shelterwood	6 0	0.0	1 0	1.5	5.9	0.0
Single Tree Selection	0	0	0	0	3 9	12 2
Group Selection	0	0	6.4	6.9	5	.01
Overstory Removal	2.0	10.4	0.6	0 3	2 2	3.6
Commercial Thin	0 5	1.9	8 4	8.0	0.1	0.0

Figure 2-88 which follows displays past, present, and Alternative outputs. Item 1 compares timber volume sold and harvested over the past decade, potential yield calculations from the Timber Management Plan, and the allowable sale quantity (ASQ) for each Alternative. Sell and harvest figures are ten year averages from 1976-1988 The sell figure subdivides green and salvage volume Average volume per year harvested for that same period was 193.7 MMBF, including salvage.

The Alternatives are displayed immediately after these first two columns They are arrayed by harvest level -- Alternative NC with the highest yield and Alternative G with the lowest

Predicted timber harvest from lands designated as unsuitable for timber harvest is presented in item 2. Volume from item 2 comes from specific projects in management areas with no scheduled timber harvest (i e , removing hazard trees from campgrounds). Item 3 displays submerchantable volume that could be utilized, but does not meet Regional utilization standards. This includes the amount of fuelwood and other material that is predicted to be used from both suitable and unsuitable lands The 1978 Timber Management Plan acknowledged that volume would come from these components for similar reasons but did not attempt to quantify it Utilization of this material was authorized. The volume displayed in the column "Average Timber Sold" displays the actual volume of this material sold

Figure 2-88 Comparison - Past, Present, and Alternative Timber Outputs

1.Allowable Sale Quantity (ASQ)

The allowable sale quantity is composed of those volumes resulting from the yield projections of FORPLAN. ASQ is obtained from lands designated as suitable for timber production under NFMA standards, and meets the utilization standards in the Regional Guide. When sold, the volume is called "chargeable", and is used to determine achievement of planned allowable sale quantity goals.

	Existing 1978 TM Plan	Average Timber Sold 76-88	NC	CD	RPA B	C	Pref. E	G
A. Green	186.6	165 2						
B. Salvage	5 0	26.2						
Total ASQ	191.6	191.4	219.0	142.1	146.5	191 2	99.8	86.0

2 Sawtimber from Lands Designated Unsuitable for Timber Production

This incidental volume is an estimate of timber that will be sold from lands not designated for timber production. These sales are generally associated with vegetative management for other resources. Though meeting Regional Guide utilization standards, this volume is not considered "chargeable" against the planned ASQ goals.

	Existing 1978 TM Plan	Average Timber Sold 76-88	NC	CD	RPA B	C	Pref. E	G
A Green		1 0		1.0	1.0	1.0	1.0	1 0
B Salvage		0 4		1.0	1.0	1.0	1.0	1.0
Total volume from unsuitable		1.4		2.0	2.0	2.0	2 0	2.0

3. Submerchantable Volumes from All Lands.

This consists of the estimated timber volume that does not meet the utilization standards in the Regional Guide, but which could be utilized for products other than sawtimber. It is not considered "chargeable" against planned allowable sale quantity goals.

	Existing 1978 TM Plan	Average Timber Sold 76-88	NC	CD	RPA B	C	Pref. E	G
A. Fuelwood		3.5		25.0	25.0		25.0	25.0
B. Other (cull)		4.5		8 0	15.0	23.0	15.0	13.0
Total volume submer-chantable		8.0		33.0	40.0	23.0	40.0	38.0
Total Net Mer-chantable Saw-timber 1+2		192 8	219.0	144.1	148 5	193 2	101 8	88 0
Total Non Chargeable		9.4						

4. Timber Sale Program Quantity

(1+2+3) The timber sale program quantity includes the allowable sale quantity for the first decade and established additional volume planned for sale during the first decade, such as fuelwood.

Existing 1978 TM Plan	Average Timber Sold 76-88	NC	CD	RPA B	C	Pref. E	G
191 6	200 8	219.0	177.1	188 5	216 2	141 8	126 0

Oregon Forestry Program

Coordination With Local, County, State, and Federal Governments

Coordination with other agencies occurred throughout the planning process The major local, County, State, and Federal agencies contacted include the City of Bend; Deschutes and Jefferson Counties; the Confederated Tribes of the Warm Springs Reservation; Oregon Department of Fish and Wildlife; Oregon Department of Forestry, Fish and Wildlife Service, Endangered Species Branch, U.S. Department of the Interior; the Bureau of Land Management, and the Soil Conservation Service

Figure 2-89 Comparison of the Preferred Alternative (E) and Other Alternatives with Goals of the Forestry Program for Oregon (FPFO), Oregon Forestry Department

FPFO Basic Objective - (Number or letter designated)
Forest Discussion - (Forest Response)

FPFO 1. Preserve the forest land base of Oregon and assure practical forest practices that conserve and protect soil productivity and air and water quality by:

a. Developing land use recommendations that recognize that forests are dynamic and most forest uses are compatible and that emphasize the integration of forest land uses,

b. Encouraging federal agencies to maintain as large and as stable a commercial forest land base as possible and to minimize future withdrawals from this land base;

c. Recommending that habitat should be managed based upon sound research data and the recognition that forests are dynamic and most forest uses are compatible over time; and

d. Cooperatively establishing forest management standards and regulations for protection of necessary habitat that are based upon the best knowledge available and that are consistent with responsible forest management,

Forest Discussion:

The relative risk of soil damage was rated numerically from a low risk of 1 to a high risk of 5. Alternative G and B provide the lowest potential of soil damage with relative risk levels of 1 and 2, respectively. Alternative E would result in a more moderate risk level of 3 with about 11,700 acres per year requiring special soil management prescriptions. The highest risk of soil damage is associated with the "No Change", A and C Alternatives, which would result in relative risk ratings of 5, 5, and 4, respectively.

Air quality can be measured in terms of total suspended particulate emissions (tons per year). Alternatives C would produce the most emissions and Alternative G would produce the least. Alternative E would produce less emissions than Alternative "No Change", A and B.

Alternative E would meet overall water quality requirements, although there would be trouble spots of localized, short-term violations Alternatives "No Change" and A would maintain a high level of water quality with slight decreases in localized areas due to increases in recreation and timber harvest. Alternative B's management levels would increase soil disturbance and reduce localized sedimentation problems and degradation of wetlands and riparian zones. Alternative

C's commodity emphasis would produce the greatest increase in soil disturbance and violations of state water quality standards. Alternative G would maintain water quality on the Forest at the highest level with slight reductions over time due to increased recreation development.

Management of the Deschutes National Forest is designed to meet or exceed State of Oregon requirements for protection of all resources although short-term, isolated violations may occur. Monitoring of Forest activities will identify such violations and mitigation measures will be implemented to minimize such impacts.

All Alternatives provide for managing Forest resources according to the principals of multiple-use and sustained yield in varying degrees

One of the Forest's goals is to provide habitat for viable populations of all vertebrate species currently found on the Forest and maintain or enhance the overall quality of wildlife habitat.

The Forest has written standards/guidelines to direct management activities and protect resources. They must comply with applicable State laws and regulations.

FPFO 2. Promote the maximum level of sustainable timber growth and harvest on all forest lands available for timber production, consistent with applicable laws and regulations and taking into consideration landowner objectives by;

a. Promoting timber growth and harvest on public lands in a manner consistent with responsible forest management.

b. Supporting the use of intensive timber management practices where those practices are professionally, environmentally, and economically sound.

c. Supporting federal policies and and initiatives that provide sufficient funding for forest management and timber sale programs on federal lands.

Forest Discussion:

The Forest will provide and optimum level of timber production consistent with various resource objectives, environmental constraints, and economic efficiency.

FPFO 3. Encourage appropriate opportunities for other forest uses, such as fish and wildlife habitat, grazing, recreation and scenic values on all forest lands, consistent with landowner objectives by;

a. Encouraging a full range of recreational opportunities on both public and private lands consistent with landowner objectives

b. Promoting adequate funding for the full implementation, operation and maintenance of forest recreation facilities, including trails, campgrounds, etc.,

Forest Discussion:

Forest goals, with regard to recreation, include providing a full range of quality outdoor recreation opportunities within a forest environment that can be modified for visitor use, visitor satisfaction, or to accommodate large numbers of visitors.

All of the Alternatives provide for recreation, on the Forest, in varying degrees. If developed and dispersed recreation are combined and rated for thousands of recreation visitor days (MRVDs), Alternative C would provide the highest level, followed by E, B, G, and "No Change" or A respectively. Alternative G does not provide for any campground construction.

FPFO 4. Devise and use environmentally sound and economically efficient strategies to protect Oregon's forests from wildfire, insects, disease, and other damaging agents by·

a. Encouraging cost-effective federal fire management policies that emphasize planned ignition fires over natural ignition fires and that consider impacts to the State of Oregon's forest fire protection program,

b. Encouraging that federal plans which develop and implement fire suppression policies at both the state and national levels be coordinated with the state; and

c. Promoting the effective use of integrated pest management as a coordinated approach to the selection, integration an implementation of pest control actions.

Forest Discussion:

The Forest's fire management program is designed to be cost efficient, responsive to land stewardship needs, resource management goals and objectives, and in compliance with State and Federal laws and regulations Prevention of human caused fires is stressed. Prescribed burning, emphasizing planned ignition, will reduce the occurrence of catastrophic wildfire.

Standards/guidelines in the Forest Plan to maintain and enhance the health and vigor of the forest ecosystem. Integrated pest management will be practiced

Soil and Water

The soil risk index number (Figure 2-50) expresses the number of suitable acres per decade where any type of timber management activity is occurring on soils with some degree of management limitation. The number of acres with timber harvest activities on soils with management limitations can be estimated by multiplying the values shown in Figure 2-50 by 10,000 (see Figures acres of soils affected below).

Figure 2-90 Soils Affected by Timber Harvest Activities (M Acre per decade)

Alternative	Decade 1	Decade 2	Decade 5
No Change	90	139	452
A	90	139	452
B	147	105	106
C	207	135	104
E	150	110	105
G	102	94	86

Best Management Practices (BMP's)

Management activities in all Alternatives would be governed by standards/guidelines, including Best Management Practices (BMPs), (Appendix H, and the Forest Plan Chapter 4). Best Management Practices are specifically designed to protect water quality, as required by Section 208 of the Clean Water Act. General BMPs will be selected and tailored for site-specific conditions to arrive at project-level BMPs for the protection of water quality. See BMP Appendix H, FEIS for a discussion of the process and practices.

As a result of public input and management concerns over protection of water resources and its related soils and fisheries resources, we have added BMPs to the Forest Plan as part of the standards/guidelines.

Minerals

Mineral outputs for locatable and leasable minerals are not listed for any alternative because mining and energy resource extraction are a function of private enterprise. At the present time, the only energy related activity is exploration and evaluation to determine whether or not geothermal development is feasible The only mining of locatable minerals is on the Central Oregon Pumice claims on the Bend Ranger District.

Varying amounts of additional lands could be withdrawn from mineral entry under the different alternatives. Given that mineral potential on the Forest is low, any additional withdrawn acreage will be in areas considered to have low potential for locatable minerals Therefore, there will be minimal impact on mineral development by new withdrawals proposed under any alternative.

Geothermal General Activities

Chapter 3 gives a perspective of how the geothermal resource might be developed. It illustrate some typical developments in terms of the number of wells, plant size, land occupied, etc. How much exploration and development could affect other resources depends a great deal on the location and the character of the resource. Since the location and character of the resource are relatively unknown, the consequences must be viewed in a broad generic way and be based on experiences in other parts of the Country (mainly California) and the world. The type of facility will also have a bearing on the type of consequences we could

expect. Some assumptions that underlie the discussion are as follows:

During the period of the Forest Plan, most of the activities undertaken will be in the exploration category.

Based on Regional energy forecasts, if a resource is discovered, it is unlikely that large scale development would occur during the planning period.

Technology associated with use of this resource will continue to develop

Primary consideration is given to the consequences of developing the resource to produce electricity, because there are fewer impacts from direct use because of the lesser density of development and some possibility of off-site use.

Lease denial and No Surface Occupancy stipulations will be used as a means of protecting other resources, as defined in the accompanying Forest Plan

Exploration and development is carried out largely by private companies under the Federal leasing program. The type of activities that are involved in exploring for and developing the resource are shown in Figure 4-12.

Other resources can be protected from the effects of exploration and development by denying leasing in those areas Another level of protection can be obtained by using leasing stipulations. For example, a "No Surface Occupancy" stipulation can apply to a lease or portion of a lease to control surface use. There are several varying levels of protection under the general term "No Surface Occupancy", depending on the specific wording of the stipulation. Different levels: 1) allow no surface use, 2) allow limited use of the surface for exploration purposes only, and 3) prohibit plant siting on the surface. The use of this type of stipulation provides resource protection yet allows a leasee to keep the area under the control of its lease even though use is restricted.

Figure 2-91 Types of Activities Involved in Geothermal Exploration and Development

Process Steps	Activity
Leasing	Environmental analysis and lease recommendations
Preliminary Exploration	Geologic mapping, electronic surveys, temperature gradient drilling
Exploration Drilling	Road and drill pad construction, drilling test wells, flow testing wells, abandoning (closing) unsuccessful wells, and rehabilitating disturbed areas
Field Development	Road and drill pad construction, drilling several wells, flow testing wells
Plant Construction and Production	Further road and drill pad construction, drilling additional wells, constructing generating plant, pipelines and powerlines, and revegetating disturbed areas.
Reclamation	Remove buildings, pipelines etc , abandon (close) wells, and revegetate for other resource use.

Although potential for the geothermal resource appears high, there is a large amount of uncertainty and speculation in the exploration process. Exploration of any particular block of leases proceeds a step at a time and only enters the next step if the results are positive and justify additional expenditure for further exploration. Experience indicates that only a small percentage of the leases are drilled and an even smaller percentage make a discovery and are developed. activity on the bulk of the leases will not proceed beyond the preliminary exploration stage.

The opportunity to explore for and develop the resource is a function of the amount of area and the quality of

the resource potential available for leasing. In this respect the alternatives differ in the amount and quality of areas available for leasing. Figure 2-13 compares the amount of acres available for leasing by the resource potential classification for each alternative. Most attention should be given to the high and medium categories of resource potential.

Figure 2-92 Acres Available for Geothermal Leasing

	No Change	Curr. Dir. A	RPA B	Alt C	Pref. E	Alt. G
High	85,900	85,900	91,500	126,100	100,000	52,800
Med.	484,000	484,000	461,000	486,500	468,800	436,300
Low	402,000	402,000	400,100	410,000	400,100	399,400
Unknown	-0-	-0-	-0-	-0-	-0-	-0-
TOTAL	**944,900**	**944,900**	**952,600**	**1,022,500**	**968,900**	**888,500**

Transportation Systems

The following Figure 2-93 shows the miles of road and trail construction probable as a comparison between alternatives

Figure 2-93 Construction/Reconstruction of Roads and Trails by Alternative Average Annual for each Decade

	No Change	Curr. Dir. A	RPA B	Alt. C	Pref. E	Alt. G
Trails						
Decade 1	5	5	5	0	5	10
Decade 2	5	5	5	0	5	10
Decade 5	5	5	5	0	5	10
Forest Road Program						
Decade 1	15	15	14	20	16	12
Decade 2	13	13	15	23	16	11
Decade 5	8	8	11	16	12	7
Timber Purchaser Roads						
Decade 1	51	51	46	70	53	40
Decade 2	40	40	47	73	49	32
Decade 5	23	23	34	53	37	21

Figure 2-94 Miles of Roads Closed - Seasonally or long-term by Alternative

	No Change	Curr. Dir. A	RPA B	Alt. C	PREF E	Alt G
Long-term Closure						
Decade 1	1400	1400	2350	500	2300	2500
Decade 2	1300	1300	2250	400	2000	2000
Decade 5	1200	1200	1900	300	1000	2000
Seasonal Closure						
Decade 1	500	500	850	1700	1100	1500
Decade 2	400	400	750	1500	900	1300
Decade 5	300	300	650	1400	800	1000
Total System Mileage						
Decade 1	8500	8500	8500	8500	8500	7500
Decade 2	8000	8000	8000	8300	8000	6500
Decade 5	7000	7000	7000	8000	7000	5000

Fire

The difference in fire management can best be determined by looking at the Fire Management Effectiveness index and the Fuel Management program. See Figures 2-95 and 2-96 below

Figure 2-95 Fuel Treatment Program (M Acres)

	No Change	Curr. A	RPA B	Alt. C	PREF E	Alt. G
Decade 1	10 5	10 5	17.8	31 8	7 1	4 6
Decade 2	16.8	16 8	11.1	26 3	5 8	4 8
Decade 5	15.2	15 2	18.6	16 6	13.4	4 2

Figure 2-96 Fire Management effectiveness Index ($/M protected acres)

	No Change	Curr. Dir. A	RPA B	Alt C	Pref. E	Alt G
Decade 1	2881	2881	2676	2594	2696	2764
Decade 2	2910	2910	2799	2696	2764	2943
Decade 5	2820	2820	2553	2512	2594	2758

Energy Requirements and Conservation

Figure 2-97 is the estimated net balance for each Alternative. The table shows the difference between the estimated energy requirements and the energy outputs for each Alternative. The values in the table are all negative which indicates that implementation of any Alternative would consume more energy than it would produce The amount of potential geothermal energy available on the Forest was not considered in the calculations. Given development of the projected potential, the energy output for each Alternative could rise significantly

Examples of items which were used to calculate energy input are:

Timber:	Logging, construction and maintenance of roads, transport to mill, processing.
Range·	Forage improvement, structural improvement.
Recreation:	Developed recreation access, dispersed recreation.

Some of the items used to estimate energy output from each alternative are.

Timber:	Firewood
Water·	Potential additional hydropower development at existing facilities.

Figure 2-97 Estimated Net Energy Balance By Alternative in Billions of British Thermal Units

Alternative	Decade 1	Decade 2	Decade 5
No Change	-1,928.9	-1,447.8	-1,328.6
Curr. Dir. Alt. A	-1,928 9	-1,447.8	-1,328 6
RPA Alt B	-1,767.2	-1,458.7	-1.354.3
Alt. C	-2,162 5	-1,439.5	-1,584.0
Pref. Alt E	-1,788.7	-1,464.0	-1,422.4
Alt G	-1,746.6	-1,539.3	-1,402.4

Environmental Consequences

This section presents a summary of the environmental concequences which are presented in detail in Chapter 4 of the FEIS.

Implementation of any Alternative, including the Preferred Alternative, would affect the Forest's environment and resources. Short-term, long-term, and cumulative effects were considered Both direct and indirect effects were also taken into account.

The environmental consequences will be mitigated by implementation of standards/guidelines, a compilation of Forest Service requirements for the conduct of activities. These standards/guidelines have been published in Chapter 4 of the Forest Plan, which accompanies this document.

Effects That Do Not Vary Significantly Among Alternatives or Resources

Some Forest resources are protected and managed equally in all Alternatives through the application of the standards/guidelines. These resources include air, Threatened and Endangered (T&E) plant and animal species, cultural resources, caves and other geological sites, water, and soil (See Chapter 4, Forest-wide standards/guidelines in the Forest Plan). In all cases, these resources are mainly affected by the amount of timber that will be harvested in any alternative, and to a lesser extent, the amount of recreation (and other) facilities that are developed.

Other resources are comparatively scarce within the boundaries of the Forest and therefore are not significantly affected by any Alternative. These include prime farmlands, wetlands and floodplains, and exploitable minerals. Where present, these resources are also protected and managed through the application of standards/guidelines.

Issues involving air and water quality, noise pollution, fire suppression, and the use of herbicides are also treated equally throughout all Alternatives. They vary among the Alternatives by the amount of timber that is proposed for harvest or treatment.

Effects on Resources that Vary Among Alternatives

Alternatives which call for the high levels of timber production and/or developed recreation have the greatest potential for affecting long-term soil productivity. Repeated harvest or post-harvest activities onto sensitive soils, including steeply sloping lands, areas of high ground water, etc. have a high potential to adversely affect soil. Projects will be designed to protect soil productivity and will be closely monitored.

Alternatives that call for high levels of timber management and recreation have the greatest potential to increase soil disturbance and violate federal and state water quality standards. Water quality would be protected in any alternative by Best Management Practices (BMPs)

Like water quality, alternatives which call for high levels of timber management and recreation have the greatest potential to negetively affect fish habitat. The cumulative effects of combinations of activities occurring over time are not expected to result in seriously negative effects on water quality and fish habitat on this Forest Impacts to stream channels can be caused by peak flow increases attributable to timber harvest They are not expected to be serious, however, because of the generally flat nature of the landscape of most activity areas and the spring-fed origins of most drainages.

Because big game hunting is a way of life in Central Oregon, most alternatives maintain or increase habitat for mule deer.

An increase in the amount of human use of some wilderness areas has produced environmental degradation. In the absence of successful measures to divert or regulate this over-use, alternatives which call for the largest increases in recreation visitors have the potential to adversely effect wilderness. However, S&Gs for wilderness (see Management Area 6, Ch. 4, Forest Plan) have been developed to mitigate the potential for adverse effects.

Alternatives calling for the most miles of road construction would increase opportunities for motorized recreation. Those calling for roading near wildernesses and roadless areas, however, reduce the quality of the wilderness experience. Roading can also degrade scenic quality.

Alternatives calling for greater harvest and road construction levels and more intensive management of developed recreation sites would increase both the potential for locating sites and for inadvertently disturbing sites during management activities.

Alternatives calling for the largest harvest of timber would most dramatically alter the structure and composition of Forest plant communities. As timber is harvested, forage for wildlife and livestock will increase and hiding and thermal cover decrease.

Harvest also reduces natural habitat for cavity dependent wildlife species, birds and small mammals. Wildlife populations which use or depend on old growth will decline with the harvest of older timber stands. Intensive timber management will change the structure of the Forest from larger trees of mixed ages to a more uniform forest with smaller trees.

The cumulative effects of the accelerated lodgepole pine harvest because of the mountain pine beetle epidemic, as proposed in most alternatives, would decrease wildlife cover and visual quality in many areas in the short-term.

Alternatives which call for more timber management and/or recreation have the potential to increase fire occurence on the Forest

Forest management activities can affect air quality by adding smoke and dust to the air Alternatives with higher levels of activities have the potential to affect air quality the most, however, such affects are short-term.

Alternative C is most responsive to range management while B is the least. The other Alternatives meet the RPA program.

Geothermal reservoirs of commercial value probably exist on the Forest but none have been discovered or characterized. At the present time, not enough is known about potential consequences of development or about the technology being proposed for development. Therefore, effects that may vary between alternatives are not known at this time.

Alternatives C promotes developed site recreation *and restrict dispersed recreation. Alternatives G* emphasizes dispersed recreation Others provide a mix.

Alternative C protects areas along major travelways. Alternatives G protects and enhance significant areas for scenic quality while achieving other objectives.

The amount of management activities called for in various alternatives will have a direct affect on the social/economic life of local and non-local people and communities

Adverse Environmental Impacts that Cannot Be Avoided

Some adverse environmental impacts would inevitably occur as a result of the implementation of any alternative. Most are temporary and would be mitigated over the long-term.

Soil would be displaced as a result of timber sales, slash treatment, and construction of roads, trails, recreation, and geothermal facilities Overall, soil productivity would be maintained except for sites dedicated to roads, landings, recreation sites, and other facilities or uses which compact the soil or occupy a site.

Air quality may be temporarily degraded in localized areas as a result of prescribed fires and geothermal development Short-term degradation of visual quality in recreation and scenic areas would occur as a result of harvesting mountain pine beetle infested lodgepole pine. Geothermal development would also affect scenic quality

Areas suitable for undeveloped recreation (semiprimitive nonmotorized, or semiprimitive motorized) could become unsuitable for this type of recreation experience if they are allocated to other land uses. Management prescriptions scheduled for these other land uses could permanently destroy or temporarily modify attributes making them suitable for undeveloped recreation.

Irreversible or Irretrievable Commitment of Resources

Acres committed to facilities and roads constitute an irretrievable loss of vegetative production Land committed to major roads and facilities could be considered to be an irreversible effect. Roadless areas committed to development, once developed, would have an irreversible effect on Wilderness values associated with them

Use of mineral resources such as cinders and gravel has both irretrievable and irreversible effects

Economic Efficiency Analysis of Alternatives

Introduction

Economic efficiency analysis is required by the National Forest Management Act Regulations (36 CFR 219) and played an important role in the development and evaluation of Forest Planning Benchmarks and Alternatives

Specifically, the Regulations (36 CFR 219.12(f)) state that.

"The primary goal in formulating alternatives, besides complying with NEPA procedures, is to provide an adequate basis for identifying the alternative that comes nearest to maximizing net public benefits "

In this and following sections, we will explain some of the key concepts and terms related to economic efficiency in general We will also discuss some of the significant differences between the Alternatives and Benchmarks with regard to their economic consequences and their responsiveness to the Issues, Concerns, and Opportunities (ICO's). Please refer to Appendix B, Section IV for a more detailed discussion of the process used to analyze economic efficiency for each of the Benchmarks and alternatives considered during the development of this FEIS.

Overview of Net Public Benefits, Present Net Value, Priced and Nonpriced Benefits

Net Public Benefits

The maximization of net public benefits is a goal of the Forest Planning process. Net public benefits is the overall value to the Nation of all outputs and positive effects (benefits) less all the associated Forest Service inputs and negative effects (costs), whether they can be quantitatively valued or not. Conceptually, "net public benefits" is the sum of the present net value of priced outputs plus the net value of all non-priced outputs. Net public benefits are maximized by the alternative which has the greatest excess of benefits over costs. A major objective of the Forest Planning process is to provide information that helps determine which alternative provides the mix of outputs and effects that best responds to the ICO's while maximizing the net public benefit of managing the National Forest Net public benefits cannot be expressed as a numeric quantity because they include the qualitatively valued nonpriced outputs Therefore, identifying the alternative which maximizes net public benefits is a subjective decision

Present Net Value

Present net value (PNV), on the other hand, is a dollar measure of economic efficiency. It was the quantitative criterion used to help ensure that each alternative consisted of the most economically efficient combination of priced outputs and management activities needed to meet the objectives of the alternative "Present net value" is the difference between the discounted value of all priced outputs (benefits) less all Forest Service fixed and variable costs associated with managing the planning area, regardless of whether they were incurred for the production of either priced or non-priced outputs, or as overhead expenses for general maintenance of the organization. Therefore, PNV is an estimate of the current market value of the priced forest resources after all costs of producing both priced and non-priced outputs and meeting other multiple-use objectiveness have been considered.

The calculation of PNV involves discounting Discounting is a process for adjusting the dollar values of costs and benefits which occur at different periods in the future to a common time period so that they may be compared. Usually the common time period is the present; in which case, the discounted cash flow is referred to as the present value. The primary discount rate used for the PNV calculations was 4 percent. An alternate rate of 7 1/8 percent was also used to evaluate the sensitivity of the results to higher discount rates.

Priced Outputs

Priced outputs are those that are, or can be, exchanged in the market place. The dollar values for these outputs fall into one of two categories: market or nonmarket (assigned). The market values constitute the unit price of an output normally exchanged in a market, and are expressed in

terms of what people are willing to pay as evidenced by actual sales transactions. Nonmarket values constitute the unit price of an output not normally exchanged in a market and must be estimated by using some comparable sales transaction data in combination with various theoretical techniques. They are valued in terms of what reasonable people would be willing to pay (above participation costs) rather than go without the output.

Timber and recreation were the most important priced outputs considered during the development of the Alternatives Together they account for 98 percent or more of the total discounted benefits associated with the Benchmarks and alternatives addressed. The remaining benefits were accounted for by the range and mineral resources, and other special uses of the Forest for which permits are required.

Timber was the major resource for which unit prices were based upon observed market transaction data These dollar values were expressed in terms of dollars per thousand cubic feet (MCF) paid by purchasers at the time of final harvest. The stumpage prices were developed for key individual species sold on the Forest, and were specific to a range of size classes.

Forest-based recreation, on the other hand, is not normally bought and sold in the market place. The values for recreation were based upon the 1985 RPA Program, and were ultimately determined by examining comparable market transaction data in conjunction with some theoretical estimation techniques The values were expressed in terms of dollars per recreation visitor day (RVD), and were specific to different types and qualities of recreation activities that may be experienced on the Deschutes National Forest.

The range outputs represent the amounts of forage permitted to be grazed and is measured in terms of animal unit months (AUM's) While the Forest receives grazing permit fees, the value received for the AUM's is not based on market prices. Therefore, the dollar values per AUM used in the analysis of the Benchmarks and Alternatives were based on market price estimations using the Range Budget Approach

Finally, the Deschutes National Forest collects permit fees for special uses of the Forest. The sources of these fees includes Mount Bachelor Ski Area, recreation residents, other resorts, campgrounds, minerals, lands, and power The dollar value of these receipts is very small compared to the total Forest priced benefits and does not vary much between the Alternatives. The estimated amount received for these permits was based on recent historical transactions on the Forest. These special use permit fees plus timber stumpage receipts constitute the total dollar revenues which the Forest receives annually and returns to the U.S. Treasury and local Governments

Nonpriced Outputs

"Non-priced outputs" are those for which there is no available market transaction evidence and no reasonable basis for estimating a dollar value commensurate with the market values associated with the priced outputs In these cases, subjective non-dollar values must be attributed to their production

The calculation of PNV enables the comparison of alternatives with regard to their output levels for priced resources, and their efficiency in producing them However, the production of nonpriced outputs also influences the decision making process. The importance of the need to consider these subjectively valued benefits in Forest management decision making is addressed in the NFMA Regulations which charge the Forest Service with identifying the alternative which comes nearest to maximizing net public benefits (36 CFR 219 12(F)). Net public benefits (NPB) include both priced and nonpriced resource outputs, less all costs associated with managing the area As stated earlier, all priced outputs and all costs associated with managing the Forest are included in the calculation of PNV To this, the net subjective values of the non-priced outputs must be added in order to arrive at the overall NPB of an alternative.

In some cases, the importance of providing non-priced benefits can outweigh the advantages of producing higher levels of priced outputs The provision for many of the non-priced benefits is achieved by applying constraints to the production of priced outputs (i.e., such as timber harvesting constraints in FORPLAN). These constraints usually result in a decrease in the PNV of the priced outputs to which the constraints were applied. Subjective judgments are necessary in assessing whether

the benefits of producing the non-priced value exceed the opportunity costs associated with producing fewer priced outputs. If a PNV tradeoff is judged acceptable, Net Public Benefit has increased and the alternative is more efficient overall.

The non-priced outputs considered during the development and evaluation of alternatives are discussed below. These are all outputs and effects which are influenced to a large degree by decisions regarding how to manage the Forest. They are all the topic of one or more issues and concerns which were identified at the outset of the planning process. While the quantitative dollar values of each can not be determined, they can generally be evaluated by examining such quantitative indicators as acres of appropriate allocations, resource inventories, or timber production related activities and outputs. Some of the most important nonpriced outputs and effects addressed during the Deschutes National Forest planning process revolve around maintaining or enhancing the following considerations.

Lifestyles

Surveys of the Central Oregon populous have shown that many people are attracted to the area for the outdoor lifestyles it can offer them. While this is not to say that jobs and income are not important, many have indicated that their choice to live here was made at the expense of economic interests. A Forest with a broad recreation base in a pleasing environment could be an asset to the Central Oregon area while still providing goods and services necessary for stable Forest based economies

Central to maintaining and enhancing the Central Oregon lifestyle is the provision of diverse recreation opportunities. The number of recreation visitor days and their associated priced values are included in the PNV calculations for each alternative. However, the assigned dollar values per RVD do not reflect the value of providing a diversity of recreation opportunities and settings. The Forest currently provides adequate recreation diversity as indicated by the reasons many people choose to live and recreate in the area. However, some aspects of the recreation opportunity spectrum are becoming more difficult to retain. For example, as remaining roadless areas are either designated as wilderness, or roaded and developed for other uses, there are fewer opportunities for the semi-primitive and primitive recreation experiences outside of wildernesses. Related to this is the idea that as more and more roadless areas are either developed or designated as wilderness, future generations will have fewer options regarding how to best manage them to meet changing needs. To the extent that retaining roadless areas in undeveloped conditions does not overly restrict the efficient production of priced outputs, both the recreation diversity and the future options which they offer are considered a non-priced benefit.

The freedom and ability to cut personal use firewood is also important Different approaches for making firewood available to the public were explored in each of the Alternatives. These involved different pricing and allocation strategies, and different rates of using the desirable dead lodgepole pine materials. To the extent that an alternative results in more restrictive access to personal use firewood, the alternative will be less desirable from a lifestyle point of view.

The stability of jobs and income in the area is also an element of the concern about lifestyles. For this purpose, each alternative was analyzed with regard to its potential impacts on jobs and income in Deschutes County (Refer to Appendix B, Section V). Any indications that the implementation of an alternative would result in fewer jobs and less income could be considered disruptive of the current lifestyles.

Suitable Habitat for Threatened and Endangered Species, and Watchable Wildlife

The threatened, endangered, and sensitive wildlife species managed on the Forest include bald eagles and northern spotted owls Each alternative provides for at least enough habitat to satisfy the Management Requirements (MR's) for each of these species. However, some alternatives provide habitat for these species in excess of the MR's.

The Deschutes National Forest provides habitat for many species which may be classified as watchable wildlife. Ospreys are one of these, and are often thought of as the Forest pet. To the extent that an alternative provides habitat for bald eagles, spotted owls, and ospreys so that their populations may thrive, a nonpriced benefit is realized.

Ecosystem Diversity

Maintaining plant and animal ecosystem diversity over time is also considered as a nonpriced component of net public benefits. Benefits generally associated with ecosystem diversity are gene pool maintenance, scientific research opportunities, and the reduction of insect and disease risks. Since animal diversity is to a large extent dependent upon vegetative diversity, attention is focused particularly on the number of acres for each working group in each successional stage. The amount of old growth provided is especially important since this component would be the most difficult to replace once it disappears. It serves as the focus for evaluating each alternative's impact on ecosystem diversity. The effects of timber harvesting and the risks of wildfire on vegetative diversity were examined for each alternative. To the extent that an alternative provides for the preservation of old growth stands as a component of forested plant communities, the higher the benefits associated with this nonpriced output.

Visual Quality

While the value of visual quality is not directly included in the PNV calculations, its value is indirectly represented through the consideration of recreation as a priced benefit. It is safe to assume that the provision of positive visual experiences has a direct relationship to the quantity and quality of recreation on the Forest. However, a large number of people who benefit from the visually appealing scenery are not tallied as recreation users of the Forest. For example, there are two principal highways which pass through the Forest. The people who drive on these pass through some quality scenic areas Yet, they are not counted as RVD's. There are also the people who live in or around the Forest who every day enjoy the scenic qualities associated with the forested mountain environment Again, these beneficiaries are not tallied as RVD's, and the benefits they receive are not measurable in dollar terms.

The Alternatives vary in their emphases to meet inventoried visual quality objectives. This can be measured in terms of the acres of all sensitive retention and partial retention visual quality objectives which are being met through the implementation of an alternative

Historical and Cultural Resources

A large number of scientifically and historically valuable cultural resources are identified on the Forest. Over 50 new sites, mainly comprising prehistoric Indian campsites, are found each year as a result of the Forest's cultural resource inventory program. Cultural resources are an issue in the sense that many people are concerned about how many and how adequately these cultural sites are being preserved and protected in the face of ground disturbing projects and vandalism that occurs on the Forest. The more areas that are opened up to development for road construction, timber harvesting, and minerals and energy development, the more difficult it will be to protect these resources.

Water Quality

The water quality and conditions along the shorelines of the lakes and streams on the Forest are good. As discussed in previous sections, water quality is one of the components which contributes to the outdoor lifestyles of Central Oregonians. In all but one case, sedimentation of streams and lakes on the Forest is not a problem. However, to the extent that an emphasis on wood production forces new road construction and harvesting on sensitive steep areas and riparian

zones, water quality may experience some degradation.

Air Quality

Air quality is another important aspect of the Central Oregon area. For the most part, air quality conditions are good except during certain times in the winter when temperature inversions create woodstove pollution problems, and certain times in the spring and summer when prescribed burning activities are going on.

Most of the firewood supply utilized in the area comes from the Forest, and is directly related to the amount of accessible beetle-killed lodgepole pine. In the short-run (i.e., 5 to 10 years), firewood burning and its related pollution problems will continue to exist. After that, however, the supply situation changes from one alternative to another, and in some cases people may be forced, or choose, to use some other energy source for heat. In which case, some benefits would be realized from improved air quality, even though the benefits of burning relatively inexpensive firewood as a way of life could be reduced

Air quality degradation resulting from fuels treatment and prescribed burning activities is directly related to the amount of scheduled timber and vegetative management activities associated with an alternative. The more acres of these activities called for in an alternative, the lower the quality of the air during certain seasons of the year.

Economic Comparisons and Tradeoffs Between Alternatives

This section compares and discusses the economic consequences of the Alternatives. The section will begin with a general discussion of PNV and the factors which influence it between the Alternatives. The section will then cover the implications of the Alternatives with regard to budget, returns to the U.S. Treasury, noncash benefits, and economic impacts on the local communities. Finally, the significant incremental changes in PNV from one alternative to another will be summarized. The focus of this discussion will be on the tradeoffs between priced and nonpriced outputs and their effects on the overall ability of the Alternatives to address certain key issues, concerns, and opportunities.

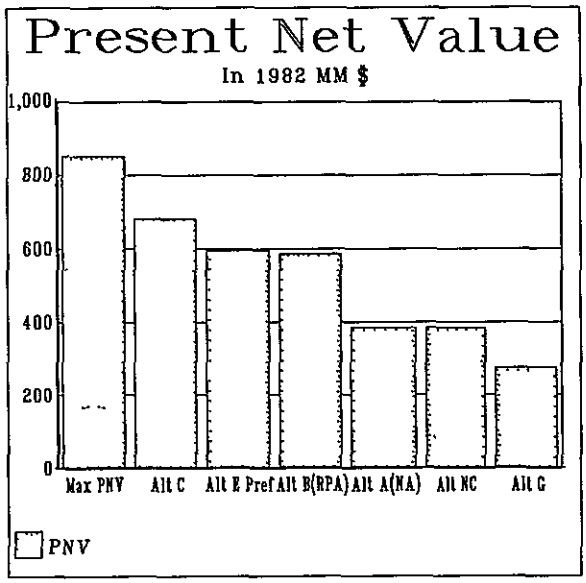
In many cases in the tables, figures, and text, reference is made to various decades. The first decade basically represents the period that would be covered by a Forest Plan while the later decades represent the potential that might occur if an alternative were to continue beyond the first decade. The period covered by a plan for any alternative is 10-15 years.

PNV, Discounted Costs and Benefits, and Their General Relationships to Both Priced and Nonpriced Outputs

Present net value (PNV) is the primary quantitative measure of economic efficiency for each benchmark and alternative. PNV is the sum of market and nonmarket priced values less all management costs discounted to present values at a 4 percent interest rate. A fifty year period was used to make the calculation.

The PNV of the Max-PNV Benchmark (BM-7) and the Alternatives are displayed in Figure 2-100. The Alternatives are ranked in order of decreasing PNV. Figure 2-100 shows the differences in PNV between adjacent pairs of the successionally ranked alternatives. These figures are estimates of the net economic values of the priced resources that would be foregone if a lower-ranked alternative is selected over the preceding one. These relationships are graphically displayed in Figure 2-98.

Figure 2-98 Bar Graph - Present Net Value



Before comparing the PNV's, it is first necessary to discuss some of the components of the PNV calculations in order to get a better understanding of the true differences between the Alternatives. Displayed in Figure 2-100 are the present values of the costs and benefits associated with each of the Alternatives. Figure 2-102 presents a more detailed breakdown of the benefits and costs by major resource categories. The PNV for each alternative is the difference between discounted costs and discounted benefits. Figure 2-99 displays these relationships for each of the Alternatives ranked in order of decreasing PNV from left to right.

Figure 2-99 Bar Graph - Present Value Benefits and Costs

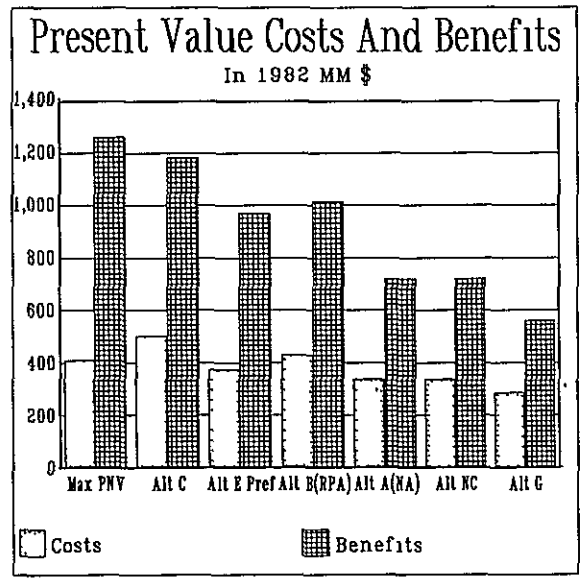


Figure 2-100 Present Net Value, Discounted Costs, Discounted Benefits, and Benefits/Costs Ratios (Millions 1982$ @4%)

	Present Net Value		Discounted Costs		Discounted Benefits		Benefit/Cost
	PNV	Change	Costs	Change	Benefits	Change	Ratio
Benchmarks:							
Max. PNV	850.74	NA	409.26	NA	1260.00	NA	3 08
Alternatives:[1]		-169.20		91.19		-78.02	
Alternative C	681 54		500.45		1181.35		2.36
		-86.48		-126.47		-212.94	
Alternative E	595 08		373.98		969.04		2.59
		-9.09		55.15		-409.04	
Alternative B	585.97		429.13		1015.10		2.37
		-202 27		-92.87		-295.14	
Alternative A	383.70		336.26		719.96		2.14
		-109.18		-50.78		-159.96	
Alternative G	274 52		285.48		560.00		1.96
		NA		NA		NA	
Alternative NC	DNA		DNA		DNA		DNA

[1]Alternatives Ranked by Decreasing PNV

DNA = Data not available to determine these values

Discounted costs are the sum of all Deschutes National Forest expenditures for 50 years, discounted to their present value using a 4 percent interest rate. The maximum discounted costs for management of the Forest is $500.45 million for Alt.C while the minimum is $285.48 million for Alternative G. As shown in Figure 2-100, the difference in discounted costs between Alternatives is primarily accounted for in the amount of funding necessary for timber management and organizational support in order to implement the Alternatives.

The "discounted benefits" for each alternative is the sum of the present values of all market and nonmarket priced benefits for 50 years. As shown in Figure 2-99 & 100, BM-7 provides the largest amount of discounted priced benefits ($1260.0 million). Of the Alternatives, Alternative C produces the most discounted priced benefits at $1181.98 million while Alternative G results in the fewest ($ 560.0 million) The differences between the Alternatives can be attributed primarily to the timber and recreation related benefits.

Figure 2-102 helps to show this. It presents the discounted benefits for each alternative broken down by resource related outputs. The benefits are mostly accounted for by timber and recreation outputs. It shows that the timber and recreation related benefits are the ones that vary the most from the high to the low end of the range in PNV's between alternatives. However, the nonmarket values for Alternative A (Current Direction) and Alternative G are distinctly lower than the nonmarket benefits for the other alternatives. These differences will be explained in more detail below.

Figure 2-101 Bar Graph - Discounted Benefits by Resource

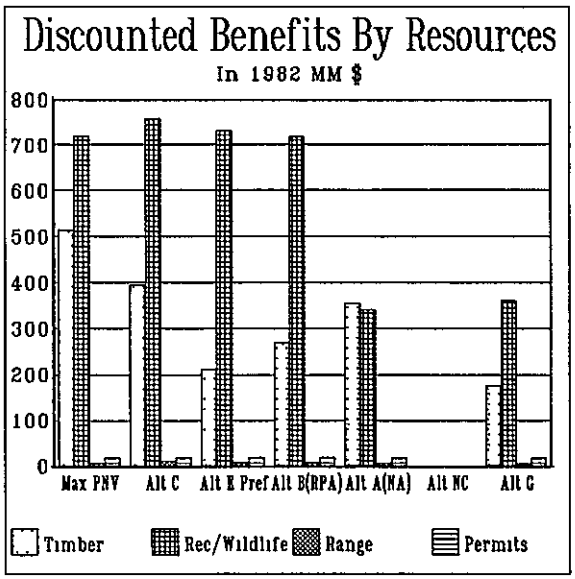


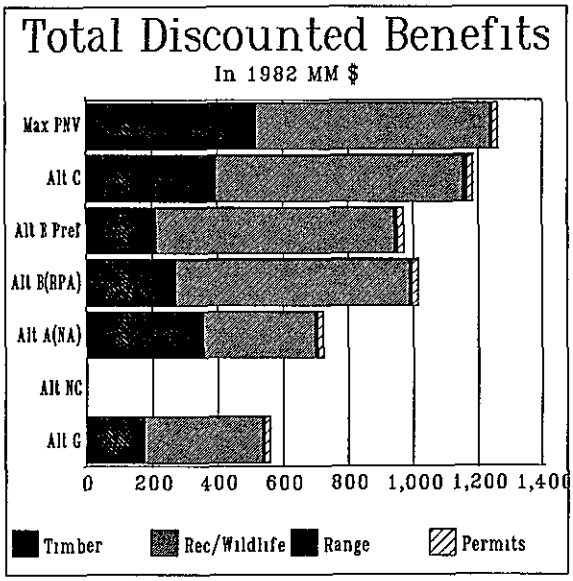
Figure 2-102 Discounted Benefits and Costs By Resource Groups (Millions 1982$ @4%)[1]

	Discounted Priced Benefits by Resource					Discounted Costs by Major Categories				
	PNV	Timber	Rec. & Wildlife	Range	Spec. Use Permits	Timber	Rec. & Wildlife	Range	Roads	Admin.& Support
Benchmarks:										
Max. PNV (Run-4)	850 74	513.78	719.20	6.77	20 25	97 85	77.66	3 31	53 60	176.84
Alternatives: (Ranked by Decreasing PNV)										
Alternative C	681.54	393.75	757 47	10.51	20.25	163.56	82.62	7.74	55.27	191.26
Alternative E	595.08	211.08	730.54	8.44	18.99	80 04	77.42	6.21	37.64	172.62
Alternative B	585.97	269.71	717 96	8 44	18.99	129.60	75.61	6.21	40.80	176.91
Alternative A	383.73	354.56	341.00	6.77	17.63	79.87	44.76	3.31	37.13	171.16
Alternative G	274.52	176.27	359.75	6.07	17.91	49.65	47.98	2.97	28.68	156.20
Alternative NC	Data is not available to make computations									

[1]Direct comparisons of benefits and costs by individual resource provide broad indications of specific relationships but they may be misleading because many costs are nonseperable under multiple-use management.

It is important to note that none of the economic consequences displayed in this Chapter, whether they be present net values, returns to the government, or impacts on jobs and income in the local economy, include those associated with the possible future development of geothermal resources on the Forest. Substantial geothermal resources are believed to exist on the Forest, but the timing of their development and the extent of their potentials is highly speculative. The potential economic consequences that could result from the development of geothermal are believed to be significant and may vary among the Alternatives. For more information regarding the geothermal resources on the Forest and their possible economic consequences, refer to Chapters 3 and 4.

Figure 2-103 Bar Graph - Cash and Non-Cash Discounted Benefits



"Noncash benefits" is an aspect of discounted benefits which needs to be discussed. Noncash benefits are the benefits individual resource users receive when charged less for the resource than they are willing to pay, or current market prices indicate they should pay. They are the difference between the full economic value of the resource and the fees actually paid to use that resource. Noncash benefits are measured by the difference between total discounted benefits less the discounted receipts that are generated by each alternative. The Forest receives revenues for stumpage, grazing permits, campground fees, and other special use permits. Yet, the Forest generates benefits to users which are not realized in terms of cash flows. This is because dollar prices are assigned to nonmarket resources on the Forest in order to reflect their full economic value even though none or only part of that value is collected as fees under current laws and policies. Timber is the only resource for which the discounted benefits are equivalent to discounted revenues. For all of the other resources, recreation being the primary one, discounted benefits exceed revenues. Figure 2-103 displays the total discounted benefits, receipts, and noncash benefits for each alternative in order of decreasing PNV. The size of the benefit is directly related to the amount of recreation (primarily) and timber (secondarily) benefits generated by each alternative

The Max-PNV Benchmark (BM-7) is presented as a reference point only While it meets the minimum legal requirements of managing the Forest, it does not represent a viable alternative because it was not designed to respond to the ICO's. It represents the maximum net economic returns available if the priced resources on the Forest were managed solely to maximize present net value. It has the highest PNV ($850 74 million) Max PNV also has the highest first decade average annual harvest level of 34.0 MMCF; most of which is the higher valued Ponderosa and mixed conifer species working groups as opposed to the significantly lower valued lodgepole pine and mountain hemlock working groups

The PNV's for the Alternatives range from $681.53 million for Alternative C to $274 52 million for Alternative G. Alternative C offers the highest first decade average annual harvest levels of all the Alternatives (34 0 MMCF), while Alternative G provides the lowest (15.6 MMCF). The recreation related benefits between Alternative C and Max PNV are relatively comparable. Therefore, it's important to note that not only is the amount of timber offered for sale an important component of PNV, the mix of species is also a significant factor. In fact, one of the principal differences in the timber programs between the Benchmarks and the Alternatives is the species mix.

Generally, as the discounted costs decrease from one alternative to another, so do the PNV's. This can be interpreted to mean that additional investments in resource management between the Alternatives usually result in relatively greater returns in terms of increased benefits

While these relationships hold as a generality, there are exceptions. For example, Alternative B incurs higher discounted costs than the alternative preceding it in the PNV ranking. For various reasons, it did not benefit from the same types of investment returns as did the other alternatives. In order to understand these complex relationships between PNV, discounted benefits, and discounted costs, a more in-depth examination of their

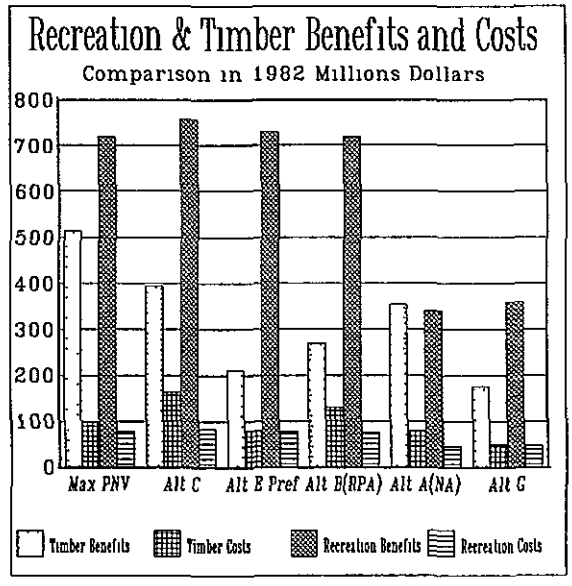
components is needed Figure 2-102 presents the discounted benefits and costs by major resource groups for each Alternative Note that it would be incorrect to assume a direct relationship between the dollar benefits associated with a particular priced output and the cost figure assigned to it *This is because* the production of any specific priced output is generally supported by a complex combination of multi-functional input costs. However, they do provide some insight into the complex financial relationships that exist between the Alternatives

Figure 2-102 also shows that from 16 to 33 percent of the total discounted cost for any alternative can be attributed to the timber resource, while 23 to 49 percent of the Benefits can be attributed to the timber resource. Recreation (Wilderness, Dispersed and Developed) accounts for anywhere from 65 to 75 percent of the benefits for any one alternative. Recreation is responsible for the *majority of the discounted benefits for the Bench*mark and Alternatives C, E, B and G Together, timber and recreation benefits total more than 95 percent of the discounted benefits for each Alternative

Timber and recreation related discounted costs and benefits as shown in Figure 104 below account for the primary differences between the PNVs for the Alternatives. Timber related benefits range from $513.78 million for Max PNV, to $393.75 million for Alternative C, to $176.27 million for Alternative G This is a total difference of $338.0 million from the lowest to the highest timber related benefits received amongst the Alternatives Timber *management costs range from $50 million for* Alternative G (the lowest) to $164 million for Alt C (the highest)

Except for Alternative A (Current Direction) and Alternative G which have respective recreation benefits of $341 million and $359 million, the recreation benefits for the other alternatives have a relatively narrow range (from $718 million to $757.8 million). This is despite the wide range in recreation land prescriptions between the Alternatives. The Alternatives reflect a relatively narrow range in recreation benefits because it was assumed that in the short-run, the propensity to participate *in recreation would* not change much between the Alternatives. What would change is where recreation takes place on the Forest. What differentiates Alternatives A and G recreation benefits from other alternatives is the quality of recreation experience managed for. They provide lower standards of recreation experiences and, therefore, lower valued recreation outputs than do the other alternatives This is because of the existing budget levels for Alternative A (Current Direction) and the resource management objectives for Alternative G.

Figure 2-104 Bar Graph - Timber & Recreation Benefits & Costs Comparison



The differences in PNV between the Alternatives can also partly be attributed to the levels of nonpriced outputs which they provide. While these outputs can not be valued in dollar terms, their output levels can often be measured in terms of other units Figure 2-105 presents information which is useful in helping to understand the relationships between some of the key nonpriced outputs and present net value. It is important to keep in mind that this table is intended to present only general relationships between the nonpriced benefits and PNV. The differences in the output levels and effects should not be interpreted as absolute measurable tradeoffs. Figures 2-106 through 2-110 graphically depict the surrogate measures of output levels for the nonpriced outputs which will be discussed in the next few paragraphs.

Figure 2-105 Present Net Value Change, Returns to Treasury and Counties, and Key Nonpriced Outputs

	PNV @4% ($MM)	Chge. In PNV ($MM)	PV Costs @4%s ($MM)	Change In Costs ($MM)	Returns To Treas. $MM[1]	Pmts To County $MM[1]	Chge.In Employ Dec.1 (Jobs)	Reserved For Pers.Use (MCords)	Firewood Quality Ret & Part Ret (MAcres)	Visual Eagles, Owls,& Osprey (MAcres)	Undev. and Winter Rec. Allocations (MAcres)	Unroaded Harvests Decades 1 and 2 (MMBF)	Timber Suitable Timber Lands (MAcres)
Benchmarks:													
Max PNV (Run-4)	850 7	N A	521 3	N A	25 1	6 3	468	0 0	0 0	22 6	0 0	200.9	1150 9
Alternatives: (Ranked by Decreasing PNV)													
		-169 2		-20 8									
Alt. C	681 5		500 5		19 9	5 0	667	0 0	42 2	31 8	27.4	191.2	1027 0
		86 5		-126 47									
Alt. E	595.08		373 98		8.9	2 2	219	60	224 2	45.6	92.6	99 8	935 0
		9 1		5 2									
Alt B	586 0		429.1		15 6	3.9	338	60	220 7	44.5	85 4	146.1	977.8
		-202 3		-92 9									
Alt A	383 7		336 3		17.8	4 5	248	60	321 5	30.0	63 5	142 1	1000.2
		0 0		0 0									
Alt. G	274.5		285 6		9 1	2 3	41	75	133 1	67 0	148 0	86.0	943 3
Alt. NC	DNA		DNA		36 0	9 0	DNA	60	321 5	30 0	63.5	DNA	1272 0

DNA = Data Not Available

[1]Average Annual First Decade

It is important to note that the provision of some nonpriced benefits is complementary to the production of priced outputs while the provision of others is contradictory. The contradictory relationships generally mean that more nonpriced outputs can only be provided at the expense of producing fewer priced outputs (primarily timber) and, therefore, lower PNV's. It is a subjective decision as to whether the foregone priced benefits are at least compensated for by the increased outputs of nonpriced benefits.

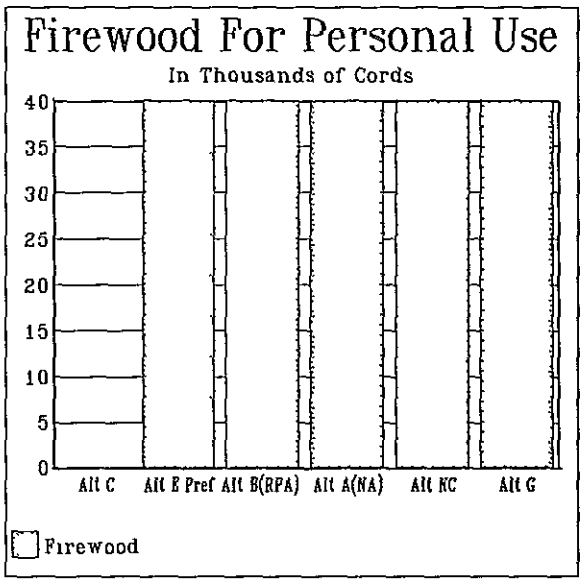
Maintaining and enhancing the lifestyles of Central Oregonians was identified as one of the more important nonpriced benefits. Of course, this is comprised of several components including the opportunity for diverse recreation experiences in a visually pleasing environment, along with clean air and water. Economic stability is also a factor. For this discussion we will cover these as separate nonpriced outputs and in no particular order of importance.

Maintaining and enhancing economic community stability can mean many things to different people and can be measured in various ways. Figure 2-105 presents the change in the number of jobs in the local economy during the first decade that could result from the implementation of an alternative. To some extent, the payments to county also provide some insight into the economic base from which the local Governments can provide services to residents of the area. In general, both of these have complementary relationships with the production of priced benefits "Payments to counties" is calculated as 25 percent of total Forest Service receipts, 97 percent of which are related to harvesting timber. In turn, many jobs in the local economy are directly related to the amount of timber and recreation supplied from the Deschutes National Forest. Figure 2-105 indicates that in the production of timber, and recreation outputs, payments to counties and potential number of jobs in the economy all run together.

With regard to the job estimates, one point needs to be explained. Timber related jobs in the area are estimated as a function of the amount of board feet sold from the Forest. Lodgepole is a relatively small tree. Because of this, fewer usable boards can be milled from the cubic feet of fiber which exist in its stem. In addition, many of the local mills now process these small diameter trees in automated (relatively low labor) mills. Therefore, the substitution of lodgepole pine volume for the volumes from larger trees such as Ponderosa pine has a downward pressure on the employment base in the area

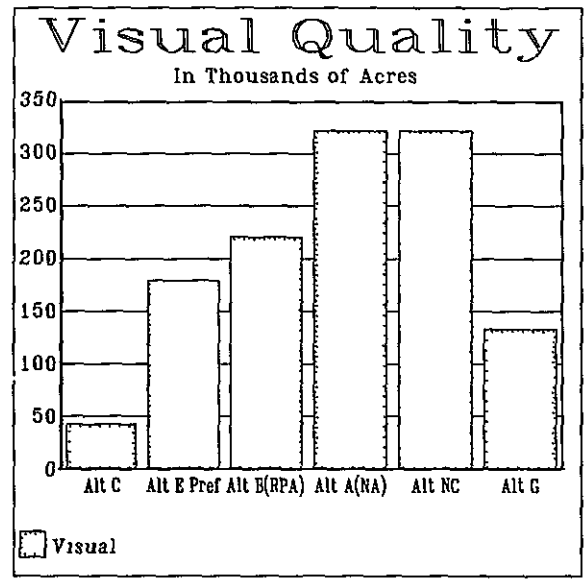
The ease of accessibility to personal use firewood from the Forest is also a component of the Central Oregon lifestyle and considered a nonpriced benefit. Different alternatives investigated various ways of pricing and rationing this material to its end users. The Benchmark, plus Alternative C put this material up for sale to the highest bidder. None was set aside for personal use. The other alternatives each set aside either 40 thousand cords per year for personal use firewood cutters, which is the current level of demand. Alternative E allows the supply to increase to 60 thousand cords to meet the demand, should it increase, while Alternative G allows the supply to increase to 75 thousand cords These relationships are depicted in Figure 2-106. To the extent that personal use firewood permits are priced below what this material would normally sell for on the competitive market, the rationing of personal use firewood supplies has a slight downward pressure on PNV (although the amount of decrease in PNV would probably be small).

Figure 2-106 Bar Graph - Firewood Reserved for Personal Use (First Decade)



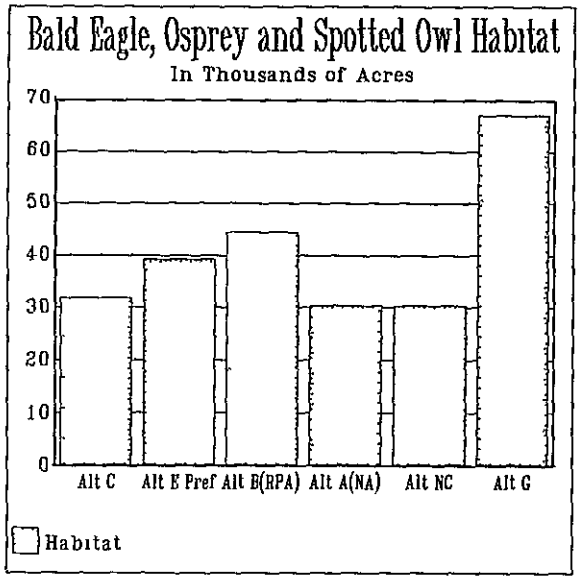
The maintenance or enhancement of visual quality in sensitive scenic areas is another nonpriced benefit. In Figure 2-105 and Figure 2-107 this output is presented in terms of the amount of acres of retention and partial retention visual quality objectives met in each alternative. While some timber harvesting is acceptable, and even necessary, in order to meet the visual management objectives in scenic areas, the provision of visual quality on the Forest usually comes at some expense to the amount of timber that could be harvested. As more acres are allocated to visual management across the Alternatives, the lower the PNV tends to be.

Figure 2-107 Bar Graph - Visual Quality (Retention & Partial Retention)



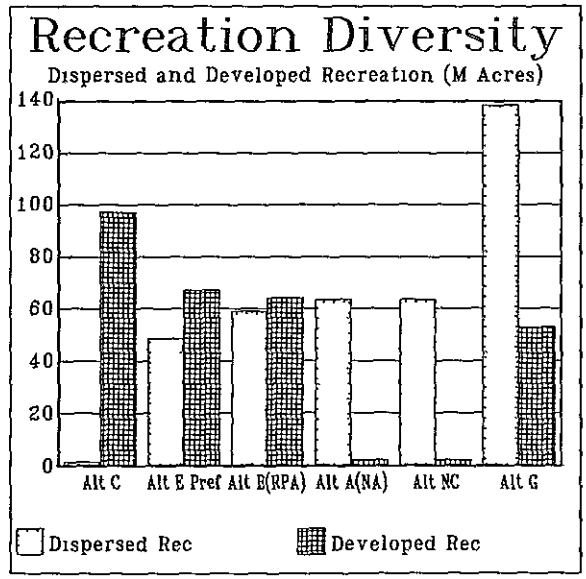
The provision and maintenance of habitat for bald eagles, spotted owls, and osprey are also considered a nonpriced benefit. Figure 2-105 and 2-108 depict the amount of habitat provided for these species for each Alternative. Generally, as the amount of acres managed for their habitat increases, PNV decreases.

Figure 2-108 Bar Graph - Habitat Provided for Bald Eagle, Spotted Owls and Ospreys



nonwilderness recreation, the lower the timber program, and the lower the PNV.

Figure 2-109 Bar Graph - Recreation Diversity (Undeveloped and Developed Recreation)



The provision of opportunities to participate in diverse recreation experiences is another non-priced benefit. Recreation diversity on the Forest is most limited by the amount of opportunities to recreate in unroaded nonwilderness areas. In Figure 2-105 and 2-109, this output is measured in terms of amount of unroaded undeveloped and winter recreation allocations outside of Wilderness The tradeoffs between this output and timber are the most extreme. On most of these areas, no programmed timber harvesting is permitted. The conflicting relationship between the provision of recreation diversity and PNV is apparent; the more recreation diversity in terms of unroaded

The maintenance and enhancement of clean air and water, and the protection of historical and cultural resources, are also, to some extent, contradictory to the harvesting of timber. While the provision of these benefits has not been a serious problem in the past, alternatives which greatly increase the amount of acres harvested will make it more difficult to protect these resources. Figure 2-105 and 2-110 show that there is no direct correlation between PNV and acres available for timber harvest, but there is a correlation between acres available for timber harvest, ASQ, and returns to the treasury.

Figure 2-110 Bar Graph - Acres of Timber Harvested

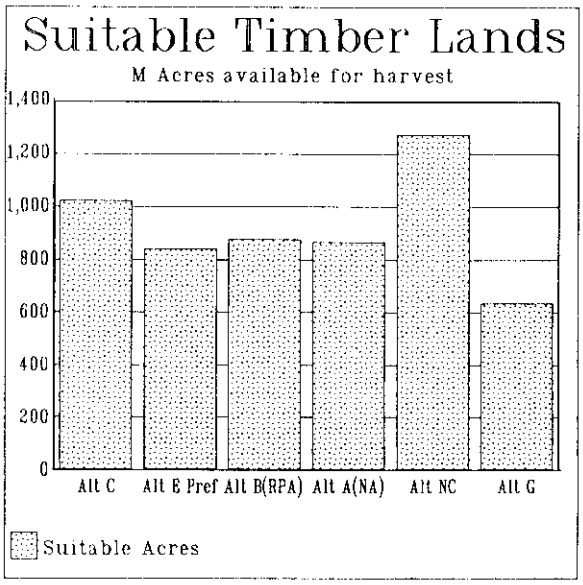


Figure 2-111 Average Annual Net Receipts to the U.S. Treasury (Millions 1982$)[1]

	Decade 1[2]				Decade 5[3]			
	Net Returns Treasury	Total Costs	Total Returns Treasury	Noncash Benefits To Users	Net Returns Treasury	Total Costs	Total Returns Receipts	Noncash Benefits To Users
Benchmarks:								
Max.PNV(Run-4)	7.9	17.2	25.1	26.5	-3.9	23.2	19.3	48.0
Alternatives:								
Alt. A	2.7	15.1	17.8	14.1	9.0	16.2	25.2	18.4
Alt. G	-3.9	13.0	9.1	14.5	6.0	13.6	19.6	27.0
Alt. C	-4.2	24.1	19.9	26.5	7.0	22.5	29.5	43.4
Alt. E	-8.5	17.4	8.9	27.2	3.4	18.5	21.9	45.3
Alt. B	-4.9	20.5	15.6	27.2	11.1	18.9	30.0	32.0
Alt. NC	Data is not available for this alternative.							

[1]Costs are limited to Forest Service or taxpayer expenditures. Twenty-five percent of the receipts would be paid to counties.

[2]First decade basically represents the life of a Plan for any alternative.

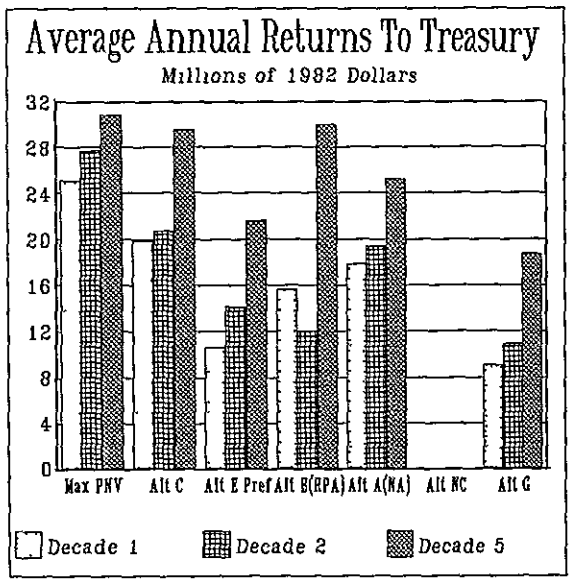
[3]The fifth decade represents the potential if an alternative were continued for 5 decades.

U.S. Treasury Cash Flows: Budgets and Receipts

Net returns to the U S. Treasury are defined as the difference between the total dollar receipts of an alternative and the budget required to implement that alternative Figure 2-111 displays the net cash flows, total budgets, total receipts, and noncash benefits by alternative for the first and fifth decades. The first decade basically represents the life of a plan which is 10-15 years while the fifth decade represents the potential if an alternative were carried forward for five decades The Alternatives are ordered in terms of decreasing first decade net cash flows Note that returns exceed budgets for all Alternatives in the 5th decade except Max PNV.

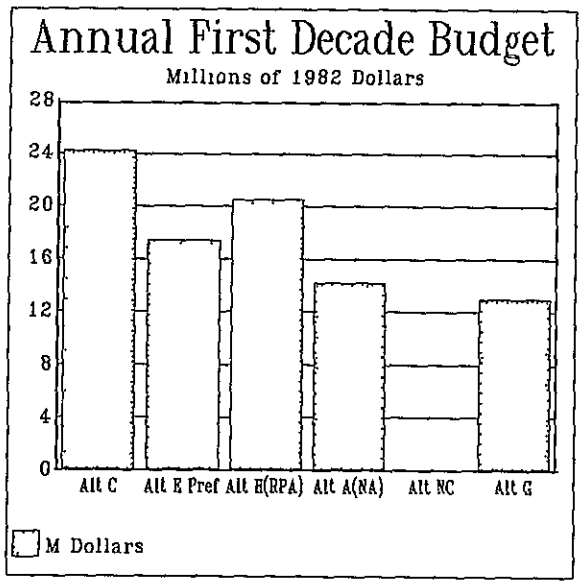
The receipts presented in Figure 2-111 represent actual dollar revenues generated by each alternative. For all Alternatives, timber stumpage revenues account for over 95 percent of the total receipts. The remainder of the receipts are from campgrounds and other special use fees collected from Mt. Bachelor Ski Area, recreation residents, other resorts, range permittees, minerals, lands, and power. Figure 2-112 depicts the estimated average annual receipts by alternative for the first, second, and fifth decades. The Alternatives show a decrease from the current situation to the first decade while the Benchmark does not The most noticeable difference is between the Benchmark and the Alternatives. The Benchmark and the Alternatives reflect increasing receipts after the first decade. This is mostly related to the differences in their timber harvest schedules and the species mix which comprise them.

Figure 2-112 Bar Graph - Average Annual Returns To The Treasury



The estimated average annual budgets for the Alternatives over this same period of time are much more stable, not varying by more than $2.2 million in any Alternative for decades 1, 2, or 5. Figure 2-113 depicts the average annual first decade budgets by alternative by two cost categories; capital investment, and operations and maintenance. At $24.2 million, Alt.C has the highest budget requirements. This is a 64 percent increase over the Alternative A (Current Direction) budget requirements of $14.7 million (1982 constant dollars). Alternative C has the highest average annual first decade budget amongst the Alternatives. Alternative G requires the least budget to achieve its management objectives; $13.0 million or 1.7 million more the current forest budget. Of these budget estimates, $4.9 million were considered to be fixed, or constant, across all Alternatives The remainder varied by alternative and was a function of specific output levels and the management activities needed to achieve them.

Figure 2-113 Bar Graph - Annual First Decade Budget



The majority of the capital investments are for timber management and the Forest road system, with most of it being accounted for by investments in timber production. Most of the Forest transportation network is already in place. Alternatives B & C require the construction of new roads in existing roadless areas during the first decade.

Economic Impacts on the Local Communities

Changes in the levels of timber harvests, recreation use, grazing, and Forest Service expenditures on the Forest have the potential to impact the employment and income levels in the local economy. Many of the local communities are particularly dependent upon the timber and recreation resources as the mainstays of their economies. Therefore, the potential economic impacts on the local economy of Central Oregon resulting from the implementation of any one of the Alternatives is an important element in the process of selecting a preferred alternative It was identified as one of the issues, concerns, and opportunities (ICO's) at the outset of the planning process. The following paragraphs present some information regarding this issue

The primary economic impacts resulting from changes in output levels on the Forest are felt in Deschutes County and small portions of southern Jefferson and northern Klamath Counties. Therefore, Deschutes County will be used as a surrogate for the total area of influence (For more detail on the economic impact analysis, refer to Appendix B, Section V on Socio Economic Analysis). However, in recent years more and more communities outside of this traditional area of influence are depending upon the Forest to some extent for their economic well being. For example, up through 1981 approximately 85 percent or more of the timber sold off the Forest was processed in Deschutes, southern Jefferson, and northern Klamath Counties. In 1982 this figure dropped to 78 percent and in 1983 it dropped again to 47 percent. It is primarily lodgepole pine which is being processed outside of the local area. In 1982 and 1983, only 40 percent and 25 percent, respectively, of the lodgepole sold on the Forest was purchased by mills within the traditional local area of influence. As timber supplies in western Oregon and other areas of the State become more restricted due to Wilderness legislation and other land use decisions, buyers are apparently traveling further for their sources of wood.

Figures 2-114 & 115 display the potential first decade economic impacts in terms of jobs and total personal income in the County that could result from the implementation of any one of the Alternatives. The Alternatives are displayed in order of decreasing PNV from left to right. The impacts are expressed as a change from the current Deschutes County employment and income base Max PNV offers the largest potential to provide a stable and growing economy over the next ten years with the opportunity to increase jobs and incomes. Alternatives E, B, A, NC, and G offer the opportunities to increase jobs, however, personal income will decrease. This is caused by the decline in timber volumes and increase in recreation, when secondary jobs from recreation pay less than those from timber. Of the Alternatives, Alternative C is the only one which provides an opportunity for an increase in personal income and jobs based on output levels from the Forest. The implementation of any of the other alternatives will result in a slight increase in jobs and total personal income in the County down from -.534 MM$ to -5 1 MM$.

Figure 2-114 Bar Graph - Changes In Local Employment (First Decade)

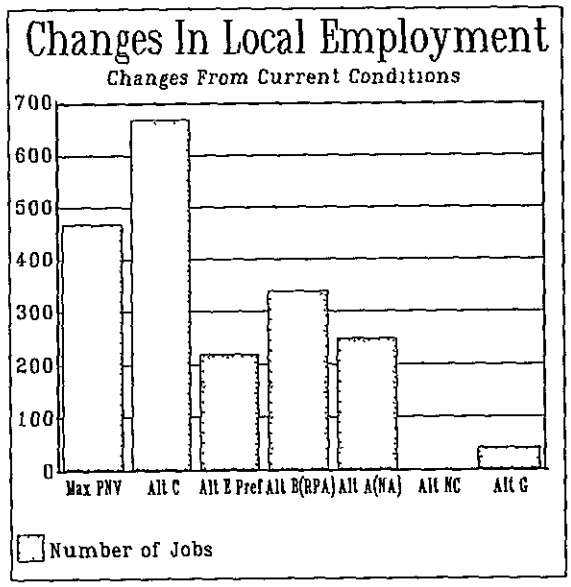
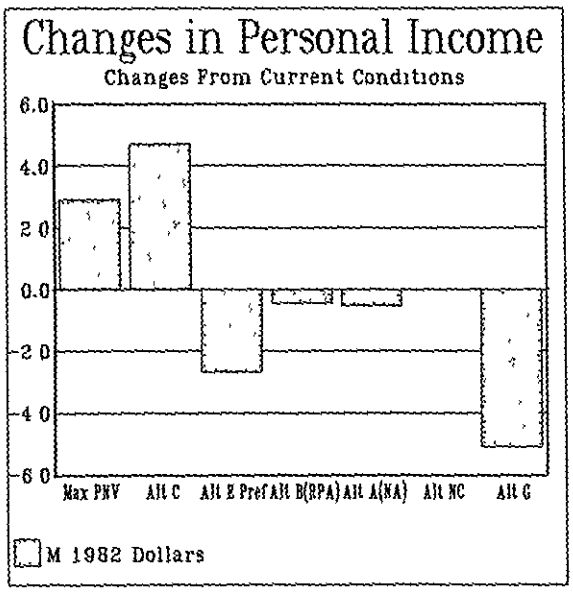


Figure 2-115 Bar Graph - Changes in Personal Income (First Decade)



The timber and recreation resources are the primary Forest based outputs which are influencing the local economy. Since the recreation use levels will not change that dramatically in the short-term from one alternative to another, it is the amount of timber that each alternative proposes to sell which most heavily influences the jobs and income levels during the first decade. Over the longer run (20 to 50 years), the differences between the Alternatives in their recreation output levels increase and, therefore, become an important factor accounting for the variation in potential for long-term economic growth opportunities.

With regard to the timber related impacts, not only is the amount of wood offered for sale an important factor, but so is the species mix. The potential impacts on timber related jobs in the local economy are estimated as a function of the change in the amount of board feet sold by an alternative as compared to current sale levels (as represented by Alternative A-Current Direction). In terms of cubic feet, Alternative G is the only alternative which proposes to sell significantly less volume than Alternative A.

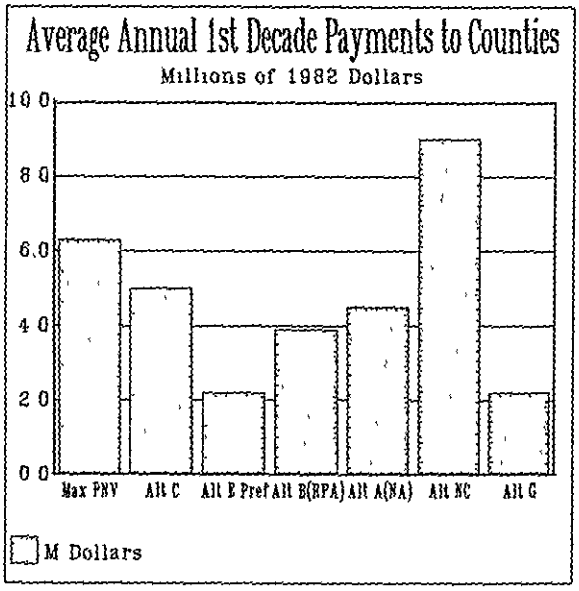
Two other factors are working to influence the relationship between the proposed timber output levels and their impacts on jobs in the local economy. First, many of the local mills now process small diameter trees in automated low labor intensity facilities. Sometimes the small diameter material is chipped and loaded into trucks right at the sale area Both of these processing techniques imply that the selling of lodgepole pine will not have strong positive impacts on the wood processing related jobs in the local economy. Secondly and as mentioned above, in 1982 and 1983, only 25 to 40 percent of the lodgepole sold off of the Deschutes National Forest was purchased and processed locally. The bulk of it went to the west side of the Cascades or to southern Klamath County. What this means is that the more an alternative accelerates the harvesting of lodgepole pine during the first two decades and substitutes this volume for the Ponderosa pine and mixed conifer species, the less opportunity for the wood processing sectors in the local communities to maintain their current employment base.

Recreation is, and will probably increasingly continue to be, a mainstay of the Central Oregon economy. In 1983, the Deschutes National Forest ranked 5th among the 19 National Forests in the Pacific Northwest Region and 27th among the 125 National Forests in the Nation in terms of visitor days. Most of the Deschutes National Forest visitors, 70 to 80 percent, come from Oregon. The majority of visitors from outside the State originate from California and Washington Visitors from Oregon come primarily from three distinct areas: the Portland-Metropolitan area, the Willamette Valley, and Central Oregon Therefore, the Forest is locally and regionally an important provider of recreation opportunities. Current estimates show the State's population to be increasing at an annual rate of roughly 2 percent. To the extent that an alternative emphasizes the development of capacity for diverse recreation opportunities, recreation use on the Forest is likely to increase at a comparable rate. In accordance, the service industry in the local economy can be expected to grow over the long-run to facilitate the recreation visitors, although the jobs will generally be lower paying than the wood processing related manufacturing jobs.

Another means by which the Forest Service can impact the local economy is through its payments

to local governments in lieu of taxes. The Forest Service pays 25 percent of its total receipts to county governments. As was discussed above, most Forest receipts are generated by the selling of timber stumpage. To the extent that an alternative emphasizes the production of timber, the local governments will benefit financially. Keep in mind that stumpage receipts are not only related to the amount of volume which an alternative proposes to sell, but also the mix of species. The Benchmark proposes to sell relatively more volume of the higher valued Ponderosa and mixed conifer species in the early decades, leaving the lower valued lodgepole and mountain hemlock for the later time periods. Figure 2-116 shows the average annual returns which the counties can expect from the implementation of any one alternative in the short and long-term.

Figure 2-116 Bar Graph - Average Annual Payments to Counties



Summary of Major Tradeoffs Between Alternatives

The following paragraphs summarize the significant tradeoffs between the Alternatives. The focus of the discussions is upon the incremental changes in PNV from one alternative to another as influenced by the production of both priced and nonpriced outputs, and more importantly, the ability of the alternatives to address key planning issues, concerns, and opportunities (ICO's). With regards to the ICO's, the summary will emphasize those to which the responsiveness varies significantly between the Alternatives and can be indicated quantitatively. Since this discussion is a summary, a more comprehensive understanding of the differences between the Alternatives requires the reading of both Chapters 2 and 4. A more complete description of the ICO's can be found in Chapter 1 and Appendix A. Finally, Appendix B presents a detailed discussion of the entire Forest Planning analysis process as it relates to addressing the planning issues.

To provide a framework for assessing these tradeoffs, the ICO's which help to identify the significant differences between the Alternatives, and their respective quantifiable indicators of responsiveness are briefly summarized. Then, the quantitative responsiveness of each of the alternatives to these ICO's will be presented in tabular form (Figure 2-117). Finally, the incremental tradeoffs between alternatives will be summarized on an alternative by alternative basis in order of decreasing present net value.

National, Regional, and Local Issues

The management of the Deschutes National Forest has implications for national, regional, and local concerns. For example, RPA timber output targets assigned to the Forest reflect the anticipated needs of national and international markets for wood products. The development of geothermal resources on the Forest could have significant implications for national, regional, and local energy needs in the future. Decisions influencing the scenic quality of the Forest and its ability to provide an adequate supply of diverse recreation opportunities is of importance to regional and local residents who are the primary users of recreation resources on the Forest.

Consequently, the entire Forest Planning process revolves around the development of alternative ways of addressing identified issues, concerns,

and opportunities concerning the management of the Deschutes National Forest In fact, the primary differences between the Alternatives is in the way they respond to the ICO's. Appendix A fully discusses each of the 18 ICO's that were identified at the outset of the planning process for the Forest. However, while all of the identified ICO's are important, only a subset of them are really useful for distinguishing significant differences between the Alternatives. The following is a brief summary of the eight ICO's used to distinguish between the Alternatives and their quantitative indicators of responsiveness Figure 2-117 displays the quantitative responsiveness to these ICO's by alternative. Also included in Figure 2-117 is the responsiveness of the Alternatives to present net value, annual cash and noncash benefits which are not specifically identified in the following ICO's but are indicators of interest to the nation

One ICO that is not displayed in Figure 2-117 but is useful in evaluating the differences between the Alternatives is "public acceptance" The response to this ICO by the Alternatives is not quantitatively measurable. However, it is likely that the way some ICO's are addressed in some alternatives will cause some conflict and polarization amongst different users of the Forest Therefore, in the following discussions, public acceptance of an alternative will also need to be considered even though it is not displayed in Figure 2-117.

Figure 2-117 Quantitative Indicators of Responsiveness to Issues, Concerns, and Opportunities

		Average Annual ($MM) Decade 1[1]		Decade 5[2]			Response to Issues, Concerns, and Opportunities						
Alts.[4]	PNV ($MM)	Net Return Treas.	Noncash Benefit to User	Net Return Treas.	Dev.[3] Rec Noncash Benefit to User	Disp[3] Rec Target 2,050 MRVD	Range Target 1,930 MRVD	Timber Target 32 MAUM	Timber Target 41.9 MMCF	Target 195 MMBF	Habitat Improve. Target 6.4 M Acres Equiv	Average Annual 1st Dec Revenue to Govt. ($MM)	Average Annual 1st Decade Budget ($MM)
C	681 54	-4 2	26.5	7.0	43 4	3392	2472	45	34	191 2	30 0	19.9	24 2
E	595 08	-8 5	27 2	3 4	45 3	2369	2157	32	17 9	99.8	6 4	8 6	17 4
B	585.97	-4 9	27 2	11 1	32.0	1926	1985	32	25 9	146 5	27.0	11 7	15.8
A	383.77	2.7	14 1	9 0	18 4	2369	2127	29	24.8	142 1	6 2	17.8	14 7
G	274 52	-3 9	14 5	6 0	27 0	1824	1857	26	15 6	86 0	16 0	9.1	13 0
NC	DNA	DNA	DNA	DNA	DNA	2369	2127	29	37 1	219 0	6.2	17 8	14.7

DNA = Data is not available
[1]First decade basically represents the life of a Plan for any alternative
[2]The fifth decade represents the potential if an alternative were continued for 5 decades.
[3]Average Annual for the 5th Decade
[4]Alternatives ranked by Decreasing PNV

Figure 2-117 Quantitative Indicators of Responsiveness to Issues, Concerns, and Opportunities (continued)

		Average Annual ($MM) Decade 1[1]		Decade 5[2]		Response to Issues, Concerns, and Opportunities							
Alts.[3]	PNV (MM$)	Net Cash Flow	Non Cash Benefit to User	Net Cash Flow	Non Cash Benefit to User	Decade 1 Firewood Reserved Personal Use M Cords	Devel. Rec. M Acres	Undev. Rec. M Acres	Visual Quality M Acres	ODF&W Mule Deer Object. 24859 Deer	Acres High Potential Geothermal Available for Lease M Acres	Average Annual 1st Dec. Pmt. to Counties (MM$)	Job Impact Local Econ [4]
C	681 54	-4 2	26 5	7 0	43 4	0	97 1	1 4	42 5	32,300	126.1	5	667
E	595 08	-8.5	27 2	3 4	45.3	60	66 5	56 4	179 3	29,800	100	2 2	219
B	585 97	-4.9	27 2	11 1	32 0	60	64 1	59 2	220 7	27,100	91.5	3 9	338
A	383 7	2.7	14 1	9 0	18 4	60	2 2	63 5	321 3	20,300	85.9	4 5	248
G	274 52	-3.9	14 5	6 0	27 0	75	52 8	138	133 1	16,700	52.8	2 3	41
NC	DNA	DNA	DNA	DNA	DNA	60	2 2	63 5	321 3	20,300	85.9	9 0	DNA

DNA = Data is not available
[1]First decade basically represents the life of a Plan for any alternative.
[2]The fifth decade represents the potential if an alternative were continued for 5 decades
[3]Alternatives ranked by Decreasing PNV
[4]Potential Job Impact on Local Economy in Decade 1 (# Changes)

Can the Forest meet the assigned Resource Planning Act (RPA) Targets?

Based on a National assessment, the RPA planning effort made projections of estimated total national demands for many resources produced on the National Forests. The RPA then assigned each USFS Region in the country a share of the National output targets that would be needed to satisfy anticipated demands for various resources. In turn, the Regional Guide for Oregon and Washington established recreation, range, timber, and wildlife targets for the Deschutes National Forest The Forest must determine if it is capable of meeting or exceeding these output targets within acceptable environmental limits. The respective first decade RPA targets by resource and the Alternatives response to them are displayed in Figure 2-117.

How should the Forest consider local and regional economies, lifestyles, and population levels in managing Forest lands?

The economy and lifestyles of many local and regional communities are tied to the Forest in many ways Both tourists and permanent residents are attracted to the wide variety of recreation opportunities available on the Deschutes National Forest. Of the 125 Forests in the National Forests System and the 19 in Oregon and Washington, the Deschutes ranks 27th and 5th respectively in terms of recreation use Accordingly, the businesses which serve the needs of recreationists and tourists are becoming and will continue to be an increasingly important component of the Central Oregon economy

The Forest also provides wood for a significant forest products industry in the local communities. In addition, since many people use wood as their primary source of home heating, personal use firewood cutting has become an important element of the Central Oregon way of life.

The resulting consequences of the Alternatives to jobs, income, and payments to counties in lieu of taxes are components of this issue. Therefore, the first decade impacts on both jobs and payments to counties in lieu of taxes are displayed by alternative in Figure 2-117.

Many of the other elements of this issue are couched as individual issues which are discussed below The way each of the following issues is treated has a bearing on this issue For example, how the mature lodgepole pine is treated in each Alternative affects personal use firewood supplies and the amount of raw materials for the forest products industry, which in turn affects the economies and lifestyles of the Central Oregon Region

How should the Forest plan to meet future demands for use of wood as an energy source?

Nearly 60 percent of the homes in Central Oregon use wood burning stoves as a source of heat An estimated 60,000 cords of personal use firewood are harvested and burned annually. In addition, it is estimated that various commercial operations cut and sell an additional 50,000 cords per year Most of this fuelwood is lodgepole pine With the combined effects of current levels of personal use firewood consumption, commercial timber sale contracts, and the mountain pine beetle epidemic, the primary source of accessible firewood supplies as we know it today will be gone in 10 to 15 years An important element of this issue is the amount firewood which will be reserved for personal use as opposed to competitive bidding on an annual basis during the first decade This is displayed in Figure 2-117

How should the Forest provide for present and future developed recreation?

Developed recreation on the Forest takes on many forms ranging from the Mount Bachelor Ski Area to small isolated picnic grounds Demand for camping, boating, and other recreation pursuits requiring facilities and resulting in concentrations of people is continuing to grow, and, if it parallels the State's population projections, could double within the next 4 to 5 decades. Destination resorts adjacent to the Forest also attract many recreationists to the area Two questions need to be addressed, which areas should be managed as developed recreation sites and how many acres should they include The number of acres managed for developed recreation opportunities by alternative are displayed in Figure 2-117

How can the Forest keep pace with expanding demands for dispersed recreation?

Hiking, rafting, fishing, snowmobiling, sailing, hunting, driving for pleasure, caving, mountain climbing, and general goofing off are all popular dispersed recreational activities. Some of the recreational activities occur in exclusive areas of the Forest. Others, such as cross country skiing and snowmobiling, occur in the same areas and conflicts can arise. Like developed recreation, demand for these types of recreation activities can be expected to grow, and if it parallels the State's population projections could double within the next 4 to 5 decades. Where and how much of the Forest to provide for dispersed recreation activities while minimizing conflicts is the heart of this issue. Figure 2-117 displays the number of acres managed for undeveloped recreation opportunities by alternative

How can the Forest maintain scenic beauty while providing goods and services?

The high recreational values of the Forest are directly linked to its beautiful scenery Viewing volcanic peaks along the Cascade Crest, large ponderosa pine trees along major roads, and free flowing rivers are all part of the recreation experience. Many people prefer to view natural appearing landscapes rather than ones dominated by timber harvesting activities The key to this issue is to determine which areas and how many acres should be managed for their scenic beauty. Figure 2-117 displays the amount of visually sensitive areas of the Forest which are managed to maintain or enhance their visual quality.

What should wildlife populations be?

The public, the Forest, and the Oregon Department of Fish and Wildlife are concerned about several species which are listed below with their currently estimated populations. They are: mule deer (22,800), elk (500 to 700), and osprey (125) pairs Other species include goshawks, pine martens, and woodpeckers The question for all the species is what level of emphasis should the Forest place on maintaining or improving habitat for these species? While all of these species are important, we will focus this part of the evaluation on the mule deer populations The Oregon Department of Fish and Wildlife has established a population objective of 24,850 deer The habitat capability of each alternative to meet this objective is portrayed in Figure 2-117

What areas on the Forest should be made available for geothermal leasing and development?

The Deschutes National Forest is considered to have some of the greatest potential for geothermal resources of any area in the Western United States. Approximately 350,000 acres have already been leased. The Newberry Crater is a designated Known Geothermal Resource Area (KGRA) The interior of the Crater is an important recreation area with two large lakes known for their fishing. Campgrounds and resorts are located adjacent to the lakes. The area is also a popular winter sports area for snowmobiling and cross country skiing. There is an active bald eagle nesting territory within the Crater Numerous unique geological features, such as obsidian flows, are also found within the Crater There are also other areas on the Forest which could be leased that are currently not leased. The main thrust of this issue is where and under what conditions should we lease and how should we protect recreation, visual, wildlife, water quality, and other resource values Figure 2-117 displays the number of high potential acres by alternative which are available for leasing.

Tradeoffs and Comparisons Between Alternatives

The following paragraphs summarize the tradeoffs between the Alternatives as displayed in Figure 2-117. The focus is on the incremental changes in PNV from one alternative to another as influenced by the production of both priced and nonpriced outputs, and more importantly, the ability of the Alternatives to address the ICO's. The Alternatives are discussed in order of decreasing PNV

Max-PNV (BM-7)

Benchmark-7 is presented here as a reference point for present net value comparisons only While it meets the minimum legal requirements of managing the Forest, it does not represent a viable alternative in that it was not designed to address the ICO's Since this Benchmark was not designed to address issues, the responsiveness to the ICO's is not displayed in Figure 2-117. However, some of the other economic implications of this Benchmark is displayed in Figures 2-100, 101, 105 and 111.

Benchmark-7 identifies the maximum present net value of the priced resources on the Forest to be $850.7 million. The primary emphasis in BM-4 is to maximize the discounted timber and developed recreation benefits from the Forest. The harvest age of stands is based on maximizing PNV, which occurs sooner than biological culmination All roadless areas are available for development The important developed recreation areas are managed to provide their maximum economic returns. Some timber harvesting is also scheduled in these areas. Any additional dispersed recreation benefits are merely incidental to people living in a roaded forested environment.

Alternative C

Of all the Alternatives, Alternative C has the highest PNV at $681.54 million This is a 169 2 MM$ drop from the maximum PNV Alternative C emphasizes the production of priced resources, much like Max PNV. Stands must reach 95 percent of biological culmination before being considered for final harvest

What really differentiates Alternative C from Max PNV is that it is designed to address the ICO's and is an implementable alternative With regard to the timber program, one of the key differences between Alternative C and the Benchmark is its allocation of acres to other multiple use objectives It has more acres available for timber harvest than any Alternative but less than Max PNV

Like Max PNV, Alternative C also has a strong emphasis for developed recreation benefits. It assigns the most acreage of any alternative to the provision of developed recreation opportunities. However, it provides the least opportunities to meet future needs for dispersed roaded and unroaded recreation. It provides the least amount of acres to dispersed recreation.

Alternative C is the most favorable alternative from a geothermal leasing and development standpoint While this is not reflected in the present net value of the alternative, this could result in a real economic plus to the local economy sometime in the next 10 to 20 years.

Of all the Alternatives, Alternative C provides for the most opportunity for the mule deer population to increase. In the future this could be translated into more hunting days and, therefore, more hunter expenditures in the local economy.

Alternative C is the strongest alternative in terms of providing the necessary timber and recreation outputs to support the local employment base and provide opportunity for growth in the future should the demand for forest based resources continue to increase. Other than that, such nonpriced benefits as visual quality, recreation diversity, and easy access to personal use firewood will be at lower standards than today

Alternative C meets RPA targets for developed recreation, dispersed recreation, range and habitat improvement. It does not meet the RPA target for timber.

Despite its strong economic performance, Alternative C may lead to some conflicts and polarization amongst local communities and other users of the Forest due to its strong commodity development emphasis.

Alternative E (Preferred)

At $622.62 million, Alternative E has the second highest PNV of all Alternatives, $58 6 million less than Alternative C which has the highest PNV. Alternative E harvests timber on a nondeclining yield basis and has a first decade annual harvest level which is second to the lowest of all Alternatives.

Alternative E generates the second to lowest revenues to both federal and local governments. However, it also requires the second highest budget

Alternative E, like Alternatives B offers a diverse spectrum of recreation opportunities. It is somewhat stronger in its attempt to provide for unroaded nonwilderness experiences which are becoming one of the limited opportunities on this Forest.

It is the third highest in the amount of acres it permits for geothermal leasing, behind Alternative C.

With regard to nonpriced benefits, Alternative E would maintain the firewood burning aspect of the Central Oregon lifestyle by setting aside 60,000 cords of personal use firewood per year during

the first decade Compared to Alternative B, Alternative E offers slightly fewer benefits pertaining to visual quality However, it exceeds both the State's targets and Alternative B's output levels for projected mule deer populations

Alternative E meets RPA targets for developed recreation, dispersed recreation, range and habitat improvement. It does not meet RPA targets for timber targets.

Alternative B

The PNV for Alternative B is $585.97 million. Alternative B provides somewhat higher timber benefits than Alternatives E & G. However, these increased timber benefits were equally matched by higher timber management, road construction, and organizational support costs.

It returns 3 9 million dollars to local county governments (third highest), and incurs the third highest budget

Alternative B is favorable in its flexibility with regard to geothermal leasing However, its proposed leasing within the Newberry Crater may cause some polarization.

Alternative B meets RPA targets for dispersed recreation, range and habitat improvement It does not meet RPA targets for developed recreation and timber.

Alternative A (Current Direction)

Alternative A ranks second lowest in present net value. Its PNV is $383 7 million. Its low PNV ranking is due to the fact that of all the Alternatives, the recreation benefits generated by Alternative A are the lowest. Its discounted recreation benefits totaled to $341 million as compared to the 360 million for Alt G and over 700 million for Alts. C, E, and B. There are two reasons for this. First, the existing management plan for expanding intensive recreation capacity is quite restrictive; not allowing enough flexibility to adapt and expand as future demands for developed types of recreation experiences increase With regard to the projections of future recreation use trends and their associated benefits, this limited capacity for expansion was a ceiling on the amount of developed recreation consumption this Forest could provide.

The second cause is related to the standard of recreation quality which is provided by Alternative A. Two sets of recreation values were used for each type of recreation opportunity provided on the Forest during the development of the Benchmarks and alternatives: standard and less than standard. The standard quality experiences had higher benefits associated with them. They also involved higher capital investment and operations and maintenance costs. On the other hand, the less than standard quality experiences had lower benefits and management costs The standard recreation experiences return more discounted benefits per dollar invested than do the less than standard However, it was believed by the ID Team that at current funding levels, the Forest is providing recreation opportunities at the less than standard level of quality Therefore, the discounted benefits associated with this Alternative are quite lower than the others. In fact, Alternative A and Alternative G have the lowest benefit/cost ratios of all the Alternatives. This is primarily due to the low returns associated with dollars invested in less than standard recreation opportunities. Since the timber related benefits for Alternative A rank second amongst the Alternatives, some increased investment in managing the recreation resources could enhance the overall PNV ranking of this Alternative.

In addition to its relatively low present net value, Alternative A also fails to meet the developed recreation, range, and timber related RPA targets. Despite this, it results in the second highest payments to counties because of its rich Ponderosa pine and mixed conifer species mix during the first decade. It also requires the second lowest funding levels of all the Alternatives

In addition to ranking fifth in terms of acres available for geothermal leasing opportunities, Alternative A also does not recognize the Newberry Crater as a Known Geothermal Resource Area.

In terms of nonpriced benefits, Alternative A ranks low. In fact, it ranks well in regard to some measures of the nonpriced benefits such as jobs, visual quality, and the abundant supply of personal use firewood. Alternative A ranks high in the amount of acres it proposes to manage for scenic quality. On the other hand, Alternative A is the sixth lowest

of all the Alternatives when it comes to projected mule deer populations, and fails to meet the State's population targets for this species. It also ranks relatively low in terms of both the amount of unroaded recreation and the amount of developed recreation which it provides, thus restricting the diversity of the recreation opportunity spectrum

Alternative A (Current Direction) and No Change meets RPA targets for developed and dispersed recreation. It does not meet RPA targets for range, timber, and habitat improvement.

Alternative G

At $274 2 million, Alternative G has the lowest PNV of all Alternatives. This is a function of both its relatively low discounted timber and recreation related benefits The timber benefits are low because Alternative G offers the lowest first decade timber sale program at 15.6 MMCF/year, 2.2 MMCF/year lower than Alternative A and 18.4 MMCF/year lower than Alternative C. The recreation benefits are low because of its relatively low capacity to provide for developed recreation opportunities, and the less than standard quality of recreation opportunities which it is budgeted to manage for. It has the lowest benefit/cost ratio at $1.96 of benefits for each dollar invested. This is primarily due to the low returns generated per dollar of investment in the recreation resource.

Alternative G falls short of the range, developed recreation, and timber RPA targets. Alternative G offers the lowest average annual first decade timber sale quantities, its returns to federal and local governments are lower than those of any Alternative. A positive aspect of the finances regarding Alternative G is its budget requirements. It is the only alternative which proposes a budget lower than current funding levels.

Alternative G is the most restrictive of all the Alternatives with regard to providing opportunities for the leasing and possible future development of geothermal resources on the Forest It is also rather limiting in its provision of opportunities to meet future needs for developed types of recreation activities. Both of these are the result of its strong emphasis towards dispersed recreation and the maintenance of roadless areas in an undeveloped condition This may lead to some conflict and polarization amongst local communities and other users of the Forest

In terms of nonpriced benefits, Alternative G ranks highly in all aspects except economic stability in the local communities. Its implementation could result in the most downward pressure on job opportunities and income levels in the local economy This is primarily due to its low timber sale program. On the other hand, it ranks highest in terms of the amount of personal use firewood available to the citizens of Central Oregon. It also ranks highest with regards to maintaining and enhancing visual quality and providing unroaded nonwilderness recreation opportunities. However, Alternative G falls short of the State's mule deer population targets, proposing lower population levels in the future than currently exist.

Alternative G meets RPA targets for habitat improvement. It does not meet RPA targets for developed and dispersed recreation, range, and timber.

Mitigation Measures

Mitigation of environmental effects are found in Chapter 4, Environmental Consequences. Probable adverse environmental impacts that cannot be avoided, irreversible or irretrievable commitment of resources, and short-term use and long-term productivity are discussed. The accompanying Land and Resources Management Plan (the Forest Plan) details standards/guidelines which also serve as mitigating measures.

Chapter 3

Affected Environment

Changes from DEIS to FEIS for Chapter 3

Timber sale information here is more recent than in Forest Plan, Chapter III - AMS. In the DEIS, the timber program was reported on for the years 1981-1985 This FEIS chapter reports on Fiscal Years 1987 and 1988.

A discussion on uneven age management was added and an entirely new section on Forest health was also added

Increased information pertaining to the fisheries resource was added

Wilderness - Descriptions of individually designated Wilderness and a new section on wilderness resource sprectum was added

The section on transportation was rewritten, added to and updated as was the section on Cultural Resources

The section on Recreation was updated to reflect the 1987 year use figures

The Wild and Scenic Rivers section has been updated to reflect the and identify those rivers designated in the Oregon Omnibus Wild and Scenic Act of 1988

Chapter 3

Affected Environment

Introduction

This is a description of the Deschutes National Forest. Emphasis is given to aspects of the Forest which would be affected differently by the management alternatives which were analyzed

It is recognized that a forest ecosystem is an intricate mesh of interrelationships and that serious error can occur when one or another of its elements are considered in isolation For the purposes of exposition, however, physical aspects of the environment are discussed first, then biological phenomena. Finally, social and economic aspects of the Forest are considered. The same order of presentation will be followed in Chapter 4, Environmental Consequences where the focus deals directly with interrelationships. A general overview of the Forest, along with a vicinity map, is given in Chapter 1.

Climate

Most large air masses move from west to east across Oregon. Much moisture is accumulated by these air masses as they pass over the Pacific Ocean Before reaching the Forest, clouds must cross two mountain ranges where they lose much of their moisture as precipitation Air reaching the Forest is much drier than the original marine air This results in a modified continental-type climate.

There is some variation from the westerly air mass influence. Occasionally, as in 1989, an Artic air mass will reach the Forest and cause extreme winter conditions Periodically in the fall and winter, warm, dry easterly winds blow when a high pressure system builds east of the Cascades. In the spring, it is not unusual to have warm "Chinook winds" from the south and southwest. Rapid snowmelt from these warm southwest winds can result in flooding, mostly at the north end of the Forest. Flooding can be especially severe when rainfall accompanies the warm air.

Approximately 55 to 65 percent of the annual precipitation occurs from November through March and only 8 to 12 percent from June through August. Yearly totals rise sharply with increase in elevation, but are much heavier on the upper slopes of the Cascades than at similar elevations on Newberry Volcano. Average annual totals range from 60 to 80 inches on the upper slopes of the Cascades to less than 12 inches along much of the eastern edge of the Forest. Within approximately 23 air miles of Bend to the South Sister, annual precipitation increases from about 12 inches to more than 80 inches. Snowfall is estimated to be as much as 250 to 350 inches per year on the upper slopes of the Cascades and about 20 inches annually at the lower elevations.

There is more sunshine in Central Oregon than anywhere else in the State. Each year, Bend has approximately 130 clear days and 90 partly cloudy days. There are periods of sunshine during many of the 145 cloudy days.

Temperatures on the Forest are characterized by moderate days and cool nights. Bend averages about 10 days per year with temperatures above 90 degrees F Lows in the winter average between 20 and 30 degrees F.

Geology and Physiography

The Deschutes National Forest is a geologically young volcanic region of mostly Quaternary age (less than 1.6 million years) that lies on the east flank of the Cascade Range and on the large and complex shield-shaped volcano, Newberry Volcano. The great variety of volcanic landforms, volcanic rock, and glacial landforms found in

Forest is unique in the United States and known throughout the world. The geologic youth of these volcanoes suggests high potential for geothermal energy Spectacular stratovolcanoes, some deeply eroded by glaciers, line the Cascade crest and cover much of the east flank. About 600 basalt cinder cones dot the landscape, 400 of them resting on the slopes of Newberry Volcano. Nearly all lakes have been formed by glacial or volcanic activity.

A short list of volcanic features found of this Forest includes stratovolcanoes, shield volcanoes, a caldera, cinder cones, lava domes, lava flows, obsidian flows, maars, tuff rings, tuff cones, lava tubes (caves), tuff sheets, and ash sheets.

Unlike the west flank of the Cascade Range, deposition has generally exceeded erosion on the east flank, creating a landscape with few deep, steep-sided valleys and canyons. Instead, most landforms are positive, constructed volcanic features with flat or gently sloping fields of lava, sediments, or glacial debris lying between Glaciers, however, have extensively carved the volcanic rocks that form the Cascade crest, leaving eroded remnants of volcanoes, a few deep glacial valleys, and great blankets and ridges of boulders and gravel. From glacial meltwater, extensive sheets of sand and gravel were deposited at lower elevations

Most land on the Forest lies between 3,000 and 6,000 feet elevation, with a minimum elevation of 1,940 at Lake Billy Chinook at the north end of the Forest, and a maximum of 10,358 feet at the top of the stratovolcano, South Sister. All surface water drains to the north and travels to the Columbia River in the Deschutes River.

The great volcanic deposits of the High Cascades and Newberry Volcano are generally highly permeable. Most rain and meltwater flows into the subsurface and becomes part of a complex ground water system Most water wells on the Forest tap perched aquifers in a variety of volcanic environments. Large springs discharge from these aquifers, many of which are fault controlled. Water quality is high except in parts of the LaPine Basin The ground water resource is vast and largely undeveloped.

At least three times within the last 300,000 years, glacial ice has covered the Cascade Range of Central Oregon with a continuous sheet The retreat of each sheet left moraines that cover most of the high flanks of the Cascades. These moraines contain the eroded fragments of volcanoes and display a wide range of fragment sizes, from silt to enormous boulders From glacial meltwater, sand and gravel were deposited in channels and in large outwash fans at lower elevations

The LaPine Basin between Newberry Volcano and the Cascades, has filled with lake and river deposits. Layers of silt, sand, and diatomite are partly covered by an eroded veneer of sand and gravel from glacial meltwater.

Large areas lie buried under silicic air fall deposits of Holocene age (less than 10,000 years old). The best known and most extensive of these is the dacitic Mazama pumice, erupted from Mount Mazama (Crater Lake) 6,800 years ago This pumice sheet covers the entire Forest and, indeed, much of the Pacific Northwest It ranges in thickness from 10 feet at the south end of the Forest to a foot near Lava Butte. It is only a few inches deep over the northern half of the Forest

In comparison with National Forests west of the Cascades, terrain on the Forest is gentle; there is little potential for mass soil movement Water quality problems are few Riparian areas are, for the most part, in good condition Most of the transportation system required to administer the Forest is in place.

Caves

There are many caves on the Deschutes National Forest which have unique biological, geological, hydrological, palaeontological, educational, cultural, and recreational values. They are being evaluated to determine significance and whether they require protection The Federal Cave Resources Protection Act of 1988 mandates the identification of significent caves on federal lands in order to:

Regulate or restrict use of caves as necessary;

Form partnerships with caving organizations to facilitate management;

Appoint cave management advisory committees;

Ensure consideration of caves in the preparation and implementation of land management plans;

Foster communication between forest land managers, cave users, and the public

Protected caves provide unique educational and scientific opportunities. Study of undisturbed cultural resource sites found in caves is a way to fill the archaeological information gaps about those who once inhabited or traveled through this area.

Endangered bat species occupy several caves and are sensitive to human disturbance. Cave features and formations can reveal much information about lava flows and other natural phenomena such as ice formation and the travel of water

The relationship between caves and surrounding surface areas is established by the study of cave geology and biota. This can lead to more effective methods of managing caves whether they are preserved intact, developed for recreation, or improved and protected from vandalism Public education is needed to instill a sense of cave values By taking advantage of interpretive opportunities, an appreciation of this unique, sensitive and nonreplaceable resource can be fostered.

Minerals

The Forest Service encourages, facilitates, and administers the orderly exploration, development, and production of mineral resources on National Forest System lands. It insures that these activities are conducted in an environmentally sound manner, including reclamation for other productive uses. The agency integrates mineral considerations with planning and management of other Forest resources This integration recognizes that mineral development can occur concurrently or sequentially with other resource uses.

Forest Service management of mineral activities is carried out within the framework of objectives and rights granted through statutes, leases, licenses, and permits. The management requires coordination and cooperation with other Federal and state agencies having authority in mineral-related activities.

There is a need to insure access for mineral development and provide adequate protection of special resource values which could be affected by mining activity. Mineral withdrawals and surface use and occupancy restrictions can prevent or reduce resource conflicts associated with mineral exploration and development activities.

Overview

Minerals management on National Forest lands involves several federal agencies. The United States Department of the Interior (USDI), primarily through the Bureau of Land Management (BLM), bears responsibility for all subsurface activities The Forest Service has various degrees of responsibility for surface management on lands where mining is ongoing or is a possibility as conferred by a variety of laws, regulations, and interdepartmental agreements.

Minerals are divided into three categories:

1. **Locatable minerals** - These are metallic and nonmetallic minerals for which the 1872 Mining Law gives U S. citizens the statutory right to prospect for, locate, and develop on public domain lands. All valuable mineral deposits on lands open to such entry are locatable unless excluded because they are leasable of saleable. Gold, silver, copper, and zinc are examples of minerals which are generally locatable

2. **Leasable minerals** - These are minerals that can be leased under the Act of March 4, 1917, the 1920 Mineral Leasing Act, the 1947 Mineral Leasing Act for Acquired Lands, or the 1970 Geothermal Steam Act The 1917 Act covers hardrock minerals on acquired lands; the 1920 Act covers coal, phosphate, oil and gas, and a variety of related materials; the 1947 Act essentially covers the same commodities as the 1920

Act when the commodities occur on acquired lands

Development of leasable minerals is a discretionary activity. The decision to lease gas and oil resources lies with the United States Department of the Interior (USDI) The decision to lease geothermal resources lies with the United States Department of Agriculture, however, actual issuance of geothermal leases is a USDI responsibility.

3 **Saleable materials** - These are mineral materials as defined in the Materials Act of 1947 Examples include, but are not limited to, common varieties of sand, stone, gravel, pumice, and clay. Disposals of these materials are handled through sales and free-use authorizations. The largest proportion of these materials are used internally in conjunction with other agency programs.

Current Conditions

Activities relating to all three of the mineral categories occur on the Deschutes National Forest A brief history of mineral exploration, development, and production in each of these categories is discussed below.

Locatable Minerals

There are no known commercial deposits of gold or other precious metals, strategic metals, and other base metals on the Deschutes National Forest None of the Deschutes National Forest is considered to have potential for locatable minerals. However, there are a number of mining claims located on the Forest some of which were located for gold and other precious metals. The numbers and locations of claims vary considerably each year as new claims are located and old claims are relinquished There are currently 58 claims involving about 3,200 acres (less than 1% of the available locatable land)

Of the 58 claims, 22 were located for pumice, aggregate, and cinders prior to 1955, 31 were located of gold, and 5 were located for gemstones (opal). The 31 gold claims are located within Wilderness areas and the Oregon Cascade Recreation Area. Some of these claims are located within the Big Marsh Creek Wild and Scenic River corridor. Also, portions of five of the claims located for pumice, aggregate, and cinders are within the Deschutes Wild and Scenic River corridor. These claims were filed before the acts were passed or were filed in accordance with requirements within the act and are considered valid and existing rights.

The only active mining is on the pumice, aggregate, and cinder claims.

Of the 1,600,900 acres on the Deschutes National Forest, 1,588,400 acres have public domain status.

Mineral withdrawals and legislation such as the Wilderness Act limit mining activities in some sensitive and classified areas. Following is a list of areas with mineral withdrawals·

Wilderness areas	180,100 acres
Oregon Cascade Rec Area	37,200 acres
Newberry area	24,600 acres
Wickiup Reservoir	15,800 acres
Crane Prairie Reservoir	7,200 acres
Crescent Lake	2,100 acres
Metolius River	6,600 acres
TOTAL	**273,600 acres**

Mineral withdrawal reviews have been prepared for the following areas and recommendations sent to the Bureau of Land Management requesting that the withdrawal be retained·

Bachelor Butte Recreation Area--15,065 acres
Riverside Guard Station Admin Site--40 acres
Lavacicle Cave Recreation Site--80 acres
Sisters Administrative Site--50 acres
Allingham Guard Station Admin. Site--65 acres
Todd Lake Administrative Site--170 acres
TOTAL--15,470 acres

Recommendations are being prepared for the following areas

Pringle Falls Experimental Forest and Research Natural Area--11,600 acres
Metolius Research Natural Area--6,200 acres
TOTAL--17,800 acres

Total Withdrawal and Recommended Withdrawal acres--306,900 acres

Area open for mineral entry under the mining law--1,281,500 acres

TOTAL--(80.8% of Forest)

Leasable Minerals

There are no oil and gas leases on the Forest. The Forest Service decision to either consent to or to deny leasing will be based subsequent NEPA actions. (See section on Energy for geothermal leasing.)

Saleable Minerals

The youthful volcanic and glacial landscape of the Deschutes National forest provides economic materials unique to this area Volcanic cinders are plentiful. Figure 3-1 shows estimated volumes and acres of some of the more important saleable minerals on the Forest Some of the material may not be developable because of other resource restraints

Figure 3-1 Saleable Mineral Volumes

Mineral	Cubic Yards	Acres
Cinders	68,695,000	1,000
Gravel	7,365,000	300
Hard Rock	7,000,000	500
Clay	2,800,000	80
Total	**85,860,000**	**1,880**

Large amounts of cinders and gravel have been and will continue to be used for Forest road projects.

The Deschutes National Forest has had an active sales program (primarily cinders) Annual sales and permits to the general public and other public agencies has ranged from 40,000 cubic yards to 380,000 cubic yards per year over the past 10 years.

Small amounts of clay and fill material have been sold to the general public.

There is a limited supply of available gravel and hard rock in Central Oregon. Therefore, gravel and hard rock resources have been reserved for Forest Service and other agency use.

A list of available saleable mineral sources (cinders, clay, gravel, and hard rock) can be found in Appendix 8.

Soils

Soil development across the Deschutes National Forest result from variations in one or more of the five soil forming factors These factors are parent material, climate, organisms (plant and animal life), topography and time Soil differences will be expressed in three ways: morphology (what they look like), potentials (how much will they produce), and limitations (how they react to activities).

Soil contains the nutrient elements required by all plant growth. It is the medium in which plant roots take anchorage, and where the many small life forms reside that are necessary for the health of a forest. The stability and fertility of all Forest soils is crucial in the production of sustainable timber, forage and wildlife habitat.

Soil is known as a "basic" natural resource since the abundance and distribution of all other renewable resources depend on soil characteristics. It is also considered a nonrenewable resource because loss of any soil is considered significant and soil formation require very long periods of time

Forest Overview

Soils within the Forest have been mapped during the Soil Resource Inventory completed in 1976 (Larsen, 1976). It is a reconnaissance level (mapping scale 1 inch per mile) with minimum delineations of 30 to 40 acres in size. Each mapping unit (landtype) is described in terms of its physical and chemical characteristics, geology, vegetation and distribution. Interpretations for management impacts are also reported.

The Forest is currently remapping areas at more detail areas shown to have critical soil concerns. We have taken advantage of opportunities to

cooperate with the Soil Conservation Service in their mapping efforts in adjoining lands. To date, the following areas have been remapped or plan on being mapped to 2.5 inches per mile:

Area	Year Complete	Acres
Metolius Basin-Green Ridge	1986	93000
Lapine Basin	1988	46000
Lake County	1992	190000

This information will be published in the Soil Survey for Deschutes and Jefferson County Oregon, and the Soil Survey for Lake County Oregon, Northern Part.

Current Conditions

Soils are formed partially to entirely from materials deposited by volcanic eruptions. These materials include volcanic ash, pumice and cinders. **Map 1** shows the general distribution of various ash and pumice deposits on the Forest. These deposits fell upon previously developed soils that become "buried soils," since they were essentially buried by the pumice, ash or cinder deposits One characteristic of most of the soils is that they are uniform over large areas. The ash, pumice and cinder deposits were local to extensive clouds of material that drifted out over the landscape. Most of the buried soils were formed from hard basalts, and andesites, tuffs, breccias, glacial till and outwash gravels. Practically all bedrock materials are extrusive volcanic rocks.

Volcanic Ash Soils

These compose about 85 percent of the Forest. To be considered a volcanic ash soil the deposit must be over 14 inches thick over buried soil. Those areas with less than 14 inches are considered residual soil Ash soils were formed from wide-spread air-fall volcanic ash and pumice materials from Mt Mazama (Crater Lake) about 6800 years ago. In addition, many of the small cinder cones on the Forest deposited varying depths of coarse and fine cinders over the landscape. The present distribution of most of the finer materials have been influenced by topography and wind patterns.

Ash soils are light in color, sandy texture and have low levels of fertility Soil depths can be more than 10 feet in places but average 36 inches. They have little structural development and contain only minor amounts of hard rock. They are very sensitive to lateral soil movement (displacement) which is often caused by heavy logging equipment Many people feel that "pumice and ash soil will not compact", and it has been said that "machinery cannot hurt the ash soils". Experience has shown that compaction can occur in all soils under certain moisture conditions. Major problems have been experienced in low lying positions that have seasonal high water tables. In addition, soil displacement of the shallow surface topsoil layers can have adverse effects on soil fertility and productivity even on flat ground.

Residual Soils

Soils comprised of thin ash layers or older ash weathered ash and residual materials compose about 9% of the Forest. These soils lack the distinct volcanic ash layer which has either eroded off or mixed with the underlying soil material.

As a rule, residual soils have thicker, darker surfaces and exhibit better cohesion than volcanic ash soils. They are generally reddish brown in color, gravelly to stony fine sandy loam, loam or clay loam texture They generally occur on the north and northeast portion around the Metolius and Green Ridge areas of the Sisters Ranger District as well as in the southeast portion around Aspen Flat and Fox Butte within the Ft. Rock Ranger District Soil compaction and muddiness are severe problems during spring and winter on these soils.

Non-forested Soils

These soils make up about seven percent of the Forest. They contain areas of barren lava flows, rocky mountain peaks, wet meadows, canyon walls, barren flats and scabs, cinder cones, lava flows with low density timber stands, etc. These are generally shallow and have higher rock contents than the other soils. Non forest soils with sparse ground cover and low water holding capacity.